APPENDIX 5.9-3

Water Supply Assessment

JULY 2022

WATER SUPPLY ASSESSMENT
ONTARIO AIRPORT - SOUTH AIRPORT CARGO CENTER PROJECT

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1. INTRODUCTION

California Environmental Quality Act (CEQA) Guidelines Section 15155 establishes the standards for assessing the sufficiency of water supplies for new development projects. This section requires the city or county lead agency to identify any water system that either: (A) is a public water system that may supply water to the water-demand project, or (B) that may become such a public water system as a result of supplying water to the water-demand project.[1] As part of the environmental review conducted for a qualifying project pursuant to the CEQA, the public water supplier or land use agency—in this case the Ontario Municipal Utilities Company—must prepare a "water supply assessment" of the reliability of water supplies for the project, considering normal, single dry, and multiple dry years over a 20-year horizon. CEQA Guidelines Section 15155 regulates Water Supply Analysis for defined "water demand projects."

Additionally, California Senate Bill 610 (SB 610) amended existing legal requirements for confirmation of water supply sufficiency as a condition of approval for development projects. The confirmation of water supply sufficiency is achieved through an assessment of the water supplier's existing and future water sources, and existing and projected water demand in relation to a "project" as defined by California Water Code (CWC) section 10912, resulting in the production of a project-specific Water Supply Assessment ("WSA" or "Assessment"). Additional analysis is required in the WSA if any portion of the water supply includes groundwater.

Law

CWC section 10910:

> *(a) Any city or county that determines that a project, as defined in Section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.*

CWC section 10912:

For the purpose of this part, the following terms have the following meanings:

(a) "Project" means any of the following:

- *(1) A proposed residential development of more than 500 dwelling units.*
- *(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.*
- *(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.*
- *(4) A proposed hotel or motel, or both, having more than 500 rooms.*

1 CEQA Guidelines, Article 10, Section 15155 Water Supply Analysis.

(5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.

(6) A mixed-use project that includes one or more of the projects specified in this subdivision.

(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

1.1 PURPOSE

The Ontario Municipal Utilities Company (OMUC) is a department of the City of Ontario (City) and the water supplier to the City. This WSA document prepared for the City is intended to meet the requirements of CEQA Guidelines Section 15155 and SB 610. This WSA is designed to answer whether the projected supply for the next 20 years, based on normal, single dry and multiple dry years, will meet the demand projected for the Project plus existing and planned future uses, including agricultural and manufacturing uses. The water demand for the Ontario Airport South Airport Cargo Center Project (Project) is calculated and the adequacy of water supplies to meet the Project is evaluated in the following sections.

The Project qualifies as a water demand project under the following definition:[2]

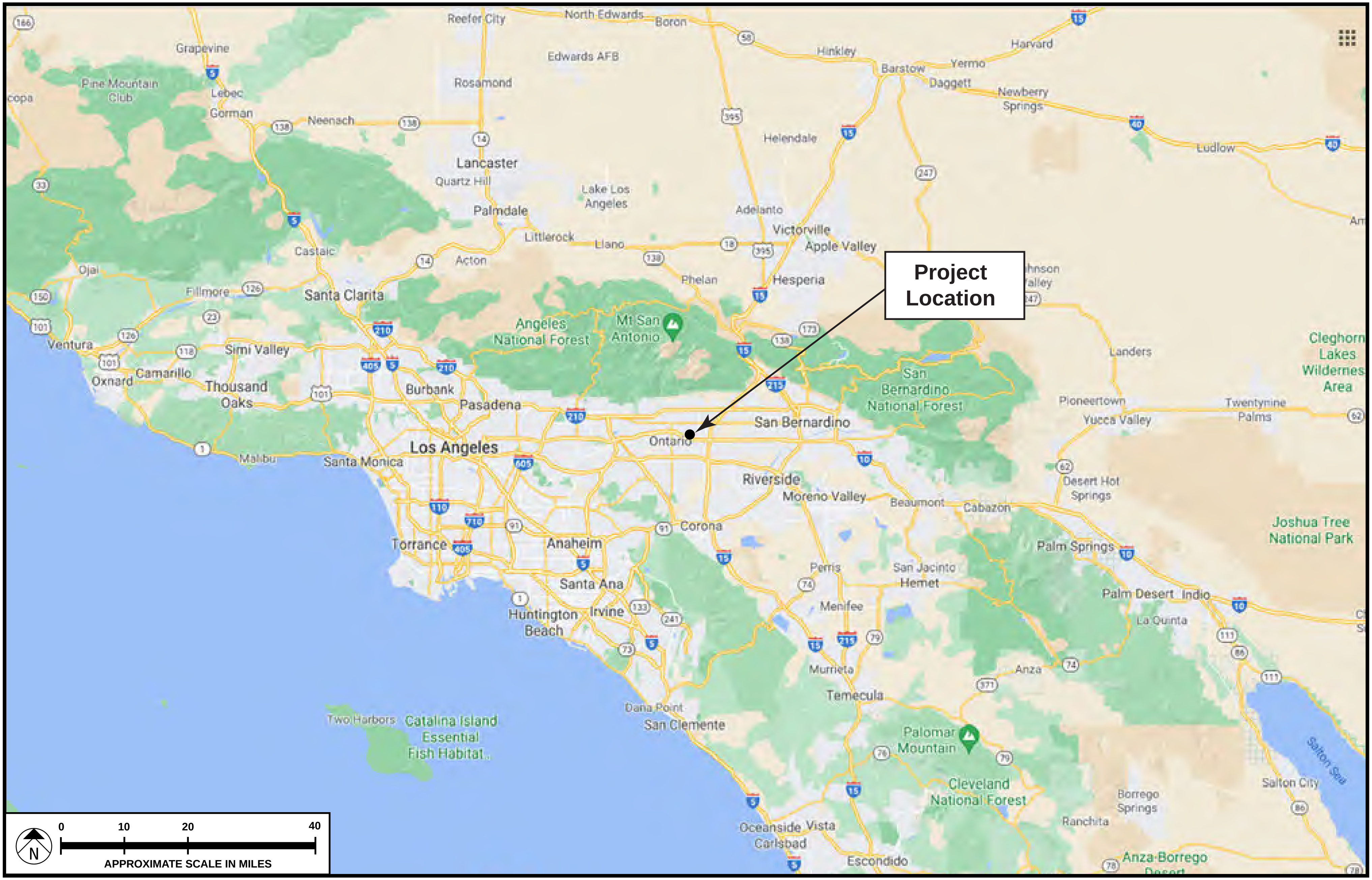
> *"An industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area."*

1.2 BACKGROUND

The Project site is located within Ontario International Airport (ONT or Airport) within the City. The Project site covers 97 acres and is located in the northern portion of the City, immediately north of the City of Chino in San Bernadino County as shown in **Figure 1, Regional Location**. The Project site is located in the southern half of the Airport, immediately west of the Cucamonga Canyon Channel and north of Mission Boulevard, as shown in **Figure 2, Project Site Location**. Most of the Project site is located north of East Avion Street with the remainder located between East Avion Street and Mission Boulevard west of South Hellman Avenue as shown by **Figure 3, Existing Ontario Policy Plan Land Use Designation within Project Site**. **Figure 3** shows the land use designations found within and around the Project site.

The City recently prepared updates to its Water Master Plan and Recycled Water Master Plan in June 2020, which includes the current unit water demand factors for potable and recycled water as well as ultimate buildout water demand projections (AKM and Stantec, respectively). On June 15, 2021, the City adopted its 2020 Urban Water Management Plan (UWMP) (Resolution No. 2021-059), a copy of which is located in **Appendix A.** The projected water demands of the 2020 UWMP are consistent with the City's said master plan updates (copies of the master plans are located in **Appendix B** and **Appendix C**).

2 CEQA Guidelines, Article 10, Section 15155 (a) (1) (E).



SOURCE: Google Earth - 2022

FIGURE **1**

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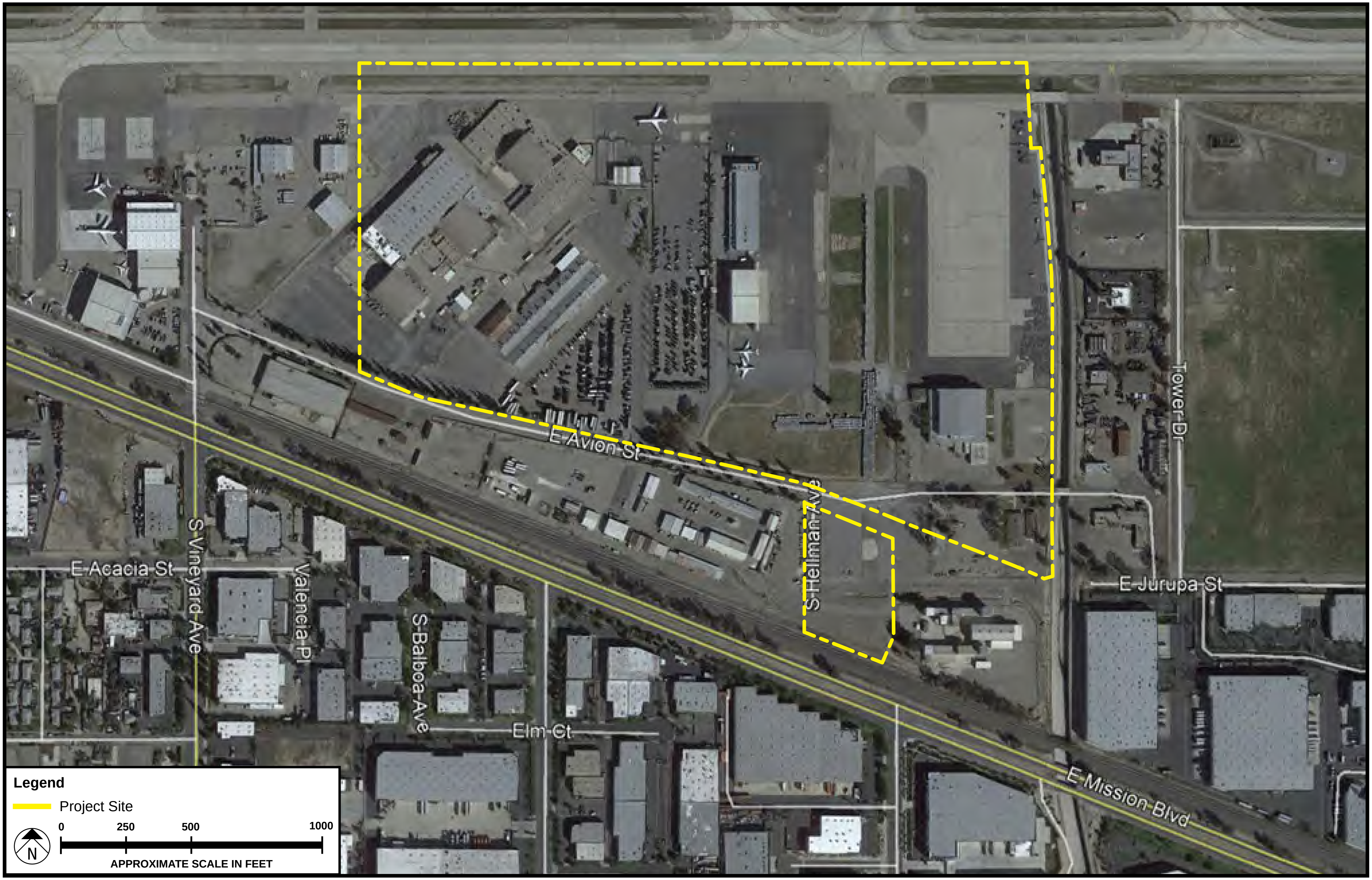
Regional Location

332-001-21



SOURCE: Google Earth - 2022

FIGURE 2

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Project Site Location

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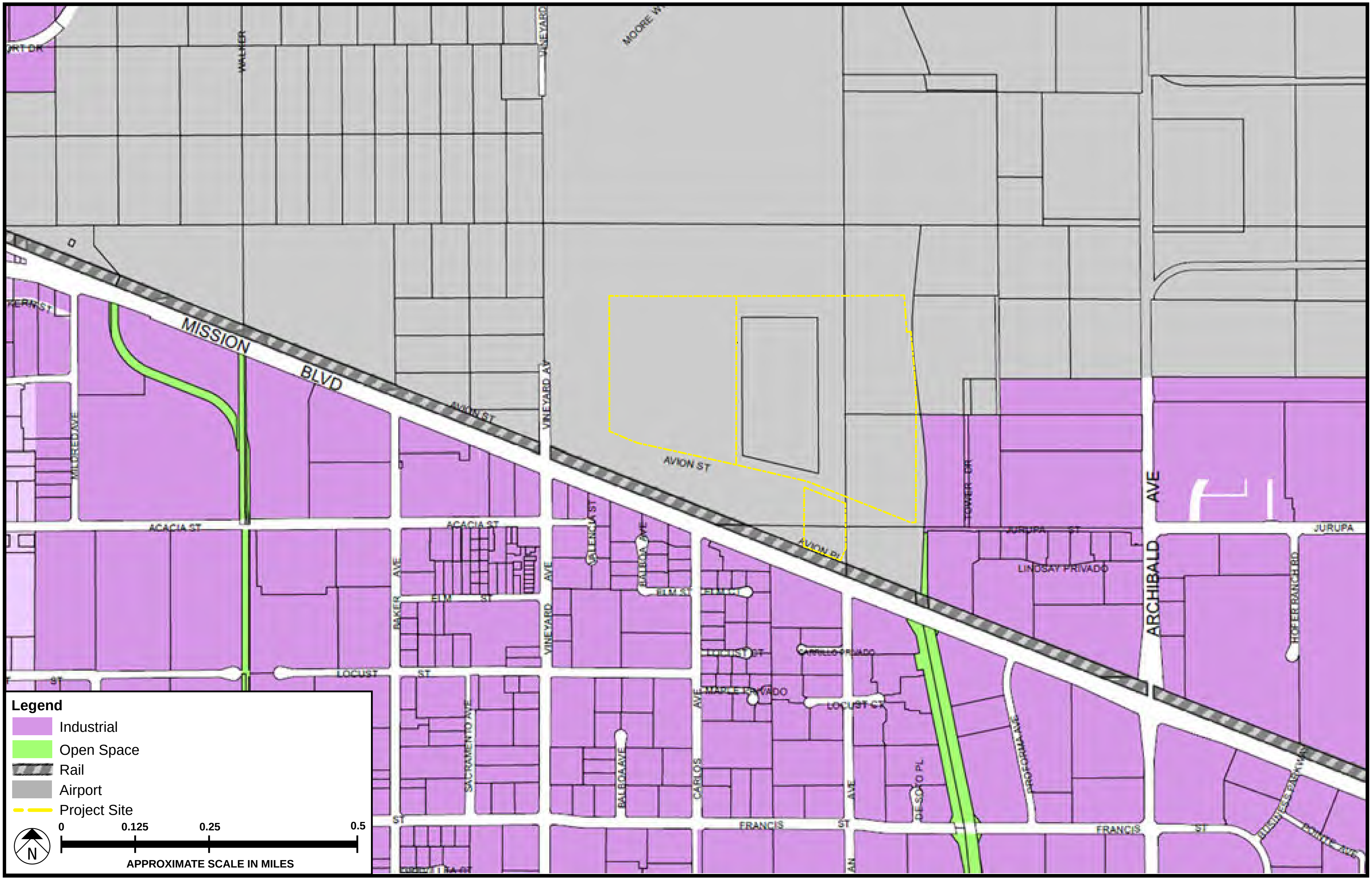

SOURCE: Google Earth - 2022

FIGURE 3

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Existing Ontario Policy Plan Land Use Designation within Project Site

332-001-21

1.3 Proposed Project

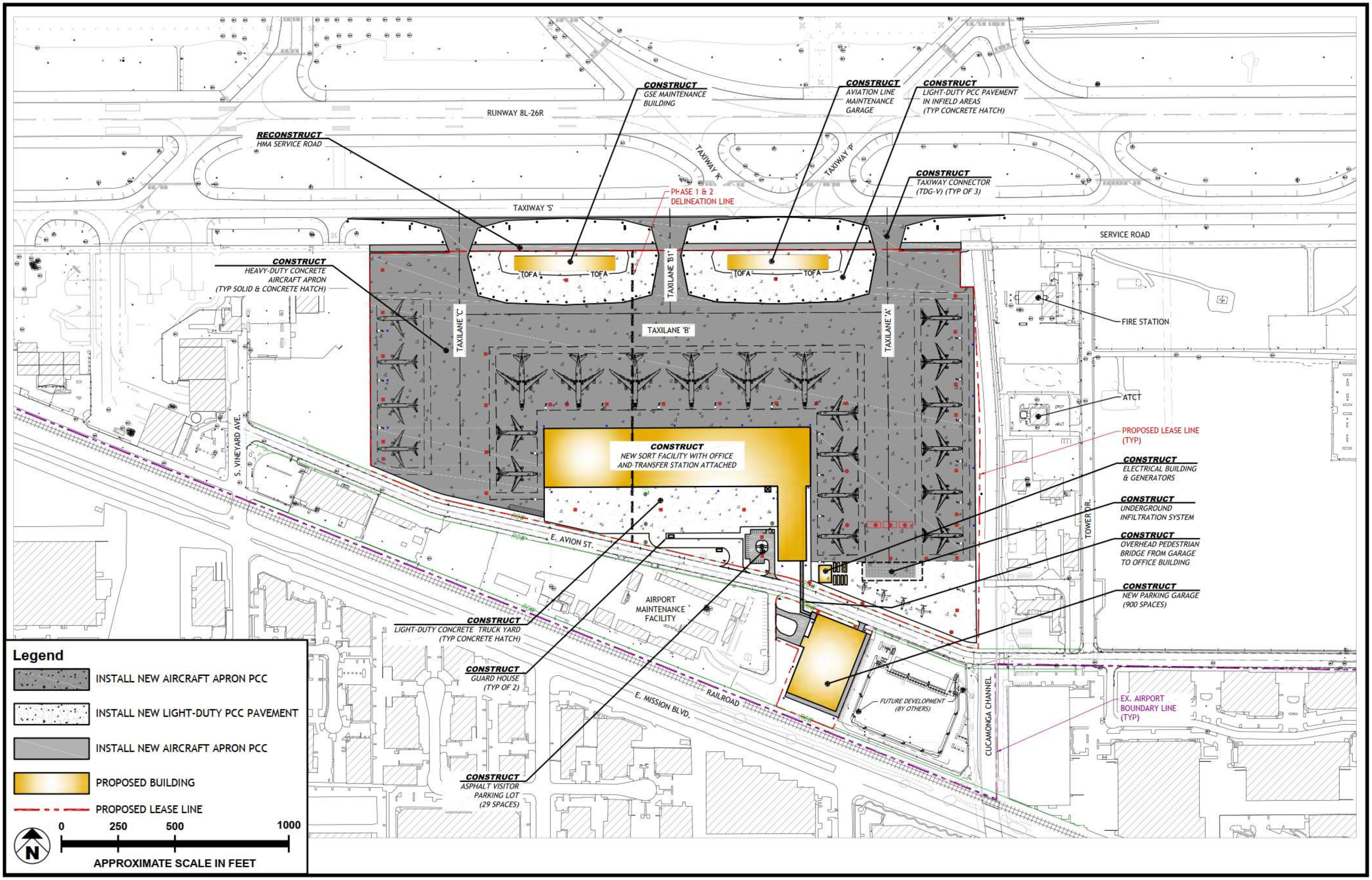
This WSA has been prepared for the Project as supplemental information to the Project's Environmental Impact Assessment (EIR; State Clearinghouse No. 2021100226). As such, this Project is considered to be "subject to CEQA" pursuant to CWC section 10910.

The Project site is developed with concrete and asphalt pavement areas, buildings, aircraft hangars, and landscaped areas. It slopes slightly from the northwest to the southeast. The surface elevation ranges from approximately 890 to 920 feet above mean sea level.

The Project would replace existing, underutilized airport-related buildings and provide site improvements with an air cargo center. The Project would include demolition of the existing buildings, site improvements, and the development of a new air cargo center in two phases as described further below.

The proposed air cargo center, illustrated in **Figure 4**, **Site Plan**, includes a Cargo Sorting Building, truckyard, parking facilities, aircraft parking apron improvements, ground service equipment (GSE) parking, and aviation support facilities. The Cargo Sorting Building, proposed north of East Avion Street, would contain a sorting facility and office spaces. The aircraft parking apron would surround the building to the west, north, and east. A ground-level visitor parking lot and truckyard are proposed on the south side of the cargo building, with access from East Avion Street. A parking garage for employees is proposed south of East Avion Street with a pedestrian bridge connecting the parking garage to the office building. The Project would be implemented in two phases. Phase 1 would take place on the easternmost 60 acres of the Project site, and Phase 2 would occur on the remaining western 30 acres.

Construction of Phase 1 of the Project is projected to start in the first quarter of 2023 and be completed by the first quarter of 2025. Construction of Phase 2 would start approximately 2 years after the completion of Phase 1, based on market conditions. It is anticipated construction of Phase 2 is assumed to start in the third quarter of 2027 and be completed by 2029.



SOURCE: CHA - JUNE 2022

FIGURE **4**

Meridian Consultants

Project Site Plan

332-001-21

Existing Water Facilities

The Project site is located north of Mission Boulevard within the existing Ontario International Airport and consists of airport uses. The Project site is located within the City's 1212 Pressure Zone for potable water and the existing water system would be used to serve the Project. **Figure 5**, **Existing Potable Water System for the City** below illustrates the existing potable water system within the City, which the Project would utilize.

The Project site is located within the City's 1158 Pressure Zone for recycled water, as shown in **Figure 6**, **Existing Recycled Water System for the City**. City Ordinance No. 2689 requires all new development to connect to and use recycled water for all approved uses, including but not limited to landscape irrigation.[3] To provide a conservative estimate in this water supply assessment, it is assumed no recycled water would be used for this Project, only potable water.

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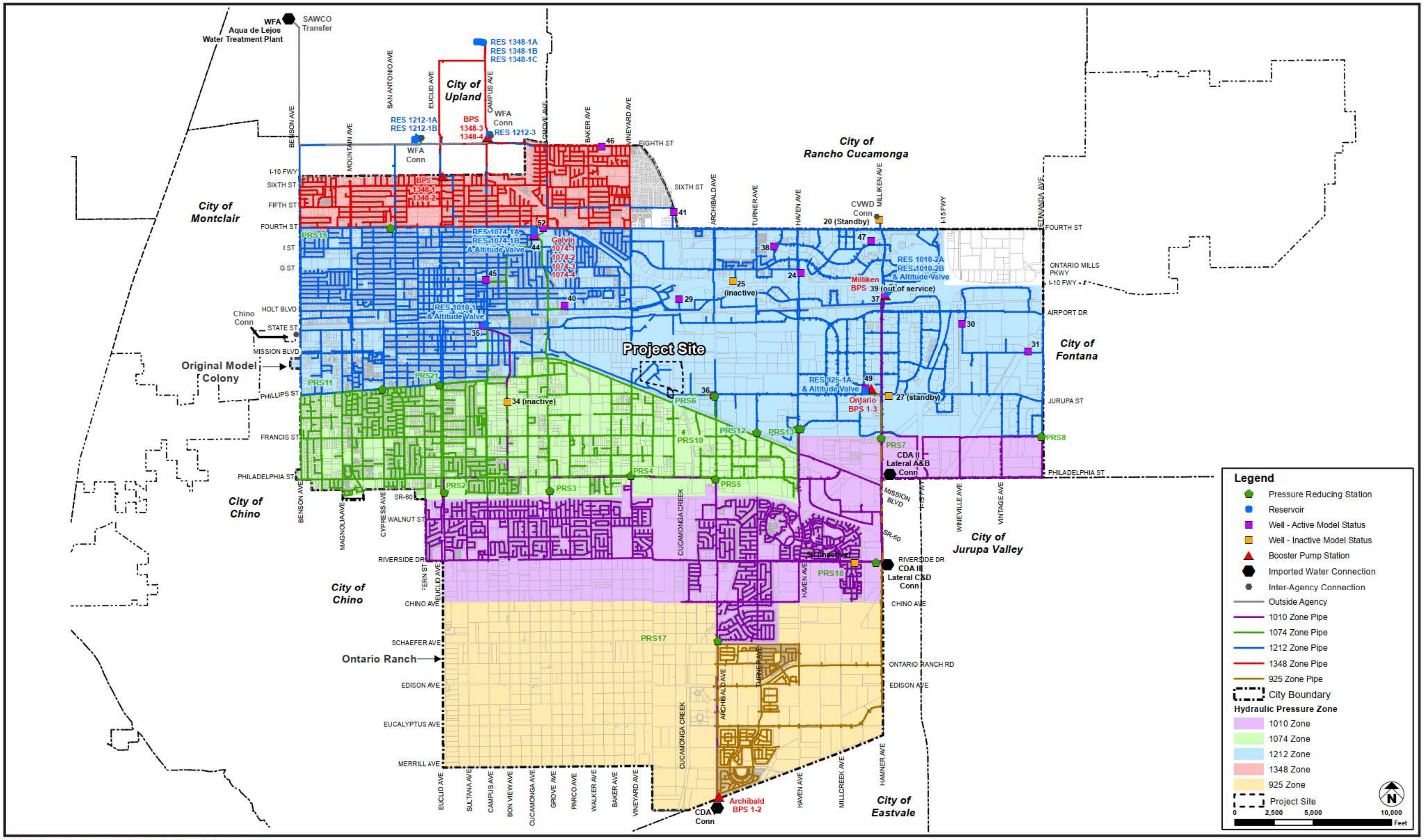
3 City Municipal Code Sections 6-8.7 to 6-8.279

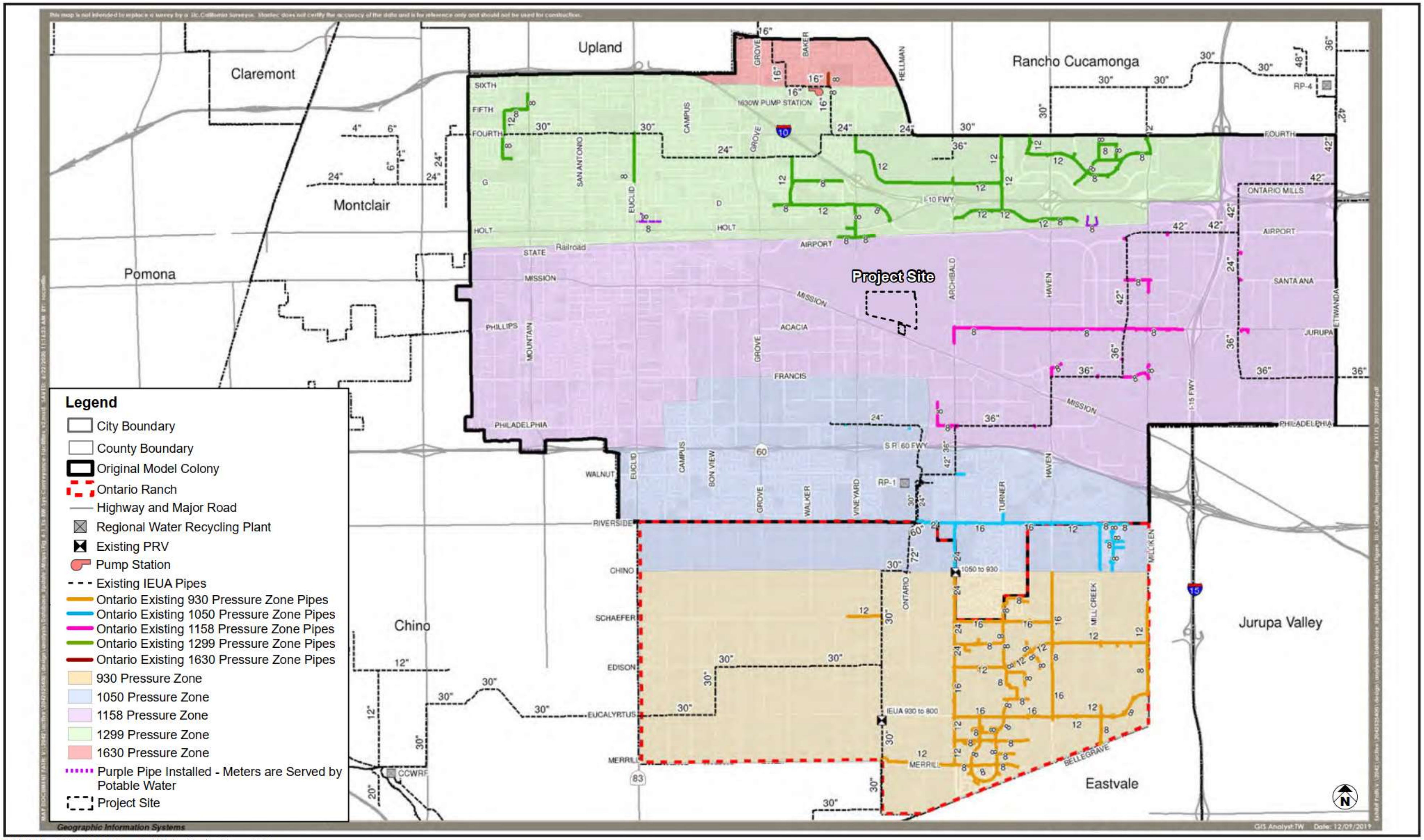


SOURCE: OMUC 2020 Water Master Plan Update – 2020

FIGURE 5

Existing Potable Water System for the City

326-001-21



SOURCE: OMUC 2020 Recycled Water Master Plan – 2020

FIGURE 6

Existing Recycled Water System for the City

332-001-21

1.4 PROJECT RELATION TO THE URBAN WATER MANAGEMENT PLAN

The City/OMUC is the water supplier for the Project and has adopted the 2020 UWMP, a copy of which is provided in **Appendix A.**[4] This WSA will rely on the 2020 UWMP. The assumptions on ultimate (buildout) water demand in the 2020 UWMP for the Project site were derived from land use-based water demand factors according to the City's 2020 Water Master Plan.

As stated in the 2020 Water Master Plan, "For future developments, water unit demand factors were used to estimate future water use. Potable water unit demand factors are generally based on the factors that were developed as a part of a study completed in May 2016 entitled 'Ultimate Citywide Water Demand Estimate.'[5]

The 2020 UWMP water demand projections are based on the General Plan Land Use Plan (**Figure 3**), which designates the 97-acres Project site as Airport. Water demand for the Project site and the Airport, as a whole, are included in the UWMP 2020 projections under the "Industrial" land use designation.

According to the Water Code, if the water demand for a project has been accounted for in the water supplier's most recent UWMP, then the WSA may use the UWMP as the source of the information required in the WSA. The determination as to whether the Project's water demand has been accounted for in the most recent UWMP is located in **Section 2**, **Water Demand Analysis**.

Relation of Water Supplier to Other Urban Water Management Plans

The City is a member agency of several water suppliers: Inland Empire Utilities Agency (IEUA), Water Facilities Authority (WFA), Chino Basin Desalter Authority (CDA), and San Antonio Water Company (SAWCo). IEUA obtains water from The Metropolitan Water District of Southern California (MWD). In addition, WFA obtains MWD water through IEUA. Each of these water suppliers has adopted individual 2020 UWMPs (copies of said plans are provided in Appendix D through Appendix H). Further, each of these agencies documented coordination with the City for preparation of said UWMP's and included the City's projected water demands into their individual UWMPs.[6] [7] [8] [9] [10]

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4 City of Ontario, 2020 Urban Water Management Plan (UWMP), prepared by Ontario Municipal Utilities Company, June 2021.

5 City of Ontario, 2020 Draft Water Master Plan Update, prepared by AKM, June 2021.

6 MWD, Appendix D, p. 1- 9.

7 IEUA, Appendix E, p. 2-7.

8 SAWCO, Appendix H, p. 4-6.

9 WFA, Appendix F, p. 4-10.

10 CDA, Appendix G, p. 4-8.

Law

CWC Section 10910:

> *(c) (1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code [CEQA], shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).*
>
> *(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).*
>
> *(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water supply assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.*
>
> *(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.*

1.5 STATEWIDE AND LOCAL WATER CONSERVATION EFFORTS

City of Ontario Water Shortage Contingency Planning

To prepare for water shortages, the City adopted Ordinance No. 3027 on September 1, 2015, in response to the Emergency Conservation Regulations mandated by the State Water Resources Control Board. Under this ordinance, the Water Conservation Plan was updated with more stringent prohibitions and penalties. Ordinance 3027 updated the City's Water Conservation Plan that is codified in Chapter 8A, Title 6 of the City's Municipal Code ("Water Conservation Plan").[11]

The City Council adopted its 2020 Water Shortage Contingency Plan in June 2021, which describes the methods to achieve and the implications of reducing water supplies to at least 50 percent.[12] The City and OMUC implement various programs to reduce customer water consumption, including stringent use

11 City of Ontario Municipal Code, Vol. I, Title 6, Ch. 8A – Water Conservation Plan.

12 2020 OMUC UWMP, Ch. 8, June 2021.

restrictions, actions and penalties, as well as public outreach, education, and communication programs. Currently, the City is in the voluntary stage of the Water Conservation Plan, and therefore voluntary water use restrictions are in-effect.

1.6 METHOD OF ANALYSIS

This Assessment follows the requirements set forth in CEQA Section 15155 for Water Supply Analysis. This Assessment also follows the Department of Water Resources (DWR) Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001.[13] Section 1 of this Assessment describes the land use designation of the Project site, the Project's relation to the water supplier's most recent UWMP. Section 2 provides the water demand analysis of the Project; Section 3 reviews the projected water supplies for the Project; Section 4 contains the required discussion of the water supplier's groundwater supplies; and Section 5 concludes the Assessment by providing overall findings for the Project's water demand.

13 California Department of Water Resources, Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001 to assist water suppliers, cities, and counties in integrating water and land use planning. October 8, 2003. (Available at https://water.ca.gov/LegacyFiles/pubs/use/sb_610_sb_221_guidebook/guideboo k.pdf.)

2. WATER DEMAND ANALYSIS

The purpose of this section is to evaluate whether the Project was considered in the water supplier's planning for water demand. This section will: 1) identify the various water use sectors, 2) identify water demand by those sectors for the next twenty years, and 3) compare the calculated water demand of the Project to the water demand assumed in the most recent UWMP for the same Project site.

LAW

CWC Section 10910:

(c)(2)(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water supply assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

2.1 CITY OF ONTARIO'S CURRENT AND FUTURE WATER DEMAND

OMUC serves at least 36,514 customer connections as part of its potable and non-potable water distribution systems.[14] As of 2020, there were 35,906 water meters throughout the City.[15] Total potable and recycled water demands within the OMUC service area averaged 40,831 acre feet per year (AFY) over the last ten years.[16] Despite growth within the City between 2010 and 2020, potable demands have steadily decreased in the last 10 years primarily due to increasing recycled water use and conservation efforts.

Current and projected potable and recycled water demands by customer class are presented in **Table 2-1**. The City's total demand in 2020 was 39,921 AFY, consisting of 32,109 AFY of potable water and 7,812 AFY of recycled water.[17] The projected 2045 potable water demand is 57,609 AFY and recycle water demand (including agricultural demand) is 16,059 AFY, for a total of 73,668 AFY.

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14 City of Ontario, 2020 Urban Water Management Plan, prepared by OMUC, June 2021.

15 City of Ontario, Water Master Plan (2020), Section 6: Existing System.

16 City of Ontario, 2020 Urban Water Management Plan, prepared by OMUC, June 2021.

17 City of Ontario, 2020 Urban Water Management Plan, prepared by OMUC, June 2021.

TABLE 2-1 CURRENT AND PROJECTED POTABLE AND RECYCLED WATER DEMANDS FOR THE CITY OF ONTARIO (AFY)						
Use Type	2020	2025	2030	2035	2040	2045
Single Family	12,502	15,723	17,540	19,109	22,431	22,431
Multi-Family	5,068	6,374	7,110	7,746	9,093	9,093
Commercial	5,359	6,740	7,519	8,191	9,615	9,615
Industrial	2,078	2,613	2,915	3,176	3,728	3,728
Institutional/ Governmental	538	677	755	822	965	965
Landscape	4,631	5,824	6,497	7,078	8,309	8,309
Losses	1,565	1,968	2,196	2,392	2,808	2,808
Other	368	463	516	562	660	660
Subtotal Potable Demand	*32,109*	*40,382*	*45,048*	*49,076*	*57,609*	*57,609*
Recycled Water Demand	*7,812*	*12,168*	*13,465*	*14,762*	*16,059*	*16,059*
Total Water Demand	**39,921**	**52,550**	**58,513**	**63,838**	**73,668**	**73,668**

Source: City of Ontario, 2020 Urban Water Management Plan, Table 4-1, Table 4-2, and Table 4-3.

Table 2-2: Existing Land Uses and **Table 2-3: Future Land Uses** illustrate the existing and future total land use (in acres) as designated by the 2020 WMP. As shown, there would be an increase of approximately 189 acres of designated "Airport" land use within the City, which would constitute a 0.6 percent change from 4.7 percent to 5.3 percent.

TABLE 2-2 EXISTING LAND USES		
Land Use Category	Acres	Percent Total Area
Residential	6,124	19.3
Commercial	2,010	6.0
Industrial	5,498	17.3
Other		
Mixed Use	75	0.2
School	497	1.6
Public Facilities	165	0.5
Transp/Utilities	1,618	5.1
Transp/Utilities/Airport	1,483	4.7
Parks/Rec/Cultural	754	2.4
Street/Parking	264	0.8
Ag. Multi-Use	6,742	21.2
Landfill	137	0.4

TABLE 2-2 EXISTING LAND USES		
Land Use Category	**Acres**	**Percent Total Area**
Vacant	1,692	5.5
Right-of-Way	4,724	15.0
Other Total	***17,918***	***57.4***
Total	**31,784**	**100.0**

Source: 2020 OMUC UWMP, Appendix E - 2020 WMP, Table 2-1 : Existing Study Area Land Uses.

Note: The City's land use GIS shapefile from May 2017 was considered current and has been used for reporting purposes.

TABLE 2-3 FUTURE LAND USES		
Land Use Category	**Acres**	**Percent Total Area**
Residential	10,868.6	34.2
Mixed Use	1,667.2	5.2
Retail/Service	1,531.7	4.8
Employment	7,818.2	24.6
Other		
Open Space – Non Recreational	1,221.3	3.8
Open Space – Parkland	950.1	3.0
Open Space – Water	59.2	0.2
Public Facility	96.6	0.3
Public School	631.9	2.0
Airport	1,671.9	5.3
Landfill	136.9	0.4
Rail	250.7	0.8
Right-of-Way	4,880.0	15.4
Other Total	**9,898.2**	**31.1**
Total	**31,783.9**	**100.0**

Source: 2020 OMUC UWMP, Appendix E - 2020 WMP, Table 2-2 : Future Study Area Land Uses.

Note: The future land uses are generally based upon the City's latest general plan document entitled The Ontario Plan (2010); Revisions have been incorporated by the City's planning department, for specific developments that have been developed or planned that may differ from the 2010 document.

2.2 Project Site Land Use Assumed in the UWMP

The primary source of water for the Project would be existing water supplies used by the City to provide service to its customers. The 2020 UWMP projected water demands are based on future land uses as specified in the City's latest 2020 Water Master Plan. The Ontario Plan (City's General Plan) designates the Project site as Airport use.[18] Projected water demand for the Airport, including the Project site, is included in the UWMP 2020 projections under the "Industrial" land use designation. Using the City's current unit water demand factors, the estimated total water demand for the 97-acre Project site that was accounted for in the 2020 UWMP is 249 acre-feet per year (AFY), as shown in **Table 2-4**.

TABLE 2-4
WATER DEMAND OF THE PROJECT SITE LAND USE ASSUMED IN THE UWMP

	Land Use	Units	Domestic Water Unit Demand[a]	Total Domestic Water Usage (GPD)	Total Domestic Water Usage (AFY)
UWMP Assumption Based on Project Acreage	Industrial	97 acres	2,290 (GPD/acre)	222,130	249

Sources: City of Ontario, 2020 UWMP, June 2021, Appendix E - 2020 WMP.
Notes:
[a] Water unit factor is for "Industrial" land use designation in the 2020 WMP Demand; Table 4.8 in Appendix E of UWMP (2020 UWMP); Industrial (w/o Recycled Water) = 110 gpd/job or 2,290 gpd/acre

2.3 Proposed Project Water Demand

The Project would connect to the City's water main for domestic water use. The Project consists of an approximately 97 acres located in the southern portion of the Airport. The Project would replace existing, underutilized airport related buildings with an air cargo center. The Project would include demolition of the existing buildings, site improvements, and the development of a new air cargo center in two phases. Buildout of the Project would include a 857,000 SF Cargo Sorting Building (approximately 9 acres), which would include a sorting facility (warehouse) and office spaces; a 210,000 square-foot truckyard; a 15,300 square foot surface lot; a 271,000-square-foot parking garage; and 2,900,000 square feet (approximately 60 acres) of aircraft apron area, including a Ground Support Equipment (GSE) Maintenance Building and Aviation Line Maintenance Garage at approximately 27,000 square feet each. Gallons per day (GPD) per job from the 2020 WMP for an Industrial land use was used to calculate the Project's specific water demand based on the concentration of employees in the proposed Cargo Sorting Building, which accounts for approximately 9 acres of the 97-acre Project site. Based on the total square footage of the proposed buildings compared to the total Project site acreage, the water demand of the Project was based on the number of full time employees estimated on site. (See **Appendix O** for detailed calculation of full time employee (FTE) count for the water demand calculation). Based on the Project site land use designation of Airport included in the 2020 UWMP as Industrial, the water demand for the Project was estimated below in **Table 2-5**.

18 City of Ontario, The Ontario Plan, "Land Use Element", accessed May 2022, https://www.ontarioplan.org/policy-plan/lu-land-use-element/.

TABLE 2-5 WATER DEMAND ESTIMATE FOR THE PROJECT SITE BASED ON LAND USE IN 2020 UWMP					
	Land Use	Units	Domestic Water Unit Demand[a]	Total Domestic Water Usage (GPD)	Total Domestic Water Usage (AFY)
Project	Industrial	1,128 FTE Employees[b]	110 (GPD/Job)GPD	124,080	119
UWMP Assumption Based on Project Acreage[c]	Industrial	97 acres	2,290 (GPD/acre)	222,130	249

Sources: City of Ontario, 2020 UWMP, June 2021, Appendix E – 2020 WMP.

Notes:

[a] Water unit factor is for "Industrial" land use designation in the 2020 WMP Demand; Table 4.8 in Appendix E of UWMP (2020 UWMP); Industrial (w/o Recycled Water) = 110 gpd/job or 2,290 gpd/acre

[b] Based on 8 hour shift per employee (see Appendix O, SACC Employment by Shift)

[c] From Table 2-4, above.

Conclusion

This section evaluates whether the Project was included in the projection of future water demands for the City, as described in the 2020 OMUC UWMP. As per Section 10910 (c) (2) of the California Water Code:

> *"if the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g)."*

Based on the projections within the 2020 UWMP, the estimated water demand for the Project site, an Industrial use at 97 acres, would be 249 AFY.[19] As shown in **Table 2-5**, the estimated total domestic water demand for the Project is 124,080 gal/day (119 AFY), 130 AFY less than projected in the UWMP for the 97-acre site.

The estimated total water demand for the Project is approximately 0.48 percent of the water demand for the Industrial land use designation. Therefore, the projected water demand for the Project site in the 2020 UWMP is sufficient to account for the water needed for the Project.

19 2020 OMUC UWMP, Appendix E, Table 4.8, "Industrial" Land Use. (Based on 2,290 gpd/acre * 97 acres).

3. WATER SUPPLY ANALYSIS

This section identifies the sources of potable water utilized and available to the water supplier of the Project. The basic requirement is that a WSA must "include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the water system's existing and planned future uses, including agricultural and manufacturing uses."[20]

The purpose of this section is to evaluate the water supplies that could be utilized by the Project during normal, single-dry, and multiple-dry water years during a 20-year projection. OMUC is the water supplier to the City and the Project. OMUC has the following sources of water supply: City wells in the Chino Groundwater Basin; treated groundwater from the CDA; recycled water from IEUA; purchased water from SAWCo; and imported wholesale water from the WFA.

LAW

CWC Section 10910(d)(1):

> *The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.*
>
> *(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:*
>
> *(A) Written contracts or other proof of entitlement to an identified water supply.*
>
> *(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.*
>
> *(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.*

3.1 DOCUMENTING WHOLESALE WATER SUPPLIES

Many retail water suppliers in California, including OMUC, receive supplies from one or more water wholesalers. SB 610 requires the WSA to document wholesale supplies received by: 1) describing the

20 California Water Code, Division 6, Part 2.10, Section 10910 (c) (3).

quantities of water received from each wholesaler in prior years; 2) identifying existing entitlements, water rights, and/or water service contracts held by the City for the wholesale supply; 3) provide proof of entitlements, water rights, service contracts, relevant capital outlay programs, and construction permits for necessary infrastructure to deliver wholesale supplies, if any; and 4) regulatory approvals required to convey or deliver the wholesale supply.

Wholesale Supplies Received

OMUC obtains treated imported water from the WFA, which is also a wholesale water supplier to the cities of Chino, Chino Hills, Ontario, Upland, and the Monte Vista Water District. WFA purchases untreated imported water from MWD through IEUA. WFA and IEUA are both wholesale water suppliers and IEUA is a member agency of MWD. MWD is a wholesaler and contractor for State Water Project water imported from northern California. State Water Project water is available as stipulated by DWR in response to the hydrology and environmental regulations that can change available supply.[21] Therefore, imported water supplies to southern California can be highly variable; in January 2014 for example, the allocation of State Water Project water to all contractors was reduced to 0 percent due to persistent drought conditions. Nonetheless, MWD has projected in its 2020 UWMP 100 percent water supply reliability over the next 20 years (2025-2045) during average, single-dry, and multiple-dry years.[22]

The amount of imported water purchased by IEUA from MWD is limited by a purchase order agreement that allows IEUA to purchase up to 93,283 acre-feet per year (AFY) at its lowest rate (Tier I) through Dec. 31, 2024.[23] The purchase order agreement includes an annual minimum purchase commitment of 39,835 AFY, which is slightly less than the minimum operational need of IEUA's four water treatment plants (40,000 AFY).[24] Resolution 2014-12-1 also establishes how much water WFA, Cucamonga Valley Water District, and Fontana Water Company may purchase from IEUA, up to 69,572 AFY.[25]

The WFA was formed in 1980 as a Joint Powers Authority by the cities of Chino, Chino Hills, Ontario, Upland, and the Monte Vista Water District in order to construct and operate water treatment facilities for providing supplemental potable water to the member agencies. In 1985, the City established an agreement to purchase capacity in the WFA water treatment plant; a copy of which is located in Appendix J. Then, in 1988, the WFA finished construction of the Agua de Lejos Water Treatment Plant (WTP) in Upland to treat the imported water from IEUA and MWD to meet drinking water standards.

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21 DWR, State Water Project Delivery Capability Report, published every 2 years, as well as "Notice to State Water Project Contractors" issued as often as needed.

22 The Metropolitan Water District of Southern California, 2020 Urban Water Management Plan. June 2021. (Appendix D)

23 Purchase Order for System Water to be Provided by The Metropolitan Water District of Southern California (Purchaser: Inland Empire Utilities Agency) and IEUA Resolution No. 2014-12-1. Effective January 1, 2015. (Appendix I)

24 Inland Empire Utilities Agency. Integrated Water Resources Plan: Water Supply & Climate Change Impacts 2015-2040. Dated 2016. (Located in Appendix B to the IEUA 2020 UWMP.)

25 Kennedy Jenks. Inland Empire Utilities Agency 2020 Urban Water Management Plan. Pg. 2-6.June 2021 (Appendix E)

Currently, the Agua de Lejos WTP has the capacity to treat and disinfect 81 million gallons per day (mgd). Recorded flows through the Agua de Lejos WTP have ranged from 40 to 50 mgd during the peak summer months and can be as low as 9-12 mgd during winter months (http://www.wfajpa.org/#Facilities). As documented in WFA Ordinance No. 99-07-02 (located in Appendix K), the City owns 31.4 percent of the plant capacity of the Agua de Lejos WTP. As of 2020, that proportion is equivalent to approximately 25 mgd (28,004 AFY).[26] OMUC can purchase up to 9,915 AFY (8.9 mgd) of imported supply through WFA at Tier 1 rates. Beyond that amount, OMUC could continue to purchase at Tier 2 rates. As of FY 19/20, OMUC purchased 6,513 AF (5.8 mgd) of wholesale water from the WFA.[27] The actual and projected wholesale water supplies that are projected to be available to WFA through 2045 are shown in **Table 3-1**.

TABLE 3-1
WHOLESALE WATER SUPPLIES AVAILABLE TO WFA (AFY)

Wholesale Water	2020	2025	2030	2035	2040	2045
WFA (potable)	25,492	30,651	31,997	33,435	34,829	36,280

Source: WFA 2020 UWMP, Appendix F.
Note: WFA = Water Facilities Authority; AFY = acre feet per year

Dry Year Yield Storage Program

The City also participates in MWD's Dry-Year Yield Program (DYYP). The DYYP is a cooperative Conjunctive Use Program Agreement between MWD, IEUA, Chino Basin Watermaster, Three Valleys Municipal Water District, and the Chino Basin groundwater producers.[28] Under the DYY Program, MWD can store up to 100,000 AFY of water in the Chino Groundwater Basin during wet years when surplus water is available, and to reduce imported water deliveries up to 33,000 AFY in dry, drought, or emergency periods, but not to exceed the amount of water in the MWD storage account.[29]

The City executed an agreement with IEUA to participate in the DYY program in 2003. The DYY Agreement was amended in September 2014 to clarify storage measurement and extraction from the MWD storage account, define baseline conditions in calculations of performance targets, define procedures for variances in performance targets, revise administrative milestones, and make miscellaneous updates. The 2014 DYY amendments also provided for a minimum imported water delivery of 40,000 AFY during

26 City of Ontario, 2020 WMP, pf 3-2, June 2020.

27 OMUC 2020 UWMP, pg. 6-37, June 2021.

28 Amendment No. 8 to Groundwater Storage Program Funding Agreement No. 49960 By and Among The Metropolitan Water District of Southern California and Inland Empire Utilities Agency and Chino Basin Watermaster. September 17, 2014. (Appendix J).

29 2020 OMUC UWMP, pg. 6-18, June 2021.

"call" years, establishing minimum needs for direct deliveries from MWD. As of June 30, 2020, the storage balance in the DYY account is 45,961 AF.[30]

Participation in the DYY program obligates OMUC to reduce its use of imported water from WFA by a fixed amount, known as the "shift obligation" when MWD makes a "call" for their water stored in the Chino Basin. OMUC's shift obligation is 8,076 AFY, which is the amount OMUC purchases from WFA during a baseline year.[31] OMUC purchases an additional 2,000 AFY from WFA that is then sold to neighboring water supplier Jurupa Community Services District (JCSD) who does not have an imported water connection. In 2014, JCSD entered into an agreement with the City to participate in the DYY program (a copy of which is located in Appendix L). During years when MWD makes a "call" for the water in their storage account, OMUC will decrease its purchase of WFA imported water by a combined total of 10,076 AF (8,076 AF plus 2,000 AF) compared to the previous year. To meet its obligation in the DYY program during a "call" year, JCSD will deliver 2,000 AF to OMUC from the Chino Basin Desalter Authority (CDA).[32]

DYY funds from DWR local assistance grants were used for the construction of three OMUC groundwater wells (Wells 45, 46, and 47) and an ion-exchange facility located at John Galvin Park to treat water extracted from Wells 44 and 52. When MWD makes a "call" for its stored water, OMUC can operate these facilities to meet its shift obligation. MWD will then pay for the cost of operations and OMUC would pay MWD (through IEUA) the full-service water rate. OMUC can use the DYY facilities to meet its normal water demands during other periods, but OMUC is responsible for the well operation and maintenance costs.[33]

The additional groundwater capacity provided by this program allows OMUC to increase the percentage supply used to meet peak demands and allow OMUC to be less reliant upon imported water supplies.[34]

3.2 Documenting Water Supplies

The OMUC provides water service to residents, businesses, and other users in the City, including the Project site. According to the 2020 UWMP, OMUC provided water to a population of 178,409 residents.[35] The City's main source of water supply is groundwater pumped from the Chino Groundwater Basin. As of the 2020 UWMP, approximately 46 percent of OMUC's water supply came from groundwater, 34 percent from imported water, and 20 percent of supply was recycled water.[36]

30 City of Ontario, 2020 UWMP, pg. 6-18, prepared by OMUC, June 2021.

31 2020 OMUC UWMP, pg. 6-33, June 2021.

32 Assuming JCSD's imported water baseline is 2,000 AFY (JCSD 2014).

33 2020 OMUC UWMP, pg. 6-33, June 2021.

34 2020 OMUC UWMP, pg. 6-33, June 2021.

35 City of Ontario, 2020 Urban Water Management Plan, accessed April 2022, https://www.ontarioca.gov/sites/default/files/Ontario-Files/Municipal-Utilities-Company/Final%20DrAFYt%20Ontario%202020%20Ontario%20UWMP.pdf.

36 City of Ontario, 2020 UWMP, pg. 6-37, prepared by OMUC, June 2021.

Other sources include treated groundwater produced by the Chino Basin Desalter Authority (CDA), imported groundwater from the Metropolitan Water District (MWD) of Southern California, groundwater and/or surface water purchased from San Antonio Water Company (SAWCo), and recycled water purchased from Inland Empire Utilities Agency (IEUA).

Actual water supplies provided to the City for the year 2020 are summarized in **Table 3-2** and **Table 3-3** illustrates projected water supplies available to OMUC.

TABLE 3-2
WATER SUPPLY SOURCES FOR THE CITY OF ONTARIO IN 2020

Water Supplier	Water Source	Amount (AFY)
City of Ontario (Chino Basin)	Groundwater	18,395
Chino Basin Desalter Authority	Purchased or Imported	6,636
Water Facilities Authority	Purchased or Imported	6,513
San Antonio Water Company	Purchased or Imported	565
Inland Empire Utilities Agency	Recycled Water	7,812
Total		**39,921**

Source: City of Ontario, 2020 UWMP, Table 6-8 June 2021.

TABLE 3-3
PROJECTED OMUC WATER SUPPLIES (AFY)

Water Supply	Water Source	2025	2030	2035	2040	2045
Chino Basin	Groundwater	20,249	22,915	24,943	31,476	31,476
Water Facilities Authority	Purchased or Imported	11,000	13,000	15,000	17,000	17,000
Chino Basin Desalter Authority	Purchased or Imported	8,533	8,533	8,533	8,533	8,533
San Antonio Water Company	Purchased or Imported	600	600	600	600	600
Inland Empire Utilities Agency	Recycled	12,168	13,465	14,762	16,059	16,059

Source: City of Ontario, 2020 UWMP, Table 6-8 and 6-9, June 2021.

OMUC anticipates increasing its total water supply by pursuing: 1) full utilization of OMUC's groundwater rights in the Chino Basin allowed under the Chino Basin Groundwater Adjudication Judgment (including increased groundwater recharge with stormwater and recycled water described in Section 4; 2) expanding use of recycled water; and 3) expanding use of desalter water.[37]

Water Supply Capacity

The capacity of each source of supply available to the OMUC is provided in the 2020 Ontario Water Master Plan (see **Appendix B**). The capacity of the supply system refers to the maximum production rate based on the pumps and infrastructure. For example, the capacity of groundwater wells refers to a pumping rate based on running the pumps at full utilization, 24 hours a day, 7 days a week. Although this maximum rate of pumping is assumed in terms of comparing capacities, pumps are rarely used at more than two-thirds capacity. Knowing the system capacity is important to ensure OMUC can meet all demands imposed upon the system, specifically meeting "average day demand" and "maximum day demand." Demand can be met with multiple supply sources, storage, or a combination of both. OMUC's reservoirs are not discussed in this Assessment, however, they are used to regulate hourly fluctuations in demand, provide fire flow, and supplement supply during an extended outage of a source.[38]

According to the 2020 Water Master Plan, OMUC is required to meet the following water supply criterion from the California Code of Regulations Related to Drinking Water: "a minimum source of supply equal of one maximum day demand of the service area."[39] Further, OMUC has set a design criterion in its 2020 Water Master Plan that "requires a source of supply equal to one average day demand (19,280 gpm) from local sources."[40] As the land uses and population changes in OMUC service area, so does the average and maximum day demands. The maximum capacities of existing sources of supply available to OMUC are provided in **Table 3-4**.

TABLE 3-4
EXISTING SOURCE OF SUPPLY

	Capacity		
Source	**GPM**	**MGD**	**AFY**
Existing Wells	38,604	55.6	62,269
WFA	10,700	15.4	17,259
CDA I & II	5,290	7.6	8,533
Total	**54,594**	**78.6**	**88,061**

Source: City of Ontario, 2020 Water Master Plan, Table 10-2.

As described in the Water Master Plan, the total existing supply sources is equivalent to 88,061 gpm which exceeds the criteria of one average day demand (ADD) of 19,280 gpm. The City's local water source includes direct access to groundwater from the Chino Basin, which is managed by the Chino Basin

37 City of Ontario, 2020 UWMP, prepared by OMUC, June 2021.

38 City of Ontario, 2020 WMP, pg. 7-3, June 2021.

39 City of Ontario, 2020 WMP, pg. 10-1, June 2021.

40 City of Ontario, 2020 WMP, pg. 10-1, June 2021.

Watermaster. The City's existing seventeen (17) active wells have a capacity of 38,604 gpm, which is about double the existing ADD.

The maximum capacities of the 'ultimate' sources of supply available to OMUC according to the City's 2020 Water Master Plan, are provided in **Table 3-5**.

TABLE 3-5
ULTIMATE SUPPLY CAPACITIES

	Capacity		
Source	**AFY**	**MGD**	**GPM**
Existing Wells	57,310	51.2	35,530
Future Wells[a]	48,068	42.9	29,800
WFA	17,259	15.4	10,700
CDA from Chino Desalter I & II	8,533	7.6	5,290
Total	**131,170**	**117.1**	**81,320**

Source: City of Ontario, 2020 Water Master Plan, Table 12-2.
[a] *Well 37 will be retrofitted to pump to Zone 1010.*

Altogether, the total future source of supply is equivalent to 81,320 gpm. This is about 149% of the City's future MDD (54,778 gpm). With 65,330 gpm from existing and future groundwater sources alone, the City is capable of providing the full projected maximum daily demand (MDD).[41]

The available future imported water from the Chino Desalter Authority (CDA) and Water Facility Authority (WFA) total 15,990 gpm (29% of the future MDD).[42] If some wells are out of service, the City would need 38,788 gpm (54,778 gpm – 15,990 gpm) from groundwater sources to supply the remaining MDD. This is about 59% of the future system well capacity.

3.3 Description of All Water Supply Projects

3.3.1 City Well Production

OMUC currently owns 17 active groundwater wells in the Chino Basin.[43] Groundwater from the Chino Basin is used by the City either directly by pumping into its distribution system or by treating the groundwater and then pumping the treated groundwater into the City of Ontario's distribution system. The Chino Basin is one of the largest groundwater basins in southern California, with an estimated 5 million AF in storage and another one million in additional storage capacity.[44] OMUC's existing well

41 City of Ontario, Water Master Plan (2020), pg. 12-1.

42 City of Ontario, Water Master Plan (2020), pg. 12-1.

43 City of Ontario, Water Master Plan (2020), pg. 6-1.

44 Wildermuth Environmental, Inc. 2020 Safe Yield Recalculation Final Report prepared for the Chino Basin Watermaster. May 15, 2020.

capacity is approximately 62,269 AFY as shown in **Table 3-4**. The amount of groundwater pumped by the City from the Chino Basin since 2016 is shown in **Table 3-6**.

TABLE 3-6
HISTORIC GROUNDWATER PRODUCTION

Year	Groundwater Produced (AFY)
2015-2016	22,751
2016-2017	24,672
2017-2018	26,109
2018-2019	19,604
2019-2020	18,395
Average	***22,306***

Source: 2020 OMUC UWMP, Table 6-1, June 2021.

As of 2020, approximately 46 percent of OMUC water supply came from groundwater pumped by its own wells in the Chino Basin.[45] OMUC strives to maximize local water supplies and minimize the need for imported water from other regions. Thorough description of the City's groundwater rights pursuant to SB 610 guidance is provided in **Section 4, Groundwater Analysis**.

3.3.2 Chino Basin Desalter Authority (CDA)

OMUC is a member of the CDA, a joint exercise of powers agency created on September 25, 2001, along with JCSD, Santa Ana River Water Company, IEUA and the cities of Chino, Chino Hills, and Norco. Western Municipal Water District joined CDA on April 2, 2009. The goals of the CDA are:

- Achieve hydraulic control of the Chino Basin to prevent contaminated Chino Basin groundwater from entering Santa Ana River;
- Remove contamination (primarily nitrates, as well as TCE, PCE, and TCP) from groundwater in the southern portion of the Chino Basin; and
- Deliver the treated water to member agencies to offset the need for imported water.

CDA provides high-quality drinking water to CDA members through "take or pay" contracts. CDA operates 30 wells and two desalters (salt removers) that treated approximately 35,003 AF of Chino Basin groundwater in 2020.[46] In the future, "CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies."[47]

45 City of Ontario, 2020 UWMP, prepared by OMUC, June 2021.

46 2020 CDA UWMP, pg. 6-27, June 2021.

47 2020 CDA UWMP, pg. 6-27, June 2021.

The Chino I Desalter, located at 6905 Kimball Avenue in Chino, was completed in 2000 and expanded in August 2005 to its current rated capacity of 14.2 mgd.[48] However, the Chino I Desalter cannot provide this rated capacity due to the high total dissolved solids (TDS) in the raw groundwater supply. The Chino II Desalter was completed in 2006 and is located at 11202 Harrel Street in the City of Jurupa Valley. The current rated capacity of Chino II Desalter is 33 mgd.[49]

Although Chino Desalter I capacity will not be increased, additional raw water capacity is provided by five new CDA wells in the Chino Creek Well Field. All five wells have been drilled and equipped.

According to the 2020 UWMP, in FY 19/20 OMUC purchased approximately 6,636 AF from CDA as shown in **Table 3-2**. As shown in **Table 3-3**, the water supply from CDA to OMUC is projected to stabilize at 8,533 AFY by 2025, which would be roughly 16 percent of the total water supply portfolio for OMUC in 2025.

3.3.3 Inland Empire Utilities Agency (IEUA)

OMUC purchases recycled water supplies from IEUA, which treats the City's wastewater at its four regional wastewater reclamation plants. IEUA provides wastewater treatment services to seven Contracting Agencies, including the City. OMUC has been using recycled water produced by IEUA since 1972. Currently, recycled water is used in the City for agricultural irrigation, landscape irrigation, golf course irrigation, and industrial purposes.

"Pursuant to the Chino Basin Regional Sewage Service Contract, each Contracting Agency has the right of first purchase of their Base Entitlement. Base Entitlement is defined as the total quantity of sewage delivered into the Regional Sewerage System by the Contracting Agency less normal processing losses resulting from the treatment of sewage."[50] In FY 19/20, this amount was 12,645 AF.[51] In FY 19/20, 7,812 AF of recycled water was purchased by OMUC for direct use (**Table 3-2**). This represents roughly 62 percent utilization of recycled water supply available to OMUC in FY 19/20. Recorded and projected supplies of recycled water available to OMUC are listed in **Table 3-7**.

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48 2020 CDA UWMP, pg. 6-8, June 2021.

49 2020 CDA UWMP, pg. 6-8, June 2021.

50 2020 OMUC UWMP, pg. 6-21, June 2021.

51 2020 OMUC UWMP, pg. 6-24, June 2021.

TABLE 3-7 CURRENT AND FUTURE RECYCLED WATER SUPPLY (AFY)						
Beneficial Use Type	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Agricultural Irrigation	2,905	1,704	1,136	568	0	0
Landscape Irrigation	3,290	7,088	8,612	10,136	11,659	11,659
Gold Course Irrigation	631	660	680	700	720	720
Industrial Use	986	2,716	3,037	3,358	3,680	3,680
Total	**7,812**	**12,168**	**13,465**	**14,762**	**16,059**	**16,059**

Source: City of Ontario, 2020 UWMP, Tables 6-8 and 6-9, June 2021.

Over the next 20 years, landscape irrigation is projected to have the greatest increase in demand for recycled water, followed by industrial use within the OMUC service area. Agricultural properties are expected to convert to more urban land uses, while supplies to golf courses are expected to remain relatively stable.[52]

IEUA has prepared recycled water studies, plans, and strategy documents to bring a regional recycled water delivery system to fruition. OMUC updated their Recycled Water Master Plan in 2020 (located in **Appendix C**) to fully coordinate with IEUA's recycled water planning efforts.

3.3.4 San Antonio Water Company (SAWCo)

SAWCo leases groundwater rights to San Antonio Heights (an unincorporated area of San Bernardino County), the Cities of Upland and Ontario, Monte Vista Water District, the United States Forest Service, the San Bernardino County Flood Control District, local golf courses, rock quarries, and grove irrigators. SAWCo supplies water based on entitlement only, which is based on the number of shares held. The number of shares is finite and considered a commodity that can be divided or sold. The "entire water of the company" and the current entitlement for 2020 is equivalent to 12,570 AFY, which distributed among the 6,178 shares. The volume per share is subject to change.[53]

In the past, the City received its water from SAWCo by a stored groundwater transfer. However, in 2015, SAWCo made a connection to the WFA and is now able to deliver water to the City through that connection. SAWCo water supplies are a mix of surface water from San Antonio Creek, groundwater from the San Antonio Tunnel, and three groundwater basins: Chino Basin, Cucamonga Basin, and Six Basins.[54] The City owns 295 shares of SAWCo, which equates to a current entitlement of 600 AFY of potable water

52 2020 OMUC UWMP, pg. 6-28, June 2021.

53 2020 OMUC UWMP, pg. 6-8, June 2021.

54 2020 OMUC UWMP, pg. 6-8, June 2021.

to OMUC. In FY 19/20, OMUC received an actual volume of 600 AF as shown above in **Table 3-2**. OMUC has forecasted that future available supplies will be 600 AFY from 2025 to 2045, as shown in **Table 3-3** above.

SAWCo water supplies are a mixture of potable and non-potable water from San Antonio Creek, the San Antonio Tunnel, and three groundwater basins: Chino Basin, Cucamonga Basin and Six Basins.[55] No new sources of supply are anticipated to be developed by SAWCo over the planning horizon. Actual supply available to SAWCo in 2020 totaled 2,584 AF of potable supply and 13,762 AF of non-potable supply. In their 2020 UWMP, SAWCo estimates for 2025 and 2030 that total reasonably available supplies will be 15,260 AFY.[56]

In terms of future reliability, SAWCo has stated the following in its 2020 UWMP (p. 6-4): "SAWCo expects to meet demands under all water year scenarios with existing supply sources." In addition, SAWCo has future transfer and exchange projects planned to mutually benefit certain shareholders during an emergency, including OMUC. SAWCo is currently constructing several projects to increase storage and capture all raw water released through the Frankish Tunnel. Both projects are anticipated to be completed in early 2021.[57]

3.4 Documenting Normal Year Water Supply and Demand

It is required that every urban water supplier assess the reliability to provide water service to its customers under normal, dry, and multiple dry water years. The City depends on a combination of imported and local supplies to meet its water demands and has taken numerous steps to ensure that it has adequate supplies. Water supplies available to the City are projected to meet full-service demands. OMUC has assumed in its 2020 UWMP that customer water demand and available water supply are equal during "normal" precipitation years. The normal year water supplies available to OMUC, as well as the normal year water demand projections are compared in **Table 3-8**, which are based on the City's 2020 Water Use Target of 196 gallons per capita per day (GPCD) for potable water demands.[58] The UWMP states that the City will be able to meet demand with projected supplies between 2020 and 2045 during normal years, single dry years, and multiple dry years as shown by **Table 3-8**.[59]

55 2020 OMUC UWMP, pg. 6-9, June 2021.

56 2020 SAWCo UWMP, p. 5-10, August 2021.

57 SAWCo, 2020 UWMP, pg. 5-7, September 2021.

58 City of Ontario, 2020 Urban Water Management Plan, prepared by OMUC, June 2021.

59 City of Ontario, 2020 Urban Water Management Plan, prepared by OMUC, June 2021.

TABLE 3-8 NORMAL YEAR SUPPLY AND DEMAND (AFY)					
	2025	2030	2035	2040	2045
Supply Totals	52,550	58,513	63,838	73,668	73,668
Demand Totals	52,550	58,513	63,838	73,668	73,668
Difference	0	0	0	0	0

Source: City of Ontario, 2020 UWMP, Table 7-4, June 2021.

3.5 **DOCUMENTING** DRY YEAR WATER SUPPLY AND DEMAND

The following assumptions are made in OMUC's 2020 UWMP to estimate future water supplies and demands during a single dry year:

- The ratio of total water supplies (including potable and recycled water supplies) available to the City during a historical normal year in FY 19/20 (39,921 AF) and during a historical single dry year in FY 17/18 (43,346 AF) were used to estimate the City's projected water demands during single dry years (p. 7-9).
- Water losses have been included in the potable water demands as 7 percent of the annual demand.

OMUC has determined that the water demands during single dry years over the next 25 years will be met, as shown in **Table 3-9**.

TABLE 3-9 DRY YEAR SUPPLY AND DEMAND (AFY)					
	2025	2030	2035	2040	2045
Supply Totals	57,058	63,534	68,847	79,989	79,989
Demand Totals	57,058	63,534	68,847	79,989	79,989
Difference	0	0	0	0	0

Source: City of Ontario, 2020 UWMP, Table 7-4, June 2021.

3.6 DOCUMENTING MULTIPLE YEAR WATER SUPPLY AND DEMAND

OMUC's projections over a five-year drought period are illustrated below in **Table 3-10**, which show the City can meet water demands during future five consecutive year drought periods.

TABLE 3-10 MULTIPLE DRY YEAR SUPPLY AND DEMAND (AFY)						
		2025	2030	2035	2040	2045
First Year	Supply Totals	56,080	62,445	67,667	78,618	78,618
	Demand Totals	56,080	62,445	67,667	78,618	78,618
	Difference	0	0	0	0	0
Second Year	Supply Totals	56,248	62,632	67,870	78,853	78,853
	Demand Totals	56,248	62,632	67,870	78,853	78,853
	Difference	0	0	0	0	0
Third Year	Supply Totals	59,493	66,246	71,786	83,403	83,406
	Demand Totals	59,493	66,246	71,786	83,403	83,406
	Difference	0	0	0	0	0
Fourth Year	Supply Totals	54,268	60,428	65,481	76,078	76,078
	Demand Totals	54,268	60,428	65,481	76,078	76,078
	Difference	0	0	0	0	0
Fifth Year	Supply Totals	47,436	52,820	57,237	66,500	66,500
	Demand Totals	47,436	52,820	57,237	66,500	66,500
	Difference	0	0	0	0	0

Source: City of Ontario, 2020 UWMP, Table 7-4, June 2021.

3.7 COMPARISON OF AVAILABLE WATER SUPPLY AND DEMAND

CWC section 10910 (c)(3) states:

> *If the projected water demand associated with the proposed project was not accounted for in the most recently adopted UWMP…the water assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.*

As described in **Section 2**, the annual total water demand for the Project is estimated at 119 AFY and the total water demand estimated by the previously planned land use of the same area, 97 acres, would be 249 AFY. This would result in a net decrease of 130 AFY.

Future water supplies available to the OMUC are projected to meet the water demands for the service area (see **Table 3-3**). Further, the Project would represent 0.21 percent of the citywide ultimate 2045 water demand/water supply as estimated by the UWMP (estimated at 57,609 AFY). In 2020, OMUC purchased about 6,513 AF from the WFA plant (Agua de Lejos WTP), which is well within their conveyance capacity of 15.4 mgd and within their rights of approximately 25 mgd.[60] As such, there would be ample

60 City of Ontario, 2020 Urban Water Management Plan, prepared by OMUC, June 2021.

water availability for the Project and meet the needs of the Project (119 AFY) based on the estimated total water demand for the 97-acre Project site that was accounted for in the 2020 UWMP (249 AFY).

Tables 3-7 through **3-9** show that OMUC projects water supplies during single-dry and multiple-dry years in volumes sufficient enough to meet the demand of the service area over the next 20 years. OMUC can also bank water and pump in excess of their rights in the Chino Basin with payment of a replenishment fee. **Section 4** will describe the supply available to OMUC through rights held to Chino Basin groundwater that are greater than the amount currently extracted.

In conclusion, based on the information provided in the 2020 UWMP and updated information provided by OMUC for this Assessment, the City has sufficient water supplies to meet the demand of the Project by purchasing additional water from WFA, and by using existing groundwater supplies and pumping capacities that are more than adequate to meet the water demands of the Project during normal, single-dry, and multiple-dry water years including future agricultural and industrial / manufacturing uses. With the implementation of water conservation efforts, OMUC will further ensure its ability to provide sufficient supply for the Project. **Section 4** will discuss the City's water rights in light of this water supply and capacity analysis.

4. GROUNDWATER ANALYSIS

SB 610 requires specific groundwater information to be included in the WSA if groundwater will be a source of water for the Project. A description of any groundwater basin or basins from which the Project will be supplied, in addition to a detailed description and analysis of the amount and location of groundwater pumped by the public water system for the past five years, should be provided.

LAW

CWC Section 10910 (f):

If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water supply assessment:

(1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.

(2) A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as over drafted or has projected that the basin will become over drafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(5) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project. A water supply assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet

the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.

4.1 Review of Urban Water Management Plan (CWC Section 101910(f)(1))

The City's 2020 UWMP, prepared by AKM on behalf of the City (OMUC), was adopted by City Council Resolution 2021-036 and 2021-037 on June 1, 2021 (located in Appendix A). The UWMP includes information relevant to the identified water supply for the Project and is incorporated herein. Relevant information includes: 1) current and projected water demands (Water Use Characterization) through year 2045; 2) a description of the Chino Groundwater Basin (Water Supply Characterization); 3) the reliability of the water supply, projected supply and demand comparisons, and water shortage plans (Water Service Reliability and Drought Risk Assessment and Water Shortage Contingency Plan); and 4) water demand management efforts (Demand Management Measures). The ultimate water demand projections of the 2020 UWMP are based on the findings of the City's 2020 Water Master Plan and 2020 Recycled Water Master Plan.

4.2 Groundwater Basin Descriptions (CWC Section 101910(f)(2))

The Chino Groundwater Basin is the direct source of groundwater for OMUC. Although water supplied to OMUC from SAWCo may include a combination of groundwater from other basins (i.e., San Antonio Tunnel, Cucamonga Basin, and Six Basins), the amount is minimal, and the basins are described in the 2020 SAWCo UWMP (located in Appendix H).

Chino Groundwater Basin Description

The City obtains its groundwater from the Chino Groundwater Basin. The Chino Basin is located within the Upper Santa Ana Valley, which is located in San Bernardino County. The surface area of the Chino Basin is approximately 154,000 acres (or 240 square miles).[61] The San Antonio Creek and Cucamonga Creek drain the Chino Basin area southward and flow into the Santa Ana River. The State Department of Water Resources (DWR) identifies the Chino Basin as Basin No. 8-002.01, which is a sub-basin of the Upper Santa Ana Valley (Bulletin 118).[62] It is estimated the Chino Basin has approximately 5 million AF of water in storage and an estimated 1 million AF of additional unused storage capacity.[63] The Chino Basin is divided into five management zones, based on similar hydrologic conditions. The City is located approximately in the center of the Chino Basin.

61 City of Ontario, 2020 Urban Water Management Plan, prepared by OMUC, June 2021.

62 DWR collects, summarizes, and evaluates groundwater data in the "Bulletin 118" series, which present the results of basin evaluations and defines the boundaries of California's 515 alluvial groundwater basins. An update was provided in 2016. In Bulletin 118, DWR identifies each basin and sub-basin with a number code.

63 The 2020 Safe Yield Recalculation Final Report (May 15, 2020) indicates the estimated total volume of water in storage was 12.6 million AF in July 2018 (WEI 2020, p. 6-15).

DWR collects, summarizes, and evaluates groundwater data in the "Bulletin 118" series, which present the results of basin evaluations and defines the boundaries of California's 515 alluvial groundwater basins. An update was provided in 2020. The state Department of Water Resources (DWR) identifies the Chino Basin as Basin No. 8-002.01, which is a sub-basin of the Upper Santa Ana Valley (Bulletin 118).[64] DWR Bulletin 118 (updated 03/05/18) describes the Chino Basin as follows:

> *The Chino Basin is bound on the northwest by the San Jose fault, on the north by the Cucamonga fault and impermeable rocks of the San Gabriel Mountains, and on the east by the Rialto-Colton fault. The basin is bound on the southeast by the Jurupa Mountains, Pedley Hills, La Sierra Hills, and the approximate location of the Santa Ana River. The Chino fault and impermeable rocks of the Chino Hills and Puente Hills bound the southwest side of the basin. In some areas, the basin boundary coincides with the Chino Basin (1978) groundwater adjudication boundary.*

The Chino Basin is an adjudicated basin and has been extensively studied by the court-appointed Chino Basin Watermaster (CBWM), with reports available at www.cbwm.org. The following is an excerpt that describes the Chino Basin geology from the Chino Basin Watermaster's management plan called the "Optimum Basin Management Program" or "OBMP."[65]

> *The Chino Basin is located within the Upper Santa Ana Valley, which is located in San Bernardino County and is bounded on the east by the Rialto-Colton fault; on the southeast by the contact with impermeable rocks forming the Jurupa Mountains; on the south by impermeable rocks of the Puente Hills and by the Chino fault; on the northwest by the San Jose fault; on the north by the impermeable rocks of the San Gabriel Mountains and by the Cucamonga fault. The location of the Chino Basin is provided in Figure 3. The surface of the Chino Basin is approximately 154,000 acres (or 240 square miles). The San Antonio Creek and Cucamonga Creek drain the Chino Basin area southward and flow into the Santa Ana River. Pursuant to the DWR Bulletin 118 (for Basin Number 8-2.01), the total storage capacity of the Chino Basin is approximately 18,300,000 AF.*
>
> *The water-bearing units in the Chino Basin includes Holocene and Upper Pleistocene alluvium. This Holocene alluvium consists mainly of alluvial-fan deposits, with maximum thickness of 150 feet that are coarsest in and near the mouths of the canyons and are finer away from canyon mouths in the southern part of the Chino Basin. The Pleistocene alluvium is exposed mainly in the north part of the subbasin and supplies most of the water to well located within the Chino Basin. The Pleistocene alluvium contains interfingering finer, alluvial-fan deposits and coarser, fluvial deposits.*
>
> *The Chino Basin was formed when eroded sediments from the San Gabriel Mountains, the Chino Hills, Puente Hills, and the San Bernardino Mountains filled a structural depression. The bottom of the Basin - the effective base of the freshwater aquifer - consists of impermeable sedimentary and igneous rocks. The base of the aquifer is overlain by older alluvium of the Pleistocene period followed by younger alluvium of the Holocene period. The younger alluvium*

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64 Department of Water Resources, California's Groundwater Update 2020 (Bulletin 118), accessed May 2022, https://data.cnra.ca.gov/dataset/calgw_update2020.

65 Wildermuth Environmental, Optimum Basin Management Program Phase I report prepared for Chino Basin Watermaster. August 19, 1999. (Available at http://www.cbwm.org/docs/engdocs/OBMP%20-%20Phase%20I%20(Revised%20DigDoc).pdf).

varies in thickness from over 100 feet near the mountains to a just few feet, south of Interstate 10 and generally covers most of the north half of the Basin in undisturbed areas. The younger alluvium is not saturated and thus does not yield water directly to wells. Water percolates readily in the younger alluvium and most of the large spreading basins are located in the younger alluvium. The older alluvium varies in thickness from about 200 feet thick near the southwestern end of the Basin to over 1,100 feet thick southwest of Fontana, and averages about 500 feet throughout the Basin.

Legal Right to Pump from the Chino Basin

Water rights to the Chino Basin were adjudicated by the Superior Court of the State of California for the County of San Bernardino in 1978 (a copy of the Judgment and amendments thereto are provided in Appendix M). The court's Judgment declared the safe yield of the Chino Basin at 140,000 acre-feet per year (AFY).[66] Withdrawal in excess of safe yield is termed overdraft. The Chino Basin Watermaster may determine that the operating safe yield (OSY) can be higher from year-to-year depending on factors including favorable precipitation and management efforts that maximize the beneficial use of the groundwater Basin.[67] The Chino Basin Watermaster has undertaken a safe yield redetermination. In July 2020, the court ordered that the safe yield be reduced by 3% and reset to 131,000 AFY for the period of July 1, 2020, to June 30, 2030. The court previously reset the safe yield from its initial 140,000 AFY to 135,000 AFY in 2017 for the period of 2010 to 2020.

The Chino Basin Watermaster is comprised of three stakeholder groups (or "pools"): Overlying Agricultural Pool Committee (representing dairymen, farmers, and the State of California); the Overlying Non-Agricultural Pool Committee (representing businesses and industries); and the Appropriative Pool Committee (representing local cities, public water districts and private water companies). The Chino Basin Watermaster carries out the provisions of the Judgment including monitoring of the Chino Basin and files an annual report on pumping and replenishment.

The City is a member of both the Overlying Non-Agricultural Pool and the Appropriative Pool. The Judgment allocates a portion of the safe yield to the Overlying NonAgricultural Pool and a portion of the OSY to the Appropriative Pool. Pursuant to the Judgment, the City has appropriative rights to 20.742 percent of the OSY allocated to the Appropriative Pool. The City has gained 53.338 percent of the safe yield assigned to the Overlying Non-Agricultural Pool.[68] The assigned share of the safe yield and OSY change depending on the safe yield set by the court.

66 Judgment (1978) defines Safe Yield as, "The long-term average annual quantity of groundwater (excluding replenishment or stored water but including return flow to the Basin from use of replenishment or stored water), which can be produced from the basin under cultural conditions of a particular year without causing an undesirable result."

67 Judgment (1978) defines Operating Safe Yield (OSY) as, "The annual amount of groundwater which Watermaster shall determine, pursuant to criteria specified in Exhibit "I", can be produced from Chino Basin by the Appropriative Pool parties free of replenishment obligation under the physical solution herein."

68 Chino Basin Watermaster, Fiscal Year 2020-2021, 44th Annual Report, 2021, accessed May 20221, http://www.cbwm.org/docs/annualrep/44th%20Annual%20Report.pdf.

The Judgment allocates safe yield of the Chino Basin according to the three pools as described above (Appendix M, Paragraph 13). The members of each pool are then enjoined from producing water from the Chino Basin in excess of such allocated amount "except pursuant to the provisions of the Physical Solution" (Appendix M, Paragraph 13(a)-(c)).

The Physical Solution of the Judgment is described in broad terms by Paragraphs 39 through 57 of the Judgment. Paragraph 45 provides the Chino Basin Watermaster with the authority to levy and collect assessments for the purchase of water necessary to balance the production by any party in excess of that party's allocated share of safe yield of the Chino Basin. Paragraphs 49 and 50 then describe the sources of water which are authorized to function as sources of replenishment water and methods by which water can be replenished to the Chino Basin. Exhibit H, Paragraph 7, of the Judgment describes the way in which costs for replenishment water will spread among the members of the Appropriative Pool.

The afore-cited paragraphs of the Judgment evince a clear expectation that parties, including the City/OMUC, would produce water in excess of their adjudicated production rights. The injunction in Paragraph 13 of the Judgment should thus be interpreted to mean that parties are enjoined from producing water in excess of their adjudicated rights except to the extent that they will pay a replenishment assessment.

The ability to produce water from the Chino Basin is accordingly not a matter of availability, as contemplated and sanctioned by the Judgment for the reasons discussed above, but rather a matter of cost. Water produced in excess of production rights will cost more than water produced within a party's production rights. Thus, the quantity and reliability of groundwater supplies under the Judgment for purposes of this Assessment is a matter of the cost of the water produced from the Chino Basin rather than limitations on production which may otherwise operate to reduce the sufficiency of the groundwater supply.

In addition to the water supplies described in Section 3, OMUC has rights to groundwater held in the Chino Basin as described below (from Chino Basin Watermaster's Approved 2021/2022 Assessment Package for Production year 2020/2021, dated May 2021) and in **Table 4-1**.

The City's legal right to pump water in an amount necessary to meet all of its demands has been adjudicated and will ensure the long-term reliability of the groundwater source as the safe yield of the aquifer has been determined. Water rights to the Chino Basin were adjudicated in 1978 by the Superior Court of the State of California for San Bernardino County (a copy of the Judgment and amendments thereto are provided in Appendix M). Since that time, the Chino Basin has been sustainably managed, as required by the Judgment, under the direction of the court-appointed Watermaster. The original Watermaster was the Chino Basin Municipal Water District (now IEUA). Since 1998, the Watermaster has been the Chino Basin Watermaster.

Appropriative Right

The City has appropriative rights to 20.742 percent of the OSY allocated to the Appropriative Pool. As of FY 20/21, the OSY is 40,834 AF; therefore, the City's assigned share is 8,469.8 AF.[69] To supplement the 2017 decrease in safe yield, the City currently receives an additional 1,866.8 AFY transferred from unproduced Agricultural Pool rights ("Safe Yield Reduction").

Overlying Non-Agricultural Right

The City has purchased and has rights to 53.338 percent of the safe yield assigned to the Overlying Non-Agricultural Pool, which is currently 7,350.3 AFY. As of FY 20/21, the City's assigned share is 3,921 AF.[70]

Land Use Conversions

The City gains rights to additional Chino Basin groundwater as a result of land use conversions from agricultural to non-agricultural uses. This is expected to increase from development of Ontario Ranch; the total of which is adjusted annually by the Watermaster. As of FY 20/21, the City receives 4,668.3 AFY from land use conversions.[71]

Annual Early Transfers

The Chino Basin Watermaster can approve an "Early Transfer" of water to the Appropriative Pool equal to the quantity of water not produced by the Overlying Agricultural Pool that is remaining after all land use conversions are satisfied, pursuant to the Peace Agreement.[72] The Early Transfer Water is annually allocated among the Appropriative Pool members in accordance with their pro-rate share of the initial Safe Yield. For the City, this is 20.742 percent of the "early transfer" water that the Watermaster may transfer from the Overlying Agricultural Pool.[73] The amount available for transfer changes from year to year but is projected to increase. In FY 20/21, the City received 4,272.6 AFY as its share of Early Transfer.[74]

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69 Chino Basin Watermaster, Fiscal Year 2020-2021, 44th Annual Report, 2021, accessed May 20221, http://www.cbwm.org/docs/annualrep/44th%20Annual%20Report.pdf.

70 Chino Basin Watermaster, Approved 2021/2022 Assessment Package (Production Year 2020/2021), Nov. 18, 2021. http://www.cbwm.org/docs/financdocs/All%20Assessment%20Packages/2021-22%20Assessment%20Package.pdf.

71 City of Ontario, 2020 UWMP, Section 6.2.2, June 2021.

72 In 2007, the parties to the Chino Basin Judgement approved the "Peace Agreement" which is a set of measures proposed by Chino Basin Watermaster to supplement the OBMP Implementation Plan. Focus for the measures were placed on achieving hydraulic control (reduction of groundwater discharge from the Chino North Management Zone to the Santa Ana River). To achieve hydraulic control, re-operation (controlled overdraft) of the groundwater basin is proposed. Strategically placed wells would be constructed in the basin and the groundwater would be pumped to the Desalter to improve the long-term reliability of the basin.

73 2020 OMUC UWMP, pg. 6-10, June 2021.

74 Chino Basin Watermaster, Approved 2021/2022 Assessment Package (Production Year 2020/2021), Nov. 18, 2021. http://www.cbwm.org/docs/financdocs/All%20Assessment%20Packages/2021-22%20Assessment%20Package.pdf.

Groundwater Recharge Credits

The City is entitled to water rights due to groundwater recharge with stormwater and recycled water in the Chino Basin. The credited amount is based on the volume recharged and therefore varies annually but is projected to increase over time. In FY 19/20, no recharge credits were purchased by the City due to limitations on groundwater storage capacity.[75]

Fontana Recycled Water Rights

The City has a long-term contract to purchase up to 3,000 AFY of recharged recycled water rights from the City of Fontana (a copy of which is in Appendix N). The City of Fontana does not operate a water system. The amount purchased by OMUC each year will vary. In FY 19/20, no recharged water rights were purchased due to limitations on groundwater storage capacity.[76]

Groundwater Storage Accounts

The City has rights to store water in the Chino Basin (Appropriative and Overlying Non-Agricultural) and has been increasing its various storage accounts in recent years. The City holds water in both local storage accounts and supplemental accounts. Local storage accounts hold unpumped OSY groundwater rights and stormwater that has been recharged into the Chino Basin. Supplemental accounts hold both imported water and recycled water that has been recharged into the Chino Basin. In 2021, the City had 133,618.4 AFY in storage pursuant to Appropriative rights and 1,918 AFY in storage pursuant to Overlying Non-Agricultural rights.[77]

75 2020 OMUC UWMP, pg. 6-11, June 2021.

76 2020 OMUC UWMP, pg. 6-12, June 2021.

77 Chino Basin Watermaster, Approved 2021/2022 Assessment Package (Production Year 2020/2021), Nov. 18, 2021. http://www.cbwm.org/docs/financdocs/All%20Assessment%20Packages/2021-22%20Assessment%20Package.pdf.

TABLE 4-1 ONTARIO GROUNDWATER RIGHTS SUMMARY	
Right	**Current FY 2021-2022 (AFY)**
Assigned Share of OSY	8,469.8
Safe Yield Reduction	1,866.8
Land Use Conversions	4,668.3
Annual Early Transfer	4,272.6
Groundwater Recharge Credits	0
Fontana Recycled Water Rights	0
Annual Production Right for Appropriative Pool Subtotal (AFY)	**28,576.9**
Annual Production Right for Overlying Non-Agricultural Pool	7,449.1
SAWCo[a]	600
Total (AFY)	**36,626**
Groundwater Storage Accounts	42,169.2 **(Excess Carry Over)** 54,823.2 **(Local Supplemental)**
Total Storage (AF)	**133,618.4**

Source: Chino Basin Watermaster's Approved 2021/2022 Assessment Package for Production year 2020/2021, dated Nov. 18, 2021, pgs. 4.1, 10.1, 11.1, 16.1, 20.1.

[a] OMUC 2020 UWMP, pg. 6-8.

4.3 Recorded Use of Groundwater (CWC Section 101910(f)(3))

The City owns 17 active groundwater wells located throughout the OMUC service area within the Chino Basin. As of FY 19/20, OMUC produced 18,395.3 AF from the basin.[78] Over the past five years, the City has produced 18,395 AFY to 26,109 AFY, with an average of 22,306 AFY from the Chino Basin, as seen in **Table 3-6**. Recorded groundwater use has generally decreased over the years. The recorded groundwater production has generally decreased from 36,842 AFY in 2000.[79]

The Project will receive water from a combination of the City's groundwater extracted from the Chino Basin, treated groundwater from the CDA, recycled water from the IEUA, and imported water from the WFA.

Projected groundwater use by OMUC will continue as noted in **Table 3-3**. The use of groundwater will continue to be dependent upon the cost of extracting, treating, and transporting the water to customers.

78 OMUC 2020 UWMP, pg. 6-3, June 2021.

79 2000-2009 from the 2012 Ontario Water Master Plan; 2010 from OMUC 2010 UWMP; and 2011-2020 from OMUC 2020 UWMP, p. 6-3.

Groundwater from the Chino Basin will be utilized by OMUC either directly by pumping into its distribution system or by treating the groundwater (Wells 44 and 52) at the John Galvin Ion Exchange Plant and then pumping the treated groundwater into the City distribution system.[80] The current and ultimate production capacity of OMUC wells is sufficient to meet current and ultimate demand as shown in **Table 3-4**.

As shown in **Table 4-1**, the amount of water that OMUC expects to withdraw from the Chino Basin is well within appropriate right pursuant to the Chino Basin Adjudication of 1978 (Appendix M). In addition to its well production, OMUC will also purchase treated Chino Basin groundwater from CDA. OMUC has 1,500 AFY capacity rights in the Chino I Desalter and 7,033 AFY capacity rights in the Chino II Desalter.[81] The City also purchases treated groundwater from the CDA. The City currently has an entitlement of 8,533 AFY from the CDA.

4.4 Sufficiency of Groundwater Basin (CWC Section 101910(f)(5))

The City's legal right to pump water in an amount necessary to meet all demands as sanctioned and protected by the Judgment as discussed above, is buttressed by several programs and projects directed at ensuring the sufficiency of groundwater supplies from the Chino Basin, particularly during dry years. An adjudicated water right has perhaps the most substantial indication of reliability of any water right that currently exists in California. An adjudicated right is based upon long-term studies whose purpose it is to protect the long-term functionality of the water source. These rights are coordinated in an established and binding manner with all the other users of the Chino Basin and are overseen by Chino Basin Watermaster, which has the authority to mandate and proscribe activities whose purpose is to protect the water source and maximize its long-term beneficial use.

All Chino Basin Watermaster processes are governed by Rules and Regulations and receive active oversight from the Court which, as noted above, retains continuing jurisdiction over the administration of the Judgment. Consequently, the sufficiency of the groundwater is not only directed by rigorous Chino Basin Watermaster management processes but validated and ensured by continuing Court oversight.

The OBMP for the Chino Basin has guided the Chino Basin Watermaster's activities since its adoption in 1998. Chino Basin Watermaster-led basin management activities to ensure the maximization of safe yield and OSY of the Chino Basin include objectives, projects, and programs identified in the Peace Agreement and the OBMP. Progress is reported in annual reports, biannual, and triennial reports. The key programs include:

1. a comprehensive monitoring program.
2. a comprehensive recharge program.

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80 OMUC 2020 UWMP, pg. 6-33, June 2021.

81 Chino Basin Desalter Authority, 2020 UWMP, June 2021.

3. development and implementation of a water supply plan for impaired areas of the Chino Basin.
4. development and implementation of a comprehensive groundwater management plan for Management Zone 1.
5. development and implementation of a regional supplemental water program.
6. development and implementation of cooperative programs with the California Regional Water Quality Control Board – Santa Ana Region and other agencies to improve Basin management.
7. development and implementation of a salt management program.
8. development and implementation of a groundwater storage program.
9. development and implementation of storage and recovery programs.

As stated, the referenced elements of the OBMP collectively comprise of a comprehensive regimen directed to ensuring and maximizing the long-term beneficial use of water in the Chino Basin. OBMP Program Element No. 3, "Develop and Implement Water Supply Plan for the Impaired Areas of the Chino Basin," and Program Element No. 5, "Develop and Implement Regional Supplemental Water Program," address the sufficiency of groundwater from the Chino Basin. Fundamentally, the goal of Program Elements 3 and 5 is to:[82]

> *To maintain and enhance Safe Yield with a groundwater desalting program that is designed to replace declining agricultural groundwater pumping in the southern part of the basin with new pumping to meet increasing municipal water demands in the same area, to minimize groundwater outflow to the Santa River, and to increase Santa Ana River recharge into the basin.*
>
> *To improve the regional conveyance and availability of imported water and recycled waters throughout the basin.*

The achievements from the implementation of the 2000 OBMP for Element 3 and 5 are summarized below.[83]

> *Program Element 3 Develop and Implement Water Supply Plan for Impaired Areas (Groundwater Desalting): The objectives of this Program Element are to maintain and enhance the Safe Yield of the basin. The groundwater desalting program was designed to replace declining agricultural groundwater pumping in the southern part of the basin with new groundwater pumping to meet increasing municipal water demands in the same area. The new wells used in the groundwater desalting program were constructed in strategic locations to minimize groundwater outflow to the Santa Ana River and to increase the Santa Ana River recharge into the basin. In 2000, the groundwater desalting program included a 6,000 AFY treatment plant and a series of wells constructed in the southern part of the Chino Basin near the Chino Airport. Under the OBMP, as*

82 2020 Optimum Basin Management Program Update Report, prepared by Wildermuth Environmental, January 2020, accessed May 2022, https://cbwm.syncedtool.com/shares/folder/PaauzoQapiZ/?folder_id=5151637.

83 Wildermuth Environmental, 2020 Optimum Basin Management Program Update Report, January 2020. Appendix A, pg. 5 – 6.

of 2018, the desalting program has grown to two treatment plants and additional wells that in aggregate pump and treat about 30,000 AFY degraded groundwater, and the program will reach the OBMP objective of 40,000 AFY in 2019. The groundwater desalting program facilities are owned by the Chino Basin Desalter Authority (CDA).

Program Element 5: Develop and Implement Regional Supplemental Water Program (Recycled Water Reuse): The objective of this Program Element is to improve the regional conveyance and availability of imported and recycled waters throughout the basin. Since 2000, the IEUA has constructed and operated a recycled water conveyance system throughout the basin enabling it to provide recycled water to its member agencies. Recycled water deliveries grew from about 3,400 AFY in 2000 to about 34,000 AFY in 2017. The recycled water provided by the IEUA has replaced a like amount of groundwater and imported water that would have been otherwise been used for non-potable purposes. Much of the post-2000 increase in supplemental water storage in the Chino Basin is attributable to the increased availability of recycled water. Recycled water is more reliable than imported water, and thus using it in lieu of imported water has improved the sustainability of the Chino Basin and water supply reliability. Improvements in the regional conveyance and availability of imported water were not achieved.

As indicated above, the City overlies groundwater supplies in the southern part of the Chino Basin which must be pumped for purposes of meeting new demands, maintaining safe yield, and to protect water quality in the Santa Ana River. As agricultural production in the southern part of the Chino Basin has declined, it is necessary for these reasons to increase production for municipal uses. This is being achieved through the Chino I and Chino II Desalters, of which the City has a contractual right to purchase 8,533 AFY pursuant to the 2001 “Joint Exercise of Powers Agreement Creating the Chino Basin Desalter Authority” and subsequent agreements. Thus, not only was Chino Basin water production increased by the City foreseen in the OBMP, but it also sanctioned and encouraged water production for purposes of achieving OBMP objectives.

The sufficiency of the groundwater supply that is available to OMUC is assured due to the abundance of groundwater in the central and southern portion of the Chino Basin. OBMP objectives that prioritize and assure production from the southern Chino Basin, coupled with desalting and ion-exchange treatment facilities, enable the use of this abundant supply for municipal (potable) purposes. As indicated in the quoted text of the OBMP, southern basin production, where the City is partially located, is the linchpin of several critical OBMP objectives. Thus, the sufficiency of groundwater is heightened and prioritized by the necessity of continued pumping from the southern Chino Basin under the OBMP, which is administered by the Chino Basin Watermaster and ultimately enforced by continuing court jurisdiction over the Judgment.

The other referenced OBMP Program Elements are collectively directed to ensuring the sufficiency of Chino Basin groundwater supplies, particularly during dry years, and comprehensively address water quality and quantity, thus maximizing beneficial use over the long-term. Sufficiency of groundwater from the Chino Basin is further assured for the following reasons:

- IEUA is a member agency of MWD, which provides imported water from the State Water Project for direct use by parties to the Judgment in the Chino Basin and for Chino Basin recharge purposes (when supplies are available). IEUA has also reviewed the sufficiency of supplies for its service territory that includes the Chino Basin in connection with its 2020 UWMP.

- IEUA's UWMP is consistent with, and reiterative of, OBMP projects and programs (see Section 4 of IEUA 2020 UWMP in Appendix E). IEUA anticipates increased limitations for imported water for direct and recharge use while noting reductions during dry years (due to increased reliance on groundwater from the Chino Basin) and in the higher amount otherwise required in the absence of OBMP projects and programs. The UWMP also analyzes the sufficiency of water supplies for single and multiple year drought scenarios and concludes the region is expected to meet 100 percent of its dry year demand under every scenario. Key assumptions included:
  - Reliance on assurances provided by MWD in its 2020 UWMP that it could meet 100 percent of projected supplemental full-service water supply demands through 2040;
  - Implementation of MWD's Chino Basin DYY Storage Program consistent with the contractual shift obligations of the participating agencies of up to 33,000 AF in a twelve-month period; and
  - Sustain per capita water use reductions of 20 percent.

IEUA concluded in its 2020 UWMP that the projected available water supply will meet projected water demand due to diversified water supply and water conservation measures. Based on IEUA water supply projections, there are sufficient water supplies to meet normal year water demands, single dry year, and multiple dry year demands.[84]

CWC section 10631(j) provides that urban water suppliers that rely upon a wholesale agency for a source of water, such as IEUA, may rely upon water supply information provided by the wholesale agency in fulfilling UWMP informational requirements.

IEUA's independent analysis of contemporary regional water conditions in conjunction with MWD's most recent report, provide additional and reliable assurances concerning the sufficiency of imported water supplies that comprise a portion of overall Chino Basin supply sufficiency.

The City's participation in the DYY Storage Program described in **Section 3**, along with future water storage and recovery projects, will drought-proof the Chino Basin and all other appropriative pool members from imported water shortages. This program is consistent with OBMP Program Element No. 9, "Develop and Implement Storage and Recovery Program." Benefits to the Chino Basin associated with this program include the construction of facilities to enhance imported water deliveries and the production of water from the Chino Basin. Further demonstrating the sufficiency of Chino Basin groundwater is MWD's DYY program to use the Chino Basin for dry year supply purposes, thus underscoring that sufficient Chino Basin groundwater is available during dry years not only for local use by agencies, such as the City, but also in connection with MWD's regional reliability programs.

84 IEUA 2020 UWMP, pg. 7-7, June 2021.

The sufficiency of groundwater supplies available to OMUC is assured because of the OBMP programs overseen by the Chino Basin Watermaster and are conducted under the auspices of continuing Court jurisdiction that specifically direct and assure the long-term production of water pursuant to the City's legal rights to produce such water necessary to meet ultimate water demands.

Conclusion

The City's total annual groundwater production has been held relatively stable over the past 10 years at roughly 20,000 AFY.[85] Production capacity meets current demands and is projected to increase to meet ultimate demand. The current water supply utilized by the City totals approximately 39,921 AFY (FY 19/20, Table 3-2). Currently, the City's water rights in the Chino Basin as recorded by the Chino Basin Watermaster totaling approximately 36,514.9 AFY (Annual Production Rights for Non-Ag Pool plus Appropriative Pool), with an additional 96,544 AF in storage.[86] Although annual fluctuations will occur, the City's rights are projected to increase over the next 20 years due to more land use conversions and credits from recharge.

In conclusion, the water supplies available to OMUC currently meet and exceed citywide water demands. Groundwater production by OMUC is currently less than their existing rights and within their production capacity. Regardless, OMUC has the means and right to exceed their groundwater allocation in the Chino Basin when required to meet demand pursuant to the Judgment. Further, OMUC has rights to water held in storage that would supply all City demands for more than two years. In addition to groundwater, OMUC can supply water to the Project purchased from the WFA that is within their existing entitlements and capacities. Therefore, OMUC can meet the additional unplanned water demand of the Project by producing additional groundwater or purchasing imported water supplies to which it has existing rights to and available capacity to use.

85 OMUC 2020 UWMP, p. 6-3, June 2021.

86 OMUC 2020 UWMP, p. 6-12, June 2021.

5. PRIMARY ISSUE FOR ASSESSMENT

The lead agency for a proposed project shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy demands of the project, in addition to existing and planned future uses (CWC section 10911). The lead agency is expected to approve or disapprove the project based on several factors, including but not limited to the WSA.

Law

CWC Section 10910(g)(1): Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county not later than 90 days from the date on which the request was received. The governing body of each public water system, or the city or county if either is required to comply with this act pursuant to subdivision (b), shall approve the assessment prepared pursuant to this section at a regular or special meeting.

CWC Section 10911(b): The city or county shall include the water assessment provided pursuant to Section 10910, and any information provided pursuant to subdivision 9a), in any environmental document prepared for the project pursuant to Division 13 (commencing with Section 21000) of the Public Resources Code.

(c) The city or county may include in any environmental document an evaluation of any information included in that environmental document provided pursuant to subdivision (b). The city or county shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses. If the city or county determines that water supplies will not be sufficient, the city or county shall include that determination in its findings for the project.

The lead agency is expected to review the WSA and decide whether additional water supply information is needed for its consideration of the Project.

5.1 FINDINGS

Whereas:

10. The City of Ontario Municipal Utilities Company (OMUC) has been identified as the water supplier for the proposed Ontario Airport South Airport Cargo Center Project (Project).
11. The estimated potable water demand for the Project would be 119 AFY.
12. The City's 2020 Water Master Plan Update and 2020 UWMP calculated the Project site's water demand as it was shown in the General Plan Land Use Plan, which is estimated as a potable water demand of 249 AFY.
13. OMUC produced 18,395 AF of groundwater in FY 19/20 (**Table 3-2**). OMUC has annual production rights in the Chino Groundwater Basin that currently total 36,515 AFY, as well as groundwater storage accounts that total 133,618 AF (**Table 4-1**). The water supply production capacity from City wells is

currently 54,594 AFY, which is projected to increase to 131,170 AFY to meet demand (**Table 3-4** and **3-5**).

14. OMUC holds shareholder entitlements to potable water from SAWCo in the amount of 600 AFY, and capacity rights to imported water from the WFA in the amount of approximately 28,000 AFY. OMUC also has capacity rights to potable water from the CDA in the amount of 8,533 AFY (Table 3-2 and 3-4). In FY 19/20, OMUC purchased 565 AF from SAWCo, 6,513 AF from WFA, and 6,636 AF from CDA (**Table 3-2**).
15. OMUC is entitled to the recycled water generated by IEUA from the City's annual share of sewer flows. In FY 19/20, the City delivered 12,650 AF to IEUA treatment plants, of which 7,812 AF was put to non-potable direct recycled water use (**Table 3-7**).
16. As of FY 19/20, citywide potable and recycled water demands were 32,109 AF and 7,812 AF, respectively (Table 2-1); ultimate potable and recycled water demands are projected to be 57,609 AFY and 16,059 AFY, respectively by 2045 (**Table 2-1**). The current production capacities are greater than needed to meet the average day demands under citywide buildout conditions. Additional wells are planned to supply the anticipated ultimate maximum day demand.
17. OMUC has forecasted excess water supplies will be available to meet citywide demand during single-dry and multiple dry water years over the next 20 years (**Table 3-8** and **Table 3-10**).
18. Based on the evidence provided herein, the total projected potable and recycled water supplies available to the OMUC during normal, single dry, and multiple dry water years over a 20-year projection will be sufficient to meet the projected water demand associated with the Project in addition to the water supplier's existing and planned future uses, including agricultural and manufacturing uses. State mandated conservation efforts will reduce demand in the future.

A Water Supply Assessment (WSA) was prepared to assess the water demand and supply conditions with implementation of the Project. As shown in **Table 2-5**, the total domestic water demand for the Project is estimated at 124,080 GPD (119 AFY).

According to the City's 2020 UWMP, the City has adequate supplies to serve 100 percent of its customers during normal, dry year, and multiple dry year demand through 2040, accounting for projected population increases and corresponding increases in water demand. Projected water demand for the Project was included in the 2020 UWMP projections based on the General Plan land use designation for "Industrial" uses. The Project would consist of 857,000 SF of warehouse and office space in the Cargo Sorting Building. The remainder of the site acreage would consist of aircraft uses and truckyard and visitor parking. The projected water demand for the Project is 0.48 percent of the water demand for the land use that was accounted for in the 2020 UWMP. Therefore, implementation of the Project would not obstruct the City's ability to meet water demands of its customers in normal, single dry, and multiple dry years.

This WSA concludes that the City will have sufficient water supplies available during normal, single dry, and multiple dry years through the year 2045 to meet all projected water demands associated with its existing and future customers, including the Project. In the unlikely event of a water shortage, implementation of the City's Water Conservation Plan and water efficiency strategies would ensure that sufficient water supplies were available to serve its customers, including the project, and existing and future users. The demands set in the 2020 UWMP for the Project area are sufficient for the Project demands and would hypothetically meet future warehouse expansion demands if the expansion does not exceed the set Project area.

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APPENDIX A

City of Ontario 2020 Urban Water Management Plan (UWMP)

CITY OF ONTARIO

CITY OF ONTARIO

JUNE 2021

FINAL

2020 URBAN WATER MANAGEMENT PLAN

STETSON ENGINEERS INC.

Northern California • Southern California • Arizona • Colorado • Oregon

City of Ontario
2020 Urban Water Management Plan

JUNE 2021

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LIST OF ACRONYMS

1,2,3-TCP	1,2,3-Trichloropropane
AB	Assembly Bill
AF	Acre-feet
AFY	Acre-feet per year
Annual Assessment	Annual Water Supply and Demand Assessment
AWWA	American Water Works Association
CBWCD	Chino Basin Water Conservation District
CCWRF	Carbon Canyon Water Recycling Facility
CEQA	California Environmental Quality Act
CDA	Chino Basin Desalter Authority
CIMIS	California Irrigation Management Information System
City	City of Ontario
CPUC	California Public Utilities Commission
CWC	California Water Code
DACs	Disadvantaged Communities
Delta	Sacramento-San Joaquin Delta
DMMs	Demand Management Measures
DOF	Department of Finance
DRA	Drought Risk Assessment
DWR	Department of Water Resources
DYYP	Dry-Year Yield Program
ERP	Emergency Response Plan
ETo	Evapotranspiration
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GCMs	General Circulation Models
GIS	Geographical Information Systems
GPCD	Gallons per capita per day
GSP	Groundwater Sustainability Plan
IEUA	Inland Empire Utilities Agency
JPA	Joint Exercise of Powers Agreement
kWh	Kilowatt Hours
LSLS	Local Storage Limitation Solution
M&I	Municipal and Industrial
MGD	Million Gallons Per Day
MWD	Metropolitan Water District of Southern California
NRWS	Non-Reclaimable Wastewater System
OBMP	Optimum Basin Management Program
OMC	Old Model Colony
OR	Ontario Ranch
Plan	Urban Water Management Plan
RCP	Representative Concentration Pathway
PCE	Perchloroethylene
RP-1	Regional Water Recycling Plant No. 1

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RP-2	Regional Water Recycling Plant No. 2
RP-3	Regional Water Recycling Plant No. 3
RP-4	Regional Water Recycling Plant No. 4
RP-5	Regional Water Recycling Plant No. 5
RRA	Risk and Resilience Assessment
RWQCB	Regional Water Quality Control Board
SAWCo	San Antonio Water Company
SB	Senate Bill
SBCFCD	San Bernardino County Flood Control District
SCAG	Southern California Association of Governments
SGMA	Sustainable Groundwater Management Act of 2014
SWRCB	State Water Resources Control Board
SWRCB - DDW	State Water Resources Control Board – Division of Drinking Water
TCE	Trichloroethylene
TDS	Total Dissolved Solids
USEPA	U.S. Environmental Protection Agency
UWMP	Urban Water Management Plan
VOCs	Volatile Organic Compounds
WFA	Water Facilities Authority
WRCC	Western Regional Climate Center
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WUCA	Water Utilities Climate Alliance
WUE	Water Use Efficiency

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Chapter 1

URBAN WATER MANAGEMENT PLAN INTRODUCTION AND OVERVIEW

INTRODUCTION

An urban water supplier is defined (pursuant to Section 10617 of the California Water Code or CWC[1]) as "*a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers.*"

The City of Ontario (City) is classified as an urban water supplier because it serves more than 3,000 customers (i.e. individual metered accounts) and it supplies more than 3,000 acre-feet of water annually to its customers for municipal purposes.

In accordance with the "Urban Water Management Planning Act", which was enacted by the California Legislature in 1983, every urban water supplier (including the City) is required to prepare and adopt an Urban Water Management Plan (UWMP), periodically review its UWMP, and incorporate updated and new information into an updated UWMP at least once every five years.

The City's most recent update was its 2015 UWMP (or 2015 Plan) which was submitted to, and approved by, the California Department of Water Resources (DWR) in 2016. Urban water suppliers (including the City) are required to complete and submit their 2020 UWMPs to DWR by July 1st, 2021.

The current requirements for preparing the UWMP are included in CWC Sections 10608 through 10657. The City's 2020 UWMP (or 2020 Plan) was prepared consistent with the CWC and the recommended organization provided in DWR's Final "Urban Water Management Plan Guidebook 2020" (Final 2020 UWMP Guidebook), dated March 2021.

The UWMP provides urban water suppliers (including the City) with a planning document for long-term resource planning to ensure adequate water supplies are available to meet existing and future water supply needs. In addition, the 2020 UMWP incorporates water supply reliability determinations resulting from potential prolonged drought, regulatory revisions, and/or changing climatic conditions.

[1] References to CWC Sections in this 2020 UWMP were obtained from https://leginfo.legislature.ca.gov/

The City's 2020 Plan consists of the following Chapters:

Chapter 1 Urban Water Management Plan Introduction and Overview
Chapter 2 Plan Preparation
Chapter 3 System Description
Chapter 4 Water Use Characterization
Chapter 5 SB X7-7 Baseline, Targets, and 2020 Compliance
Chapter 6 Water Supply Characterization
Chapter 7 Water Service Reliability and Drought Risk Assessment
Chapter 8 Water Shortage Contingency Plan
Chapter 9 Demand Management Measures
Chapter 10 Plan Adoption, Submittal, and Implementation

Lay descriptions are presented at the beginning of each of these Chapters that offer a succinct, executive summary type overview.

LAY DESCRIPTION – CHAPTER 1

URBAN WATER MANAGEMENT PLAN INTRODUCTION AND OVERVIEW

Chapter 1 (Urban Water Management Plan Introduction and Overview) of the City's 2020 Plan discusses and provides the following:

- An analysis of the City's ability to provide sufficient water supplies to meet the projected water demands of its customers, including during a five consecutive year drought period.
- An overall lay description of the 2020 Plan, including California Water Code and Urban Water Management Plan Act requirements, is provided. The City is required to prepare an Urban Water Management Plan.
- The City's 2020 Plan was prepared consistent with the recommended organization provided in DWR's Final "Urban Water Management Plan Guidebook 2020", dated March 2021. A description regarding the organization of the 2020 Plan, including a summary of each Chapter, is provided. The City's Water Shortage Contingency Plan (discussed in Chapter 8) is also included in the 2020 Plan.
- The 2020 Plan incorporates DWR's water use and supply tables (standardized tables) for the reporting and submittal of UWMP data. These tables are included within the respective sections of the 2020 Plan and in Appendix A.
- The City's coordination efforts with other planning agencies are discussed, including coordination efforts with the City of Ontario's Planning Division, Inland Empire Utilities Agency, Water Facilities Authority, and the Southern California Association of Governments
- The City's eligibility to receive grants and loans administered by the State of California and/or DWR, as a result of preparing the 2020 Plan, is discussed.

- Information is provided which demonstrates the City's prior, continued, and projected reduction on imported water supplies obtained (either directly or indirectly) from the Sacramento-San Joaquin Delta (Delta). The City has reduced its reliance on imported water supplies through a reduction of GPCD water demand and increased recycled water use for Fiscal Year 2014-15 through Fiscal Year 2019-2020. In addition, the City is projected to continue reducing its reliance on imported water supplies through Fiscal Year 2044-45. Further discussion which demonstrates the City's measurable reduction in imported water supplies and improvement in regional self-reliance is provided in Appendix B.
- The checklist developed by DWR and used by the City to incorporate the specific UWMP requirements is discussed. The completed checklist is provided in Appendix C.

1.1 RECOMMENDED UWMP ORGANIZATION

The City's 2020 Urban Water Management Plan (2020 Plan) was prepared consistent with the recommended organization provided in DWR's Final "Urban Water Management Plan Guidebook 2020" (Final 2020 UWMP Guidebook), dated March 2021. The City's 2020 Plan consists of the following Chapters:

Chapter 1	Urban Water Management Plan Introduction and Overview
Chapter 2	Plan Preparation
Chapter 3	System Description
Chapter 4	Water Use Characterization
Chapter 5	SB X7-7 Baselines, Targets, and 2020 Compliance
Chapter 6	Water Supply Characterization
Chapter 7	Water Service Reliability and Drought Risk Assessment
Chapter 8	Water Shortage Contingency Plan
Chapter 9	Demand Management Measures
Chapter 10	Plan Adoption, Submittal, and Implementation

Pursuant to CWC requirements, the City's 2020 Plan incorporates DWR's water use and supply tables (standardized tables) for the reporting and submittal of UWMP data. DWR's standardized tables are provided within the body of the 2020 Plan text as well as in Appendix A. The City also submitted the UWMP data (standardized tables) electronically through DWR's Online Submittal Tool.

The City's 2020 Plan also provides supporting documents (appendices) including notification letters of the Plan update, public notice of the Plan hearing, and adoption resolution from the City's governing body. Further discussions regarding these supporting documents are provided within the individual Chapters of the City's 2020 Plan.

1.2 UWMPS IN RELATION TO OTHER EFFORTS

The City's 2020 Plan was prepared in coordination with planning agencies including the City of Ontario's Planning Division and the Southern California Association of Governments (SCAG). In addition, the City's 2020 Plan was prepared using management documents including the City's "*2020 Water System Master Plan*", the City's *"2018 Hazard Mitigation Plan"*, and the San Bernardino County's "*2017 San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan*".

The City is a member agency of various wholesale agencies including the Chino Basin Desalter Authority (CDA), Inland Empire Utilities Agency (IEUA), and the Water Facilities Authority (WFA). CDA, IEUA, and WFA have each individually prepared a 2020 Plan which are incorporated in the City's 2020 Plan by reference. In addition, the City provided its 2020 Plan to CDA, IEUA, and WFA, which includes water use projections in five-year increments for a normal year, a single dry year, and a five consecutive year drought over the next 25 years.

The City is a shareholder in, and purchases water from, San Antonio Water Company (SAWCo). The City receives water from SAWCo based upon the City's proportional number of shares and the water supply available to SAWCo.

1.3 UWMPS AND GRANT OR LOAN ELIGIBILITY

Pursuant to DWR's Final 2020 UWMP Guidebook:

"*In order for a Supplier to be eligible for any water grant or loan administered by DWR, the Supplier must have a current UWMP on file that has been determined by DWR to address the requirements of the Water Code. A current UWMP must also be maintained by the Supplier throughout the term of any grant or loan administered by DWR. A UWMP may also be required in order to be eligible for other state funding, depending on the conditions that are specified in the funding guidelines. Suppliers are encouraged to seek guidance on the specifics of any state funding source from the respective funding agencies. The following sections of the Water Code are pertinent to Suppliers considering pursuit of grants or loans*."

The City's 2020 Plan has been prepared to meet eligibility requirements for grants and loans administered by the State and/or DWR.

1.4 DEMONSTRATION OF CONSISTENCY WITH THE DELTA PLAN FOR PARTICIPANTS IN COVERED ACTIONS

Pursuant to DWR, an urban water supplier that anticipates participating in or receiving water from a proposed project (or "covered action") such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Sacramento-San Joaquin Delta (Delta) should provide information in their 2015 and 2020 UWMPs for use in demonstrating consistency with Delta Plan Policy WR P1, "*Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance*". In addition, pursuant to California Code of Regulations, Title 23, § 5003:

> *(c)(1) Water suppliers that have done all of the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:*
>
> > *(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;*
> >
> > *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and*
> >
> > *(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).*

The City has reduced its reliance on imported water supplies for FY 2014-15 and FY 2019-20. In addition, the City is projected to continue reducing its reliance on imported water supplies through FY 2044-45. A further discussion which demonstrates the City's measurable reduction imported water reliance and improvement in regional self-reliance is provided in Appendix B.

1.5 TIPS FOR UWMP PREPARERS

The City's 2020 Plan (which includes the City's 2020 Water Shortage Contingency Plan (WSCP) is considered an update to the City's 2015 Plan. However, the 2020 Plan and the WSCP are considered stand-alone documents. As discussed in Section 1.1, the City's 2020 Plan was prepared consistent with the recommended organization provided in DWR's Final 2020 UWMP Guidebook.

A checklist of specific UWMP requirements is included in Appendix C. The checklist includes the page number where the required elements are addressed to assist in DWR's review of the submitted Plan.

Chapter 2

PLAN PREPARATION

LAY DESCRIPTION – CHAPTER 2

PLAN PREPARATION

Chapter 2 (Plan Preparation) of the City's 2020 Plan discusses and provides the following:

- The basis for preparing an Urban Water Management Plan is provided. The City is required to prepare the 2020 Plan because it is an "urban water supplier" (the City serves more than 3,000 customers and it supplies more than 3,000 acre-feet of water annually to its customers for municipal purposes).
- The City is a "Public Water System" and is regulated by the State Water Resources Control Board - Division of Drinking Water. The City's Public Water System number is provided in Table 2-1.
- The City's Plan has been prepared as an "individual" plan rather than a "regional" plan in an effort to provide information specific to the City to best inform its employees, management, and customers.
- Information presented in the City's 2020 Plan is provided on "fiscal year" basis which is from July 1 through June 30 of the following year.
- Water quantities presented in the City's 2020 Plan are provided on an "acre-foot" basis.
- The City's coordination and outreach efforts with wholesale water agencies, other retail water agencies, and the community are described. The City coordinated the preparation of its 2020 Plan with the Chino Basin Watermaster, Chino Basin Desalter Authority, Cucamonga Valley Water District, Fontana Water Company, Inland Empire Utilities Agencies, Monte Vista Water District, Metropolitan Water District (MWD) of Southern California, Santa Ana Watershed Project Authority, San Antonio Water Company, and Water Facilities Authority.
- The City's notification process to the cities and county which the City provides water to is discussed.

2.1 PLAN PREPARATION

As discussed in Section 1.1, the City's 2020 UWMP was prepared consistently with the recommended organization provided in DWR's Final 2020 UWMP Guidebook. Pursuant to DWR's Final 2020 UWMP Guidebook:

"*The [CWC] specifies several requirements for preparing a UWMP, including who is required to prepare a UWMP; how to prepare a UWMP, depending on whether the Supplier choses to* *participate in a regional or individual planning effort; selection of reporting year-type; and coordination, notification, and outreach.*"

Pursuant to CWC requirements, the City's 2020 Plan incorporates DWR's water use and supply tables (standardized tables) for the reporting and submittal of UWMP data.

2.2 BASIS FOR PREPARING A PLAN

CWC 10617.

"Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

CWC 10620.

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

CWC 10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update.

The City's 2020 Plan was prepared in accordance with the UWMP Act which was established in 1983. The UWMP Act requires every "urban water supplier" to prepare and adopt a Plan, to review its Plan at least once every five years and make any amendments or changes which are indicated by the review. An "urban water supplier" is defined as "a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually." (CWC 10617.)

Section 10621(a) of the CWC states, "*[e]ach urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update".* As a result, DWR requires the 2020 Plans be submitted by July 1, 2021.

The City is an "urban water supplier" pursuant to Section 10617 of the CWC and directly serves potable water to more than 3,000 customers and supplies more than 3,000 acre-feet per year (AFY) at retail for municipal purposes. The City's 2020 Plan is an update to the City's 2015 Plan.

2.2.1 PUBLIC WATER SYSTEMS

CWC 10644.

(a)(2) The plan, or amendments to the plan, submitted to the department ... shall include any standardized forms, tables, or displays specified by the department.

California Health and Safety Code 116275.

(h) "Public Water System" means a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year.

Pursuant to CWC requirements, the City's 2020 Plan incorporates DWR's standardized tables for the reporting and submittal of UWMP data. The standardized tables are provided within the body of the 2020 Plan text as well as in Appendix A. The City also submitted the UWMP data (from the standardized tables) electronically through DWR's Online Submittal Tool.

In addition, the City is a Public Water System and is regulated by the State Water Resources Control Board - Division of Drinking Water (SWRCB-DDW). The SWRCB-DDW requires water agencies to provide the number of connections, water usage, and other information annually. The information provided to SWRCB-DDW indicates the City serves potable water to more than 3,000 customers and supplies more than 3,000 AFY. Table 2-1 provides the City's Public Water System name and number.

2.2.2 SUPPLIERS SERVING MULTIPLE SERVICE AREAS / PUBLIC WATER SYSTEMS

The City serves only a single Public Water System. Table 2-1 provides the City's Public Water System name and number.

Table 2-1 Public Water Systems

Submittal Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 *
Add additional rows as needed			
3610034	Ontario Municipal Utilities Company	36,514	39,921
	TOTAL	36,514	39,921
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES: The "Volume of Water Supplied 2020" includes recycled water supplies of 7,812 AF. Source for "Number of Municipal Connections 2020": https://sdwis.waterboards.ca.gov/PDWW/			

2.3 REGIONAL PLANNING

The City has developed its 2020 Plan reporting solely on its service area to address all requirements of the California Water Code. The City's 2020 Plan was not developed as a Regional Plan.

2.4 INDIVIDUAL OR REGIONAL PLANNING AND COMPLIANCE

As shown in Table 2-2, the City's 2020 Plan is an "Individual UWMP". The City has developed its 2020 Plan reporting solely on its service area to address all requirements of the California Water Code, including water use targets and baselines pursuant to SB X7-7 Water Conservation Act of 2009 reporting (discussed further in Chapter 5). The City notified and coordinated with appropriate regional agencies and constituents (See Section 2.6).

Table 2-2 Plan Identification Type

Submittal Table 2-2: Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance** *if applicable* (select from drop down list)
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

2.4.1 REGIONAL UWMP

CWC 10620.

(d)(1) An urban water supplier may satisfy the requirements of this part by participation in area wide, regional, watershed, or basin wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

As indicated in Table 2-2, the City's 2020 Plan was developed as an "Individual UWMP" and not as part of a Regional Plan.

2.4.2 REGIONAL ALLIANCE

CWC 10608.20.

(a)(1) …Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28…

CWC 10608.28.

(a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

(1) Through an urban wholesale water supplier.

(2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31 (commencing with Section 81300)).

(3) Through a regional water management group as defined in Section 10537.

(4) By an integrated regional water management funding area.

(5) By hydrologic region.

(6) Through other appropriate geographic scales for which computation methods have been developed by the department.

(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

As indicated in Table 2-2, the City's 2020 Plan was developed as an "Individual UWMP" and not part of a Regional Alliance.

2.5 FISCAL OR CALENDAR YEAR AND UNITS OF MEASURE

CWC 10608.20.

(a)(1) Urban retail water suppliers…may determine the targets on a fiscal or calendar year basis.

2.5.1 FISCAL OR CALENDAR YEAR

The data provided in the City's 2020 Plan is reported on a fiscal year (FY) basis, unless noted otherwise, as shown in Table 2-3. A fiscal year begins on July 1st of every year.

Table 2-3 Supplier Identification

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☐	Supplier is a wholesaler
☑	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables are in calendar years
☑	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
07/01	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

2.5.2 REPORTING COMPLETE 2020 DATA

The data provided in the City's 2020 Plan is provided on a fiscal year basis through June 30, 2020.

2.5.3 UNITS OF MEASURE

As shown in Table 2-3, the data provided in the City's 2020 Plan is reported in units of acre-feet (AF), unless noted otherwise.

2.6 COORDINATION AND OUTREACH

CWC 10631.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

2.6.1 WHOLESALE AND RETAIL COORDINATION

The City is a member agency of CDA, IEUA, and WFA. As indicated in Table 2-4, the City has provided its 2020 Plan to CDA, IEUA, and WFA, which includes water use projections in five-year increments for a normal year, a single dry year, and a five consecutive year drought over the next 25 years.

The City is a shareholder in SAWCo, a private water company. The City obtains water supply based on its proportional number of shares and the amount of water available to SAWCo.

Table 2-4 Water Supplier Information Exchange

Submittal Table 2-4 Retail: Water Supplier Information Exchange
The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Wholesale Water Supplier Name
Add additional rows as needed
Chino Basin Desalter Authority
Inland Empire Utilities Agency
San Antonio Water Company
Water Facilities Authority
NOTES:

2.6.2 COORDINATION WITH OTHER AGENCIES AND THE COMMUNITY

CWC 10620.

(d)(3) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

CWC 10642.

Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of both the plan…

The City of Ontario is a retail water supplier that serves customers in the City of Ontario. The City is required to coordinate the preparation of the Plan with appropriate agencies in the area, including appropriate water suppliers that share a common source. Therefore, the City coordinated the preparation of its 2020 Plan with the Chino Basin Watermaster, CDA, Cucamonga Valley Water District, Fontana Water Company, IEUA, Monte Vista Water District, MWD, Santa Ana Watershed Project Authority, SAWCo, and WFA. As discussed in Section 10.2, the City notified these agencies, as well as the cities and county within which the City provides water supplies, at least sixty (60) days prior to the public hearing of the preparation of the 2020 Plan and invited them to participate in the development of the 2020 Plan. A copy of the notification letters sent to these agencies is provided in Appendix D.

2.6.3 NOTICE TO CITIES AND COUNTIES

CWC 10621.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

As discussed in Section 10.2, notification that the City was reviewing and considering amendments (updates) to the previous 2015 Plan, and preparing the 2020 Plan was provided to the cities and counties for which the City provides water supplies. Notification was provided at least 60 days prior to the public hearing (see Appendix D).

Chapter 3

SYSTEM DESCRIPTION

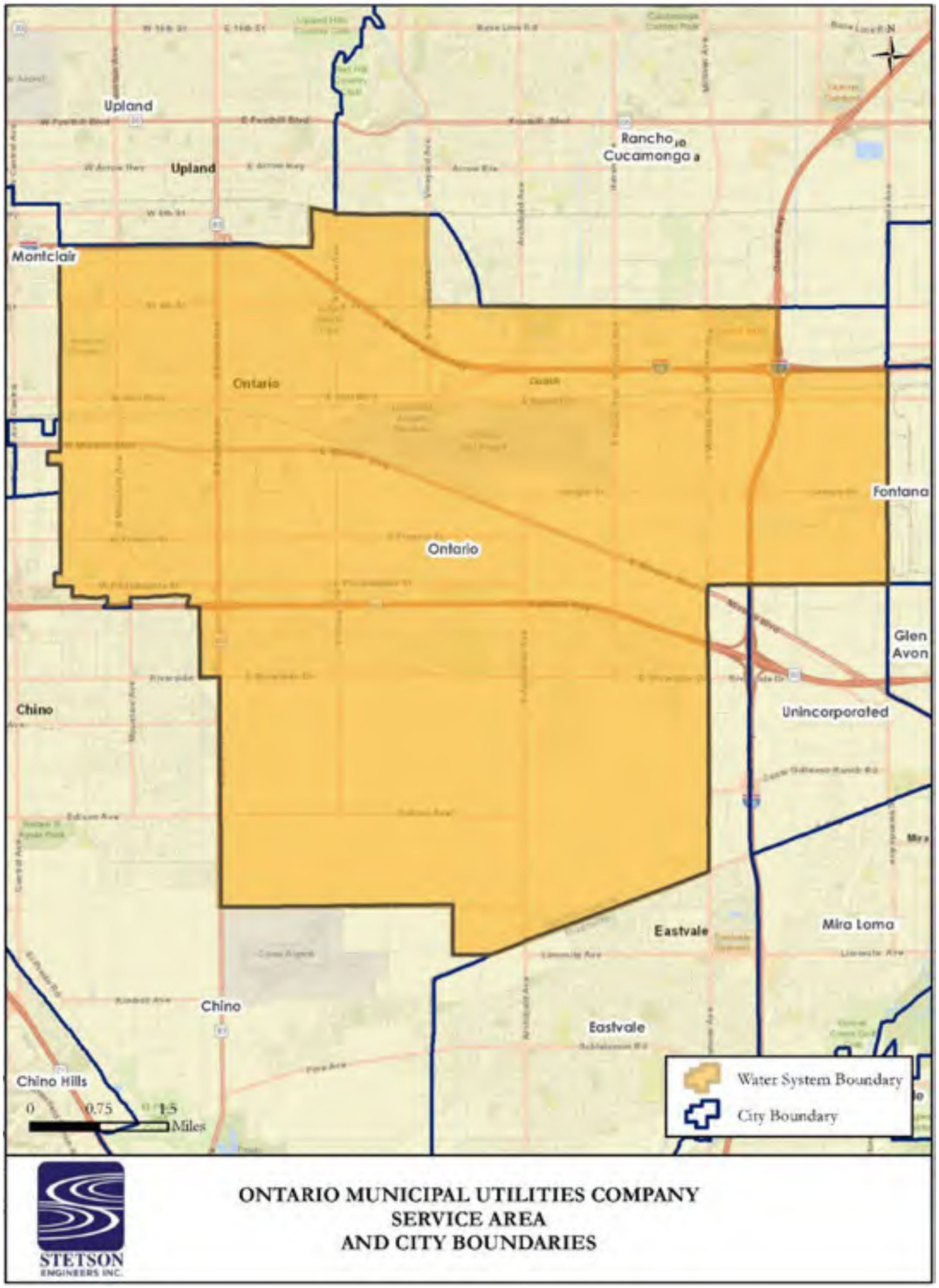
LAY DESCRIPTION – CHAPTER 3

SYSTEM DESCRIPTION

Chapter 3 (System Description) of the City's 2020 Plan discusses and provides the following:

- A description of the City's service area is provided. The City is located approximately 35 miles easterly of downtown Los Angeles in the County of San Bernardino. The City is bounded by the Cities of Chino and Montclair to the west; the Cities of Rancho Cucamonga and Upland to the north; the City of Fontana to the east; and the Cities of Chino and Eastvale to the south.
- The City's water service area encompasses an area of approximately 49 square miles. The location of the City's water service area is provided in Figure 1.
- A description regarding the City's water service area climate is provided. The monthly historical average temperatures (including minimum and maximum), monthly historical average rainfall, and monthly evapotranspiration (ETo) in the vicinity of the City's service area is summarized. The sources of the climate information are also discussed.
- The population within the City's water service area is discussed and projected. The sources of the population information are also discussed. The City provides water service to an area with a current population of 178,409. The City is projected to have a population of 362,903 by Fiscal Year 2044-45.
- A discussion of land use information used by the City to develop the 2020 Plan is provided. The City reviewed the current and projected land uses within its service area. The City also reviewed data provided by the Southern California of Governments, the Department of Finance, and the United States Census Bureau and prepared for counties, cities, and unincorporated areas within Southern California.

Figure 1 – Water Service Area and City Boundaries



3.1 GENERAL DESCRIPTION

CWC 10631.

(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.

The City of Ontario was founded in 1881 and was officially incorporated in 1891. The City is located approximately 35 miles easterly of downtown Los Angeles in the County of San Bernardino. The City is bounded by the Cities of Chino and Montclair to the west; the Cities of Rancho Cucamonga and Upland to the north; the City of Fontana to the east; and the Cities of Chino and Eastvale to the south.

The predominant land developments found within the City's service area are residential, commercial, industrial, and agricultural. Since acquiring new land in 1999, the City's service area is divided between two districts known as the Old Model Colony (OMC) and the Ontario Ranch (OR). The OMC area is mostly composed of residential, commercial, and industrial developments, including the Ontario International Airport, whereas the OR area is predominantly an agricultural development with plans to be redeveloped for residential, commercial, industrial, and public uses. Large areas of the OR already have been or are currently undergoing redevelopment.

3.2 SERVICE AREA BOUNDARY MAPS

The City's service area covers approximately 49 square miles encompassing most of the City of Ontario. The City's water service area boundary relative to the City of Ontario's municipal boundary is provided in Figure 1.

The City's service area map was submitted online through DWR's Population Tool in a "KML" file format (i.e. Google Earth format). The KML file was originally created in a Geographical Information Systems (GIS) shape file format and converted into a KML format. To the extent information was available, metadata was included in the KML file (including map projection, contact information, start and end dates for which the map is valid, constraints, attribute table definitions, and digitizing base).

3.3 SERVICE AREA CLIMATE

CWC 10631.

(a) Describe the service area of the supplier, including … climate…

CWC 10630.

It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

The monthly historical average temperatures (including minimum and maximum), monthly historical average rainfall, and monthly evapotranspiration in the vicinity of the City's service area is summarized in the tabulation below. Historical climate information was obtained from the Western Regional Climate Center (WRCC), the National Oceanic and Atmospheric Administration, and from DWR's California Irrigation Management Information System (CIMIS).

Service Area Climate Information

Month	Average Temperature (F)	Average Minimum Temperature (F)	Average Maximum Temperature (F)	Average Total Precipitation (Inches)	ETo (Inches)
January	55.47	44.06	67.63	2.17	1.95
February	55.12	44.85	67.44	2.69	2.41
March	58.82	48.21	58.82	1.27	3.75
April	60.93	51.00	74.85	0.87	4.55
May	67.88	55.61	79.62	0.30	5.19
June	71.22	59.78	86.23	0.01	5.97
July	77.76	64.70	93.08	0.05	6.60
August	78.88	65.16	94.20	0.03	6.41
September	75.39	62.90	90.75	0.11	4.88
October	67.78	56.58	82.00	0.46	3.46
November	58.87	48.62	73.87	0.85	2.31
December	54.68	43.22	66.20	1.86	1.72
Annual	65.23	53.73	77.89	10.68	49.20

Source:

Historical average monthly precipitation and temperature information was obtained from the National Oceanic and Atmospheric Administration (https://search.usa.gov/search?utf8=%E2%9C%93&affiliate=noaa.gov&query=ontario+ca) from 1998 through 2020 (for Ontario International Airport). Historical monthly average ETo information was obtained from the California Irrigation Management Information Systems (http://wwwcimis.water.ca.gov) and is based on data collected from Station 255 (Chino).

The historical average rainfall in the vicinity of the City's service area is 10.68 inches. The City's service area has a dry climate and summers can reach average maximum daily temperatures in the high 80s to low 90s. The City's water supplies and demands are projected during average year, single dry year and a five consecutive year drought (See Chapter 7), and are based on historical data and projected demands. Nonetheless, it is recognized changes in climatic conditions may have an impact on water supplies (as discussed in Section 4.5). Precipitation within the vicinity of the City's service area is discussed further in Section 7.2.

A discussion of the City's sources of supply, how those sources may be impacted by climate change, and the proactive actions the City and other local/regional water managers may take to address the potential climate change on water supplies is provided in Section 4.5.

3.4 SERVICE AREA POPULATION AND DEMOGRAPHICS

3.4.1 SERVICE AREA POPULATION

CWC 10631.

(a) Describe the service area of the supplier, including current and projected population… The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

The City provides water service to an area with a current population of 178,409. Table 3-1 presents the current and projected population of the area encompassed by the City's service area from FY 2019-20 to FY 2044-45. The City is projected to have a population of 362,903 by FY 2044-45.

The City initially reviewed the available historical populations within its service area for population growth trends. The City determined historical U.S. Census populations within its service area using DWR's Population Tool (https://wuedata.water.ca.gov/). The City's service area boundary was uploaded to DWR's Population Tool in a "KML" file format (i.e., Google Earth format). The KML file was originally created in a GIS shapefile format and converted into a KML format. The uploaded KML file represents the City's service area boundary from 1990 to present (2020). DWR's Population Tool utilized U.S. Census data from 1990, 2000, and 2010. The calculated FY 2019-20 population (discussed in Section 5.4) was used to determine compliance with the City's SB X7-7 water use target for 2020 (discussed in Section 5.5).

Projected populations in the City's service area were based on growth rate projections obtained from data provided by SCAG. The data provided by SCAG was based on their "*The 2020-2045 Regional Transportation Plan / Sustainable Communities Strategy of the SCAG*", dated September 2020, and incorporates demographic trends, existing land use, general plan land use policies, and input and projections through the year 2045 from the Department of Finance (DOF) and the US Census Bureau for counties, cities and unincorporated areas within Southern California.

Table 3-1 Population – Current and Projected

Submittal Table 3-1 Retail: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	178,409	232,583	266,339	300,095	362,903	362,903
NOTES: The 2020 population and the populations projected through 2045 were obtained the City of Ontario's 2020 Water Master Plan (See Section 3.4.1 and Section 5.4.1). Population is equal for years 2040 and 2045 because the City anticipates buildout to occur in 2040.						

3.4.2 OTHER SOCIAL, ECONOMIC, AND DEMOGRAPHIC FACTORS

CWC 10631.

(a) Describe the service area of the supplier, including… other social, economic, and demographic factors affecting the supplier's water management planning.

Many families within the City's water service area have special housing needs. They are the severely low-income earners, single-parent families, large families, seniors, people with disabilities, and homeless persons. Pursuant to the California Census' "Census 2020 California Hard-to-Count Fact Sheet, Census 2020 California Hard-to-Count Fact Sheet" approximately 28.1 percent of the population within the City has an income level below 150 percent of the poverty level. The City current has a vacancy rate of approximately 6.2 percent. In addition, approximately 46.5 percent of households are renter occupied. Extremely low income earners account for most renters because homeownership is essentially infeasible for them. Significant financial subsidies are necessary to assist extremely low-income earners in acquiring affordable housing. The City's efforts in providing this assistance are concentrated on rental housing vouchers. Large families are typically more prone to overpayment since they require bigger houses. Those who live in cheaper, smaller apartments experience overcrowding and substandard living conditions. To solve the housing problem among large families and single-parent households, the City offers low cost units at mobile home parks, deed restricted apartments, and units in publicly assisted multi-family housing projects. Additional units, part of the Ontario Town Square project, are also planned to be built. The City has considered these demographic factors which can affect the City's water management planning. Increased population will also have an impact on water demand.

3.5 LAND USES WITHIN SERVICE AREA

CWC 10631.

(a) The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities.

The City reviewed the current and projected land uses within its service area during the preparation of this 2020 Plan. Information regarding current and projected land uses is included in the City's General Plan and the City's 2020 Water Master Plan. Information regarding current and projected land uses identified in the City's 2020 Water Master Plan is provided in Appendix E. The existing land uses within the City's service area include residential (single-family and multi-family), commercial, industrial, and agricultural developments. Pursuant to the City's 2020 Water Master Plan Update, approximately 6,124 acres of the City's total land area use is currently attributed to residential use. Commercial and industrial use accounts for approximately 7,508 acres. Additionally, agricultural use comprises of 6,740 acres (184 acres within the Original Model Colony and 6,556 acres within the Ontario Ranch area).

The City anticipates the Ontario Ranch area will be converted from primarily agricultural land use to other land uses as the City transitions to buildout. As a result, land area for residential purposes is estimated to increase from its current amount of 6,124 acres to 10,869 acres at buildout. Additionally, land area for commercial and industrial purposes is projected to increase from 7,508 acres to 11,017 acres at buildout. In addition, the projected population within the City's service area is anticipated to increase (as discussed in Section 3.4). A discussion of the existing and projected water uses for the individual water use sectors within the City's service area, which includes the different land uses, is provided in Section 4.2. As discussed in Section 2.6, the City coordinated the preparation of the 2020 Plan with the City of Ontario, the County of San Bernardino, and other agencies.

As discussed in Section 3.4, the City obtained data from the Southern California Association of Governments document entitled "*The 2020-2045 Regional Transportation Plan / Sustainable Communities Strategy of the SCAG*", dated September 2020. Projected populations in the City's service area were based on growth rate projections developed by SCAG. The data provided by SCAG incorporates demographic trends, existing land use, general plan land use policies, and input and projections through the year 2045 from the Department of Finance and the US Census Bureau for counties, cities and unincorporated areas within Southern California.

Chapter 4

WATER USE CHARACTERIZATION

LAY DESCRIPTION – CHAPTER 4

WATER USE CHARACTERIZATION

Chapter 4 (Water Use Characterization) of the City's 2020 Plan discusses and provides the following:

- The City provides water service to individual "water use sectors". These water use sectors include single-family residential, multi-family, commercial, institutional (and governmental), landscape, and industrial. Individual descriptions for these water use sectors are provided in Section 4.2.1.
- The City's total water demands (including potable and recycled water) over the past 10 years have ranged from 36,036 AFY to 45,196 AFY, with an average of 40,831 AFY. The City currently measures its water use through meter data and billing records.
- The City conducts an annual water loss audit to identify distribution system water losses. Water losses can result from pipeline leaks and inaccurate metering due to faulty meters. Water loss estimates are incorporated into the City's projected water demands.
- The City's current and projected water demands are provided in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 4-3.
- The City's water demand projections incorporate water savings which are the result of implementation of new plumbing codes along with consumer awareness of the need to conserve water.
- The projected water demands for lower income households are identified and are included in the City's total projected water demands
- The City's sources of water supply and how those sources may be impacted by climate change are discussed. The proactive actions the City and other local/regional water managers may take to address the potential climate change impacts on water supplies are also discussed.

The City will be able to provide sufficient water supplies to meet the projected water demands of its customers, including during a five consecutive year drought period.

4.1 NON-POTABLE VERSUS POTABLE WATER USE

The Water Code requires a description and quantification of water uses within the City's service area, including both non-potable and potable water. Recycled water (non-potable) uses are addressed in Section 6.5; however, a summary is provided in Table 4-3. Furthermore, Chapter 4 addresses the City's potable water demands.

4.2 PAST, CURRENT, AND PROJECTED WATER USES BY SECTOR

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

CWC 10631.

(d)(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following…

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(4)(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

> *(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.*
>
> *(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.*

The City's current and projected water demands are provided in five-year increments over the next 25 years (through FY 2044-45) in Tables 4-1, 4-2, and 4-3. The City's total water demands were projected based on a review of the SB X7-7 calculations which are discussed in Chapter 5 (including the SB X7-7 water use target for 2020), current water use factors based on recent water demands, the City of Ontario's Water Master Plan Update 2020, the City of Ontario Recycled Water Master Plan Update 2020, and the total population projections based on land use trends within the City.

The City provides water service to individual "water use sectors" as identified by the California Water Code. The water use sectors supplied by the City are discussed in Section 4.2.1. The water use for each of these sectors during FY 2019-20 is provided in Table 4-1. The projected water use for each individual water use sector is provided in Table 4-2 and is based on the percentage breakdown of water use from each individual water use sector in FY 2019-20 (the percentages were then applied to the projected total water use).

Table 4-1 Demands for Potable and Non-Potable Water - Actual

Submittal Table 4-1 Retail: Demands for Potable and Non-Potable[1] Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Single Family		Drinking Water	12,502
Multi-Family		Drinking Water	5,068
Commercial		Drinking Water	5,359
Industrial		Drinking Water	2,078
Institutional/Governmental		Drinking Water	538
Landscape		Drinking Water	4,631
Losses		Drinking Water	1,565
Other	Hydrant	Drinking Water	368
		TOTAL	32,109

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*
[2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Recycled water demands are provided in Table 4-3 and Table 6-4.

Table 4-2 Use for Potable and Non-Potable Water - Projected

Submittal Table 4-2 Retail: Use for Potable and Non-Potable[1] Water - Projected						
Use Type	Additional Description (as needed)	Projected Water Use[2] *Report To the Extent that Records are Available*				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Single Family		15,723	17,540	19,109	22,431	22,431
Multi-Family		6,374	7,110	7,746	9,093	9,093
Commercial		6,740	7,519	8,191	9,615	9,615
Industrial		2,613	2,915	3,176	3,728	3,728
Institutional/Governmental		677	755	822	965	965
Landscape		5,824	6,497	7,078	8,309	8,309
Losses		1,968	2,196	2,392	2,808	2,808
Other		463	516	562	660	660
	TOTAL	40,382	45,048	49,076	57,609	57,609

[1] Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4. [2] Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

NOTES: Projected water use are equal for years 2040 and 2045 because the City anticipates buildout to occur in 2040.

Table 4-3 Total Gross Water Use (Potable and Non-Potable)

Submittal Table 4-3 Retail: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable Water, Raw, Other Non-potable *From Tables 4-1R and 4-2 R*	32,109	40,382	45,048	49,076	57,609	57,609
Recycled Water Demand[1] *From Table 6-4*	7,812	12,168	13,465	14,762	16,059	16,059
Optional Deduction of Recycled Water Put Into Long-Term Storage[2]						
TOTAL WATER USE	39,921	52,550	58,513	63,838	73,668	73,668

[1] Recycled water demand fields will be blank until Table 6-4 is complete [2]
*Long term storage means water placed into groundwater or surface storage that is not removed from storage in the same year. Supplier **may** deduct recycled water placed in long-term storage from their reported demand. This value is manually entered into Table 4-3.*

NOTES: Projected total water use are equal for years 2040 and 2045 because the City anticipates buildout to occur in 2040.

4.2.1 WATER USE SECTORS LISTED IN WATER CODE

CWC 10631.

(d)(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.
(J) Distribution system water loss.

As shown in Table 4-1, the City's service area includes the following water use sectors listed in the California Water Code:

- Single-family residential
  (A single-family dwelling unit is a lot with a free-standing building containing one dwelling unit that may include a detached secondary dwelling. Single-family residential water demands are included in retail demands.)

- Multi-family
  (Multiple dwelling units are contained within one building or several buildings within one complex. Multi-family residential water demands are included in retail demands.)

- Commercial
  (Commercial users are defined as water users that provide or distribute a product or service)

- Institutional (and governmental)
  (Institutional users are defined as water user dedicated to public service. Institutional users include, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions.)

- Landscape
  (Landscape connections supply water solely for landscape irrigation. Landscape users may be associated with multi-family, commercial, industrial, or institutional/governmental sites, but are considered a separate water use sector if the connection is solely for landscape irrigation. Landscape water demands are included in retail demands.)

- Industrial
  (Industrial users are defined as water users that are primarily a manufacturer or processor of materials as defined by the North American Industry Classification System (NAICS) code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development. Industrial water demands are included in retail demands.)

- Agricultural
  (Water used for commercial agricultural irrigation. Agricultural water demands are included in recycled water retail demands.)

- Distribution system losses
  (Distribution system losses represent the potable water losses from the pressurized water distribution system and water storage facilities, up to the point of delivery to the customers. Additional information is discussed in Section 4.2.4)

4.2.2 WATER USE SECTORS IN ADDITION TO THOSE LISTED IN WATER CODE

The City's service area does not include other water demand sectors which are not listed in the California Water Code (including exchanges, surface water augmentation, transfers, and wetlands or wildlife habitat).

4.2.3 PAST WATER USE

Chapter 6 provides a discussion of the sources of water supply the City uses to meet its water demands. Section 6.1 provides a tabulation of the City's historical annual water demands for each water supply source. Over the past ten years, the City's total water demands (including potable and recycled water demands) have ranged from 36,036 AFY to 45,196 AFY, with an average of 40,831 AFY. In addition, the City recently experienced a five-consecutive-year-drought within its service area from FY 2011-12 to FY 2015-16. The City also reviewed its historical water demands to determine the projected water demands and water supply reliability (discussed in Chapter 7). The City is able to provide sufficient water supplies to meet the projected water demands of its customers, including during a five consecutive year drought period.

4.2.4 DISTRIBUTION SYSTEM WATER LOSS

CWC 10631.

(d)(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following…

(J) Distribution system water loss.

CWC 10631.

(3)(A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.

(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met the distribution loss standards enacted by the board pursuant to Section 10608.34.

Distribution system water losses represent the potable water losses from the pressurized water distribution system and water storage facilities, up to the point of delivery to the customers. Sources of distribution system water loss can include: inaccurate metering due to faulty meters; water use not metered such as firefighting, flushing of the water system; and pipeline leaks.

The California Water Code Section 10608.34(b)(1) requires "[o]n or before October 1of each year until October 1, 2023, each urban retail water supplier shall submit a completed and validated water loss audit report for the previous calendar year or the previous fiscal year..." The water loss audits must follow American Water Works Association (AWWA) guidance and be validated by a certified water audit validator. The City has completed the annual water loss audit process through October 1, 2020, as required by the California Water Code (i.e. the City has completed water loss audits representing calendar years 2016, 2017, 2018, and 2019). The City's water loss audits were prepared and validated pursuant to DWR requirements. The annual water loss audit reports submitted by retail water agencies in California, including the City (provided in Appendix F), are available on DWR's website (https://wuedata.water.ca.gov/awwa_plans).

The City's annual water loss audits identify real water losses (e.g. leaks and main failures) and apparent water losses (e.g. customer meter inaccuracies, systematic data handling errors in customer billing systems, and unauthorized consumption). The City's distribution system water losses are based on the sum of the real and apparent water losses and are summarized in Table 4-4 for the past five years. Over the past five years, the City's average distribution system water losses represent approximately 2.9 percent of its total water demands. This average water loss factor was incorporated into the City's total potable water demand projections (Tables 4-2 and 4-3).

Table 4-4 12 Month Water Loss Audit Report

Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss [1,2]
07/2015	618
07/2016	1,325
07/2017	1,282
07/2018	1,031
07/2019	1,565
[1] *Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.* [2] ***Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES: The "Volume of Water Losses" from FY 2016-17 through FY 2018-19 are based on the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheets. Because the water loss audits are reported in calendar years, the volume of water losses were calculated to be an average of the two calendar years as part of that fiscal year. The volume of water losses for FY 2015-16 and FY 2019-20 (calendar years 2016 and 2020) were estimated based on water system metered production and sales data.	

The California Water Code Section 10608.34(i) directs the SWRCB to "adopt rules requiring urban retail water suppliers to meet performance standards for the volume of water losses." Pursuant to this law, and as discussed above, urban retail water suppliers (including the City) have been submitting water loss audits to DWR annually since October 2017. Pursuant to (SB) Senate Bill 606, urban retail water suppliers are required to calculate an "urban water use objective" that includes indoor, outdoor, commercial, industrial and institutional irrigation uses, and allowed system water loss by November 1, 2023. The City will continue to develop its water loss standard and urban water use objective pursuant to SWRCB requirements.

4.2.5 CURRENT WATER USE

The City currently measures its water use through meter data and billing records. The water use for the City's individual water use sectors during FY 2019-20 are provided in Table 4-1. Recycled water uses are addressed separately in Section 6.5; however, a summary of projected recycled water uses is provided in Table 4-3. The City's total water uses during FY 2019-20 have been reviewed for compliance with the SB X7-7 water use target for 2020 adopted in the City's 2015 Plan (discussed in Section 5.5).

DWR has created an optional "Planning Tool Worksheet" for water suppliers to review and assess monthly water use trends. DWR has deemed the tool as optional, and the City is not required by DWR to use the tool. Section 6.1 provides a tabulation of the City's historical annual water uses for each water supply source. During the past 10 years, the City experienced a five-consecutive-year-drought within its service area from FY 2011-12 to FY 2015-16. Historical records indicate the City's annual water demands had been greater prior to FY 2011-12. The City has been able to provide sufficient water supplies to its customers, including during long-term droughts and years with historically high water demands. In addition, the City has been able to provide water service to meet maximum day water demands for these years, including during the summer months. A further discussion regarding the reliability of the City's water supply sources is provided in Chapter 7.

4.2.6 PROJECTED WATER USE

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

CWC 10631.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

CWC 10631.

(d)(4)(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(d)(4)(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.
(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

The City's projected water demands are provided in five-year increments over the next 25 years (through FY 2044-45) in Table 4-3. The City's projected water demands and water supplies during a normal year, a single dry year, and a five consecutive year drought are provided in Chapter 7. The projected water demands for each of the City's water use sectors are provided in Table 4-2.

The City's water demands were projected based on a review of the SB X7-7 calculations discussed in Chapter 5 (including the SB X7-7 water use target for 2020), existing water use factors based on recent water demands, the total population projections based on projected land uses; and information identified in the City's 2020 Water Master Plan. The projected ultimate water demands at buildout (anticipated to occur in year 2040) for the water use sectors were determined using projected land uses and water & recycled water demand factors obtained from the City's 2020 Water Master Plan (see Appendix E) and 2020 Recycled Water Master Plan (see Section 6.2.5.4). A discussion of the City's water supplies from wholesalers CDA, IEUA, and WFA, are discussed in Section 6.2. As discussed in Section 2.6, the City has coordinated its water demand projections with CDA, IEUA, and WFA for each water use sector.

The City's water demand projections incorporate water savings, or "passive savings", which are the result of implementation of new plumbing codes along with consumer awareness of the need to conserve water. The City's Municipal Code Title 6, Chapter 8A "Water Conservation Plan", which was created through the adoption of Ordinance No. 3027 in October 2015 (discussed in Section 9.2), includes methods for current and ongoing reduction in water use and water waste. Prior to adoption of Ordinance No. 3027, the City's water use rate ranged from approximately 224 gallons per capita day to 264 gallons per capita day (from 1995 through 2004). As identified in Section 5.5, the City's actual water use rate during FY 2019-20 was 161 gallons per capita per day which is a decrease of up to 103 gallons per capita per day from the recent historical water use . The City's projected water demands use GPCD water use rates which are less than the City's established SB X7-7 water use target for 2020 and incorporate ongoing water passive savings and reduced water use resulting from the City's existing Water Conservation Plan. As indicated in Table 4-5, estimated future water savings have been considered as part of the City's water use projections.

Table 4-5 Inclusion in Water Use Projections

Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) *Drop down list (y/n)*	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	Section 4.2.6 and Chapter 8
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes
NOTES:	

4.2.7 CHARACTERISTIC FIVE-YEAR WATER USE

CWC 10635.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following. . .

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

The City's projected water demands are provided in five-year increments over the next 25 years (and through FY 2044-45) in Table 4-3. The City's projected water demands and water supplies during a normal year, a single dry year, and a five consecutive year drought over the next 25 years (and through FY 2044-45) are provided in Chapter 7.

The City's "Drought Risk Assessment" (DRA) for the next five years (from FY 2020-21 through FY 2024-25) is discussed in Section 7.3. The DRA includes the City's projected annual water demands and supplies for each of the next five years and was prepared based on the five driest consecutive years on record. The DRA provides an assessment of the City's water service reliability during a drought lasting five years. The DRA reflects anticipated water demands and supplies prior to any expected benefits associated with water supply shortage responses included in the City's Water Shortage Contingency Plan (provided in Chapter 8). In addition to historical drought hydrology, the City considered impacts to water supplies and demands based on climate change conditions (discussed in Section 4.5) and anticipated regulatory changes, including the urban water use objectives (discussed in Section 4.2.4)

4.3 WORKSHEETS AND REPORTING TABLES

The City's current and projected water demands, including the water demands for each of the City's water use sectors, are provided in five-year increments over the next 25 years (and through FY 2044-45) in Tables 4-1, 4-2, and 4-3.

4.3.1 OPTIONAL PLANNING TOOL USE ANALYSIS WORKSHEET

As discussed in Section 4.2.5, DWR has deemed the "Planning Tool Worksheet" as optional and the City is not required by DWR to use the tool. In addition, the City has been able to provide sufficient water supplies to its customers, including during long-term droughts and years with historically high water demands. The City has also been able to provide water service to meet maximum day water demands for these years, including during the summer months. For these reasons, the City chose not to use the optional worksheet. A further discussion regarding the reliability of the City's water supply sources is provided in Chapter 7.

4.3.2 DWR 2020 UWMP SUBMITTAL TABLES

The City's current water demands for each of the water use sectors during FY 2019-20 are provided in Table 4-1. The City's projected water demands for each of the water use sectors, in five-year increments over the next 25 years (and through FY 2044-45), are provided in Table 4-2. The City's total projected water demands, including potable and recycled water, in five-year increments over the next 25 years (and through FY 2044-45), are summarized in Table 4-3. The City's distribution system water losses over the past five years, based on the sum of the real and apparent water losses, are summarized in Table 4-4. The City's annual AWWA water loss audits are provided in Appendix F.

4.4 WATER USE FOR LOWER INCOME HOUSEHOLDS

CWC 10631.1.

(a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

California Health and Safety Code 50079.5.

(a) "Lower income households" means persons and families whose income does not exceed the qualifying limits for lower income families… In the event the federal standards are discontinued, the department shall, by regulation, establish income limits for lower income households for all geographic areas of the state at 80 percent of area median income, adjusted for family size and revised annually.

The City's water demands projections provided in Table 4-3 include projected water demands for lower income single-family and multi-family households. A lower income household is defined as a household with an income less than 80 percent of the area median income, adjusted for family size. For the purpose of this evaluation the entire San Bernardino County was used for the "area median income". The median household income within San Bernardino County was $67,903. The total number of lower income households within the City's service area was estimated based on billing records provided by the City, a review of the City's General Plan, a review of median household income range statistics provided by the US Census Bureau, and a review of GIS maps of Disadvantaged Communities[2] (DACs), including block groups, tracts, and places, provided by DWR. The estimated number of lower income households (i.e. with a median household income less than 80 percent of $67,903) located within the City's service area is approximately 34.5 percent of the total number of households. As indicated in Table 4-2, the total projected residential (single family and multi-family) water demands within the City in 2045 is estimated at about 31,524 AFY. Based on a 34.5 percent use factor of total residential water demands, the projected water demand for lower income households will be about 10,876 AFY by the FY 2044-2045. The projected water demands for lower income households were included in the City's total projected water demands, as indicated in Table 4-5.

4.5 CLIMATE CHANGE CONSIDERATIONS

CWC 10630.

It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

CWC 10635.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following…

[2] GIS information for DACs is based on data from the US Census showing census block groups, tracts, and places identified as disadvantaged communities (less than 80 percent of the State's median household income) or severely disadvantaged communities (less than 60 percent of the State's median household income)

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

Climate is defined as "the average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity and precipitation[3]". A change in the climate which produces a greater amount of precipitation (i.e. more runoff and/or snowpack) and lower temperatures is generally a benefit to water supplies. However, drought conditions which may result in decreased precipitation, decreased runoff, and increased temperature may adversely affect an urban water supplier's ability to meet demands by potentially impacting supplies. Consequently, the focus of impacts of climate change is on these adverse consequences.

Section 6.2 of this Plan describes the City's sources of water supply, management practices associated with those sources, and the long-term reliability of those sources. Section 7.3 includes a Drought Risk Assessment which considers the potential impacts of climate change to the City's water supply sources. Chapter 8 provides a detailed discussion of the City's Water Shortage Contingency Plan, including but not limited to, the six standard water shortage levels in the event climate change results in a reduction to water supplies associated with a periodic drought condition. The following is a discussion of the City's sources of supply, how those sources may be impacted by climate change, and the proactive actions the City and other local/regional water managers may take to address the potential climate change impacts on water supplies.

<u>Imported Water Supplies</u>

The City receives treated imported water (see Section 6.2.1 for a more in depth discussion). Consequently, the City directly and/or indirectly relies on the Metropolitan Water District of Southern California for those imported water supplies. MWD has prepared a Regional 2020 Urban Water Management Plan which includes a discussion (Section 2.6 in MWD's 2020 UWMP) of the reliability of its water supplies and the impacts of climate change and is incorporated by reference in this Plan. Furthermore, the City is a retail agency of the Inland Empire Utilities Agency which has also provided a discussion of climate change considerations and that discussion is included by reference. The following is a brief summary of MWD's efforts:

<u>Resource Planning</u>

- MWD has established the Robust Decision Making (RDM) approach to identify vulnerabilities to its water supplies. Climate change information was applied to MWD's simulated water supply scenarios to demonstrate the vulnerability of water supplies to climate change.

[3] www.merriam-webster.com

Knowledge Sharing and Research Support

- MWD is an active and founding member of the Water Utility Climate Alliance (WUCA) which includes 12 nationwide partners collaborating on climate change considerations. As such, MWD shares agency actions on climate change and adaptation. WUCA has also released numerous research papers on climate change.

Implementation of Programs and Policies

- MWD's programs include the use of solar energy, use of ride share programs, and reduction of greenhouse emissions. Collectively these actions are intended to impact the effects of climate change.

Groundwater Supplies

The City relies on groundwater produced from the Chino Basin as discussed in Section 6.2.2. The Chino Basin (Basin Number 8-2.01 pursuant to DWR Bulletin 118) has been identified by DWR as a very low-priority groundwater basin partially due to the fact it is adjudicated. In that regard, the Chino Basin is actively managed by the Chino Basin Watermaster and those management activities are described in detail in Section 6.2.2.

Recognizing the potential impacts of climate change on the Chino Basin groundwater supplies (decreased local runoff and replenishment, along with increased groundwater production which may lead to decreased groundwater levels), the City has used climate tools available on the California' Energy Commission's Cal-Adapt website (https://cal-adapt.org/) to identify potential future climate change cycles for the Chino Basin. The Cal-Adapt website has been developed by the Geospatial Innovation Facility at the University of California, Berkeley with funding and advisory oversight by the California Energy Commission and California Strategic Growth Council.

To address the uncertainty in future greenhouse gas emissions, Cal-Adapt has developed a Representative Concentration Pathway 4.5 (RCP 4.5) scenario and a Representative Concentration Pathway 8.5 (RCP 8.5) scenario. RCP 4.5 represents a scenario in which greenhouse gas emissions peak around 2040, then decline and stabilize. RCP 8.5 represents a scenario in which emissions continue to strongly rise through 2050 and plateau around 2100. RCP 4.5 is a "medium" emissions scenario that models in future in which there is an effort made by societies to reduce greenhouse gas emissions, whereas RCP 8.5 is a "business-as-usual" scenario. For the City's climate change analysis, the RCP 4.5 scenario was selected.

The Cal-Adapt climate tools also incorporate several General Circulation Models (GCMs), which represent physical processes in the atmosphere, ocean, and land surface. These GCMs projected future climates under conditions such as warm/dry, cooler/wetter, and average simulations. For the City's climate change analysis, the average condition GCM (CanESM2) was selected.

The climate tools available on the Cal-Adapt website were to simulate projected annual precipitation and annual average maximum temperature in the Chino Basin. An electronic boundary of the Chino Basin was submitted online through the Cal-Adapt website in a "KML" file format (i.e. Google Earth format) and data using several of the available climate tools was generated.

Based on the data generated by the Cal-Adapt simulations (see Appendix G), the average annual rainfall in the Chino Basin is projected to be 16.00 over the next 25 years (through 2045), inches compared to a historical average of 14.82 inches (from 1950 through 2019). In addition, the average maximum temperature is projected to be 82.1 degrees Fahrenheit compared to a historical average of 78.5 degrees Fahrenheit. Although there may be more precipitation in the future, it may be more likely to fall as rainfall compared to snowfall. The simulation does not denote the duration or intensity of the storms contributing to the annual precipitation. Notwithstanding, the Santa Ana River watershed (including the area of the Chino Bain) has a complex and interconnected series of dams, reservoirs and replenishment basins to capture stormwater runoff in the Santa Ana River watershed. Most if not all precipitation (whether it is rain or snowfall) likely will be captured during normal and dry year conditions and will not be adversely impacted by a potentially higher average annual temperature.

Recognizing these potential impacts to local hydrology resulting from climate change and the resultant impacts to the groundwater supplies, the Chino Basin Watermaster has taken (and may reinstate as needed) the following proactive actions to anticipate and circumvent the potential impacts of climate change. These actions will enable the City to rely on the Chino Basin as a reliable source of supply.

Chino Basin – Storage Management Plan

The Chino Basin Judgment parties adopted as part of the 2000 Chino Basin Peace Agreement a storage management plan, which consists of three types of storage agreements that result in five types of storage accounts: 1) Excess Carryover, 2) Local Supplemental-Recycled, 3) Local Supplemental-Imported, 4) Pre-2000 Quantified Supplemental, and 5) Storage and Recovery. An Excess Carryover account includes a Party's unproduced rights in the Safe Yield and Basin Water purchased or transferred from other Parties. A Local Supplemental Water account includes any imported and/or recycled water that is recharged by a producer and similar water acquired from other Parties. A Storage and Recovery Account includes Supplemental Water and is intended to produce a broad and mutual benefit to the Judgment Parties. The Chino Basin Watermaster maintains records of the replenishment, production, losses, and end-of-year storage totals for all storage accounts and reports this accounting on an annual basis.

Individual Parties are involved in water transfers of annual unproduced rights in the Safe Yield and water in their storage accounts. Chino Basin Watermaster has an application and review process for these transfers. The Parties engage in conjunctive-use activities individually by storing

Chino Basin and Supplemental Water that are in excess of their demands and may recover that water in the future as the need arises. These activities collectively cause temporary adjustment in the managed storage. The Parties' aggregate amount of water in managed storage was 541,845 AF during FY 2019-20.

MWD's Dry-Year Yield Program (DYYP), a water exchange, is the only active Storage and Recovery Program in the Chino Basin. The DYYP can store up to 100,000 AF with maximum replenishment of 25,000 AFY and maximum extraction of 33,000 AFY. During FY 2019-20, there was 45,961 AF within the DYYP account, resulting in a total managed storage volume of 587,806 AF (541,845 AF + 45,961 AF). The agreement that authorized the DYYP will expire in 2028.

Inland Empire Utilities Agency's "Addendum No. 2 to the Optimum Basin Management Program Project", completed in February 2021, amends the 2000 Chino Basin Peace Agreement's Programmatic Environmental Impact Report to address managed storage within the Chino Basin, consistent with the Local Storage Limitation Solution (LSLS). Consistent with Addendum No. 1, from July 1, 2017 through June 30, 2021, the Safe Storage Capacity of the Chino Basin is 600,000 AF. The LSLS proposes a change in the Safe Storage Capacity to 700,000 AF through June 30, 2030, and to 620,000 AFY from July 1, 2030 through June 30, 2035. Full utilization of the allowable increased storage space is expected to occur gradually as additional water is stored and less groundwater is produced. The Safe Storage Capacity of the Chino Basin will revert to 500,000 AF after June 30, 2035.

Chino Basin Safe Yield

The Chino Basin Judgment assessed the initial Safe Yield for the Chino Basin at 140,000 AFY, but reserved to re-determine the Safe Yield after ten years. Pursuant to the most recent Safe Yield reset effective July 2020, the Safe Yield in the Chino Basin is determined to be 131,000 AFY (through June 30, 2030). The Safe Yield is recalculated every 10 years and is defined in the Chino Basin Judgment as "the long-term average annual quantity of ground water (excluding replenishment of stored water but including return flow to the Basin from use of replenishment or stored water) which can be produced from the Chino Basin under conditions of a particular year without causing an undesirable result".

Chapter 5

SB X7-7 BASELINES, TARGETS, AND 2020 COMPLIANCE

LAY DESCRIPTION – CHAPTER 5

SB X7-7 BASELINES, TARGETS, AND 2020 COMPLIANCE

Chapter 5 (SB X7-7 Baselines, Targets, and 2020 Compliance) of the City's 2020 Plan discusses and provides the following:

- The Water Conservation Act of 2009 (or SB X7-7) required the State of California achieve a 20 percent reduction in urban water use by the year 2020.
- SB X7-7 required urban water suppliers, including the City, to develop a "2020 Water Use Target" to assist the State of California to achieve the 20 percent reduction. The 2020 Water Use Target represents the amount of water each person should use per day (i.e. gallons per capita per day or GPCD) by the year 2020.
- The City previously determined its 2020 Water Use Target during the preparation of its 2015 Plan by completing standardized tables (or the SB X7-7 Verification Form) to demonstrate compliance with the Water Conservation Act of 2009. The City's SB X7-7 Verification Form has not been modified and is included as part of this 2020 Plan as Appendix H. The City's 2020 Water Use Target is 196 GPCD.
- The City's 2020 Plan incorporates the 2020 Water Use Target and determines compliance based on actual water use.
- The population within the City's service area during Fiscal Year 2019-20 is estimated at 178,409. The City's population was estimated using the City's 2020 Water Master Plan Update. The 2020 Water Master Plan Update reviewed population data from the Southern California Association of Governments and land use data for residential, retail/service, mixed use, and public use areas to estimate the FY 2019-20 population with the City's municipal boundaries.
- The City's "gross water" use represents the total volume of water entering its distribution system from its water supply sources. The City's gross water use excludes recycled water deliveries or water conveyed to another supplier. The City's annual gross water during Fiscal Year 2019-20 was 32,109 AF.
- The City's per-capita water use is based on the gross water use divided by the population. The City's per-capita water use during Fiscal Year 2019-20 was 161 GPCD. The City's confirmed 2020 Water Use Target is 196 GPCD. The City's per-capita water use during Fiscal Year 2019-20 meets the 2020 Water Use Target.
- The City has also demonstrated compliance with the 2020 Water Use Target by completing the SB X7-7 2020 Compliance Form (provided in Appendix I).

5.1 GUIDANCE FOR WHOLESALE SUPPLIERS

CWC 10608.12.

(w) "Urban wholesale water supplier," means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

The City is not a wholesale agency and is not required by DWR to complete Section 5.1.

5.2 SB X7-7 FORMS AND SUMMARY TABLES

The City previously calculated its "Baseline" water periods and a "2020 Water Use Target" in its 2015 Plan. There were two different Baseline periods identified (consisting of a "10-year Baseline" period and a "5-year Baseline" period). The average water use for each of these two Baseline periods, expressed in GPCD, represents the Baseline water use for each period. A 10-year Baseline period was identified by the City and information regarding the starting year, ending year, and average year water use rate during this period is provided in Table 5-1. The City determined its 2020 Water Use Target by calculating 80 percent of the 10-year Baseline water use.

According to Section 10608.22 of the California Water Code, if an urban retail water supplier's 5-year Baseline period water use is greater than 100 GPCD, the calculated 2020 Water Use Target may need to be reduced. A 5-year Baseline period was identified by the City and information regarding the starting year, ending year, and average water use rate during this period is provided in Table 5-1. The average water use rate during the identified 5-year Baseline period was greater than 100 GPCD. As a result, the 5-year Baseline period was used to determine if the 2020 Water Use Target required any adjustments.

The City's calculated 2020 Water Use Target was compared with the 95 percent of the average water use within the 5-year Baseline to determine if any adjustments were required. As shown in Table 5-2, no adjustments were required. The Baseline water uses were used to confirm the City's 2020 Water Use Target (which represents the per capita water use target for 2020 pursuant to SB X7-7).

5.2.1 SB X7-7 VERIFICATION FORM (BASELINES AND TARGETS)

The City's service area has not changed (i.e. expansion or contraction) since the 2015 Plan was prepared. The City's 2020 Plan incorporates the Baseline water uses and 2020 Water Use Target calculated in the 2015 Plan. The City previously prepared standardized tables (SB X7-7 Verification Form) to demonstrate compliance with the Water Conservation Act of 2009 in its 2015 Plan, including compliance with the City's 2015 Interim Water Use Target. The City's SB X7-7 Verification Form has not been modified and is included as part of this 2020 Plan as Appendix H.

5.2.2 SB X7-7 2020 COMPLIANCE FORM

The City's compliance with its 2020 Water Use Target is summarized in the following sections. The City has also demonstrated compliance with the 2020 Water Use Target by completing the SB X7-7 2020 Compliance Form (provided in Appendix I).

5.2.3 SUBMITTAL TABLES 5-1 AND 5-2

Summary information from the SB X7-7 Verification Form and from the SB X7-7 2020 Compliance Form is provided in Tables 5-1 and 5-2 below.

Table 5-1 Baselines and Targets Summary from SB X7-7 Verification Form

<table>
<tr><th colspan="5">Submittal Table 5-1 Baselines and Targets Summary
From SB X7-7 Verification Form
Retail Supplier or Regional Alliance Only</th></tr>
<tr><th>Baseline Period</th><th>Start Year *</th><th>End Year *</th><th>Average Baseline GPCD*</th><th>Confirmed 2020 Target*</th></tr>
<tr><td>10-15 year</td><td>1995</td><td>2004</td><td>245</td><td rowspan="2">196</td></tr>
<tr><td>5 Year</td><td>2003</td><td>2007</td><td>237</td></tr>
<tr><td colspan="5">*All cells in this table should be populated manually from the supplier's SBX7-7 Verification Form and reported in Gallons per Capita per Day (GPCD)</td></tr>
<tr><td colspan="5">NOTES:</td></tr>
</table>

Table 5-2 2020 Compliance from SB X7-7 2020 Compliance Form

Submittal Table 5-2: 2020 Compliance From SB X7-7 2020 Compliance Form *Retail Supplier or Regional Alliance Only*				
2020 GPCD			2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* *(Adjusted if applicable)*		
161	*0*	*161*	*196*	*Y*
**All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)*				
NOTES:				

5.2.4 REGIONAL UWMP/REGIONAL ALLIANCE

As discussed in Section 2.4, the City's 2020 Plan was not developed as part of a Regional Alliance. Information from the City's 2020 Plan is not required to be reported in a Regional Alliance report.

5.3 BASELINE AND TARGET CALCULATIONS FOR 2020 UWMPS

5.3.1 SUPPLIER SUBMITTED 2015 UWMP, NO CHANGE TO SERVICE AREA

The general requirements associated with determining the Baseline periods, Baseline water uses, and 2020 Water Use Target were previously provided by DWR. Based on the requirements, the City calculated the Baseline water uses and 2020 Water Use Target in its 2015 Plan. The City's service area has not changed (i.e. expansion or contraction) since the 2015 Plan was prepared. The City's 2020 Plan incorporates the Baseline water uses and 2020 Water Use Target calculated in the 2015 Plan. The City's SB X7-7 Verification Form is included in Appendix H.

As discussed in Section 5.2.1, the City prepared standardized tables (SB X7-7 Verification Form) to demonstrate compliance with the Water Conservation Act of 2009. The City's SB X7-7

Verification Form is provided in Appendix H and includes Baseline water uses and the 2020 Water Use Target. A summary of the Baseline water uses and 2020 Water Use Target is provided below.

The California Water Code allows an urban water supplier to calculate up to a 15-year Baseline period if at least 10 percent of its 2008 retail water demands were met through recycled water deliveries within its service area, otherwise calculation of a 10-year Baseline period is required. The City's recycled water deliveries were less than 10 percent of its retail water demands during FY 2007-08. Consequently, a 10-year Baseline period was identified by the City and information regarding the starting year, ending year, and average water use rate during this period is provided in Table 5-1. Water systems could potentially identify their 2020 Water Use Target by calculating 80 percent of the 10-year Baseline water use.

According to Section 10608.22 of the California Water Code, if an urban retail water supplier's 5-year Baseline period water use is greater than 100 GPCD, the calculated 2020 Water Use Target may need to be reduced. A 5-year Baseline period was identified by the City and information regarding the starting year, ending year, and average water use rate during this period is provided in Table 5-1. The average was use rate during the identified 5-year Baseline period was greater than 100 GPCD. As a result, the 5-year Baseline period was used to determine whether the 2020 Water Use Target required any adjustments.

The City's calculated 2020 Water Use Target was compared with the 95 percent of the average water use within the 5-year Baseline to determine whether any adjustments were required. The City's confirmed 2020 Water Use Target is 196 GPCD and is summarized in Table 5-1.

5.4 METHODS FOR CALCULATING POPULATION AND GROSS WATER USE

5.4.1 SERVICE AREA POPULATION

CWC 10608.20.

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

CWC 10644.

(a)(2) The plan… shall include any standardized forms, tables, or displays specified by the department.

A discussion regarding the City's compliance with the 2020 Water Use Target is provided in Section 5.5. Compliance with the 2020 Water Use Target is based on the total estimated population within the City's water service during FY 2019-20. Because U.S. Census 2020 population data was not available during the preparation of the 2020 Plan, the City reviewed the methodologies recommended by DWR to estimate the FY 2019-20 population. The population methodology used by the City in the 2020 Plan is provided below.

The City initially reviewed the available historical populations within its service area for population growth trends. The City determined historical U.S. Census populations within its service area using DWR's Population Tool (https://wuedata.water.ca.gov/). The City's service area boundary was uploaded to DWR's Population Tool in a "KML" file format (i.e. Google Earth format). The KML file was originally created in a GIS shapefile format and converted into a KML format. The uploaded KML file represents the City's service area boundary from 1990 to present (2020). DWR's Population Tool utilized U.S. Census data from 1990, 2000, and 2010, along with the City's service area boundary, to estimate the population served by the City in the years 1990, 2000, and 2010.

The population within the City's service area in FY 2019-20 was estimated using data prepared in the City's 2020 Water Master Plan Update, which is a method allowed by DWR. The 2020 Water Master Plan Update reviewed population data from the Southern California Association of Governments and land use data for residential, retail/service, mixed use, and public use areas to estimate the FY 2019-20 population with the City's municipal boundaries. Based on Geographical Information Systems data, the area within the City's water service boundary is approximately 97.6 percent of the area within the City's municipal boundaries. The estimated population within the City's water service area for FY 2019-20 is 178,409 (or approximately 97.6 percent of the estimated FY 2019-20 population within the City's municipal boundaries) and is consistent with the historical population growth trends. The City's FY 2019-20 population is presented in Table 3 of the SB X7-7 2020 Compliance Form.

5.4.2 GROSS WATER USE

CWC 10608.12.

(h) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.
(2) The net volume of water that the urban retail water supplier places into long-term storage.
(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.
(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

California Code of Regulations Title 23 Division 2 Chapter 5.1 Article 1, Section 596.

(a) An urban retail water supplier that has a substantial percentage of industrial water use in its service area is eligible to exclude the process water use of existing industrial water customers from the calculation of its gross water use to avoid a disproportionate burden on another customer sector.

Gross water use represents the total volume of water entering a distribution system (but excludes recycled water deliveries, indirect potable use, water placed into long term storage, water conveyed to another supplier, water delivered for agricultural use, and process water if there is a substantial percentage used for industrial purposes) over a 12-month period. The City's annual gross water use amounts are based on the total amount of water entering the City's distribution system from its water supply sources (including groundwater production wells, purchased water, and purchased treated imported water). The annual gross water use by the City during FY 2019-20 was 32,109 AF.

The annual gross water use amounts within the City for each year of the Baseline periods (discussed in Section 5.6) are provided in SB X7-7 Verification Form, Table 4 (Appendix H). A further discussion of the Baseline periods is provided in Section 5.6.

The City currently does not use indirect recycled water within its service area. The City is not required by DWR to complete SB X7-7 Verification Form, Table 4-B.

Industrial process water is not subtracted from the City's gross water use provided in SB X7-7 Verification Form, Table 4. The City is not required by DWR to complete SB X7-7 Verification Form, Table 4-C.1, Table 4-C.2, Table 4-C.3, Table 4-C.4, and Table 4-D.

5.5 2020 COMPLIANCE DAILY PER CAPITA WATER USE (GPCD)

CWC 10608.12.

(f) "Compliance daily per capita water use" means the gross water use during the final year of the reporting period, reported in gallons per capita per day.

CWC 10608.20.

(e) An urban retail water supplier shall include in its urban water management plan due in 2010… compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

As discussed in Section 5.4.2, the annual gross water use by the City during FY 2019-20 was 32,109 AF. As discussed in Section 5.4.1, the estimated population within the City's service area for FY 2019-20 is 178,409. As a result, the City's per-capita water use during FY 2019-20 was 161 GPCD. As discussed in Section 5.3.1, the City's confirmed 2020 Water Use Target is 196 GPCD. The City's per-capita water use during FY 2019-20 meets the 2020 Water Use Target and is in compliance. The City has also demonstrated compliance with the 2020 Water Use Target by completing the SB X7-7 2020 Compliance Form (provided in Appendix I).

5.5.1 2020 ADJUSTMENTS FOR FACTORS OUTSIDE OF SUPPLIER'S CONTROL

CWC 10608.24.

(d)(1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:

(A) Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.

(B) Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.

(C) Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.

(2) If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.

Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use, Methodology 4.

This section discusses adjustments to compliance-year GPCD because of changes in distribution area caused by mergers, annexation, and other scenarios that occur between the baseline and compliance years.

The City has determined its compliance with the 2020 Water Use Target without adjusting its annual gross water use during FY 2019-20.

5.5.2 SPECIAL SITUATIONS

The City's 2020 Plan incorporates the Baseline water uses and 2020 Water Use Target calculated in the 2015 Plan. There were no special situations that required the City to recalculate the Baseline water uses and 2020 Water Use Target.

5.5.3 IF SUPPLIER DOES NOT MEET 2020 TARGET

The City's per-capita water use during FY 2019-20 meets the 2020 Water Use Target and is in compliance.

5.6 REGIONAL ALLIANCE

As discussed in Section 2.4, the City's 2020 Plan was not developed as part of a Regional Alliance. Information from the City's 2020 Plan is not required to be reported in a Regional Alliance report.

Chapter 6

WATER SUPPLY CHARACTERIZATION

LAY DESCRIPTION – CHAPTER 6

WATER SUPPLY CHARACTERIZATION

Chapter 6 (Water Supply Characterization) of the City's 2020 Plan discusses and provides the following:

- The City's water supply sources include: groundwater pumped from the Chino Basin; treated groundwater from the Chino Basin produced by the Chino Basin Desalter Authority; imported water from Metropolitan Water District of Southern California treated and purchased through Water Facilities Authority; groundwater and/or surface water purchased from San Antonio Water Company; and recycled water purchased from Inland Empire Utilities Agency.
- The City's main source of water supply is groundwater pumped from the Chino Basin.
- A tabulation of the City's historical water supplies is provided in Section 6.1.
- A discussion regarding the City's imported water supplies from the Water Facilities Authority is provided. Information regarding imported water connections, capacities, reliability, and historical production is provided.
- A discussion regarding the City's purchased water supplies from San Antonio Water Company is provided. Information regarding purchased water connections, capacities, and historical production is provided.
- A discussion regarding the City's groundwater supplies from the Chino Basin is provided. Information regarding basin location, adjudication, management, water levels, water quality, water rights, and historical production is provided.
- A discussion regarding the City's recycled water supply is provided. The City's recycled water supplies are produced by Inland Empire Utilities Agency. The City uses recycled water for industrial processes, landscape irrigation, agricultural irrigation, and golf course irrigation.
- The City's proposed future projects to maximize its water supply resources are discussed.
- The City's "energy intensity" is discussed and represents the quantity of energy consumed, measured in kilowatt hours, divided by the volume of water, measured in acre-feet over a one-year period. The total energy intensity associated with the City's water management processes was estimated during FY 2019-20.

In this Chapter, the City will identify and describe each of its sources of water supply. In addition, the City will describe the following:

- Management of each water supply source;
- Current provisions of a basin adjudication or Groundwater Sustainability Plan (GSP), as applicable, pertaining to management of groundwater supplies;
- Measures the City is taking to develop potential new sources of water supply (as applicable); and
- Opportunities for exchanges and transfers on a long- or short-term basis.

The characterization of the City's water supply sources will account for the anticipated availability during a normal year, a single dry year, a five consecutive year drought, along with projections through FY 2044-45.

6.1 WATER SUPPLY ANALYSIS OVERVIEW

CWC 10631.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:

(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(3) For any planned sources of water supply, a description of the measures that are being undertaken to acquire and develop those water supplies.

CWC 10631.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

The City's water supply sources include: groundwater pumped from the Chino Basin; treated groundwater from the Chino Basin produced by the Chino Basin Desalter Authority; treated, imported water purchased from MWD through Water Facilities Authority; groundwater and/or surface water purchased from San Antonio Water Company; and recycled water purchased from Inland Empire Utilities Agency. The City's main source of water supply is groundwater pumped from the Chino Basin. A tabulation of the City's historical water uses is provided below in Figure 2.

Figure 2 - Historical Water Use by Source

Fiscal Year	System Water Supply Sources (AF)						Total
	Potable Water					Recycled Water	
	Groundwater	Purchased Water			Subtotal		
	Chino Basin	Chino Basin Desalter Authority	Water Facilities Authority	San Antonio Water Company			
2010-11	18,938	5,176	9,824	0	33,938	5,743	39,681
2011-12	19,164	5,127	10,820	0	35,111	7,492	42,603
2012-13	20,801	4,793	10,243	0	35,837	6,894	42,730
2013-14	21,724	5,141	9,904	0	36,769	8,427	45,196
2014-15	17,425	4,827	10,703	172	33,128	8,098	41,226
2015-16	22,751	2,682	2,755	338	28,526	7,510	36,036
2016-17	24,672	3,069	2,327	171	30,238	8,351	38,589
2017-18	26,109	4,032	3,211	341	33,693	9,653	43,346
2018-19	19,604	5,724	5,737	403	31,467	7,511	38,978
2019-20	18,395	6,636	6,513	565	32,109	7,812	39,921

Source: Data provided by Ontario Municipal Utility Company

6.1.1 SPECIFIC ANALYSIS APPLICABLE TO ALL WATER SUPPLY SOURCES

The section below provides a discussion of the following information to the extent practical:

- The City's existing and planned sources of water supply are identified;
- Each source of supply is quantified in five-year increments through FY 2044-45;
- The anticipated supply availability under normal, single dry, and five consecutive dry years, and any other water year conditions included in the Drought Risk Assessment (see Chapter 7) are described;
- The management of each water supply in correlation with other identified supplies is described.
- Information pertinent to the reliability analysis, including climate change effects, is considered.

The City historically has relied on groundwater pumped from the Chino Basin; treated groundwater from the Chino Basin produced by the Chino Basin Desalter Authority; treated, imported water purchased from MWD through Water Facilities Authority; groundwater and/or surface water purchased from San Antonio Water Company; and recycled water purchased from Inland Empire Utilities Agency. The following descriptions summarize the City's sources of supply (detailed descriptions are provided in Section 6.2).

Existing and Planned Sources of Supply

Purchased Treated Imported Water

The City has historically purchased treated imported water from the Water Facilities Authority (from IEUA), as described in Section 6.2.1. In addition, Section 6.2.1 provides a detailed discussion of the existing and planned supply of the treated imported water, including a description of the management and reliability of those treated imported water supplies. Table 6-8 summarizes the actual treated imported water supply for FY 2019-20. Table 6-9 summarizes the projected water supply, in five-year increments, through FY 2044-45 under varying water supply conditions.

Groundwater

The City has historically pumped groundwater from the Chino Basin as described in Section 6.2.2. In addition, Section 6.2.2 provides a detailed discussion of the existing and planned supply of the groundwater, including a description of the management and reliability of those groundwater supplies. Table 6-8 summarizes the actual groundwater supplies for FY 2019-20. Table 6-9 summarizes the projected water supply, in five-year increments, through FY 2044-45 under varying water supply conditions.

Surface Water

The City does not use self-supplied surface water sources to meet its water demands. The City purchases treated surface water supplies from SAWCo.

Storm Water

The City has historically produced groundwater from the Chino Basin. Management and use of the stormwater runoff from the Chino Basin watershed is crucial to groundwater management. However, the City currently does not have its own program to beneficially use stormwater runoff as a direct source of supply.

Wastewater and Recycled Water

The City has historically purchased recycled water supplies from Inland Empire Utilities Agency as described in Section 6.2.5. In addition, Section 6.2.5 provides a detailed discussion of the existing and planned use of the recycled water, including a description of the management and reliability of those recycled water supplies. Table 6-8 summarizes the actual recycled water supplies for FY 2019-20. In addition, Table 6-9 summarizes the projected recycled water supply, in five-year increments, through FY 2044-45 under varying water supply conditions.

6.1.2 OTHER CHARACTERIZATION CONSIDERATIONS

A description of the City's water system along with a map of its service area is included in Chapter 3. In addition, the agencies which manage the water supplies used by the City are identified in Section 6.2.1 (imported water), 6.2.2 (groundwater), 6.2.3 (surface water), 6.2.4 (stormwater), and 6.2.5 (recycled water).

6.1.3 OPTIONAL PLANNING TOOL

As discussed in Section 4.2.5, DWR has created an optional "Planning Tool Worksheet" for water suppliers to review and assess monthly water use trends. DWR has deemed the tool as optional, and the City is not required by DWR to use the tool. Section 6.1 provides a tabulation of the City's historical annual water uses for each water supply source. During the past 10 years, the City experienced a five-consecutive-year-drought within its service area from FY 2011-12 to FY 2015-16. Historical records indicate the City's annual water demands had been greater prior to FY 2011-12. The City has been able to provide sufficient water supplies to its customers, including during long-term droughts and years with historically high water demands. In addition, the City has been able to provide water service to meet maximum day water demands for these years, including during the summer months. A further discussion regarding the reliability of the City's water supply sources is provided in Chapter 7.

6.2 NARRATIVE SECTIONS FOR SUPPLIER'S UWMP WATER SUPPLY CHARACTERIZATION

6.2.1 PURCHASED OR IMPORTED WATER

CHINO BASIN DESALTER AUTHORITY

The City purchases treated groundwater from the Chino Basin Desalter Authority (through the "*Amended and Restated Water Purchase Agreement, January 1, 2011*" contract between the City and CDA). On September 25, 2001, CDA was formed under a Joint Exercise of Powers Agreement (JPA) to remove salts from brackish groundwater extracted from the lower Chino Basin. The area which receives water supplies from CDA is 304 square miles. A further discussion of CDA's treatment facilities is provided in Section 6.2.2.

Treated water is distributed to CDA's member agencies which include the City of Chino, City of Chino Hills, City of Norco, City of Ontario, Inland Empire Utilities Agency, Jurupa Community Services District, Santa Ana River Water Company, and Western Municipal Water District. Western Municipal Water District joined the CDA member agencies in 2010. CDA's member agencies provide water service within Riverside County and San Bernardino County. The member agencies have contract entitlements to receive a total of 35,200 AFY of treated water from CDA[4]. The City has a contract entitlement to receive a total of 8,533 AFY of treated water from CDA. A further discussion of CDA's water supplies, and the management of these supplies in the Chino Basin, is provided in Section 6.2.2.

The City purchases treated groundwater supplies from CDA. The City's purchases over the past five years have been tabulated in Figure 2 above. Over the past five years, the City has purchased 2,682 AFY to 6,636 AFY, with an average of 4,429 AFY from CDA. The City's projected purchases from the CDA, over the next 25 years in five-year increments, is provided in Table 6-9.

WATER FACILITIES AUTHORITY

The City purchases treated, imported surface water from the Water Facilities Authority (through the "*Installment Purchase Agreement Relating to Water Facilities Authority Water Treatment Plant, October 1, 1985*" contract between the City and WFA). On February 19, 1980, WFA was formed under a Joint Exercise of Powers Agreement to acquire and construct facilities to supply and distribute potable water to its member agencies. WFA's service area is located within Chino Basin's boundaries at the western portion of San Bernardino county. WFA's member agencies include the Cities of Chino, Chino Hills, Ontario, Upland, and the Monte Vista Water District. The area which receives water supplies from WFA is approximately 148 square miles.

[4] https://www.chinodesalter.org/98/Member-Agencies

WFA purchases untreated imported water from Metropolitan Water District of Southern California through Inland Empire Utilities Agency. WFA owns and operates the Agua de Lejos Treatment Plant located in the City of Upland. The Agua de Lejos Treatment Plant is a conventional surface water treatment facility that treats and disinfects imported water supplies from the State Water Project delivered by MWD through IEUA. The Agua de Lejos Treatment Plant began operating in 1988 and has a treatment capacity of 81 million of gallons per day (MGD).

The City purchases treated, imported water supplies from the Water Facilities Authority. The City's purchases over the past five years has been tabulated in Section 6.1. Over the past five years, the City has purchased 2,327 AFY to 6,513 AFY, with an average of 4,109 AFY from WFA. The City's projected purchases from the WFA, over the next 25 years in five-year increments, are provided in Table 6-9.

The City's treated imported water supplies from MWD, through WFA, may be impacted during a multi-year drought or other conditions which limits MWD from delivering sufficient water supplies to all of its member agencies, and consequently to the City. In anticipation of such a reduction in supplies, MWD developed a Water Supply Allocation Plan (WSAP) which is briefly described below. The WSAP provides a means of equitably providing reduced water supplies to each of MWD's member agencies for up to 10 levels of reduction representing up to a 50 percent reduction.

During calendar year 2007, critically dry conditions impacted MWD's water supply sources. In addition, a ruling in the Federal Courts in August 2007 provided protective measures for the Delta Smelt (and subsequently other aquatic species) in the Sacramento-San Joaquin River Delta resulting in restrictions on the availability of State Water Project water. As a result, MWD adopted a WSAP in February 2008 to allocate available water supplies to its member agencies. MWD revised the WSAP in December 2014.

The WSAP establishes ten different shortage levels and a corresponding Allocation to each member agency. Based on the shortage levels established by MWD, the WSAP provides a separate reduced Allocation to a member agency for its 1) Municipal and Industrial (M&I) retail demand and 2) replenishment demand. The WSAP formula considers historical local water production, full service treated water deliveries, agricultural deliveries and water conservation efforts when calculating each member agency's Allocation.

In general, the WSAP process calculates total historical member agency demand. That historical demand is then compared to member agency projected local supply for a specific Allocation year. The balance required from MWD, less an Allocation reduction factor, is the member agency's "Water Supply Allocation" of imported water from MWD. When a member agency reduces its local demand through conservation or other means, the Allocation of imported water will increase. Depending on MWD's available supply, MWD can establish a specific WSAP shortage level. The shortage level causes a regional reduction and calculates an allocation for each of its member agency. Additional information about MWD's WSAP is provided in MWD's Regional 2020 UWMP which is incorporated by reference. The following is a summary of MWD's water shortage levels:

Level 1 – Regional Percent Reduction of 5%
Level 2 – Regional Percent Reduction of 10%
Level 3 – Regional Percent Reduction of 15%
Level 4 – Regional Percent Reduction of 20%
Level 5 – Regional Percent Reduction of 25%
Level 6 – Regional Percent Reduction of 30%
Level 7 – Regional Percent Reduction of 35%
Level 8 – Regional Percent Reduction of 40%
Level 9 – Regional Percent Reduction of 45%
Level 10 – Regional Percent Reduction of 50%

In response to a fourth consecutive year of below average rainfall and critically dry conditions, MWD declared a WSAP Allocation Level 3 for FY 2015-16, which represented a regional reduction of 15 percent. MWD rescinded the WSAP for FY 2016-17 and has not reinstated the WSAP since that time.

SAN ANTONIO WATER COMPANY

The City purchases water from SAWCo (through the "*Water Service Agreement, January 1, 2017*" contract between the City and SAWCo) which delivers domestic and irrigation water to a variety of shareholders. These shareholders include most residents of San Antonio Heights (an unincorporated area of San Bernardino County), the Cities of Upland and Ontario, Monte Vista Water District, the United States Forest Service, the San Bernardino County Flood Control District, local golf courses, rock quarries, and grove irrigators. SAWCo is governed by a seven-member Board of Directors that is elected by shareholders at the end of each calendar year.

Pursuant to SAWCo's "*Approved FY 2020 Budget Report*[5]", there are 6,178 Active Shares and a total of 6,389 Company Shares (Inactive Shares are those shares currently not utilizing entitlement water). In 2020, each Active Share was equal to 2.035 AF of entitlement water from SAWCo, making the total active share entitlement 12,570 AF. The City of Upland is the largest shareholder with an entitlement of 9,186 AF and the domestic customers of San Antonio Heights as a group represent the second largest block of shareholders, with an entitlement of 1,269 AF. Monte Vista Water District has an entitlement of 671 AF and the City has an entitlement of 600 AF based on Active Share entitlements (volume per share is subject to change).

[5] https://www.sawaterco.com/2020-approved-budget

SAWCo's water supply sources include surface water obtained from the San Antonio Canyon, water from the San Antonio Tunnel, and groundwater sources from the Chino Basin, Six Basins, and Cucamonga Basin. The majority of SAWCo's water supplies are obtained from groundwater produced from the Cucamonga Basin and surface water from San Antonio Creek. A description regarding of the reliability of SAWCo's individual water supply sources is included in SAWCo's 2020 UWMP, which is incorporated by reference.

The City's purchase of treated water from SAWCo over the past five years has been tabulated in Section 6.1. Over the past five years, the City has purchased 171 AFY to 565 AFY, with an average of 364 AFY from SAWCo. The City's projected purchased water from SAWCo, over the next 25 years in five-year increments, is provided in Table 6-9.

6.2.2 GROUNDWATER

CWC 10631.

(b)(4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(C) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(D) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

CHINO BASIN

Chino Basin - Sustainable Groundwater Management Act

The Chino Basin is a sub-basin of the Upper Santa Ana Valley Groundwater Basin pursuant to DWR Bulletin 118, Basin Number 8-2.01. Pursuant to the Sustainable Groundwater Management Act of 2014 (SGMA), the Chino Basin was named as an adjudicated groundwater basin and is exempt from the requirements of developing a GSP and subsequently was designated a very-low-priority basin in DWR's 2019 SGMA Basin Prioritization report. In compliance with SGMA, the Chino Basin Watermaster submits its Annual Report to DWR.

Chino Basin - Adjudication

The Chino Basin was adjudicated under the Chino Basin Judgment, entered on January 27, 1978 by the Superior Court for the County of San Bernardino. A copy of the Chino Basin Judgment is provided in Appendix J. The Chino Basin Watermaster was created by the Judgement to administer the provisions of the Judgement as an arm of the Court.

The Chino Basin Judgment originally established a Safe Yield for the Chino Basin of 140,000 AFY. Pursuant to the most recent Safe Yield reset effective in 2020, the Safe Yield in the Chino Basin is currently 131,000 AFY (July 1 to June 30, 2030). The Safe Yield is recalculated every 10 years and is defined in the Chino Basin Judgment as "the long-term average annual quantity of ground water (excluding replenishment of stored water but including return flow to the Basin from use of replenishment or stored water) which can be produced from the Chino Basin under conditions of a particular year without causing an undesirable result". The Chino Basin Judgment's allocation of the Safe Yield includes three separate Pools: (1) the "Overlying Agricultural Pool"; (2) the "Overlying Non-Agricultural Pool"; and (3) the "Appropriative Pool". The Operating Safe Yield (OSY) is defined as "The annual amount of groundwater which Watermaster shall determine, pursuant to criteria specified in Exhibit "I", can be produced from Chino Basin by the Appropriative Pool parties free of replenishment obligation under the physical solution herein."

The City is a member of both the Overlying Non-Agricultural Pool and the Appropriative Pool. The Judgment allocates a portion of the safe yield to the Overlying Non-Agricultural Pool and a portion of the OSY to the Appropriative Pool. Pursuant to the Judgment, the City has appropriative rights to 20.742 percent of the OSY allocated to the Appropriative Pool. The City has gained 53.338 percent of the Safe Yield assigned to the Overlying Non-Agricultural Pool.

As of July, 2020 the Safe Yield is allocated at 82,800 AFY to the Overlying Agricultural Pool, 7,366 AFY to the Overlying Non-Agricultural Pool, and 40,834 AFY to the Appropriative Pool. Per the Judgment, the City has appropriative rights to 20.742 percent of the OSY. With an OSY of 40,834 AF, the City's current appropriative right is approximately 8,470 AFY as of July 2020. The City has purchased and has rights to 3,921 AF of Overlying Non-Agricultural Pool water.

Appropriators who are Parties to the Chino Basin Judgment, are authorized to produce groundwater in excess of their rights. Appropriators pay assessments for groundwater produced in excess of their rights to the Chino Basin Watermaster. The assessments are used to purchase water to replenish the Chino Basin. The Chino Basin Watermaster purchases water from Metropolitan Water District of Southern California through Inland Empire Utilities Agency and/or Three Valleys Municipal Water District, on behalf of the Parties, to replenish the Chino Basin. Occasionally, Watermaster has purchased water from storage accounts from parties within the Chino Basin.

In addition to the water rights described above, the City of Ontario has rights to groundwater held in the Chino Basin as described below:

Land Use Conversion and Annual Early Transfers

The City gains rights to additional Chino Basin groundwater as a result of land use conversions from agricultural to non-agricultural uses. This is expected to increase from development of Ontario Ranch; the total of which is adjusted annually by the Watermaster. As of FY 19/20, the City receives 4,254 AFY from land use conversions.

The Chino Basin Watermaster reallocates the unused portion of the Chino Basin Safe Yield from the Overlying Agricultural Pool to the Appropriative Pool members as a supplement to the Appropriative Pool share of Operating Safe Yield rights in any year. These transfers are permanent if agricultural land has been converted to non-agricultural use, or temporary if agricultural pool extractions are less than their share of the Safe Yield. From FY 2000-01 to FY 2019-20, the annual quantity of the Agricultural Pool's share available for reallocation to Appropriative Pool members[6] ranged from 40,822 AF to 61,014 AF, with an annual average of approximately 50,457 AF. As Agricultural Pool production declines within the Chino Basin, the reallocation of water to the Appropriative Pool will increase.

Groundwater Recharge Credits

The City is entitled to water rights due to groundwater recharge with stormwater and recycled water in the Chino Basin. The credited amount is based on the volume recharged and therefore varies annually but is projected to increase over time. Stormwater recharge credit is assigned based on OSY percentage. Recycled water recharge credit is assigned based on wastewater contribution percentage. In FY 2018/2019, 2,544 AF of recycled water was recharged for the City. In FY

[6] Pursuant to the Chino Basin Watermaster "*Fiscal Year 2019-20, 43rd Annual Report*", Appendix G

19/20, no recharge credits were purchased by the City due to limitations on groundwater storage capacity.

Fontana Recycled Water Rights

The City has a long-term contract to purchase up to 3,000 AFY of recharged recycled water rights from the City of Fontana. The City of Fontana does not operate a water system. The amount purchased by OMUC each year will vary. In FY 2018/2019, the City purchased 2,157 AF of Fontana's recycled water entitlement. In FY 19/20, no recharged water rights were purchased due to limitations on groundwater storage capacity.

Groundwater Storage Accounts

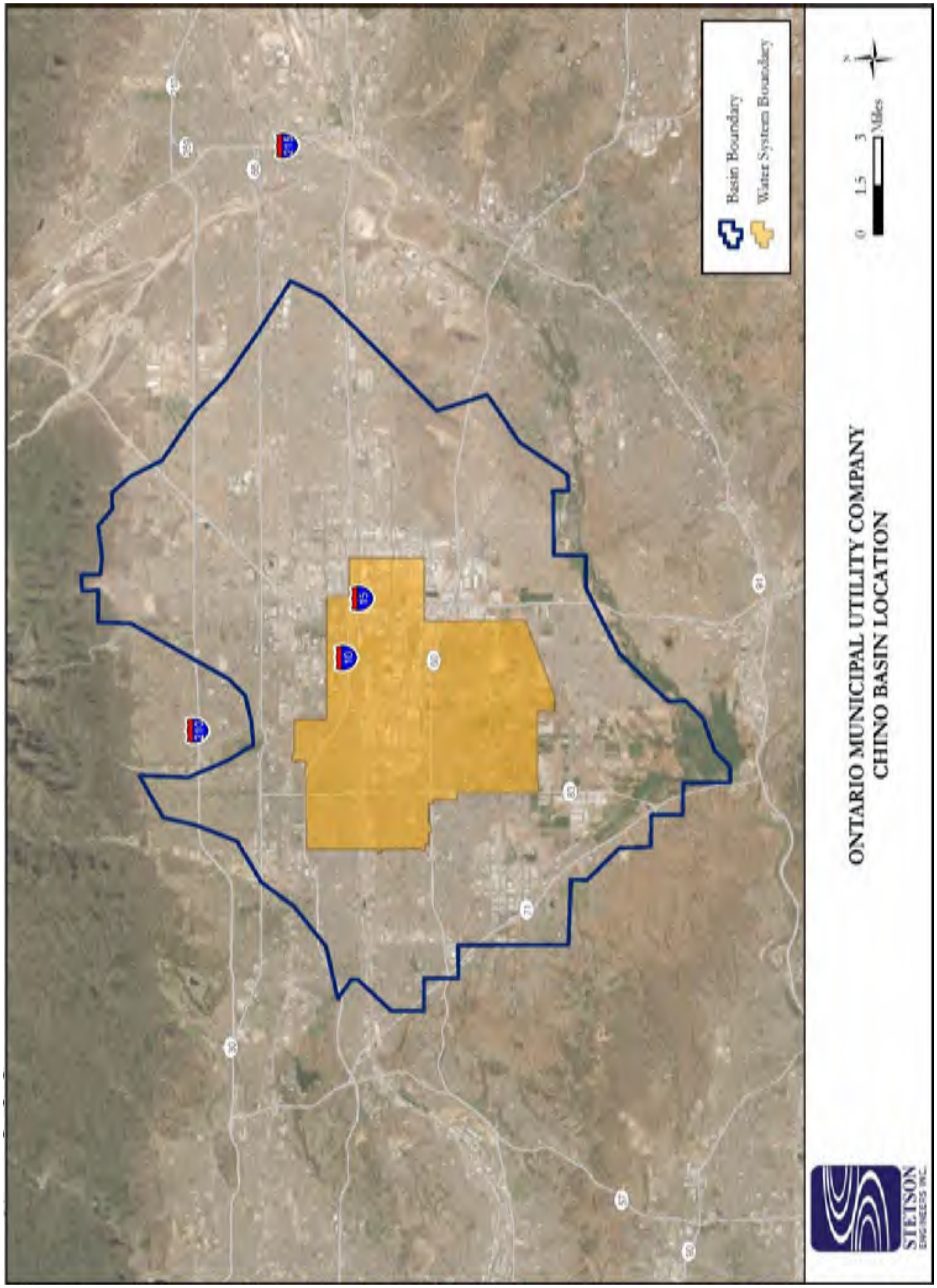
The City has rights to store water in the Chino Basin (Appropriative and Overlying Non-Agricultural) and has been increasing its various storage accounts in recent years. The City holds water in both local storage accounts and supplemental accounts. Local storage accounts hold un-pumped OSY groundwater rights and stormwater that has been recharged into the Chino Basin. Supplemental accounts hold both imported water and recycled water that has been recharged into the Chino Basin. As of June 30, 2020, the City has 96,544 AF in storage pursuant to Appropriative rights and 3,461 AF in storage pursuant to Overlying Non-Agricultural rights.

Chino Basin - Description

The Chino Basin is located within the Upper Santa Ana Valley, which is located in San Bernardino County and is bounded on the east by the Rialto-Colton fault; on the southeast by the contact with impermeable rocks forming the Jurupa Mountains; on the south by impermeable rocks of the Puente Hills and by the Chino fault; on the northwest by the San Jose fault; and on the north by the impermeable rocks of the San Gabriel Mountains and by the Cucamonga fault. The location of the Chino Basin is provided in Figure 3. The surface area of the Chino Basin is approximately 154,000 acres (or 240 square miles). The San Antonio Creek and Cucamonga Creek drain the Chino Basin area southward and flow into the Santa Ana River. Pursuant to DWR Bulletin 118 (for Basin Number 8-2.01), the total storage capacity of the Chino Basin is approximately 18,300,000 AF.

The water-bearing units in the Chino Basin includes Holocene and Upper Pleistocene alluvium. This Holocene alluvium consists mainly of alluvial-fan deposits, with maximum thickness of 150 feet that are coarsest in and near the mouths of the canyons and are finer away from canyon mouths in the southern part of the Chino Basin. The Pleistocene alluvium is exposed mainly in the northern part of the subbasin and supplies most of the water to wells located within the Chino Basin. The Pleistocene alluvium is about 600 to 700 feet thick throughout most of the Chino Basin. The alluvium contains interfingering finer, alluvial-fan deposits and coarser, fluvial deposits.

Figure 3 – Chino Basin Location



The Chino Basin is bounded by three major fault systems. Many of the faults within the Chino Basin form groundwater barriers marked by discontinuities in groundwater elevations. The Rialto-Colton fault forms the eastern boundary of the Chino Basin. Although it has no surface expression, it forms a major barrier to groundwater movement. The San Jose fault forms the northwest boundary of the Chino Basin. The Cucamonga fault zone forms part of the northern boundary of the Chino Basin. Displacement on the Cucamonga fault amounts to about 1,000 feet on its west end to 4,000 feet at its east end.

Chino Basin - Management

Basin Production

Over the past 20 years, total groundwater production from the Chino Basin has ranged from approximately 133,275 AFY to 188,910 AFY[7]. A majority of production currently is pumped for municipal and agricultural purposes while the remaining production is pumped by non-agricultural Parties.

Groundwater Level Monitoring

Groundwater elevation contours in the Chino Basin Watermaster's 2018 State of the Basin Report show a regional depression of groundwater surrounding the Chino-II Desalter well field and the eastern half of the Chino-I Desalter well field. Hydraulic Control of the Chino Basin is achieved east of Chino Desalter Well I-20. The contours also indicate groundwater flowing past the desalter wells west of Chino Desalter Well I-20, indicating only partial Hydraulic Control; however, losses are currently considered de minimis.

Chino Basin Desalter Authority

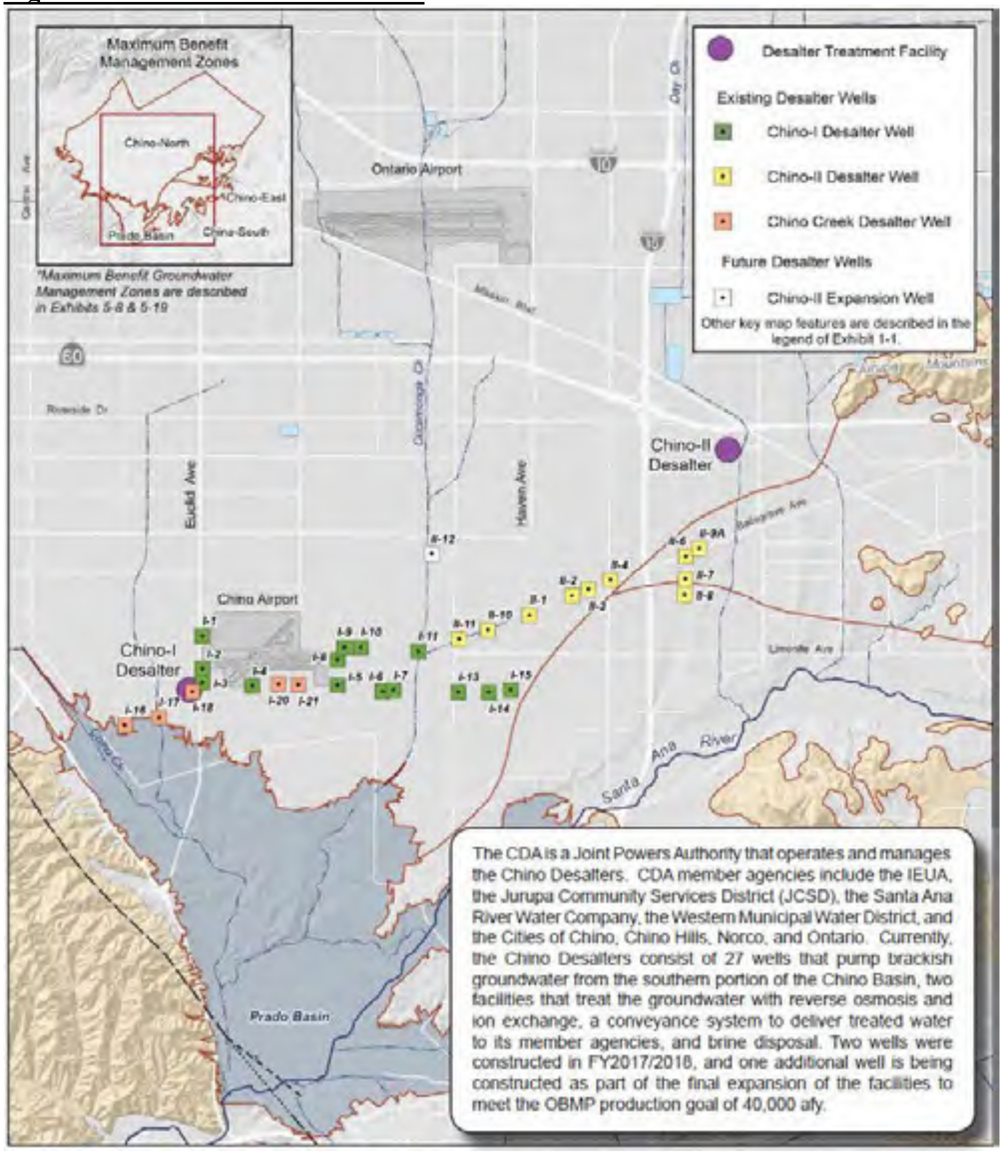
On September 25, 2001, the Chino Basin Desalter Authority was formed under a Joint Exercise of Powers Agreement to remove salts from brackish groundwater extracted from the lower Chino Basin. The area which receives water supplies from CDA is 304 square miles. A map showing CDA Desalter facilities and associated wells is provided in Figure 4 below.

CDA removes salts from brackish groundwater extracted from the lower Chino Basin through the Chino I and II Desalter facilities. The Chino I Desalter is located in the City of Chino and commenced operation in 2001 and was expanded in 2005 to have a total capacity of 14.2 MGD. The Chino I Desalter includes reverse osmosis, ion exchange, and air stripper treatment for treating brackish water and removing nitrate and volatile organic chemicals (VOCs). The Chino II Desalter is located in Jurupa Valley and began operation in 2006 and was expanded in 2011 and again in

[7] Pursuant to the Chino Basin Watermaster "*Fiscal Year 2019-20, 43rd Annual Report*", Appendix H http://www.cbwm.org/docs/annualrep/43rd%20Annual%20Report.pdf

2017 to have a total capacity of 33 MGD. The Chino II Desalter includes reverse osmosis and ion exchange treatment for treating brackish water and removing nitrate. Following the expansion, CDA constructed the Concentrate Reduction Facility in 2017, which utilizes chemical softening to remove the limiting foulants (specifically, calcium and silica) from the reverse osmosis concentrate. Additional components of the Chino II Desalter were constructed as part of the South Archibald Plume Project which will be operational in 2021, with the goal of removing and treated trichloroethylene (from groundwater wells impacted by the South Archibald Plume.

Figure 4 - Location of CDA Facilities



(source: Chino Basin Optimum Basin Management Program 2018 State of the Basin Report)

Treated water is distributed to CDA's member agencies which include the City of Chino, City of Chino Hills, City of Norco, City of Ontario, Inland Empire Utilities Agency, Jurupa Community Services District, Santa Ana River Water Company, and Western Municipal Water District through "take or pay" contracts. CDA's member agencies provide water service within Riverside County and San Bernardino County. CDA can produce up to 40,000 AF from the Chino Basin every year for the purpose of groundwater cleanup and control of contaminant migration. This production is fixed to achieve the desired groundwater cleanup goal. The member agencies have contract entitlements to receive a total of 35,200 AFY of treated water from CDA. The City's current contract entitlement is 8,533 AFY.

A portion of the production is in-lieu of those CDA member agencies producing an equal amount of groundwater from their own groundwater wells using their individual water rights. An additional portion of the production is temporarily assigned as "controlled overdraft". Pursuant to the Chino Basin Judgment, a total of 200,000 AF was authorized for controlled overdraft between the period of 1978 through 2017. In 2007, the Peace II Agreement was adopted to establish measures for achieving hydraulic control of the Chino Basin. One of the measures put forth included increasing the authorized controlled overdraft to 600,000 AF. This increase in controlled overdraft is separate from, and in addition to, the 200,000 AF authorized in the Chino Basin Judgment and is available for utilization until December 31, 2030. For the balance of the production, the Chino Basin Watermaster levies an annual Replenishment Assessment to purchase replenishment water to replace that overproduced water. Each of CDA's member agencies is responsible to pay a Replenishment Assessment for their purchases in excess of their respective water rights allocated to the program.

Chino Basin Optimum Basin Management Program

In 2000, the Chino Basin Watermaster developed the Chino Basin Optimum Basin Management Program (OBMP). The OBMP was developed in a collaborative process that identified the needs of the stakeholders, described the physical state of the basin, defined a set of management goals, identified impediments to these goals, and established a series of actions that would remove these impediments and achieve the management goals. The goals identified in the OBMP included: (1) Enhance Basin Water Supplied; (2) Protect and Enhance Water Quality; (3) Enhance Management of the Basin; and (4) Equitably Finance the OBMP.

The OBMP defines nine Program Elements which were incorporated into the OBMP Implementation Plan as part of the Court-ordered Peace Agreement (2000):

- Program Element 1 - Develop and Implement Comprehensive Monitoring Program
- Program Element 2 - Develop and Implement Comprehensive Recharge Program
- Program Element 3 - Develop and Implement a Water Supply Plan for Impaired Areas
- Program Element 4 - Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1

- Program Element 5 - Develop and Implement Regional Supplemental Water Program
- Program Element 6 - Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin
- Program Element 7 - Develop and Implement Salt Management Plan
- Program Element 8 - Develop and Implement Groundwater Storage Management Program
- Program Element 9 - Develop and Implement Storage and Recovery Programs

The "Peace Agreement" (2000) and the "Peace II Agreement" (2007) are agreements among the Parties that allow the implementation of the OBMP and guides the management of the Chino Basin, including the construction and operations of the Desalters, hydraulic control of the Basin, groundwater production and replenishment for the Desalters, yield accounting and recharge.

Chino Basin Storage Management Plan

The Peace Agreement (2000) establishes rules and regulations, standard storage agreements, and related forms for storage in the Chino Basin. Since 2000, Chino Basin Watermaster administers groundwater storage in the Chino Basin pursuant to the storage management plan described in Program 8 of the 2000 OBMP and evaluated in the Programmatic Environmental Impact Report.

The three types of storage agreements resulted in five types of storage accounts: Excess Carryover, Local Supplemental-Recycled, Local Supplemental-Imported, Pre-2000 Quantified Supplemental, and Storage and Recovery. An Excess Carryover account includes a Party's unproduced rights in the Safe Yield and Basin Water purchased or transferred from other Parties. A Local Supplemental Water account includes any imported and/or recycled water that is recharged by a producer and similar water acquired from other Parties. A Storage and Recovery Account includes Supplemental Water and is intended to provide a broad and mutual benefit to the Parties of the Judgement. The Chino Basin Watermaster tracks the puts, takes, losses, and end-of-year storage totals for all storage accounts and reports on this accounting on an annual basis. The Chino Basin Watermaster assesses losses by considering water in managed storage (excluding Carryover) and offsets the increases in groundwater discharge to the Santa Ana River and from the Chino Basin attributable to managed storage (excluding Carryover). Chino Basin Watermaster also considers losses due to evaporation on the puts when water is recharged in spreading basins.

The individual Parties are involved in water transfers of annual unproduced rights in the Safe Yield and water in their storage accounts. Chino Basin Watermaster has an application and review process for these transfers. The Parties engage in conjunctive-use activities individually by storing Chino Basin and Supplemental Water that are in excess of their demands and recover that water as necessary. These activities collectively cause a temporary increase in the storage. The Parties' aggregate amount of water in managed storage was 541,845 AF as of June 30, 2020.

MWD's Dry-Year Yield Program is the only active storage and Recovery Program in Chino Basin. This program is a water exchange as discussed in 6.2.7.1. The DYYP can store up to 100,000 AF with maximum replenishment of 25,000 AFY and maximum extraction of 33,000 AFY. As of June 30, 2020, there was 45,961 AF within the DYYP account, resulting in a total managed storage volume of 587,806 AF (541,845 AF + 45,961 AF). The agreement that authorized the DYYP will expire in 2028. The combined volume of managed storage by MWD's DYYP and the Parties is projected to have a maximum of 790,000 AF in 2028, assuming DYYP has 100,000 AF in storage and that MWD removes the contract rate of 33,000 AFY starting in 2029.

As discussed in Section 4.5, Inland Empire Utilities Agency's "Addendum No. 2 to the Optimum Basin Management Program Project", completed in February 2021, amends the 2000 Chino Basin Peace Agreement's Programmatic Environmental Impact Report to address managed storage within the Chino Basin consistent with the Local Storage Limitation Solution. Consistent with Addendum No. 1, from July 1, 2017 through June 30, 2021 the Safe Storage Capacity of the Chino Basin is 600,000 AF. The LSLS proposes a change in the Safe Storage Capacity to 700,000 AF through June 30, 2030, and to 620,000 AFY from July 1, 2030 through June 30, 2035. Full utilization of the allowable increased storage space is expected to occur gradually as additional water is stored and less groundwater is produced. The Safe Storage Capacity of the Chino Basin will revert to 500,000 AF after June 30, 2035.

Groundwater Clean-up

Groundwater in areas of the Chino Basin is currently contaminated with Perchlorate and VOCs, including 1,2,3-Trichloropropane (1,2,3-TCP), trichloroethylene (TCE), and perchloroethylene (PCE). In addition, nitrates and TDS concentrations in areas of the Chino Basin exceed drinking water quality standards. Wellhead treatment is necessary in these areas to allow delivery of the groundwater for potable purposes.

Chino Basin - Historical and Projected Basin Production

The City currently produces groundwater from the Chino Basin. The City's share of the Operating Safe Yield is 20.742 percent; Ontario's current appropriative right is 8,470 AFY as of July 2020. In addition, the City has purchased and has rights to 3,921 AF of Overlying Non-Agricultural Pool water.

Over the past five years, the City has produced 18,395 AFY to 26,109 AFY, with an average of 22,306 AFY from the Chino Basin. The City's projected production from the Chino Basin, over the next 25 years in five-year increments, is provided in Table 6-9.

Table 6-1 Groundwater Volume Pumped

Submittal Table 6-1 Retail: Groundwater Volume Pumped						
☐	Supplier does not pump groundwater. The supplier will not complete the table below.					
☐	All or part of the groundwater described below is desalinated.					
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
Alluvial Basin	Chino Basin	22,751	24,672	26,109	19,604	18,395
	TOTAL	22,751	24,672	26,109	19,604	18,395
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

6.2.3 SURFACE WATER

The City does not use surface water supplies to meet its water demands.

6.2.4 STORMWATER

The City has historically received groundwater from the Chino Basin. Management and use of the stormwater runoff from the Chino Basin watershed, which is crucial to groundwater management. However, the City currently does not have its own program to beneficially use stormwater runoff as a direct source of supply.

6.2.5 WASTEWATER AND RECYCLED WATER

CWC 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

As a local water purveyor, the City delivers water to its customers from its potable and recycled water supplies. Table 6-4 summarizes current and projected recycled water use within the City from FY 2019-20 to FY 2044-45. The following sections provide a description of the City's current recycled water use and its plans to expand the use of recycled water as a source of water supply over the next 25 years.

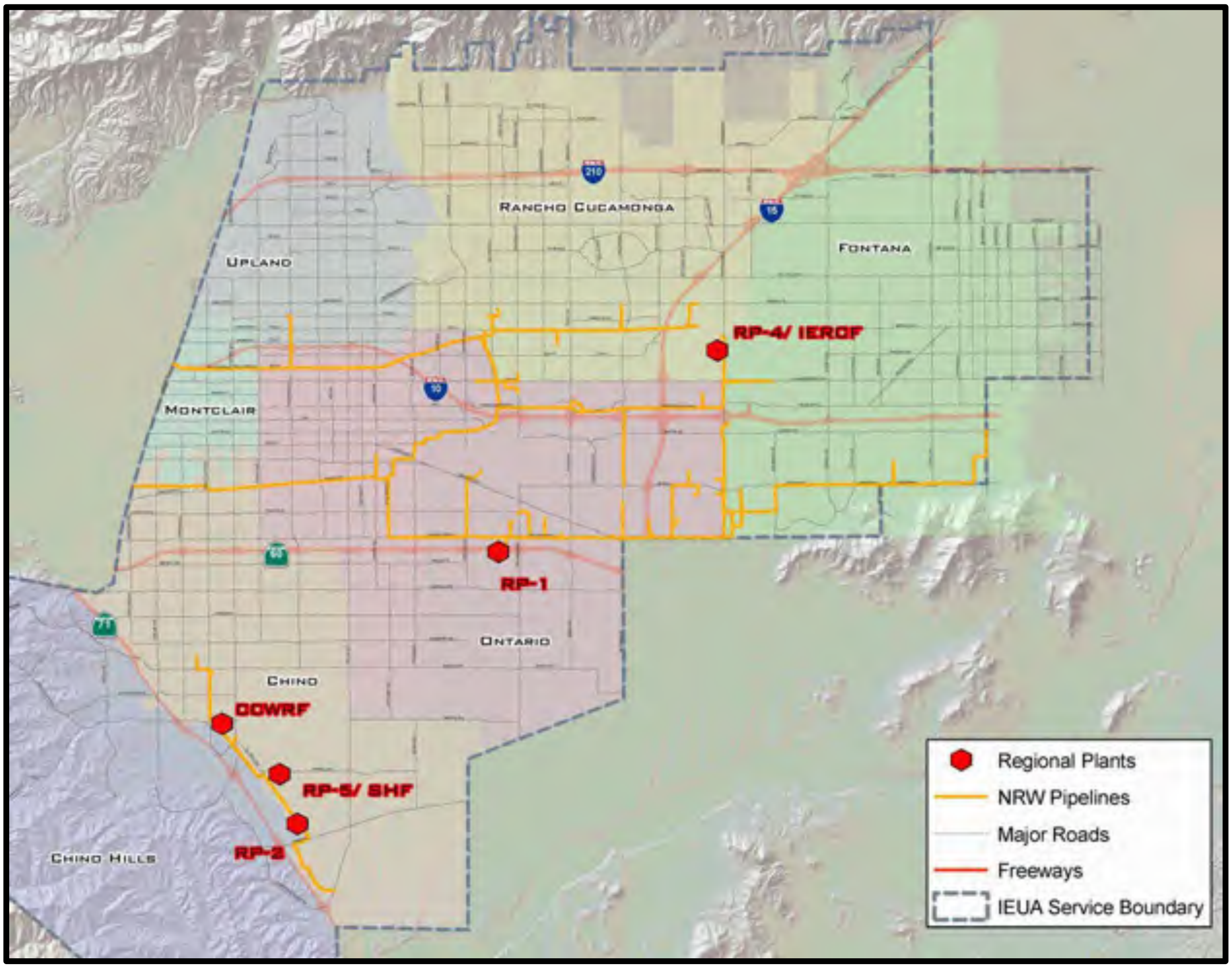
6.2.5.1 RECYCLED WATER COORDINATION

CWC 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area…

The City's recycled water supplies are produced by IEUA. Pursuant to the Chino Basin Regional Sewage Service Contract, each Contracting Agency has the right of first purchase of their Base Entitlement. Base Entitlement is defined as the total quantity of sewage delivered into the Regional Sewerage System by the Contracting Agency less normal processing losses resulting from the treatment of sewage. IEUA owns and operates five regional wastewater treatment plants including the Regional Water Recycling Plant No. 1 (RP-1), Regional Water Recycling Plant No. 2 (RP-2), Regional Water Recycling Plant No. 4 (RP-4), Regional Water Recycling Plant No. 5 (RP-5), and Carbon Canyon Water Recycling Facility (CCWRF). RP-1 has a wastewater treatment capacity of 44 MGD; RP-2 does not have any liquid treatment processes and does not produce any recycled water; RP-4 has a wastewater treatment capacity of 14 MGD; RP-5 has a wastewater treatment capacity of 15 MGD; and CCWRF has a wastewater treatment capacity of approximately 9.5 MGD. IEUA is currently planning an expansion of RP-5 which will increase its hydraulic capacity up to 22.5 MGD. The locations of IEUA's regional plants are provided in Figure 5 below.

Figure 5 - Location of IEUA Regional Water Recycling Plants



Source: IEUA (https://www.ieua.org/everything-water/recycled-water/)

IEUA's regional plants (with the exception of RP-2 which does not have any liquid treatment processes) can produce tertiary-treated, Title 22-quality recycled water. Information regarding recycled water effluent monitoring data and compliance data is provided in IEUA's annual "*Recycled Water Quality Reports*" and "*Recycled Water Annual Reports*[8]"

Table 6-4 summarizes current and projected recycled water use within the City from FY 2019-20 to FY 2044-45. The City works closely with IEUA regarding the development of recycled water infrastructure in its service area and the identification of new recycled water users. As discussed in Section 2.6, the City has coordinated the preparation of its 2020 Plan with IEUA.

[8] https://www.ieua.org/read-our-reports/recycled-water-reports/

6.2.5.2 WASTEWATER COLLECTION, TREATMENT, AND DISPOSAL

CWC 10633.

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

Wastewater generated by the City is treated by IEUA. IEUA provides sewage utility services to seven contracting agencies including the Cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Upland, and Cucamonga Valley Water District. Wastewater is collected within the City's local sewer collection system. The City's local sewers tie into IEUA's regional trunk sewers, including 90 miles of regional sewage interceptors. The regional sewer lines deliver wastewater to one or more regional plants owned by IEUA for treatment. IEUA owns and operates five regional water recycling plants including the Regional Water Recycling Plant No. 1, Regional Water Recycling Plant No. 2, Regional Water Recycling Plant No. 4, Regional Water Recycling Plant No. 5, and Carbon Canyon Water Recycling Facility. Wastewater is treated through various processes including preliminary screening, grit removal, primary clarification, secondary treatment, tertiary treatment, dechlorinating, solids thickening, anaerobic digestion, and dewatering. With the exception of RP-2, the regional plants can produce tertiary-treated, Title 22-quality recycled water.

IEUA operates a Non-Reclaimable Wastewater System (NRWS) which conveys high strength wastewater to treatment facilities in Los Angeles and Orange counties for eventual discharge to the Pacific Ocean. The NRWS consists of two trunk lines which convey wastewater to the Los Angeles County Sanitation Districts' sewer system, and one trunk line which conveys wastewater to the Orange County Sanitation District's sewer system. Treated wastewater is ultimately disinfected prior to being discharged to the Pacific Ocean. All water discharged to the ocean is monitored to ensure compliance with applicable local, state, and federal standards for discharge water

According to information provided by IEUA, IEUA treated approximately 49.1 MGD of wastewater at its regional plants during FY 2019-20. In addition, IEUA estimates that the total estimated amount of wastewater collected within the City's service area during FY 2019-20 was approximately 12,650 AFY), as shown in Table 6-2. As indicated in Table 6-2 and Table 6-3, the City's wastewater is treated at RP-1 and RP-5.

Table 6-2 Wastewater Collected Within Area in 2020

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020

☐	There is no wastewater collection system. The supplier will not complete the table below.
100	Percentage of 2020 service area covered by wastewater collection system *(optional)*
100	Percentage of 2020 service area population covered by wastewater collection system *(optional)*

Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? *Drop Down List*	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*	Is WWTP Operation Contracted to a Third Party? *(optional)* *Drop Down List*
IEUA	Estimated	12,645	IEUA	RP-1 and RP-5	Yes	No
Total Wastewater Collected from Service Area in 2020:		12,645				

**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3* **.**

NOTES:

Table 6-3 Wastewater Treatment and Discharge within Service Area in 2020

Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020											
☐	**No wastewater is treated or disposed of within the UWMP service area.** The supplier will not complete the table below.										
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area? *Drop down list*	Treatment Level *Drop down list*	2020 volumes [1]				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
RP-1	Santa Ana River	San Ana River		River or creek outfall	Yes	Tertiary	31,000	14,200	7,812	8,988	
						Total	31,000	14,200	7,812	8,988	0

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.
[2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility

NOTES: RP-1 are located within the City's service area; however; the water reclamation plant is wholly owned and operated by IEUA. Information regarding "2020 volumes" is estimated based IEUA's Recycled Water Annual Report FY 2019-20. Recycled water volume (within the serviced area) is for fiscal year 2019-20. Because the City does not own the water reclamation plant, information regarding "Instream Flow Permit Requirement" is not available and is not applicable.

6.2.5.3 RECYCLED WATER SYSTEM DESCRIPTION

CWC 10633.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

The City's recycled water supplies are produced by IEUA. Pursuant to the Chino Basin Regional Sewage Service Contract, each Contracting Agency has the right of first purchase of their Base Entitlement. Base Entitlement is defined as the total quantity of sewage delivered into the Regional Sewerage System by the Contracting Agency less normal processing losses resulting from the treatment of sewage. The City has received recycled water from IEUA since 1972. The City uses recycled water for industrial, landscape irrigation, agricultural irrigation, and golf course irrigation. The recycled water pipelines operated and maintained by the City total approximately 173,000 feet. The pipelines range from 6-inch to 36-inch and consist of polyvinyl chloride and cement mortar lined and coated materials. The location of the City's recycled water distribution system is provided in Appendix K.

Identification of Agencies Involved in the Recycled Water System

As part of the Chino Basin Watermaster's development of the OBMP, recycled water use was identified as a critical component in drought-proofing and maintaining the region's economic growth. The OBMP established the path for the development of IEUA's regional recycled water distribution system and a Recycled Water Implementation Plan. IEUA in partnership with its member agencies and the Central Basin Watermaster have invested approximately $625 million since 2000 to increase the availability of local water supplies through water recycling, conservation, recharge improvements, the MWD groundwater storage and recovery project, the Chino Desalter, and other water management programs.

As previously discussed, IEUA owns and operates five regional wastewater treatment plants consisting of Regional Water Recycling Plant No. 1, Regional Water Recycling Plant No. 2, Regional Water Recycling Plant No. 4, Regional Water Recycling Plant No. 5, and Carbon Canyon Water Recycling Facility. IEUA began providing recycled water services in the 1970s at the Whispering Lakes Golf Course adjacent to RP-1 in the City Ontario and at the El Prado Park and Golf Course in the City of Chino. RP-2 does not have any liquid treatment processes and does not produce any recycled water. In the 1980s, IEUA expanded its recycled water system with the construction of the CCWRF and RP-4 recycling plants.

Those regional wastewater treatment plant capacities are:

- RP-1 has a wastewater treatment capacity of 44 MGD.
- RP-2 does not have any liquid treatment processes and does not produce any recycled water.
- RP-4 has a wastewater treatment capacity of 14 MGD.
- RP-5 has a wastewater treatment capacity of 15 MGD.
- CCWRF has a wastewater treatment capacity of approximately 9.5 MGD.

Information on Recycled Water System History and Operation

IEUA, in coordination with their member agencies, began providing recycled water services in the 1970s at the Whispering Lakes Golf Course adjacent to RP-1 in the City Ontario and at the El Prado Park and Golf Course in the City of Chino. In the 1980s, IEUA continued the implementation of its recycled water system with the construction of the CCWRF and RP-4 recycling plants. IEUA installed a backbone recycled water distribution system into the Cities of Chino and Chino Hills from the CCWRF in 1997. IEUA began groundwater recharge with recycled water at Ely Basin in 1999. In 2002, IEUA Board of Directors adopted Ordinance No. 75, the Mandatory Use Ordinance, to establish incentives and encourage recycled water use from the regional distributions system. A brief summary of recycled water project is provided below.

- In 2002, the Chino Basin Watermaster, Chino Basin Water Conservation District (CBWCD), San Bernardino County Flood Control District (SBCFCD) and IEUA combined efforts to greatly expand groundwater recharge capacity through the Chino Basin Facilities Improvement Program.

- In 2005, IEUA was permitted by the Regional Water Quality Control Board (RWQCB) to operate its recycled water groundwater recharge programs at six additional recharge sites (Banana, Hickory, Etiwanda Conservation Ponds, Declez, RP3, and Turner Basins).
- In 2007, IEUA was permitted to operate its recycled water groundwater recharge program at seven more recharge sites (Brooks, 8th Street, Victoria, Lower Day, San Sevaine, Etiwanda Spreading Grounds (later reconfigured as the Etiwanda Debris Basin) and Ely Basins).
- November 2007, IEUA and its member agencies unanimously adopted the Three-Year Recycled Water Business Plan. IEUA and its member agencies committed to implementing the plan, which laid out a focused and cost-effective approach to rapidly increase the availability and use of recycled water within IEUA's service area.
- Recycled water use within the IEUA service area increased from approximately 5,396 AF in FY 2004-05 up to 38,251 AF in FY 2013-14. However, with the conversion of land use from agricultural to urban, recycled water demand has decreased in recent years due to a reduction in irrigation demands.

6.2.5.4 POTENTIAL, CURRENT, AND PROJECTED RECYCLED WATER USES

CWC 10633.

(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use. A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

The City's "2020 Recycled Water Master Plan" identified potential recycled water customers within the City based on recycled water use for large-volume irrigation purposes (e.g. municipal parks, fields, golf courses, etc.). Recycled water use factors were applied to the ultimate land uses for these customers to determine the potential ultimate recycled water demands (see Appendix K).

The City uses recycled water for agricultural irrigation, landscape irrigation, golf course irrigation and industrial purposes. The City plans to increase recycled water use within its service area by expanding the recycled water system to additional parks, schools, nurseries, and commercial landscaping areas not currently using recycled water.

The City continues to retrofit landscape irrigation systems to use recycled water where available. Future recycled water use projections are based on current recycled water use and planned recycled water projects. As shown in Table 6-4, the current and projected deliveries reflect the volume of municipal recycled wastewater from IEUA to customers through the City's recycled water distribution system.

The City's recycled water supplies are produced by IEUA. Pursuant to the Chino Basin Regional Sewage Service Contract, each Contracting Agency has the right of first purchase of their Base Entitlement. Base Entitlement is defined as the total quantity of sewage delivered into the Regional Sewerage System by the Contracting Agency less normal processing losses resulting from the treatment of sewage. A tabulation of the City's recycled water demands over the past five years are provided in Section 6.1. Over the past five years, the City recycled water demands have ranged from 7,510 AFY to 9,653 AFY, with an average of 8,167 AFY. The City's actual use of recycled water in FY 2019-20 was 7,812 acre-feet and the 2015 Plan projected a recycled water use of 7,929 acre-feet for FY 2019-20, as shown in Table 6-5. The City's projected recycled water demands, over the next 25 years in five-year increments, are provided in Table 6-4 and Table 6-9.

Table 6-4 Current and Projected Recycled Water Direct Beneficial Uses Within Service Area

Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area

☐ Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.

Name of Supplier Producing (Treating) the Recycled Water:	Inland Empire Utilities Agency
Name of Supplier Operating the Recycled Water Distribution System:	Ontario Municipal Utilities Company
Supplemental Water Added in 2020 (volume) *Include units*	0
Source of 2020 Supplemental Water	N/A

Beneficial Use Type *Insert additional rows if needed.*	**Potential** Beneficial Uses of Recycled Water (Describe)	Amount of **Potential** Uses of Recycled Water (Quantity) *Include volume units* [1]	General Description of 2020 Uses	Level of Treatment *Drop down list*	2020 [1]	2025 [1]	2030[1]	2035[1]	2040[1]	2045[1] (opt)
Agricultural irrigation		5,971		Tertiary	2,905	1,704	1,136	568	0	0
Landscape irrigation (exc golf courses)	Schools, Parks, City Landscape	6,764	Schools, Parks, City Landscape	Tertiary	3,290	7,088	8,612	10,136	11,659	11,659
Golf course irrigation		1,297		Tertiary	631	660	680	700	720	720
Commercial use										
Industrial use		2,027		Tertiary	986	2,716	3,037	3,358	3,680	3,680
Geothermal and other energy production										
Seawater intrusion barrier										
Recreational impoundment										
Wetlands or wildlife habitat										
Groundwater recharge (IPR)										
Reservoir water augmentation (IPR)										
Direct potable reuse										
Other (Description Required)										
				Total:	7,812	12,168	13,465	14,762	16,059	16,059
				2020 Internal Reuse						

[1] ***Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Projected recycled water use is equal for years 2040 and 2045 because the City anticipates buildout to occur in 2040. Pursuant to the City's 2020 Recycled Water Master Plan, the City anticipates agricultural recycled water use will decrease to 0 AFY at buildout.

Table 6-5 2015 Recycled Water Use Projection Compared to 2020 Actual

Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual

☐	Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below. If recycled water was not used in 2020, and was not predicted to be in 2015, then check the box and do not complete the table.	
Beneficial Use Type	**2015 Projection for 2020** [1]	**2020 Actual Use**[1]
Insert additional rows as needed.		
Agricultural irrigation	2,177	2,905
Landscape irrigation (exc golf courses)	4,195	3,290
Golf course irrigation	600	631
Commercial use		
Industrial use	957	986
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Description Required)		
Total	7,929	7,812

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.

NOTE:

6.2.5.5 ACTIONS TO ENCOURAGE AND OPTIMIZE FUTURE RECYCLED WATER USE

CWC 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

The City plans to continue to increase delivery capacity and expand the recycled water system to serve additional customers. Because the City is reliant on imported water supplies from IEUA, the economic value of a recycled water system continues to increase. Any additional water supplies that can offset imported water purchases will make these projects more viable. As discussed previously, the City's "2020 Recycled Water Master Plan" identified potential recycled water customers within the City based on recycled water use for large-volume irrigation purposes (e.g. municipal parks, fields, golf courses, etc.). The City is evaluating the following potential methods to expand future recycled water use. These potential methods are tabulated in Table 6-6.

- As a retail water supplier, the City will offer its customers (with non-potable water demands) an economic incentive to convert its use to recycled water.
- The City's potable and recycled water rates are a combination of a Readiness-to-Serve Charge, which is based on meter size, and a Usage Charge, which is based on the amount of water use. The Readiness-to-Serve Charge for a recycled water meter is approximately 55 percent of the Readiness-to-Serve Charge for a potable water meter. The variable Usage Charge for recycled water is approximately 60% of the charge for potable water. (The City's current and future recycled water charges largely depend on the rate that IEUA sells the recycled water for.)
- The City's Municipal Code Sec. 6-8.715 Rates, fees, charges and deposits provides that "*Under certain circumstances, the City may contribute to the cost of designing and/or constructing the facilities needed to deliver recycled water to an applicant's property. Subject to the availability of funds, the City may:*
    (1) Reimburse an applicant for costs incurred to install oversized facilities in the public right-of-way
    (2) *Elect to participate in or construct pipelines, reservoirs, pumping stations or other facilities, as it determines necessary, and/or as funds are available.*
- The City's Municipal Code Sec. Section 6-8.703, Policy states "*It is the policy of the City that recycled water be used for any purposes approved for recycled water use, when it is economically, technically, and institutionally feasible. Recycled water shall be the primary*

source of supply for commercial and industrial uses, whenever available and/or feasible. Use of potable water for commercial and industrial uses shall be contrary to City policy; shall not be considered the most beneficial use of a natural resource; and shall be avoided to the maximum extent feasible."

- As a contracting agency of IEUA, the City will investigate the availability of financial assistance for plumbing retrofits necessary to receive recycled water.
- The City will evaluate the viability of making conversion to recycled water mandatory for those customers with non-potable supplies that are in proximity to an existing or planned recycled water pipeline.

Table 6-6 Methods to Expand Future Recycled Water Use

Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
☐	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
Section 6.2.5	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
Add additional rows as needed			
Recycled Water Expansion	Expand recycled water distribution system pursuant to City's "2020 Recycled Water Master Plan" (Near Phase)	2025	4,356
Recycled Water Expansion	Expand recycled water distribution system pursuant to City's "2020 Recycled Water Master Plan" (Future Phase)	2045	3,891
		Total	8,247
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES:			

6.2.6 DESALINATED WATER OPPORTUNITIES

CWC 10631.

(g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

Chino Basin

As discussed in Section 6.2.2, the Central Basin Desalter Authority removes salts from brackish groundwater extracted from the lower Chino Basin through the Chino I and II Desalter facilities. The Chino I Desalter is located in the City of Chino and commenced operation in 2001 and was expanded in 2005 to have a total capacity of 14.2 MGD. The Chino I Desalter includes reverse osmosis, ion exchange, and air stripper treatment for treating brackish water and removing nitrate and VOCs. The Chino II Desalter is located in Jurupa Valley and began operation in 2006 and was expanded in 2011, and again in 2017 to have a total capacity of 33 MGD. The Chino II Desalter includes reverse osmosis and ion exchange treatment for treating brackish water and removing nitrate. Following the expansion, CDA constructed the Concentrate Reduction Facility in 2017, which utilizes chemical softening to remove the limiting foulants (specifically, calcium and silica) from the reverse osmosis concentrate. Additional components of the Chino II Desalter were constructed as part of the South Archibald Plume Project which will be operational in 2021, with the goal of removing and treated TCE from groundwater wells impacted by the South Archibald Plume.

Treated water is distributed to CDA's member agencies which include the City of Chino, City of Chino Hills, City of Norco, City of Ontario, Inland Empire Utilities Agency, Jurupa Community Services District, Santa Ana River Water Company, and Western Municipal Water District. The member agencies have contract entitlements to receive a total of 35,200 AFY of treated water from CDA. A portion of the production is in-lieu of those CDA member agencies producing an equal amount of groundwater from their own groundwater wells from the Chino Basin using their individual water rights.

6.2.7 WATER EXCHANGES AND TRANSFERS

CWC 10631.

(c) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

6.2.7.1 EXCHANGES

Pursuant to DWR's Final 2020 UWMP Guidebook, "*[w]ater exchanges are typically water delivered by one water user to another water user, with the receiving water user providing water in return at a specified time or when the conditions of the parties' agreement are met. Water exchanges can be strictly a return of water on a basis agreed upon by the participants or it can include payment and the return of water.*"

As discussed in Section 4.5, the City participates in MWD's Dry-Year Yield Program. The DYYP is a groundwater storage and recovery program where supplemental water is stored in the Chino Basin during surplus years and could be recovered in-lieu of imported water from MWD through IEUA. The DYYP allows maximum use of imported water supplies available during wet years and stored groundwater in the Chino Basin during dry years. The DYYP can store up to 100,000 AF with maximum replenishment of 25,000 AFY and maximum extraction of 33,000 AFY. During FY 2019-20, there was 45,961 AF within the DYYP account. The agreement that authorized the DYYP will expire in 2028.

The City authorized execution of an agreement with IEUA to participate in the DYY program in 2003. Participation obligates the City to reduce its use of imported water compared to the previous year by a fixed amount, known as the "shift obligation." The City's shift obligation is 8,076 AFY. During years when MWD calls for extraction, the City's WFA purchases would be reduced by 8,076 AFY compared to the previous year. Since Jurupa Community Services District does not have an imported water connection, it has entered into an agreement with the City for meeting its shift obligation. Under this agreement, Jurupa Community Services District conveys groundwater to the City in an amount equal to its shift obligation.

DYY funds were used for the construction of three groundwater wells (Wells 45, 46, and 47) and an ion-exchange facility located at John Galvin Park to treat water extracted from Well 44 and Well 52. When the City is required to extract MWD's stored water, MWD will pay for the operation and maintenance costs and the City would pay MWD (through IEUA) the full-service water rate. The City can use the DYY facilities to meet its normal water demands during other periods but is responsible for the cost of well operation and maintenance.

The program allows the City to be less reliant upon imported water supplies. The additional groundwater capacity allows the City to increase the percentage of groundwater supply used to meet peak demands.

6.2.7.2 TRANSFERS

Pursuant to DWR's Final 2020 UWMP Guidebook, "*[t]he Water Code defines a water transfer as a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer, sale, lease, or exchange of water or water rights.*"

Pursuant to the Chino Basin Peace Agreement (discussed in Section 4.5), transfers include the assignment, lease, or sale of a right to produce water to another producer within the Chino Basin or to another person or entity for use outside the basin whether the transfer is temporary or permanent. The leasing of water rights is also permissible. In addition, the Chino Basin Watermaster accounts for transfers of stored water between producers. The City can utilize the transfer opportunities available for Chino Basin water when necessary.

6.2.7.3 EMERGENCY INTERTIES

The City has emergency interties with other water agencies that service short-term emergency water supplies. Emergency interconnections are distribution system interconnections between water agencies for use during critical situations where one system or the other is temporarily unable to provide sufficient potable water to meet its water demands and/or fire protection needs. An emergency interconnection will allow a water system to continue serving water during critical situations such as local water supply shortages as a result of earthquakes, fires, prolonged power outages, and droughts.

The City has Mutual Aid Agreements with the following agencies: Chino, Chino Hills, Fontana, Monte Vista Water District, Cucamonga Valley Water District and IEUA.

The City also has several existing inter-agency and emergency interconnections with neighboring cities and water agencies. There are additional inter-agency and emergency interconnections planned as the City continues to expand. Currently, the City has two interconnections to WFA and five interconnections to CDA for imported water and can be utilized in times of emergency. Additionally, the City has one interconnection with Cucamonga Valley Water District and one interconnection with the City of Chino. The connection size between the City and Cucamonga Valley Water District is 4 inches and 8 inches through a Pressure Reducing Station. The interconnection size between the City and the City of Chino is 10 inches and the interconnection is located at the City of Chino Reservoir. These interconnections provide reliable water supply, in the event of a catastrophic supply interruption, from multiple sources of supply.

6.2.8 FUTURE WATER PROJECTS

CWC 10631.

(f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single-dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

The City's water supply sources include: groundwater pumped from the Chino Basin; treated groundwater from the Chino Basin produced by the Chino Basin Desalter Authority; treated, imported water purchased from MWD through Water Facilities Authority; groundwater and/or surface water purchased from San Antonio Water Company; and recycled water purchased from Inland Empire Utilities Agency. These water supply sources will allow the City to provide sufficient water service in the present moment, and in the future. Although the City has no plans for future water supply projects, the City will construct new groundwater production wells to replace existing wells when necessary.

Table 6-7 Expected Future Water Supply Projects or Programs

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
☑	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☐	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type *Drop Down List*	Expected Increase in Water Supply to Supplier* *This may be a range*
	Drop Down List (y/n)	*If Yes, Supplier Name*				
Add additional rows as needed						
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

6.2.9 SUMMARY OF EXISTING AND PLANNED SOURCES OF WATER

CWC 10631.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following…

(b)(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

6.2.9.1 DESCRIPTION OF SUPPLIES

As discussed in Section 6.2, the City's water supply sources consist of purchased groundwater treated by CDA (see Section 6.2.1), treated imported water purchased from WFA (see Section 6.2.1), treated groundwater and/or surface water from SAWCo (see Section 6.2.1), groundwater from the Chino Basin (see Section 6.2.2), and recycled water from IEUA (see Section 6.2.5). The actual quantities of the water supply sources available to the City during FY 2019-20 are summarized in Table 6-8. The reliable quantities of projected water supply sources available to the City in five-year increments through FY 2044-45 during normal or average years are summarized in Table 6-9. The reliability of these sources of supply are addressed in Section 7.2.3, including during normal years, single dry years, and five consecutive year droughts.

The order of use of the City's projected reliable water supplies from FY 2019-20 through FY 2044-45 in five-year increments is based on historical practices, water supply availability, and the cost of water. It is anticipated the City will initially use groundwater produced from the Chino Basin. At the same time the City will continue to use recycled water for non-potable demands. The City will then use purchased treated water from CDA and SAWCo, to the extent it is available. The City will also use treated imported water. It is important to note that the Chino Basin is adjudicated (as discussed in Section 6.2.2) and that there is no limit to the amount of groundwater which can be produced annually. Consequently, in the event purchased treated water supplies from CDA and SAWCo and/or treated imported water may be limited, the City has the flexibility to increase groundwater production from the Chino Basin.

6.2.9.2 QUANTIFICATION OF SUPPLIES

The actual quantities of the water supply sources available to the City during FY 2019-20 are summarized in Table 6-8. The reliable quantities of projected water supply sources available to the City in five-year increments through FY 2044-45 during average years are summarized in Table 6-9. The reliability of these sources of supply are addressed in Section 7.2.3, including during normal years, single dry years, and five consecutive year droughts.

The City's projected quantities of purchased treated water supplies from CDA and SAWCo are based on historical long-term averages and available supplies during previous dry year conditions. The City's projected quantities of recycled water supplies to meet non-potable demands are based on historical long-term averages. The City's projected quantities of treated imported water and groundwater supplies from the Chino Basin are based on meeting the remainder of the City's total water demands. As noted above, in the event purchased treated water and/or treated imported water may be limited, the City has the flexibility to increase groundwater production from the Chino Basin. Consequently, it is anticipated the City will have sufficient water supplies available to meet projected demands.

Table 6-8 Water Supplies - Actual

Submittal Table 6-8 Retail: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Groundwater (not desalinated)	Chino Basin	18,395	Drinking Water	
Purchased or Imported Water	Chino Basin Desalter Authority	6,636	Drinking Water	
Purchased or Imported Water	Water Facilities Authority	6,513	Drinking Water	
Purchased or Imported Water	San Antonio Water Company	565	Drinking Water	
Recycled Water	Inland Empire Utilities Agency	7,812	Recycled Water	
	Total	39,921		0
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*				
NOTES:				

Table 6-9 Water Supplies - Projected

Submittal Table 6-9 Retail: Water Supplies — Projected											
Water Supply	Additional Detail on Water Supply	Projected Water Supply * Report To the Extent Practicable									
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		2025		2030		2035		2040		2045 (opt)	
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Groundwater (not desalinated)	Chino Basin	20,249		22,915		24,943		31,476		31,476	
Purchased or Imported Water	Water Facilities Authority	11,000		13,000		15,000		17,000		17,000	
Purchased or Imported Water	Chino Basin Desalter Authority	8,533		8,533		8,533		8,533		8,533	
Purchased or Imported Water	San Antonio Water Company	600		600		600		600		600	
Recycled Water	Inland Empire Utilities Agency	12,168		13,465		14,762		16,059		16,059	
	Total	52,550	0	58,513	0	63,838	0	73,668	0	73,668	0
****Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*											
NOTES:											

6.2.10 SPECIAL CONDITIONS

The City considered the issues described below when developing its planned sources of water supply.

6.2.10.1 CLIMATE CHANGE EFFECTS

Climate Change has the possibility of impacting the availability of planned water supplies, particularly during a drought period. Section 4.5 of this Plan provides a discussion regarding climate change effects on the City's various sources of supply.

6.2.10.2 REGULATORY CONDITIONS AND PROJECT DEVELOPMENT

The City has considered the implications of changing regulatory conditions and project development on the availability of planned water supplies. Section 1.4 provides a discussion the reduced reliance on Delta water supplies.

6.2.10.3 OTHER LOCALLY APPLICABLE CRITERIA

There are no locally applicable criteria which applies to the City.

6.3 SUBMITTAL TABLES COMPLETION USING THE OPTIONAL PLANNING TOOL

As discussed in Section 4.2.5, DWR has created an optional "Planning Tool Worksheet" for water suppliers to review and assess monthly water use trends. DWR has deemed the tool as optional and the City is not required by DWR to use the tool. Section 6.1 provides a tabulation of the City's historical annual water uses for each water supply source. During the past 10 years, the City experienced a five-consecutive-year-drought within its service area from FY 2011-12 to FY 2015-16. Historical records indicate the City's annual water demands had been greater prior to FY 2011-12. The City has been able to provide sufficient water supplies to its customers, including during long-term droughts and years with historically high water demands. In addition, the City has been able to provide water service to meet maximum day water demands for these years, including during the summer months. A further discussion regarding the reliability of the City's water supply sources is provided in Chapter 7.

6.4 ENERGY USE

CWC 10631.2.

(a) In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain:

(1) An estimate of the amount of energy used to extract or divert water supplies.

(2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.

(3) An estimate of the amount of energy used to treat water supplies.

(4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.

(5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.

(6) An estimate of the amount of energy used to place water into or withdraw from storage.

(7) Any other energy-related information the urban water supplier deems appropriate.

Pursuant to DWR's Final 2020 UWMP Guidebook "Energy intensity" is defined as the quantity of energy consumed or generated divided by volume of water entering a water management process. The energy intensity can be calculated based on the quantity of energy consumed, measured in kilowatt hours (kWh), divided by the volume of water, measured in AF for a water management process over a one-year period. The information used to calculate the estimated energy intensity associated with the City's water system is provided below. The energy intensity information is based on readily obtainable energy and water use data for the following water management processes: 1) extraction or diversion of water supplies; 2) placement into storage; 3) conveyance to distribution; 4) treatment; and 5) water system distribution.

The City has tabulated its energy intensity using readily obtainable energy consumption data obtained from monthly electricity bills from Southern California Edison (SCE) for the whole water system and the corresponding water use data obtained from available water meter readings. The City has reported the energy intensity associated with the water management processes which occur within its operational control. Because the City does not track individual energy usage for each water management process identified above, the City has estimated the energy intensity using the a “total utility approach” (i.e. sum of all water management processes). The total energy consumed was approximately 18,152,675 kWh during FY 2019-20.

The total volume of water entering the potable water system was approximately 32,109 AF during FY 2019-20 and is consistent with the total volume of water provided in Table 4-1 (less recycled water supplies).

The total energy intensity associated with the City’s water management processes is estimated at 565 kWh/AF. The energy intensity data and calculations based on the “total utility approach” are provided in Table O-1B below.

The City’s water management processes do not include “consequential hydropower generation” where the energy generation is a direct consequence of water delivery (i.e. all water passing through the energy generation devices is delivered to users). The City’s water management processes do not include “non-consequential hydropower generation” where the energy generation is not a direct consequence of water delivery (i.e. energy could be generated even if no water was being delivered to water users). In addition, the City’s water management processes do not include any substantial “self-generated energy sources” including solar, wind, geothermal, biomass, co-generation, and diesel generator sources.

Table O-1B. Recommended Energy Reporting — Total Utility Approach

Urban Water Supplier: *City of Ontario*

Water Delivery Product (If delivering more than one type of product use Table O-1C)

Retail Potable Deliveries

Table O-1B: Recommended Energy Reporting - Total Utility Approach				
Enter Start Date for Reporting Period	7/1/2019	Urban Water Supplier Operational Control		
End Date	6/30/2020			
☐ Is upstream embedded in the values reported?		Sum of All Water Management Processes	Non-Consequential Hydropower	
Water Volume Units Used	*AF*	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (volume unit)		*32109*	*0*	*32109*
Energy Consumed (kWh)		*18152675*	*0*	*18152675*
Energy Intensity (kWh/volume)		*565.3*	*0.0*	*565.3*

Quantity of Self-Generated Renewable Energy

0 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Combination of Estimates and Metered Data

Data Quality Narrative:

The total energy consumed was identified based on Southern California Edison (SCE) billing records. The total energy consumed excludes electricity usage for general administration (which is not an identified water management process).

Narrative:

The total energy consumption includes energy associated with operating groundwater production wells and booster pumps to deliver water in the distribution system. Energy consumption is associated with operating groundwater treatment. Energy consumption is also associated with plant lighting and air conditioning, and operating the Supervisory Control and Data Acquisition (SCADA) system and chlorination injection pumps.

Chapter 7

WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

LAY DESCRIPTION – CHAPTER 7

WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

Chapter 7 (Water Service Reliability and Drought Risk Assessment) of the City's 2020 Plan discusses and provides the following:

- FY 2019-20 represents an "average" or "normal" water year for the City in which the total amount of rainfall was similar to the historical average rainfall.
- A "single dry" year for the City was represented in FY 2017-18, in which the total amount of rainfall was below the historical average rainfall.
- A "five consecutive year drought" period for the City is represented from FY 2011-12 to FY 2015-16, where the total amount of rainfall during each of these years was less than the historical average rainfall.
- The City's current and projected water supplies available during normal years in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 7-2.
- The City's current and projected water supplies available during single dry years in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 7-3.
- The City's current and projected water supplies available during each year of a five consecutive year drought in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 7-4.
- The reliability of the City's water supply sources, including a review of water supply constraints, is provided. A single dry year or a five consecutive year drought period will not compromise the City's ability to provide a reliable supply of water to its customers.
- A Drought Risk Assessment is provided which includes an assessment of the City's water supply reliability over a five-year consecutive drought period. The City's DRA assumes a five-year consecutive drought from FY 2020-21 through FY 2024-25 and includes a review of water supplies, water uses, and water supply reliability for each water supply source during this period. The City's water system has experienced a prior five consecutive year drought with no limitation to its collective water supplies. However, the cost of those water supplies may have increased based on the mix of water supplies which are used. Consequently, the City has the ability to enact varying water shortage levels (see Chapter 8) to help educate its customers and provide an economic incentive for the retail customers to reduce their water consumption.

7.1 INTRODUCTION

This section of the City's UWMP describes the City's ability to meet retail customer water demands by analyzing a variety of factors which affect the City's water supply. This section assesses the City's water service reliability during average years, single dry years, and during a five consecutive year drought period to meet the water needs of its customers. This section also includes the discussion of a DRA which provides a mechanism for the City to evaluate the risk to its water supply under a drought lasting for the next five consecutive years.

7.2 WATER SERVICE RELIABILITY ASSESSMENT

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

Information regarding the reliability of the City's water supplies is based on the historical precipitation data in the Chino Basin area. Historical annual precipitation in the Chino Basin area is discussed in Section 3.3 and is based on historical data collected from the National Oceanic and Atmospheric Administration (Ontario International Airport). Furthermore, Section 4.5 of this Plan notes that potential future climate change impacts may result in an increase in the average annual precipitation within the City's service area, thus indicating use of historical data is a reasonable and conservative approach. As indicated in Section 3.3, the historical average rainfall in the vicinity of the City's service area is 10.68 inches. FY 2019-20 represents an average or normal water year for the City in which the total amount of rainfall was similar to the historical average rainfall. A single dry year for the City was represented in FY 2017-18, in which the total amount of rainfall was below the historical average rainfall. A five consecutive year drought period for the City is represented from FY 2011-12 to FY 2015-16, where the total amount of rainfall during each of these years was less than the historical average rainfall. Table 7-1 summarizes these "base years" for average, single dry, and five consecutive year drought and provides the total amount of water supplies available to the City during those base years. The following discussion assesses the water service reliability of the City's water supply sources.

Water Service Reliability - Imported Water

The City's treated imported water supplies from MWD, through WFA (also IEUA, but this is untreated), may be impacted during a multi-year drought or other conditions which limits MWD from delivering sufficient water supplies to all of its member agencies, and consequently to the

City. In anticipation of such a reduction in supplies, MWD developed a WSAP which is briefly described below. The WSAP provides a means of equitably providing reduced water supplies to each of MWD's member agencies for up to 10 levels of reduction representing up to a 50 percent reduction.

During calendar year 2007, critically dry conditions impacted MWD's water supply sources. In addition, a ruling in the Federal Courts in August 2007 provided protective measures for the Delta Smelt (and subsequently other aquatic species) in the Sacramento-San Joaquin River Delta resulting in restrictions on the availability of State Water Project water. As a result, MWD adopted a WSAP in February 2008 to allocate available water supplies to its member agencies. MWD revised the WSAP in December 2014.

The WSAP establishes ten different shortage levels and a corresponding Allocation to each member agency. Based on the shortage levels established by MWD, the WSAP provides a separate reduced Allocation to a member agency for its 1) Municipal and Industrial retail demand and 2) replenishment demand. The WSAP formula considers historical local water production, full service treated water deliveries, agricultural deliveries and water conservation efforts when calculating each member agency's Allocation.

In general, the WSAP process calculates total historical member agency demand. That historical demand is then compared to member agency projected local supply for a specific Allocation year. The balance required from MWD, less an Allocation reduction factor, is the member agency's "Water Supply Allocation" of imported water from MWD. When a member agency reduces its local demand through conservation or other means, the Allocation of imported water will increase. Depending on MWD's available supply, MWD can establish a specific WSAP shortage level. The shortage level causes a regional reduction and calculates an allocation for each of its member agency. Additional information about MWD's WSAP is provided in MWD's Regional 2020 UWMP which is incorporated by reference. The following is a summary of MWD's water shortage levels:

Level 1 – Regional Percent Reduction of 5%
Level 2 – Regional Percent Reduction of 10%
Level 3 – Regional Percent Reduction of 15%
Level 4 – Regional Percent Reduction of 20%
Level 5 – Regional Percent Reduction of 25%
Level 6 – Regional Percent Reduction of 30%
Level 7 – Regional Percent Reduction of 35%
Level 8 – Regional Percent Reduction of 40%
Level 9 – Regional Percent Reduction of 45%
Level 10 – Regional Percent Reduction of 50%

In response to a fourth consecutive year of below average rainfall and critically dry conditions, MWD declared a WSAP Allocation Level 3 for fiscal year 2015-16, which represented a regional reduction of 15 percent. MWD rescinded the WSAP for fiscal year 2016-17 and has not reinstated the WSAP since that time.

Water Service Reliability - Groundwater

The Chino Basin groundwater supplies are managed by the Chino Basin Watermaster, as discussed in Section 6.2.2. During a normal year (FY 2019-20), the City met about 46 percent of its total demands with supplies from the Chino Basin. During a single dry year (FY 2017-18), the City met about 60 percent of its total demands with supplies from the Chino Basin. During a five consecutive year drought multiple dry year period (FY 2011-12 to FY 2015-16), the City met between 42 and 63 percent of its total demands with supplies from the Chino Basin.

Water Service Reliability Summary

Table 7-1 shows the water supplies during the base years (for average year, single dry year and a five consecutive year drought). As a result of the City's diverse water supply portfolio, water supplies may be re-apportioned during a five consecutive year drought to meet the City's water demands.

7.2.1 SERVICE RELIABILITY - CONSTRAINTS ON WATER SOURCES

CWC 10631.

(b)(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

The City's sources of supplies consist of groundwater pumped from the Chino Basin; treated groundwater from the Chino Basin produced by the Chino Basin Desalter Authority; treated, imported surface water purchased from MWD through Water Facilities Authority; groundwater and/or surface water purchased from San Antonio Water Company; and recycled water purchased from Inland Empire Utilities Agency, as described in Section 6.2. Although all of these supplies are managed, the following constraints may occur which the City has considered in this reliability analysis.

Chino Basin

The City produces groundwater from the Chino Basin. The groundwater historically had been impacted by contamination. However, the City has developed and implemented appropriate treatment (blending and/or treatment facilities) which have been approved by SWRCB-DDW. These groundwater supplies are considered reliable both from a water quality and quantity standpoint.

Overall, groundwater quality in Chino Basin is generally good with better quality in the northern portion of the basin where recharge occurs. However, salinity (TDS) and nitrate-nitrogen concentrations increase in the southern portion of the basin. CDA treats the impaired groundwater by means of reverse osmosis, ion exchange, and air stripping, resulting in high quality drinking water. VOC plumes throughout Chino Basin, several of which are located within the City, are constantly being monitored.

The City has already inactivated several wells (Well 3, 4, 9, 15, 31, 35, and 50) due to high nitrate and perchlorate concentrations detected above the maximum contaminant levels (MCL). Well 34 was removed from service due to (TCP) water quality issues. The operations of Wells 44 and 52 are limited due to the migration of the bacterial groundwater plume when these wells are used too frequently. Well 25 was taken out of service due to a Perfluorooctanoic acid (PFOA) detection, which was below the PFOA interim notification level. The impact on supply due to the closure of these wells is minimized by constructing replacement wells at other locations where contaminant levels are low and constructing wellhead treatment facilities.

High levels (maximum concentration of 5,620 µg/L at one site) of TCE and chromium (485 µg/L) were found at one of the City's inactive well sites in 1987. They were found to have come from the General Electric Flatiron Facility, which operated a clothes iron manufacturing plant in the City from the early 1900s to 1982. Detectable, but low, concentrations of tetrachloroethene (PCE), toluene, and total xylenes were also found. The plant is no longer in operation, but an industrial park occupies the site. Since 1991, that area has been regularly monitored, and in 1995, two wells were constructed to extract groundwater, treat it, and direct it to the Ely Basins via the West Cucamonga Channel. The Ely Basins allowed the treated water to percolate back into the Chino Basin until 2005 when the basins became fully dedicated to the recharge of storm water, recycled water, and imported water pursuant to the long-term recharge plan executed by Watermaster and IEUA. As an alternative, three injection wells and conveyance pipelines were constructed in July 2011 to inject treated water into the Chino Basin. VOCs are also removed from contaminated soil through a Soil Vapor Extraction (SVE) system, which began in 2003.

VOCs were also located at the General Electric Test Facility, whose operations include testing and maintenance of commercial and military aircraft engines. In the past, hazardous wastes were disposed in dry wells, and this activity caused VOCs, such as TCE, PCE, cis-1,2-DCE, 1,2-dichloropropane, 1,1-DCE, 1,1-DCA, and chloroform, to appear in the soils and groundwater. A maximum concentration of 1,240 µg/L of TCE was measured at the site and 190 µg/L was quantified at an offsite monitoring well. Groundwater and soil remediation began in 1988 after a Consent Order was agreed upon by General Electric and the California Department of Public Health (CDPH). Since then, regular monitoring has been conducted, and status reports have been submitted. In 1996, vapor extraction treatment began, and as recently as 2008, contaminant levels in shallow soils have been deemed acceptable. The remediation process will continue until most, if not all, of the VOCs have been eliminated.

Quantities of TCE are found in private wells south of the Ontario International Airport in the area bounded by State Route 60 on the north, Bellegrave Ave. to the south, Turner Avenue on the east, and Grove Avenue on the west. The maximum concentration detected was 156 ug/L in 1990. Since 2016, the highest detected concentration was 90 ug/L. This area of TCE groundwater contamination is known as the South Archibald Plume and is believed to have come from several parties related to various activities within the airport. In September 2016, the Santa Ana Regional Water Quality Control Board issued a Final Stipulated Settlement and Cleanup & Abatement Order (CAO R8-2016-0016). The plume remediation alternative involves the use of existing and proposed CDA production wells and facilities. The remediation project is currently underway and includes the construction and operation of three new CDA production wells and a dedicated pipeline to convey groundwater produced from the wells to CDA's Chino II Desalter facility where TCE and other VOCs would be removed via air stripping. The project is anticipated to be operational in 2021.

Additionally, organic and inorganic compounds were discovered in the underlying groundwater when groundwater monitoring at the Milliken Sanitary Landfill began in 1987 as part of Solid Waste Assessment Test. An Evaluation Monitoring Program (EMP) was then launched, and 29 monitoring wells were drilled to assess the extent of damage of the compounds on the groundwater. Amounts of TCE, PCE, and dichlorodifluoromethane were found in combined concentrations as high as 159.6 μg/L. Other VOCs found at the site are vinyl chloride, benzene, 1,1-dichloroethane, and 1,2- dichloropropane. The landfill is owned by the County of San Bernardino and managed by the County's Waste System Division. It was inactivated in 1999.

Water quality in the Chino Basin is closely monitored by the Chino Basin Watermaster in compliance with the Optimum Basin Management Plan (OBMP). Data are collected by the Regional Water Quality Control Board (RWQBC) and other agencies that obtain groundwater from Chino Basin. The Chino Basin Watermaster then combines all data into a comprehensive database.

Imported water

The City also receives treated surface water from MWD through WFA. WFA purchases untreated water from IEUA (a MWD wholesale supplier). Constraints to water supplies from MWD relating to supply reliability is addressed in MWD's 2020 Regional Urban Water Management Plan. The relevant MWD discussion relating to supply reliability is provided in Appendix L.

7.2.2 SERVICE RELIABILITY - YEAR TYPE CHARACTERIZATION

7.2.2.1 TYPES OF YEARS

The City's base years for an average year, a single dry year, and a five consecutive year drought are discussed in Section 7.2 and are summarized in Table 7-1. As indicated in Chapter 6, the City's water supplies sources have been sufficient in meeting the City's historical water demands during an average year, a single dry year, and a five consecutive year drought. An average year was based on a historical year during the past 10 years with a total precipitation similar to the historical average precipitation in the vicinity of the City's service area. Because a single dry year or a five consecutive year drought period will not compromise the City's ability to provide a reliable supply of water to its customers, a single dry year in this Plan was selected based on one of the driest years during the past 10 years. The five consecutive year drought period was based on a period of five consecutive dry years during the past 10 years.

As indicated in Section 3.3, the historical average rainfall in the vicinity of the City's service area is 10.68 inches. FY 2019-20 represents an average or normal water year for the City in which the total amount of rainfall was similar to the historical average rainfall. A single dry year for the City was represented in FY 2017-18, in which the total amount of rainfall was less than the historical average rainfall. A five consecutive year drought period for the City is represented from FY 2011-12 to FY 2015-16, where the total amount of rainfall during each of these years was less than the historical average rainfall. Table 7-1 summarizes these "base years" for an average year, a single dry year and a five consecutive year drought period and provides the total amount of water supplies available to the City during those base years.

Table 7-1 Basis of Water Year Data (Reliability Assessment)

Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)			
Year Type	Base Year If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	Available Supplies if Year Type Repeats	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ___________________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	% of Average Supply
Average Year	2020	39,921	100%
Single-Dry Year	2018	43,346	108.6%
Consecutive Dry Years 1st Year	2012	42,603	106.7%
Consecutive Dry Years 2nd Year	2013	42,730	107.0%
Consecutive Dry Years 3rd Year	2014	45,196	113.2%
Consecutive Dry Years 4th Year	2015	41,226	103.3%
Consecutive Dry Years 5th Year	2016	36,036	90.3%
Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.			
***Units of measure (AF, CCF, MG**) must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES:			

7.2.2.2 SOURCES FOR WATER DATA

The monthly historical average temperatures (including minimum and maximum), monthly historical average rainfall, and monthly evapotranspiration in the vicinity of the City's service area are discussed in Section 3.3 Historical climate information was obtained from the WRCC, the National Oceanic and Atmospheric Administration, and from DWR's CIMIS.

7.2.3 WATER SERVICE RELIABILITY – SUPPLY AND DEMAND COMPARISON

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

The City primarily obtains its water supplies from groundwater wells located in the Chino Basin. As discussed in Section 7.3 and shown in Table 7-2, Table 7-3, and Table 7-4, each of the City's water supply sources share the same base years. As previously discussed in Section 7.2.1, a single dry year or a five consecutive year drought period will not compromise the City's ability to provide a reliable supply of water to its customers.

As previously discussed in Section 4.2.6, the City's projected normal year water demands over the next 25 years, in five-year increments, were based on the City's 2020 Water Use Target of 196 GPCD for potable water demands. The ratio of total water supplies (including potable and recycled water supplies) available to the City during a historical normal year in FY 2019-20 (or 39,921 AF) and during a historical single dry year in FY 2017-18 (or 43,346 AF) was used to estimate the City's projected water demands during single dry years. The ratio of water supplies available to the City during a historical normal year in FY 2019-20 (or 39,921AF) and a historical five consecutive year drought period from FY 2011-12 to FY 2015-16 (or 42,603 AF, 42,730 AF, 45,196 AF, 41,226 AF and 36,036 AF, respectively) was used to estimate the City's projected water demands during a five consecutive year drought period. The City's projected dry year water supplies over the next 25 years were based on the minimum supplies needed by the City to meet projected single-dry year demands. Table 7-2, Table 7-3, and Table 7-4 summarize the City's projected water demands and supplies over the next 25 years in five-year increments, including during normal years, single dry years, and a five consecutive year drought periods. These tables indicate the City can meet water demands during normal years, single dry years, and a five consecutive year drought periods over the next 25 years.

7.2.3.1 WATER SERVICE RELIABILITY – NORMAL YEAR

Table 7-2 summarizes the City's projected water demands and supplies over the next 25 years in five-year increments during normal years. Table 7-2 indicates the City can meet water demands during normal years over the next 25 years.

Table 7-2 Normal Year Supply and Demand Comparison

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	52,550	58,513	63,838	73,668	73,668
Demand totals *(autofill from Table 4-3)*	52,550	58,513	63,838	73,668	73,668
Difference	0	0	0	0	0
NOTES: Supply and demand are equal for years 2040 and 2045 because the City anticipates buildout to occur in 2040.					

7.2.3.2 WATER SERVICE RELIABILITY – SINGLE DRY YEAR

Table 7-3 summarizes the City's projected water demands and supplies over the next 25 years in five-year increments during single dry years. Table 7-3 indicates the City can meet water demands during single dry years over the next 25 years.

Table 7-3 Single Dry Year Supply and Demand Comparison

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	57,058	63,534	68,847	79,989	79,989
Demand totals*	57,058	63,534	68,847	79,989	79,989
Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES: Supply and demand are equal for years 2040 and 2045 because the City anticipates buildout to occur in 2040.					

7.2.3.3 WATER SERVICE RELIABILITY – FIVE CONSECUTIVE DRY YEARS

Table 7-4 summarizes the City's projected water demands and supplies over the next 25 years in five-year increments during five consecutive year drought periods. Table 7-4 indicates the City can meet water demands during five consecutive year drought periods over the next 25 years.

Table 7-4 Multiple Dry Years Supply and Demand Comparison

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	56,080	62,445	67,667	78,618	78,618
	Demand totals	56,080	62,445	67,667	78,618	78,618
	Difference	0	0	0	0	0
Second year	Supply totals	56,248	62,632	67,870	78,853	78,853
	Demand totals	56,248	62,632	67,870	78,853	78,853
	Difference	0	0	0	0	0
Third year	Supply totals	59,493	66,246	71,786	83,403	83,403
	Demand totals	59,493	66,246	71,786	83,403	83,403
	Difference	0	0	0	0	0
Fourth year	Supply totals	54,268	60,428	65,481	76,078	76,078
	Demand totals	54,268	60,428	65,481	76,078	76,078
	Difference	0	0	0	0	0
Fifth year	Supply totals	47,436	52,820	57,237	66,500	66,500
	Demand totals	47,436	52,820	57,237	66,500	66,500
	Difference	0	0	0	0	0
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
Units of measure (AF, CCF, MG) *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: Supply and demand are equal for years 2040 and 2045 because the City anticipates buildout to occur in 2040.						

7.2.4 DESCRIPTION OF MANAGEMENT TOOLS AND OPTIONS

CWC 10620.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

As noted in Section 6.2.2, the Chino Basin is managed under the Chino Basin adjudication. During the period of management under the Judgment, significant drought events have occurred. In each drought cycle the Chino Basin has been managed to maintain water levels. Therefore, based on historical and on-going management practices, the City will be able to rely on the Chino Basin for adequate supply over the next 25 years under single dry years and a five consecutive year drought periods.

Section 6.2.2 provides a description of the management of groundwater resources in the Chino Basin, as well as information on basin management. Chapter 6 also demonstrates the management structure of the Chino Basin provides a reliable source of groundwater supply for the City during a normal year, a single-dry year and a five consecutive year drought. Historical data indicates the Chino Basin has been well managed for the full period of the adjudication, resulting in a stable and reliable water supply. Basin management changes are discussed in Section 6.2.2 and include increased direct use of recycled water (see Section 6.5) and the continued use of recycled water for groundwater replenishment in the Chino Basin to reduce the need to import water from other regions. Therefore, the groundwater supplies in the Chino Basin are deemed reliable.

7.3 DROUGHT RISK ASSESSMENT

CWC 10635.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

(1) A description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive water years, starting from the year following when the assessment is conducted.

(2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

The City's sources of supplies consist of groundwater from the Chino Basin (which is managed under the Chino Basin adjudication), treated import water purchased through Water Facilities Authority and managed by the Metropolitan Water District of Southern California, groundwater and/or surface water purchased from San Antonio Water Company, and recycled water purchased from inland Empire Utilities Agency. The following discussion provides a DRA which assesses the City's water supply reliability over a five-year consecutive drought period. The City's DRA incorporates a five-year consecutive drought from FY 2020-21 through FY 2024-25 and includes a review of water supplies, water uses, and water supply reliability.

7.3.1 DRA DATA, METHODS, AND BASIS FOR WATER SHORTAGE CONDITIONS

The City's DRA was prepared using historical production data from the City's water supply sources. The following assumptions were considered during the preparation of the City's DRA for each year of the five-year consecutive drought.

- The five consecutive year drought period associated with the 2020 UWMP is based on five consecutive dry years from FY 2020-21 through FY 2024-25.
- The projected water supplies available during each year of this five consecutive year drought are assumed to be identical to the water supplies produced during each year between FY 2011-12 and FY 2015-16 (which represents the most recent and historical five consecutive year drought).
- The projected demands during this five consecutive year drought are based on water demands from FY 2019-20 (a normal year) which were adjusted based on projected population over the next five years along with the ratio of the normal year demands to actual demands over each year of the most recent and historical five consecutive year drought period (from FY 2011-12 and FY 2015-16).
- The projected demands were compared to the projected supplies to identify potential water supply deficits which may require implementation of the Water Shortage Contingency Plan (discussed further in Chapter 8).

The following hypothetical methodologies were considered during the preparation of the City's DRA during for each year of the five consecutive year drought:

- Drought Year 1: The region had experienced an average to above average year of precipitation in the prior year. Water use in the prior year had been below average due to a reduced need for outdoor water use, the groundwater basin had been replenished from above average local stormwater runoff, and imported water supplies were not restricted.
- Drought Year 2: The region experienced a second year of below average precipitation and runoff. Retail customers increase water use for outdoor irrigation to compensate for lack of precipitation, however, this increased use is partially offset by conservation measures. Groundwater and imported water supplies have not been impacted.
- Drought Year 3: The region experienced a third year of below average precipitation and runoff. Retail customers increase water use for outdoor irrigation to compensate for lack of precipitation; however, this increased use is partially offset by heightened conservation messaging. Groundwater and imported water supplies have not been impacted. However, there is an increased demand on both groundwater and treated imported water.
- Drought Year 4: The region experienced a fourth year of below average precipitation and runoff. Groundwater supplies have not been impacted. However, there is an increased demand on groundwater.
- Drought Year 5: Fifth year of below average precipitation and runoff. Groundwater supplies have not been impacted. However, there is an increased demand on groundwater.

7.3.2 DRA INDIVIDUAL WATER SOURCE RELIABILITY

The City's DRA incorporates a five-year consecutive drought based on five consecutive dry years commencing in FY 2021-22. The quantity of water supplies available for each year during this five-year consecutive drought period included in the City's DRA is assumed to be the same as the quantity of water supplies produced by the City (i.e. demands) during the most recent and historical five-year consecutive drought which occurred from FY 2011-12 through FY 2015-16. Production data for those years have been tabulated in Section 6.1. The following describes the anticipated reliability of each water source for each year of the five consecutive year drought based on recent experience.

Groundwater

The City receives water supplies from the Chino Basin, which is actively managed under the Chino Basin adjudication, as described in Section 6.2.2. Each year the Chino Basin Watermaster reviews water supply conditions including local rainfall, groundwater levels, local stormwater runoff available for replenishment, imported water availability and the amount of water stored in the groundwater basin for future demands, to ensure the Basin is responsibly managed. Regardless of the annual safe yield adopted (a new safe yield is adopted every ten years) there is never a restriction on the amount of water which may be pumped from the Chino Basin, subject to replenishment requirements under the Chino Basin Watermaster's oversight. The quantity of groundwater used (and reliably available) during the most recent and historical five consecutive year drought period have been tabulated in Section 6.1. During this period, the City was able to increase its production of its groundwater supplies from an adjudicated and managed groundwater basin. The City also had the ability to systematically implement aspects of its Water Shortage Contingency Plan (see Chapter 8). As a result of these collective actions (and experience during prior consecutive five-year droughts), the City does not anticipate a water supply shortage from the Chino Basin.

Imported Water

The City obtains imported water from the Metropolitan Water District of Southern California through Water Facilities Authority. Section 6.2.1 describes the planning conducted by the Metropolitan Water District of Southern California regarding treated imported water supplies available to the City. The reliability of MWD's supplies is also discussed in its 2020 Regional UWMP and is incorporated by reference. The City purchases treated imported water which is delivered directly within its distribution system. The City's purchases of treated, imported water over the past ten years have been tabulated in Section 6.1. In the event of a drought which limits imported water supplies, the City will rely on its groundwater production and will pay the applicable assessments to purchase untreated imported water to be delivered in the future when supplies are available.

The imported water purchases by the City during the most recent and historical five consecutive year drought period have been tabulated in Section 6.1. Because the City's DRA assumes the most recent and historical five consecutive year drought scenario will be repeated over the next five years, it is assumed the quantity of treated imported water supplies purchased during the most recent and historical five consecutive year drought scenario will be available. Furthermore, this constitutes the minimum amount of treated imported water which may be available in a future five consecutive year drought absent MWD's programs which it has since implemented.

Recycled Water

The City has a recycled water distribution system which it has developed over the years to reduced demands on its potable water supplies as described in Section 6.2.5. The availability of recycled water supplies is not adversely impacted by drought conditions and are locally available.

The quantity of recycled water used during the most recent and historical five consecutive year drought period have been tabulated in Section 6.1. The quantity of recycled water available during each year of the most recent and historical five consecutive year drought is expected to be available during a future five consecutive year drought.

Summary

The City's water system has experienced a prior five consecutive year drought with no limitation to its collective water supplies. However, the cost of those water supplies may have increased based on the mix of supplies which are used. Consequently, the City has the ability to enact varying water shortage levels (see Chapter 8) to help educate its customers and provide an economic incentive for the retail customers to reduce their water consumption.

7.3.3 DRA TOTAL WATER SUPPLY AND USE COMPARISON

Gross water use for the projected five consecutive year drought is shown on Table 7-5. Section 7.3.2 describes the water source reliability for each source of supply the City will rely on during a five consecutive year drought. The annual quantities are summed and are also provided on Table 7-5. The most important aspect of the City's water supplies is the groundwater which can be produced from a managed groundwater basin without restriction on the amount the City is allowed to produce. However, for the purposes of the City's DRA, as a worst-case scenario, the City has considered no water supply augmentation (as indicated in Table 7-5) from its groundwater supplies. When necessary, the City can implement various water shortage levels of its Water Shortage Contingency Plan (as discussed in Chapter 8) in order to reduce its water demands. The total water supplies available to the City shown in Table 7-5 are based on the quantity of supplies produced by the City (i.e. demands) during the most recent historical five consecutive drought period (from FY 2011-12 through FY 2015-16) as provided in Table 7-1. As shown in Table 7-5, assuming no additional water supply benefits will be available from groundwater supplies, the City will implement various stages of its Water Shortage Contingency Plan to balance water demands with available supplies during years 1, 2, 3, 4, and 5 of the projected five consecutive year drought.

Table 7-5 Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b)

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)	
2021	**Total**
Total Water Use	45,299
Total Supplies	42,603
Surplus/Shortfall w/o WSCP Action	(2,696)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	2,696
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	6%
2022	**Total**
Total Water Use	48,138
Total Supplies	42,730
Surplus/Shortfall w/o WSCP Action	(5,408)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	5,408
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	11%
2023	**Total**
Total Water Use	53,774
Total Supplies	45,196
Surplus/Shortfall w/o WSCP Action	(8,578)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	8,578
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	16%
2024	**Total**
Total Water Use	51,660
Total Supplies	41,226
Surplus/Shortfall w/o WSCP Action	(10,434)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	10,434
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	20%
2025	**Total**
Total Water Use	47,436
Total Supplies	36,036
Surplus/Shortfall w/o WSCP Action	(11,400)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	11,400
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	24%

7.3.4 OPTIONAL PLANNING TOOL WORKBOOK

DWR has deemed the "Planning Tool Worksheet" as optional and the City is not required by DWR to use the tool. The City has provided sufficient water supplies to its customers, including during long-term droughts and years with historically high water demands. The City has also been able to provide water service to meet maximum day water demands for these years, including during the summer months. The City obtains the majority of its water supplies from a managed groundwater basin which is not subject to seasonal fluctuation. Consequently, an evaluation regarding water supplies on a monthly basis was not considered.

Chapter 8

WATER SHORTAGE CONTINGENCY PLAN

LAY DESCRIPTION – CHAPTER 8

WATER SHORTAGE CONTINGENCY PLAN

Chapter 8 (Water Shortage Contingency Plan) of the City's 2020 Plan discusses and provides the following:

- The City's Water Shortage Contingency Plan is a detailed approach which presents how the City intends to act, or respond, in the case of an actual water shortage contingency.
- Preparation of the City's "Annual Water Supply and Demand Assessment" (or Annual Assessment) is discussed. Commencing July 1, 2022, the City is required to submit the Annual Assessment. The Annual Assessment will include a review of the City's "unconstrained" water demands for the current year and for a potential upcoming single dry year. Unconstrained water demands represent the City's water demands prior to any "response actions" the City may invoke pursuant to the City's Water Shortage Contingency Plan.
- The City will manage water supplies to minimize the adverse impacts of water shortages. The City's plan for water usage during periods of shortage is designed to incorporate six standard water shortage levels corresponding to progressive ranges from up to a 10, 20, 30, 40, and 50 percent shortage, and greater than a 50 percent shortage.
- For each declared water supply shortage level, customers will be required to reduce their consumption by the percentage specified in the corresponding water supply shortage level.
- For each declared water supply shortage level, the City has established response actions to reduce demand on water supplies and to reduce any shortage gaps in water supplies. These demand reduction actions include irrigation and other outdoor use restrictions, rate structure changes, and other water use prohibitions.
- The operational changes the City will consider in addressing water shortages on a short-term basis are discussed and include improved monitoring, analysis, and tracking of customer water usage to enforce demand reduction measures.
- The City's Emergency Response Plan is summarized. The Emergency Response Plan provides the management, procedures, and designated actions the City and its employees will implement during emergency situations (including catastrophic water shortages) resulting from natural disasters, system failures, and other unforeseen circumstances.
- The preparation of the City's seismic risk assessment and mitigation plan is discussed. The locations of earthquake faults in the vicinity of the City's water service area are provided.
- The effectiveness of the shortage response actions for each of the City's standard water shortage levels is presented. The City has been able to provide sufficient water supplies to

its customers, including during long-term droughts and years with historically high water demands.

- The communication protocols implemented by the City when it declares any water shortage level are presented.
- The compliance and enforcement procedures associated with City's standard water shortage levels are presented.
- The legal authorities associated with City's standard water shortage levels are presented.
- The financial consequences associated with City's standard water shortage levels are presented.
- The City will evaluate the need for revising the Water Shortage Contingency Plan in order to resolve any water shortage gaps, as necessary. The steps necessary for the City to adopt and amend its Water Shortage Contingency Plan are presented.

The following Water Shortage Contingency Plan includes references to Chapters and Sections from the City of Ontario's 2020 Urban Water Management Plan:

8.1 WATER SUPPLY RELIABILITY ANALYSIS

CWC 10632.

(a)(1) The analysis of water supply reliability conducted pursuant to Section 10635.

The City's sources of supply were discussed in Section 6.2 of the 2020 UWMP and consist of groundwater pumped from the Chino Basin; treated groundwater from the Chino Basin produced by the Chino Basin Desalter Authority; treated, imported water purchased from MWD through Water Facilities Authority; groundwater and/or surface water purchased from San Antonio Water Company; and recycled water purchased from Inland Empire Utilities Agency. The City provides recycled water for irrigation instead of potable supplies. The Chino Basin is adjudicated, and groundwater supplies are managed. The reliability of the various sources of supply are discussed in Chapter 7 of the 2020 UWMP. Based on the adjudication provisions in the Chino Basin, the City is able to produce groundwater without limitation, provided any amount produced in excess of the production rights is replenished. Imported water supplies (both treated and untreated) may be impacted in the event MWD implements its WSAP due to a water supply shortage. Finally, recycled water is locally generated and generally is not impacted by drought conditions. Section 7.2.3 summarizes the City's projected water demands and supplies over the next 25 years in five-year increments, including during normal years, single dry years, and a five consecutive year drought periods. These tables indicate the City can meet water demands during normal years, single dry years, and a five consecutive year drought periods over the next 25 years. Consequently, it is anticipated the City will have sufficient water supplies available to meet projected demands.

8.2 ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

<u>CWC 10632.</u>

(a)(2) The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:

(A) The written decision-making process that an urban water supplier will use each year to determine its water supply reliability.

(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:

(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.

(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.

(iii) Existing infrastructure capabilities and plausible constraints.

(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.

(v) A description and quantification of each source of water supply.

<u>CWC 10632.1.</u>

An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later.

Commencing July 1, 2022, the City is required to submit an "Annual Water Supply and Demand Assessment" (Annual Assessment) in accordance with DWR's guidance and requirements. The Annual Assessment will include a review of the City's unconstrained water demands (i.e. water demands prior to any projected response actions the City may trigger under this WSCP) for the current year and the upcoming (potential single dry) year. The City will also include information regarding anticipated shortages, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the City's WSCP.

For each Annual Assessment, the City plans to prepare a preliminary assessment which evaluates the adequacy of its water supplies for the current and upcoming years by April of each year. The preliminary assessment will include a review of water supplies for at least a single dry year.

The components of an Annual Assessment consist of the following:

- A written decision-making process
- Key data inputs and assessment methodology

8.2.1 DECISION MAKING PROCESS

The City produces groundwater from the Chino Basin as its primary source of water supply and that basin is managed on a fiscal year basis. Consequently, during the third quarter of each fiscal year the City will review its water demands from the initial six months along with the current groundwater basin conditions and local hydrology. This information will be used to help develop the Annual Assessment. A draft of the Annual Assessment will be circulated internally within the City for peer review and comment. Based on comments received, a redraft will be prepared and provided to City managers during the Spring of each year. The draft subsequently will be provided to the City Manager for final review. Subsequently, a final draft of the Annual Assessment will be provided to the City Council as necessary for review and included in the agenda as part of a City Council meeting such that it can be reviewed or approved and any recommended specific shortage response actions may be enacted. The final Annual Assessment will be provided to DWR no later than July 1 of each year.

The Annual Assessments will be instrumental in providing guidance to the City for decisions regarding potential declarations of a water supply shortage and implementation of water reduction stages, instituting mandatory water restrictions, promoting water use efficiency and conservation programs, adopting and implementing water rates and drought rate surcharges, and pursuing alternative water supplies when necessary. This process will help ensure adequate water supplies resources are available to the City.

8.2.2 DATA AND METHODOLOGIES

The key data inputs and methodologies which will be evaluated by the City during the preparation of the preliminary assessment will include the following:

1) Evaluation Criteria: The locally applicable evaluation criteria used to prepare the Annual Assessment will be identified. The evaluation criteria will include, but is not limited to, an analysis of current local hydrology (including rainfall and groundwater levels), current water demands, a review of water system improvement plans which may impact infrastructure availability, and water quality regulations which may impact groundwater availability.

2) Water Supply: A description of each available water supply source will be provided. The descriptions will include a quantification of each available water supply source and will be based on review of current production capacities, historical production, Urban Water Management Plans, and prior water supply studies (including Water Supply Assessments and/or Master Plans).

3) Unconstrained Water Demand: The potential unconstrained water demands during the current year and the upcoming (potential single dry) year, prior to any special shortage response actions, will be reviewed. The review will include factors such as weather, existing and projected land uses and populations, actual customer consumption and water use factors, monthly Urban Water Supplier Monthly Reports, existing water shortage levels (see Section 8.3), and existing water conservation ordinances (see Section 9.2.1).

4) Planned Water Use for Current Year Considering Dry Subsequent Year: The water supplies available and projected for use to meet the demands during the current year and the upcoming (potential single dry) year will be considered and identified by each type of supply. The evaluation will include factors such as estimated water demands, weather, groundwater basin operating safe yields, water quality results, existing available pumping capacities, imported water allocations, contractual obligations, regulatory issues, use of emergency interconnections, and the costs associated with producing each water supply source.

5) Infrastructure Considerations: The capabilities of the water system infrastructure to meet the water demands during the current year and the upcoming (potential single dry) year will be considered. Available production capacities (e.g. groundwater well capacities) and distribution system water losses (see Section 4.2.4) will be reviewed. In addition, capital improvement and replacement projects, as well as potential projects which may increase water system and production capacities (see Section 6.2.8), will be considered.

6) Other Factors: Additional local considerations, if any, which can affect the availability of water supplies will be described.

8.3 SIX STANDARD WATER SHORTAGE LEVELS

CWC 10632.

(a)(3)(A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.

(a)(3)(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and indicating a cross-reference relating its existing categories to the six standardized water shortage levels.

The City has a legal responsibility to provide water utility services, including water for residential, commercial, industrial, public authority, and for public fire hydrants and private fire services. The City will manage water supplies prudently to minimize the adverse impacts of water shortages. In its 2015 Plan, the City's WSCP was designed to provide a minimum of 50 percent of normal supply during a severe or extended water shortage. For its 2020 Plan, the City's WSCP is designed to provide water supplies in the event there is less than 50 percent of normal supply during a severe or extended water shortage. Water shortage trigger mechanisms have been established to ensure that this policy is implemented. This includes structured stages of action referred to as water supply shortage planning levels.

Table 8-1 provides a description of the six standard stages of action which may be triggered by a shortage in one or more of the City's water supply sources, depending on the severity of the shortage and its anticipated duration.

Table 8-1 Water Shortage Contingency Planning Levels

Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions** *(Narrative description)*
1	Up to 10%	Washing of motor vehicles, trailers, boats or other types of mobile equipment shall be done only with a hand-held bucket or a hose equipped with a positive shutoff nozzle for quick rinses, except that washing may be done at the immediate premises of a commercial car wash or with reclaimed wastewater. No person shall sprinkle, water, or irrigate any landscaped or vegetated areas between the hours of 9:00 a.m. and 4:00 p.m.
2	Up to 20%	In addition to Shortage Level 1, operators of hotels and motels must provide the option of choosing not to have towels and linens laundered daily. Irrigation is prohibited during and within 48 hours of rainfall.
3	Up to 30%	In addition to Shortage Level 2, the use of fire hydrants shall be limited to fire fighting and related activities and other uses of water for municipal purposes shall be limited to activities necessary to maintain the public health, safety, and welfare. Unless written permission has been granted by the City Manager or his/her designee, the use of potable water for construction activities and grading shall be prohibited.
4	Up to 40%	In addition to Shortage Level 3, residents and CII customers will be prohibited from irrigating turf or other landscaping more than two days a week. No person shall irrigate any turf or landscaped area more than fifteen minutes (15) on watering days. No vehicles shall be washed unless it is taken to a carwash.
5	Up to 50%	In addition to Shortage Level 4, residents and CII customers will be prohibited from irrigating turf or other landscaping more than one day a week.
6	>50%	In addition to Shortage Level 5, unless otherwise permitted by a resolution of the City Council, there shall be no use of potable water for irrigation of outdoor landscape or turf. Commercial nurseries shall be prohibited from the use of potable water for irrigation of outdoor, landscape and turf except by use of a hand-held hose equipped with a positive shutoff nozzle. The following nonessential use of water shall be prohibited: the filling, cycling, filtering, or refilling of swimming pools, spas, Jacuzzis, fountains or other like devices.
NOTES:		

The 2020 Plan requires urban water suppliers to have six standardized water shortage response actions in accordance with DWR. The City's previous WSCP, originally included in the City's 2015 Plan as Ordinance No. 3027 (see Appendix M), established a voluntary stage followed by four water supply shortage levels that would be mandatory once put into effect: Stage 1 addresses a water supply shortage of up to 10 percent; Stage 2 addresses a water supply shortage of up to 20 percent; Stage 3 addresses a water supply shortage of anywhere between 20 percent to 50 percent; and Stage 4 addresses a water supply shortage of more than 50 percent.

For its 2020 Plan, the City has prepared a draft Water Conservation Plan (see Appendix N) that will address the six standard stages of action in accordance with DWR. Under this draft Water Conservation Plan, the City will continue to incorporate Ordinance No. 3027's voluntary stage during normal water supply conditions as well as the existing Stage 1 and Stage 2 water supply shortage levels as is. However, the City has amended Stage 3 to address a water supply shortage of up to 30 percent. In addition, the City has included a Stage 4 and Stage 5 that will be used to address a water supply shortage of up to 40 percent, and 50 percent, respectively. The City's existing Stage 4 has been amended to a Stage 6 level which addresses a water supply shortage of more than 50 percent.

8.4 SHORTAGE RESPONSE ACTIONS

CWC 10632.

(a)(4) Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:

(A) Locally appropriate supply augmentation actions.

(B) Locally appropriate demand reduction actions to adequately respond to shortages.

(C) Locally appropriate operational changes.

(D) Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions.

(E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.

8.4.1 DEMAND REDUCTION

Voluntary Conservation Stage

All persons are encouraged to voluntarily limit the amount of water used to the amount absolutely necessary for health and safety, business operations, and irrigation. Except as otherwise provided in this chapter where a declared water shortage stage or water shortage emergency requires mandatory or other more stringent requirements, the following elements of conservation apply at all times on a voluntary basis by all persons within the City:

1) Avoid hose washing of sidewalks, walkways, driveways, parking areas or other paved surfaces, except as required for sanitary purposes. If a person uses a hand-held hose to wash any paved surfaces, the hose shall be equipped with a positive shutoff nozzle.
2) Wash motor vehicles, trailers, boats, and other types of mobile equipment using a hand-held bucket, or a hose equipped with a positive shutoff nozzle for quick rinses, or at the immediate premises of a commercial car wash or with recycled wastewater for approved uses.
3) Avoid using water to clean, fill, or maintain levels in decorative fountains, ponds, lakes, or other similar aesthetic structures unless such water is part of a recycling system.

4) Encourage restaurants, hotels, cafes, cafeterias, or other public places where food is sold, served or offered for sale, to serve drinking water only to those customers expressly requesting water.
5) Promptly repair all leaks from indoor and outdoor plumbing fixtures.
6) Avoid watering lawn, landscape or other turf areas more often than every other day and during the hours between 6:00 a.m. and 6:00 p.m.
7) Avoid causing or allowing the water to run off landscape areas into adjoining streets, sidewalks, or other paved areas due to incorrectly directed or maintained sprinklers or excessive watering.

Stage 1 Water Supply Shortage (Up to 10%)

During a Stage 1, the following mandatory restrictions on the use of potable water shall be applicable when the City Council determines that the City's water conservation goals are not being met by voluntary water conservation measures, or that the City's water supplies are likely to be reduced by up to ten percent (10%) or it has otherwise been requested or directed by executive order or regulation of a State agency to reduce its potable water consumption or production by a specified amount.

1) Except as required for health and sanitary purposes, washing of sidewalks, driveways, parking areas or other paved surfaces is prohibited. Any hand-held hose used for such purposes shall be equipped with a positive shutoff nozzle.
2) Washing of motor vehicles, trailers, boats or other types of mobile equipment shall be done only with a hand-held bucket or a hose equipped with a positive shutoff nozzle for quick rinses, except that washing may be done at the immediate premises of a commercial car wash or with reclaimed wastewater.
3) No water shall be used to clean, fill or maintain levels in decorative fountains, ponds, lakes or other similar aesthetic structures unless such water is part of a recycling system.
4) No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested.
5) All water customers of the City shall promptly repair all leaks from indoor and outdoor plumbing fixtures. Such leak shall be repaired in a timely manner after notification by the City, but in no case after notification in excess of 72 hours for the first violation and then every 72 hours thereafter for the second and third violations.
6) No person shall sprinkle, water, or irrigate any landscaped or vegetated areas between the hours of 9:00 a.m. and 4:00 p.m. In any event, such watering shall not be in excess of needs nor be of a manner that allows water flow onto streets or other paved areas. The above mentioned may be watered by a hand-held hose equipped with a positive shutoff nozzle at any time of the day. Commercial nurseries, golf courses, and other water-dependent industries are exempt.
7) No water customer of the City shall cause or allow the water to run off landscaped area into adjoining streets, sidewalks or other paved areas due to incorrectly directed or maintained sprinkler or excessive watering.

8) The use of water from fire hydrants shall be limited to fire fighting and related activities necessary to maintain the public health, safety, and welfare. An exception may be made for construction use through a proper City-Designated meter. The use of potable water for construction activities shall be restricted in areas where recycled water is available for such use.

<u>Stage 2 Water Supply Shortage (Up to 20%)</u>

During a Stage 2, the following mandatory restrictions on the use of potable water shall be applicable when the City Council determines that it is likely that the City will suffer a reduction of more than ten percent (10%) up to twenty percent (20%) in its water supplies or it has otherwise been requested or directed by executive order or regulation of a State Agency to reduce its potable water consumption or production by a specified amount.

1) All the prohibitions and restrictions in Stage 1 shall be in effect provided that the more restrictive measures noted in this Stage shall take precedence.
2) Filling or refilling of empty swimming pools shall not occur without the written permission of the City Manager or his/her designee.
3) All customers are prohibited from irrigating turf or ornamental landscapes during and within 48 hours following measurable rainfall.
4) Operators of hotels and motels must provide guests with the option of choosing not to have towels and linens laundered daily and prominently display notice of this option.
5) All persons, including the City, are prohibited from irrigating with potable water any ornamental turf on public street medians.
6) The use of potable water irrigation outside of newly constructed homes and buildings shall be consistent with the California Building Standards Commission and the Department of Housing & Community Development.

<u>Stage 3 Water Supply Shortage (Up to 30%)</u>

During a Stage 3, the following mandatory restrictions on the use of potable water shall be applicable when the City Council determines that it is likely that the City will suffer a reduction of more than twenty percent (20%) and up to thirty percent (30%) in its water supplies or it has otherwise been requested or directed by executive order or regulation of a State Agency to reduce its potable water consumption or production by a specified amount.

1) All the prohibitions and restrictions in the preceding Stages shall be in effect provided that the more restrictive measures noted in this Stage shall take precedence.
2) Residents and CII customers will be prohibited from irrigating any turf or landscape area more than four (4) days a week.
3) The use of water from fire hydrants shall be limited to fire fighting and related activities and other uses of water for municipal purposes shall be limited to activities necessary to maintain the public health, safety, and welfare. Unless written permission has been granted

by the City Manager or his/her designee, the use of potable water for construction activities and grading shall be prohibited.

Stage 4 Water Supply Shortage (Up to 40%)

During a Stage 4, the following mandatory restrictions on the use of potable water shall be applicable when the City Council determines that it is likely that the City will suffer a reduction of more than thirty percent (30%) and up to forty percent (40%) in its water supplies or it has otherwise been requested or directed by executive order or regulation of a State Agency to reduce its potable water consumption or production by a specified amount.

1) All the prohibitions and restrictions in the preceding Stages shall be in effect provided that the more restrictive measures noted in this Stage shall take precedence.
2) Residents and CII customers will be prohibited from irrigating turf or other landscaping more than two (2) days a week.
3) No person shall irrigate any turf or landscaped area more than fifteen minutes (15) on watering days.
4) No vehicles shall be washed unless it is taken to a carwash.

Stage 5 Water Supply Shortage (Up to 50%)

During a Stage 5, the following mandatory restrictions on the use of potable water shall be applicable when the City Council determines that it is likely that the City will suffer a reduction of more than forty percent (40%) and up to fifty percent (50%) in its water supplies or it has otherwise been requested or directed by executive order or regulation of a State Agency to reduce its potable water consumption or production by a specified amount.

1) All the prohibitions and restrictions in the preceding Stages shall be in effect provided that the more restrictive measures noted in this Stage shall take precedence.
2) Residents and CII customers will be prohibited from irrigating turf or other landscaping more than one (1) day a week.

Stage 6 Water Supply Shortage Emergency (More than 50%)

During Stage 6, the following mandatory restrictions on the use of potable water shall be applicable when the City Council determines that it is likely that the City will suffer a reduction of more than fifty percent (50%) in its water supplies or it has otherwise been requested or directed by executive order or regulation of a State agency to reduce its potable water consumption or production by a specified amount. A water shortage emergency may be declared whenever the City Council finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the City to the extent that there would be insufficient water for human consumption, sanitation, and fire protection. A water shortage emergency may include an immediate emergency. An immediate emergency may occur as a result of a breakage or failure of a dam, pump, pipe line or conduit, a major earthquake, large-scale fire, or other so called "Act of God" which may have serious impacts on the City's available water supply.

The following restrictions on the use of potable water shall be applicable during a Stage 6 Water Supply Shortage Emergency:

1) All the prohibitions and restrictions in the preceding Stages shall be in effect provided that the more restrictive measures noted in this Stage shall take precedence.
2) Unless otherwise permitted by a resolution of the City Council, there shall be no use of potable water for irrigation of outdoor landscape or turf.
3) Commercial nurseries shall be prohibited from the use of potable water for irrigation of outdoor, landscape and turf except by use of a hand-held hose equipped with a positive shutoff nozzle.
4) The following nonessential use of water shall be prohibited: the filling, cycling, filtering, or refilling of swimming pools, spas, Jacuzzis, fountains or other like devices.

Table 8-2 Demand Reduction Actions

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
1	Other - Prohibit use of potable water for washing hard surfaces	Collective reduction from all Shortage Level 1 actions is up to 4,712 AF		Yes
1	Other - Require automatic shut of hoses	Collective reduction from all Shortage Level 1 actions is up to 4,712 AF		Yes
1	Water Features - Restrict water use for decorative water features, such as fountains	Collective reduction from all Shortage Level 1 actions is up to 4,712 AF		Yes
1	CII - Restaurants may only serve water upon request	Collective reduction from all Shortage Level 1 actions is up to 4,712 AF		Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Collective reduction from all Shortage Level 1 actions is up to 4,712 AF		Yes
1	Landscape - Limit landscape irrigation to specific times	Collective reduction from all Shortage Level 1 actions is up to 4,712 AF		Yes
1	Landscape - Restrict or prohibit runoff from landscape irrigation	Collective reduction from all Shortage Level 1 actions is up to 4,712 AF		Yes
1	Other	Collective reduction from all Shortage Level 1 actions is up to 4,712 AF	The use of water for fire hydrants shall be limited to fire fighting and related activities necessary to maintain the public health, safety, and welfare. An exception may be made for construction use through proper city-designated meter. The use of poable water for construction activities shall be restricted in areas where recycled water is available for such use.	Yes
2	Other	Collective reduction from all Shortage Level 2 actions is up to 9,424 AF	Includes all Stage 1 actions	Yes
2	Other water feature or swimming pool restriction	Collective reduction from all Shortage Level 2 actions is up to 9,424 AF	Filling or refilling of empty swimming pools shall not occur without the written permission of the City Manager or his/her designee.	Yes
2	Landscape - Other landscape restriction or prohibition	Collective reduction from all Shortage Level 2 actions is up to 9,424 AF	All customers are prohibited from irrigating turf or ornamental landscapes during and within 48 hours following measurable rainfall.	Yes
2	CII - Lodging establishment must offer opt out of linen service	Collective reduction from all Shortage Level 2 actions is up to 9,424 AF		Yes
2	Landscape - Prohibit all landscape irrigation	Collective reduction from all Shortage Level 2 actions is up to 9,424 AF	All persons, including the City, are prohibited from irrigating with potable water any ornamental turf on public street medians.	Yes
2	Landscape - Other landscape restriction or prohibition	Collective reduction from all Shortage Level 2 actions is up to 9,424 AF	The use of potable water for irrigation outside of newly constructed homes and buildings shall be consistent with California Building Standards Commission and Department of Housing & Community Development.	Yes
3	Other	Collective reduction from all Shortage Level 3 actions is up to 14,137 AF	includes all Stage 2 actions	Yes
3	Landscape - Limit landscape irrigation to specific days	Collective reduction from all Shortage Level 3 actions is up to 14,137 AF	Residents and CII customers will be prohibited from irrigating any turf or landscape area more than four days a week.	Yes
3	Other - Prohibit use of potable water for construction and dust control	Collective reduction from all Shortage Level 3 actions is up to 14,137 AF	The use of water from fire hydrants shall be limited to fire fighting and related activities and other uses of water for municipal purposes shall be limited to activities necessary to maintain the public health, safety and welfare. Unless written permission has been granted by the CityManager or his/her designee, the use of potable water for construction activities and grading shall be prohibited.	Yes

4	Other	Collective reduction from all Shortage Level 4 actions is up to 18,849 AF	Includes all Stage 3 actions	Yes
4	Landscape - Limit landscape irrigation to specific days	Collective reduction from all Shortage Level 4 actions is up to 18,849 AF	Residents and CII customers will be prohibited from irrigating any turf or landscape area more than two days a week.	Yes
4	Landscape - Other landscape restriction or prohibition	Collective reduction from all Shortage Level 4 actions is up to 18,849 AF	No person shall irrigate any turf or landscaped area more than fifteen minutes (15) on watering days.	Yes
4	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Collective reduction from all Shortage Level 4 actions is up to 18,849 AF		Yes
5	Other	Collective reduction from all Shortage Level 5 actions is up to 23,561 AF	Includes all Stage 4 actions	Yes
5	Landscape - Limit landscape irrigation to specific days	Collective reduction from all Shortage Level 5 actions is up to 23,561 AF	Residents and CII customers will be prohibited from irrigating any turf or landscape area more than one day a week.	Yes
6	Other	Collective reduction from all Shortage Level 6 actions is greater than 23,561 AF	Includes all Stage 5 actions	Yes
6	Landscape - Prohibit all landscape irrigation	Collective reduction from all Shortage Level 6 actions is greater than 23,561 AF	Commercial nurseries shall be prohibited from the use of potable water for irrigation of outdoor, landscape and turf except by use of a hand-held hose equipped with a positive shutoff nozzle.	Yes
6	Landscape - Other landscape restriction or prohibition	Collective reduction from all Shortage Level 6 actions is greater than 23,561 AF		Yes
6	Other water feature or swimming pool restriction	Collective reduction from all Shortage Level 6 actions is greater than 23,561 AF	The following nonessential uses of water shall be prohibited: the filling, cycling, filtering, or refilling swimming pools, spas, Jacuzzis, fountains or other like devices.	Yes
NOTES:				

8.4.2 SUPPLY AUGMENTATION

The City does not plan to add a new source of water supply to address customer demands, but instead will consider increased supplies from existing sources. Table 8-3 reflects this approach and does not identify any new supplies. Instead, the City will focus on demand reduction measures in the event existing sources of supply are not sufficient to meet customer demands. As discussed in Chapter 6, the City's sources of water supply include: groundwater pumped from the Chino Basin; treated groundwater from the Chino Basin produced by the Chino Basin Desalter Authority; treated, imported surface water purchased from MWD through Water Facilities Authority; groundwater and/or surface water purchased from San Antonio Water Company; and recycled water purchased from Inland Empire Utilities Agency. The City's main source of water supply is groundwater pumped from the Chino Basin. As noted in Section 8.2, beginning July 1, 2022, the City will prepare and submit an Annual Assessment which will include a review of water supplies available to meet water demands for the current and upcoming years. In the event the City is currently in, or considers entering into, one of the standard water shortage levels identified in Section 8.3, the City will consider the water supply augmentation actions described below.

For each water shortage level discussed in Section 8.3, the City will consider supplementing its existing water supplies through increased groundwater production instead of the purchase of additional imported water supplies. Due to previous critically dry conditions, MWD developed the Water Supply Allocation Plan whereby available supplies are equitably allocated to its member agencies, including CDA, IEUA, and WFA. The WSAP establishes ten different shortage levels and a corresponding drought allocation to each member agency. Based on the shortage level established by MWD, the WSAP provides a reduced drought allocation to a member agency for its Municipal and Industrial retail demand. The ratio of MWD water supply drought allocation to local water supply will change based on the WSAP stage. The MWD drought allocation can be used to make Full-Service water deliveries at the Tier 1 rate up to a Tier 1 allocation. Any Full-Service water delivered in excess of a drought allocation is subject to a penalty rate in addition to the normal rate paid for the water.

MWD's primary first response to any gap between core supplies (from the State Water Project and Colorado River) and demand is to make optimal use of its supply augmentation options, consisting of drawing from flexible supply programs and storage reserves. MWD has developed and actively manages a portfolio of water supply programs including water transfer, storage, and exchange agreements. MWD pursues voluntary water transfer and exchange programs to help mitigate supply/demand imbalances and provide additional dry-year supply sources. In addition, MWD has developed significant storage capacity in reservoirs, conjunctive use, and other groundwater storage programs totaling approximately 6.0 million AF. Pursuant to MWD's "Emergency Storage Objective", updated in 2019, approximately 750,000 AF of total stored water is emergency storage reserved by MWD for use in the event of supply interruptions. Based on MWD's historical and on-going water supply and storage programs and management practices, the City will use up to the treated imported water supply made available from MWD through WFA in association with each of the standard water shortage levels identified in Section 8.3. Water demands will be addressed through increased use of the local groundwater supplies and implementation of demand reduction measures through the various stages of action.

The City will consider augmenting its existing water supplies through production of additional groundwater from the Chino Basin. As noted in Section 6.2.2, the Chino Basin is managed under the Chino Basin adjudication. During the period of management under the Chino Basin Judgment, significant drought events have occurred. In each drought cycle the Chino Basin has been managed to maintain water levels. Parties to the Chino Basin Judgment, including the City, are authorized to produce groundwater in excess of their rights and pay assessments for such production to the Chino Basin Watermaster. The assessments are used to purchase untreated imported water to replenish the Chino Basin. The Chino Basin Watermaster purchases untreated imported water to replenish the Chino Basin from MWD through Inland Empire Utilities Agency. Groundwater quality is carefully monitored by the Chino Basin Watermaster. Treatment facilities and/or blend plans have been developed by water agencies to meet potable water standards and to prevent the spread of any groundwater contamination. Groundwater quality in the Chino Basin is not expected to impact potable supplies or constrain supply reliability. Based on historical and on-going management practices, the City will be able to continue relying on the Chino Basin for adequate supplies in response to each of the standard water shortage levels identified in Section 8.3.

Table 8-3 Supply Augmentation and Other Actions

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
1	Transfers	Not applicable (see Notes)	
2	Transfers	Not applicable (see Notes)	
3	Transfers	Not applicable (see Notes)	
4	Transfers	Not applicable (see Notes)	
5	Transfers	Not applicable (see Notes)	
6	Transfers	Not applicable (see Notes)	
NOTES: The City will consider increased production from the Chino Basin using existing facilities to address increased demands. As noted on Table 8-2, the City plans to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.			

8.4.3 OPERATIONAL CHANGES

During a water supply shortage situation, the City will manage its water supply resources to provide sufficient water supplies capable of meeting the demands of its customers. Section 8.4.1 describes the City's standard water shortage levels and associated demand reduction measures. Section 8.4.2 describes the City's water supply sources and water supply augmentation actions available. The supply augmentation actions and demand reduction measures, when implemented, may potentially result in short-term operational changes which are necessary to allow the City to utilize all available water supply sources in response to water shortage situations.

As noted in Section 8.2, beginning July 1, 2022, the City will prepare and submit an Annual Assessment which will include a review of the water supplies available to meet water demands for the current and upcoming years. Preparation of the Annual Assessment will assist the City in determining any potential operational changes. In addition, the City's standard water shortage levels and the associated demand reduction measures, in conjunction with the City's existing Demand Management Measures (discussed in Chapter 9), will be essential to the City in reducing water demands during any water shortage period. The operational changes the City will consider in addressing non-catastrophic water shortages on a short-term basis include the following:

- Improved monitoring, analysis, and tracking of customer water usage to enforce demand reduction measures
- Optimized production from existing available water supply sources
- Potential use of emergency supply sources, including emergency interconnections
- Potential blending of water supply resources
- Improved monitoring, maintenance, and repairs to reduce water distribution system losses

8.4.4 ADDITIONAL MANDATORY RESTRICTIONS

The mandatory restrictions which are implemented by the City to reduce customer demands are discussed in Section 8.4.2. There are no additional mandatory restrictions planned at this time.

8.4.5 EMERGENCY RESPONSE PLAN

Catastrophic water shortages are incorporated in the City's standard water shortage levels (identified in Section 8.3) and the associated demand reduction measures (described in Section 8.4.2). In addition to the water supply augmentation actions (Section 8.4.1) and potential operational changes (Section 8.4.3) which the City may consider in order to continue providing sufficient water supplies, the City will review and implement any necessary steps included in its "Emergency Response Plan".

As part of the "America's Water Infrastructure Act of 2018", community water systems serving a population greater than 3,300 people, including the City, are required to review and update their "Risk and Resilience Assessment" (RRA) and the associated "Emergency Response Plan" (ERP) every five (5) years. However, due to security concerns regarding the submitting of these reports, water systems are required to submit certifications to the United States Environment Protection Agency (USEPA), from March 31, 2020 and December 30, 2021, confirming the current RRA and ERP have been reviewed and updated.

The City's RRA, prepared in May 2020, evaluates the vulnerabilities, threats, and consequences from potential hazards to the City's water system. The City prepared its RRA (which is incorporated by reference) by evaluating the following items:

- Natural hazards and malevolent acts (i.e., all hazards);
- Resilience of water facility infrastructure (including pipes, physical barriers, water sources and collection, treatment, storage and distribution facilities, and electronic, computer and other automated systems);
- Monitoring practices;
- Financial systems (e.g., billing systems);
- Chemical storage and handling; and
- Operation and maintenance.

The District's RRA evaluated a series of potential malevolent acts, natural hazards, and other threats in order to estimate the potential "monetized risks" (i.e. associated economic consequences to both the water system and surrounding region, and the likelihood of occurrence) associated with the City's water facility assets. The cost-effectiveness of implementing potential countermeasures to reduce risks was also reviewed.

The City's ERP, prepared in September 2020, provides the management, procedures, and designated actions the City and its employees will implement during emergency situations (including catastrophic water shortages) resulting from natural disasters, system failures and other unforeseen circumstances. The City's ERP (which is incorporated by reference) provides the guidelines for evaluating an emergency situation, procedures for activating an emergency response, and details of the different response phases in order to ensure that customers receive a reliable and adequate supply of potable water. The scope of the ERP includes emergencies which directly affect the water system and the ability to maintain safe operations (such as a chlorine release, and earthquake or a threat of contamination). The ERP also incorporates the results of City's RRA and includes the following:

- Strategies and resources to improve resilience, including physical and cybersecurity
- Plans and procedures for responding to a natural hazard or malevolent act
- Actions and equipment to lessen the impact of a natural hazard or malevolent act
- Strategies to detect natural hazards or malevolent act

The City will review the ERP for procedures regarding the utilization of alternative water supply sources in response to water supply shortages, including during the standard water shortage levels. The City will also review applicable procedures described in the ERP regarding any necessary temporary shutdown of water supply facilities, including appropriate regulatory and public notifications.

8.4.6 SEISMIC RISK ASSESSMENT AND MITIGATION PLAN

CWC 10632.5.

(a) In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.

(b) An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.

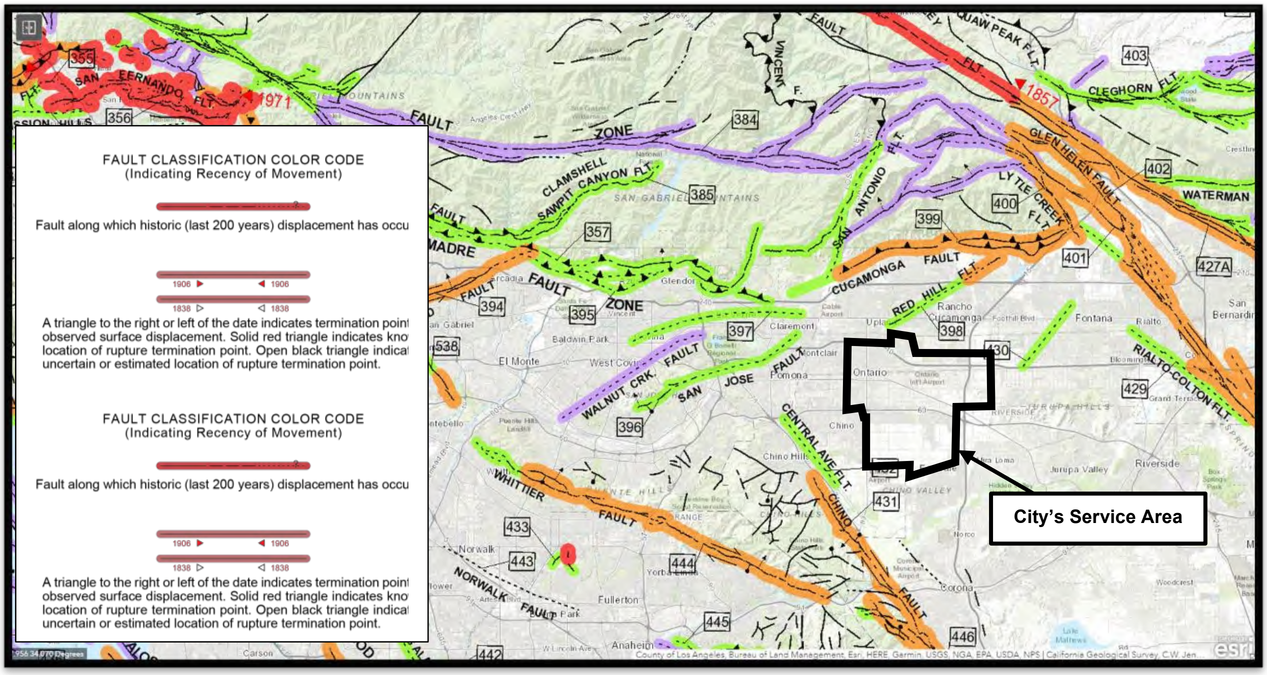
(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

The City prepared a local "Hazard Mitigation Plan" which was approved by the Federal Emergency Management Agency (FEMA) in 2018. The Hazard Mitigation Plan identifies effective ways to assess the significant natural hazards (including earthquakes) that may affect the City and its residents. The Hazard Mitigation Plan provides resources, information, and strategies to reduce the City's vulnerability to these hazards, while providing guidance for the coordination of mitigation activities throughout the City. The Hazard Mitigation Plan includes mitigation projects necessary to reduce seismic risk to the City's water distribution system facilities (including its distribution system pipelines, groundwater wells, booster pumps, and storage reservoirs) and potential disruptions in providing water service. The City's Hazard Mitigation Plan is provided in Appendix O.

The County of San Bernardino prepared a "Multi-Jurisdictional Hazard Mitigation Plan" which was approved by the Federal Emergency Management Agency in June 2017. The County's Multi-Jurisdictional Hazard Mitigation Plan identified methods to assess significant natural hazards (including earthquakes) affecting areas throughout San Bernardino County, and the mitigation strategies necessary to reduce risks, including seismic risk. The County's Multi-Jurisdictional Hazard Mitigation Plan is provided in Appendix P.

The California Geological Survey has published the locations of numerous faults which have been mapped in the Southern California region. Although the San Andreas fault is the most recognized and is capable of producing an earthquake with a magnitude greater than 8 on the Richter scale, some of the lesser-known faults have the potential to cause significant damage. The locations of these earthquake faults in the vicinity of the City's water service area are provided in the Figure 6 below. The faults that are located in close proximity to and could potentially cause significant shaking in the City's water service area include the San Andreas fault, the Walnut Creek fault, the San Jose fault, the Red Hill fault, the Cucamonga fault, the Chino fault, the Rialto-Colton fault and the Central Avenue fault. As discussed in Section 6.2.2, the faults which border the Chino Basin include the Rialto-Colton fault, the Chino fault, the San Jose fault, and the Cucamonga fault.

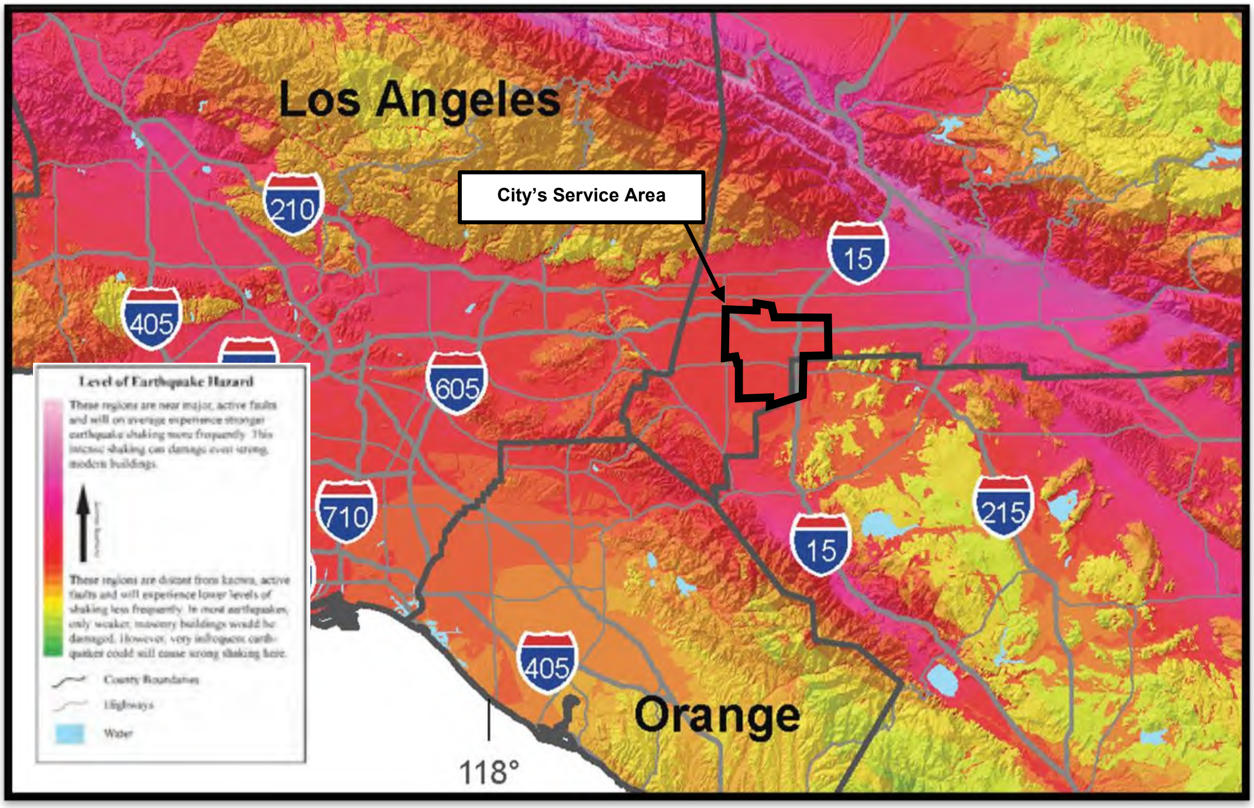
Figure 6 - Location of Earthquake Faults



Source: https://maps.conservation.ca.gov/cgs/fam/App/

The following Figure 7 provides the relative intensity of ground shaking in the vicinity of the City's service area from anticipated future earthquakes. The locations of relatively long-period (1.0 second) earthquake shaking, including the City's service area, are provided. Long-period shaking affects tall, relatively flexible buildings, but also correlates with earthquake damage. The shaking potential is calculated based on the level of ground motion that has a 2 percent chance of being exceeded in 50 years (or the level of ground-shaking with an approximate 2,500-year average repeat time). As discussed in Section 8.4.5, the City has prepared an Emergency Response Plan which provides the management, procedures, and designated actions the City and its employees will implement during emergency situations resulting from natural disasters, including during earthquakes, to ensure that customers receive a reliable and adequate supply of potable water. The City's ERP is incorporated by reference.

Figure 7 - Earthquake Shaking Potential



Source: "Earthquake Shaking Potential for California", 2016, California Geological Survey and United States Geological Survey

8.4.7 SHORTAGE RESPONSE ACTION EFFECTIVENESS

The effectiveness of the shortage response actions for each of the standard water shortage levels identified in Section 8.3, is evident in the City's historical ability to meet its customer's water demands in response to a water supply shortage. In addition, the City imposes water consumption regulations and restrictions, and supports local agencies in efforts to enforce regulations and prohibitions on water use. The effectiveness of each of the City's shortage response actions, in order to reduce any potential gaps between supply and demand, has been quantified in the expected demand reduction provided in Table 8-2 and Table 8-3.

Section 6.1 provides a tabulation of the City's historical annual water demands for each water supply source. During the past 10 years, the City experienced a five-year consecutive drought within its service area from FY 2011-12 to FY 2015-16. Throughout this extended dry year period, the City's annual water production ranged from 36,036 AF to 45,196 AF, with an average of approximately 41,558 AF. In addition, historical records indicate the City previously produced a maximum of up to 45,196 AF during FY 2013-14. The City has been able to provide sufficient water supplies to its customers, including during long-term droughts and years with historically high water demands. In addition, the City has been able to provide water service to meet maximum day water demands for these years, including during the summer months.

The City's water demands during the most recent five years (from FY 2015-16 to FY 2019-20) averaged approximately 39,374 AFY. Due to conservation efforts and demand management measures (discussed in Chapter 9), the City's recent water demands have been less than its historical water demands, including during long-term droughts. The City's projected water demands (during normal, single dry, and multiple dry years) are provided in Section 7.2.3 and are anticipated to incorporate similar reductions in water use rates as a result of the shortage response actions, ongoing conservation efforts, and demand management measures. Because the City's projected water rates are similar to its historical water use rates, it is anticipated the City will be able to continue providing sufficient water supplies to its customers to meet projected water demands, including during long-term droughts. In addition, as discussed in Section 8.4.1, based on historical and on-going management practices, the City will be able to continue relying on its water supply source from the Chino Basin for adequate supply augmentation in response to each of the standard water shortage levels identified in Section 8.3.

Based on the City's demonstrated ability to meet water demands during past water supply shortages, the adopted water shortage levels, the adjusted operating safe yields, and water supplies during long-term droughts, it is anticipated that the City will be able to provide sufficient water supplies to its customers during each of its standard water shortage levels. Although adequate supplies are anticipated, the cost of those water supplies may become incrementally more expensive. The City will enact varying stages of its WSCP to encourage retail customers to reduce water consumption and at the same time reduce the need to use the more expensive water supplies. Notwithstanding, the effectiveness of each of the City's shortage response actions, in order to reduce any potential gaps between supply and demand, has been quantified in the expected demand reduction section provided in Table 8-2 and Table 8-3. The effectiveness of the City's shortage response actions is based on the City's water demands prior to 2015 (unconstrained demands). The City reduced its water demands in 2015 in response to the Governor's April 1, 2015 Executive Order B-29-15 which mandated statewide reduction in water use of 25 percent. The City's actual water demand reduction during this period was used to estimate the extent of water use reductions for the City's Water Shortage Stages. The City's Water Shortage Stages 1, 2, 3, 4, 5, and 6 are expected to reduce water demands by up to 10%, 20%, 30%, 40%, 50%, and greater than 50%, respectively.

8.5 COMMUNICATION PROTOCOLS

CWC 10632.

(a)(5) Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:

(A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.

(B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.

(C) Any other relevant communications.

Upon finding that a need to implement a Stage 1 through Stage 6 Water Supply Shortage exists, the City Council will order implementation of the appropriate water shortage response action, or other measures which it deems appropriate to address the water shortage. This order shall be made by Resolution and will be published in a daily newspaper of general circulation and will become effective immediately following publication. The appropriate regulations that fall under the Stage Level declared will take effect with the first full billing period commencing on or after the effective date of the City Council's Resolution.

In the event of an immediate emergency that causes an unplanned interruption of water supply, the City Manager or his/her designee is authorized to restrict water use and apportion the available supply of water among its customers in the most equitable manner possible to continue service fairly and without discrimination, except that preference shall be given to such service as is essential to the public interest and to the preservation of life and health.

8.6 COMPLIANCE AND ENFORCEMENT

CWC 10632.

(a)(6) For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.

The City's WSCP includes fines and penalties that may be imposed on any customer who fails to comply with the prohibitions and restrictions of each water supply shortage stage. All fines and penalties may apply to each of the prohibitions and restrictions of each water supply shortage stage. If a customer if found to be in violation of any water supply shortage stage provision, fines begin with a written notice and subsequent violations include fines of $100, $200, and $500.

8.7 LEGAL AUTHORITIES

CWC 10632.

(a)(7)(A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions.

(B) A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1.

(C) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

CWC Division 1, Section 350

The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, shall declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

The City has the legal authority to implement and enforce its water shortage contingency plan. California Constitution article X, section 2 and California Water Code section 100 provide that water must be put to beneficial use, the waste or unreasonable use or unreasonable method of use of water shall be prevented, and the conservation of water is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and the public welfare. In addition, CWC Section 375 provides the City with the statutory authority to adopt and enforce water conservation restrictions, and CWC Section 350 et seq. authorizes the City to declare a water shortage emergency and impose water conservation measures when it determines that the City may not be able to satisfy ordinary demands without depleting supplies to an insufficient level. If necessary, the City shall declare a water shortage emergency in according with CWC Chapter 3 (commencing with Section 350) of Division 1. Once having declared a water shortage, the City is provided with broad powers to implement and enforce regulations and restrictions for managing a water shortage. For example: CWC section 375(a) provides:

> Notwithstanding any other provision of the law, any public entity which supplies water at retail or wholesale for the benefit of persons within the service area or area of jurisdiction of the public entity may, by ordinance or resolution adopted by a majority of the members of the governing body after holding a public hearing upon notice and making appropriate findings of necessity for the adoption of a water conservation program, adopt and enforce a water conservation program to reduce the quantity of water used by those persons for the purpose of conserving the water supplies of the public entity.

(CWC Section 375(a).) CWC Section 375(b) grants the City with the authority to set prices to encourage water conservation.

Pursuant to these authorities, the City adopted Ordinance No. 3027. Under the City's Ordinance No. 3027, a water shortage, including a water shortage emergency but excluding an immediate emergency, shall be declared by the adoption of a resolution of the City Council, in accordance with CWC section 350. The City Council may declare a water shortage based on a determination by the MWD and the IEUA of a water shortage, the declaration of an executive order of the Governor or the adoption of voluntary or mandatory water use restrictions by any State Agency governing the use of water or based upon any interruption in water supply or delivery that the City Council determines in its sole discretion necessitates water conservation pursuant to this chapter.

Under California law, including CWC Chapters 3.3 and 3.5 of Division 1, Parts 2.55 and 2.6 of Division 6, Division 13, and Article X, Section 2 of the California Constitution, the City is authorized to implement the water shortage actions outlined in this WSCP and in the City's Ordinance No. 3027. In water shortage cases, shortage response actions to be implemented will be at the discretion of the City and will be based on an assessment of the supply shortage, customer response, and need for demand reductions as outlined in this WSCP and the City's Ordinance No. 3027.

It is noted that upon proclamation by the Governor of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions, the state will defer to implementation of locally adopted water shortage contingency plans to the extent practicable.

The City will coordinate with the County and any other entities as necessary for possible proclamation of a local emergency as necessary under California Government Code, California Emergency Services Act (Article 2, Section 8558).

In the event of an immediate emergency that causes an unplanned interruption of water supply, the City Manager or his/her designee is authorized to restrict water use and apportion the available supply of water among its customers in the most equitable manner possible to continue service fairly and without discrimination, except that preference will be given to such service as is essential to the public interest and to the preservation of life and health.

At any time during Stage 1, 2, 3, 4, 5, or 6, if the City Council determines that additional reductions in the amount the potable water being used by water customers are necessary, it may adopt a resolution establishing water use limitations and enforce those water use limitations by the adoption and imposition of a volumetric penalty established therein.

8.8 FINANCIAL CONSEQUENCES OF WSCP

CWC 10632.

(a)(8) A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:

(A) A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(B) A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(C) A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.

Potential revenue reductions and expense increases associated with activated shortage response actions are regulated and tracked by the City's financial department.

During periods of water supply shortages, state-mandated water use restrictions, or emergency conditions, the City may require its customers to reduce demands below levels projected under the current water rate structure. Under any of these circumstances, the City may experience a decrease in revenues. In order to offset any decline in revenues, the City Council may adopt resolutions to make additional adjustments to the water rates based on the City's increased costs to provide water to its customers.

Projected demands, water supply reductions, water rates and cost of water cannot be known with certainty. However, even under a hypothetical scenario whereby sales are gradually reduced by up to 50 percent, certain actions are known as noted below:

Water supplies:

- CDA supplies will not be impacted from a quantity or cost standpoint.
- As demands/sales are reduced, the City will rely on its least expensive sources of supply first and sequentially reduce the most expensive sources of water supply (i.e. imported water). This action will address much of the gap between reduced revenue from water sales and the cost of the water supplies.
- As sales are reduced, distribution system losses will also be reduced on a proportional basis resulting in savings by not having to provide as much water.

Revenue from water sales:

Revenue from the monthly standby charge to each retail customer will remain constant regardless of the volume of water sold.

The City will regularly track the impacts of potentially reduced water sales on revenue and compare it to the cost of operations. In the event that the City's revenues and expenditures are severely affected by a water shortage, the following measures could be taken by the City to alleviate the financial impacts before there has been a significant draw on financial reserves:

- Rate Adjustment
- Decrease in Capital Expenditure
- Decrease in O&M Expenditure

Rate increases are not viewed positively by the customers particularly when they reduce consumption. Negative consequences that could arise from the cost-cutting actions include dissatisfaction of the customers, reduced funding for Capital Improvement Projects and system maintenance, and reduced staff availability for emergency response. Nonetheless, these tools are available to the City in a worst-case scenario to ensure a constant balance between revenue and expenses.

8.9 MONITORING AND REPORTING

CWC 10632.

(a)(9) For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.

Customer compliance of the provisions adopted by declaration of a WSCP are monitored and reported through water loss audits performed by the City's Utilities Department. Staff prepares annual Distribution System Water Audits to monitor water losses. Staff reviews the audits to track real and apparent losses. Losses are monitored by comparing water production to sales. The City regularly monitors its system and repairs leaks in a timely manner. This includes regular checks on valves and meters, and pipeline maintenance. If leaks are encountered or suspected during routine inspection of the system, further evaluation is conducted. If leaks are found, they are repaired.

8.10 WSCP REFINEMENT PROCEDURES

CWC 10632.

(a)(10) Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.

The City's WSCP has been prepared as an adaptive management plan. As discussed in Section 8.9, the City will monitor and report on the implementation of the WSCP. The City will review the implementation results for any current or potential shortage gaps between water supplies and demands. The City will evaluate the need for revising the WSCP in order to resolve any shortage gaps, as necessary. The City will consider the following potential revisions in the event of a potential shortage gap:

- Implementation of additional public outreach, education, and communication programs (in addition to the programs discussed in Chapter 9).
- Implementation of more stringent water use restrictions under the standard water shortage levels (discussed in Section 8.4.1).
- Implementation of stricter enforcement actions and penalties (discussed in Section 8.6).
- Improvements to the water supply augmentation responses (discussed in Section 8.4.2), as well as any associated operational changes (discussed in Section 8.4.3) which may be required.
- Incorporation of additional actions recommended by City staff or other interested parties.

The City will use the monitoring and reporting data to evaluate the ability for these potential revisions to resolve any shortage gaps which may occur within the standard water shortage levels.

The WSCP is adopted as part of the City's 2020 Urban Water Management Plan adoption process discussed in Section 10.3. It is anticipated the City will review, revise, and adopt an updated WSCP as part of preparing its 2025 Urban Water Management Plan as necessary. However, the City will continue to review the monitoring and reporting data, and if needed, update the WSCP more frequently. Any updates to the City's WSCP will include a public hearing and adoption process by the City Council (see Section 8.12).

8.11 SPECIAL WATER FEATURE DISTINCTION

CWC 10632.

(b) For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

The City's WSCP defines "decorative water features" as water features which are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, but excluding pools and spas. In general, there are additional health and safety considerations in the water supplied to pools and spas compared to decorative water features. As a result, the City's WSCP has reviewed the response actions, enforcement actions, and monitoring and reporting programs separately for decorative water features and for pools and spas, as applicable.

As described in Section 8.4.1, under a Stage 1 Water Supply Shortage Level, no water shall be used to clean, fill or maintain levels in decorative fountains, ponds, lakes or other similar aesthetic structures unless such water is part of a recycling system.

8.12 PLAN ADOPTION, SUBMITTAL, AND AVAILABILITY

CWC 10632.

(c) The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.

The City's WSCP is adopted as part of the City's 2020 Urban Water Management Plan adoption process discussed in Chapter 10. The process for adopting the City's WSCP includes the following:

- The City will conduct a public hearing and make the WSCP available for public inspection.
- The City will provide notification of the time and place of the public hearing to any city or county in which water is provided.
- The City will publish notice of public hearing in a newspaper once a week, for two successive weeks (with at least five days between publication dates).
- The City Council will adopt the 2020 Urban Water Management Plan and the WSCP.
- As part of submitting the 2020 Urban Water Management Plan to DWR, the City will also submit the WSCP (electronically through DWR's online submittal tool) within 30 days of adoption and by July 1, 2021. The City will submit a copy of the WSCP to the California State Library and to any city or county in which water is provided within 30 days of adoption. In addition, the City will make the WSCP available for public review within 30 days of adoption.

If there are any subsequent amendments required, the process for adopting an amended WSCP includes the following:

- The City will conduct a public hearing and make the amended WSCP available for public inspection via public City Council agendas.
- The City Council will adopt the amended WSCP.
- The City will submit the amended WSCP to DWR (electronically through DWR's online submittal tool) within 30 days of adoption.

Additional information regarding the adoption, submittal, and availability of the City's WSCP (and 2020 Urban Water Management Plan) is provided in Chapter 10.

Chapter 9

DEMAND MANAGEMENT MEASURES

LAY DESCRIPTION – CHAPTER 9

DEMAND MANAGEMENT MEASURES

Chapter 9 (Demand Management Measures) of the City's 2020 Plan discusses and provides the following:

- The City has implemented "Demand Management Measures" to reduce its water demands and achieve its water use targets (discussed in Chapter 5)
- The City's Demand Management Measures include adoption of an ordinance to prevent water waste.
- The City's Demand Management Measures include metering of all customer connections, including separate metering for single-family residential, commercial, industrial, large landscape and institutional/governmental facilities.
- The City's Demand Management Measures include conservation pricing. The City's current water rate structure is tiered to promote water conservation by customers.
- The City's Demand Management Measures include public education and outreach programs regarding water conservation.
- The City's Demand Management Measures include various actions to assess and manage water distribution system losses.
- Additional Demand Management Measures including rebate, conservation, and educational programs are discussed.
- A summary of the Demand Management Measures the City has implemented over the past five (5) years is provided. The City met the 2020 Water Use Target (discussed in Chapter 5) through the implementation of these Demand Management Measures.

9.1 DEMAND MANAGEMENT MEASURES FOR WHOLESALE SUPPLIERS

CWC 10631.

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(ii) Metering.

(iv) Public education and outreach.
(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.

(2) For an urban wholesale water supplier, as defined in Section 10608.12, a narrative description of the items in clauses (ii), (iv), (vi), and (vii) of subparagraph (B) of paragraph (1), and a narrative description of its distribution system asset management and wholesale supplier assistance programs.

9.1.1 METERING

The City is not a wholesale agency and is not required by DWR to complete Section 9.1.

9.2 EXISTING DEMAND MANAGEMENT MEASURES FOR RETAIL SUPPLIERS

CWC 10631.

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(i) Water waste prevention ordinances.

(ii) Metering.

(iii) Conservation pricing.

(iv) Public education and outreach.

(v) Programs to assess and manage distribution system real loss.

(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.

9.2.1 WATER WASTE PREVENTION ORDINANCES

Waste is defined as any excessive, unnecessary or unwarranted use of water, including but not limited to any use which causes unnecessary runoff beyond the boundaries of any property as served by its meter and any failure to repair as soon as reasonably possible any leak or rupture in any water pipes, faucets, valves, plumbing fixtures or other water service appliances. The City adopted Ordinance No. 3027 in October 2015 to establish water conservation measures, staged water supply shortage demand management measures (DMMs), and prevent water waste. The adoption of Ordinance No. 3027 was part of a comprehensive water shortage planning effort to manage the City's response to any water supply challenges it may encounter. The City will review and update as necessary when DWR publishes urban water use targets for its service area in accordance with SB 606 and AB 1668 regulations.

9.2.2 METERING

CWC 526.

(a) Notwithstanding any other provision of law, an urban water supplier that, on or after January 1, 2004, receives water from the federal Central Valley Project under a water service contract or subcontract… shall do both of the following:

(1) On or before January 1, 2013, install water meters on all service connections to residential and nonagricultural commercial buildings… located within its service area.

CWC 527.

(a) An urban water supplier that is not subject to Section 526 shall do both of the following:

(1) Install water meters on all municipal and industrial service connections located within its service area on or before January 1, 2025.

The City meters all customer connections, including separate metering for single-family residential, commercial, industrial, large landscape and institutional/governmental facilities. Furthermore, if there is new development within the City, each facility is individually metered.

Service charges for the city are based on the customers' connection size. Further information regarding the City's service fees and conservation pricing is provided in Section 9.2.3.

9.2.3 CONSERVATION PRICING

The City has two commodity rates (Budgeted Use and Drought Surcharge) for water for customers within its service area. A Readiness-to-Serve Charge is added to the commodity rates to comprise the total water bill and is based on the size of the meter. Water bills are sent out monthly. A water rate sheet showing current rates is provided in Appendix Q.

The City's current water rate structure is tiered to promote water conservation by customers. The water rates have been developed to fund the cost of water and are related to the overall cost of water service. In the event the customer uses more than the amount of water allotted for the budgeted allocation, a Drought Surcharge rate would apply. The Drought Surcharge rate essentially penalizes the customers for over usage of water. This applies to all water-use sectors (e.g., single family residential, multifamily residential, industrial, institutional, etc.). Therefore, there is an economic benefit to conserving water.

9.2.4 PUBLIC EDUCATION AND OUTREACH

The City developed a public information program to educate the public to the benefits of water conservation. The program involves the dissemination of information through literature provided at City Hall and other City of Ontario facilities, and articles in the City of Ontario newsletter. The City includes informational flyers with the water bills periodically to address water conservation and other important matters. The City periodically holds public seminars and workshops with other local agencies to promote water conservation. The City also provides water conservation information and updates on its website. The City will continue these programs to promote water conservation.

As part of a public outreach program for water conservation, City representatives have visited schools to discuss water conservation. This discussion is usually included as part of an overall presentation on the water system and how it works. The City will continue the school education programs to promote water conservation to that sector of the community.

9.2.5 PROGRAMS TO ASSESS AND MANAGE DISTRIBUTION SYSTEM REAL LOSS

The City's system is comprised mainly of single and multi-family dwellings. The City estimates water system losses at approximately 2.9 percent, as discussed in Section 4.2. The City has water conservation literature that alerts customers to be on the lookout for water system leaks and to correct them promptly. The City is available to assist customers in answering questions regarding system leaks or higher than expected water usage.

As a part of normal operation and maintenance of the water system, City staff does preventive maintenance. This includes regular checks on valves and meters, and pipeline maintenance. If leaks are encountered or suspected during routine inspection of the system, further evaluation is conducted. If leaks are found, they are repaired.

The City monitors the water system for loss by comparing water production to water sales. The City will continue to monitor the water system for water loss, and if a trend develops to indicate that further analyses are required, the City will provide the necessary funds to institute another leak detection program.

The City will continue these programs to assess and manage distribution system real losses.

9.2.6 WATER CONSERVATION PROGRAM COORDINATION AND STAFFING SUPPORT

Various City departments are involved in the water conservation program. These include maintenance and operations personnel, the Utilities General Manager, the Public Works Director, and administrative staff who answer billing and usage questions and serve at the front counter at City Hall. In addition, the City employs a full time Water Resources Coordinator to oversee all water conservation activities. The Water Resources Coordinator is responsible for all matters pertaining to the City's water conservation program including implementation of DMMs. The City plans to continue to provide water conservation program coordination and staffing support.

9.2.7 OTHER DEMAND MANAGEMENT MEASURES

Large Landscape Conservation Programs
The City routinely hosts seminars and workshops in the community to promote landscape conservation. The City continues to offer a rebate program for the purchase of landscape related items to both residential and commercial customers to promote water conservation. During FY 2015-16 through FY 2019-20, the City provided rebates for this program.

Rebate Programs
The City continues to offer a rebate program for the purchase of high-efficiency washing machines, high-efficiency toilets, and weather-based irrigation controllers to customers to promote water conservation. The City currently offers rebates to qualifying customers for high-efficiency washing machines, high-efficiency toilets, and weather-based irrigation controllers. The rebate application, along with a list of qualifying appliances, are listed on the City's website. During FY 2015-16 through FY 2019-20, the City provided rebates for this program.

The City plans to continue implementation of the programs described above to promote water conservation.

9.3 REPORTING IMPLEMENTATION

9.3.1 IMPLEMENTATION OVER THE PAST FIVE YEARS

CWC 10631.

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) (A) ...a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years.

The City is committed to implementing water conservation programs. The highlights of DMM implementation over the past five years are described below.

As discussed in Section 9.2.1, in October 2015, the City adopted Ordinance No. 3027 to establish water conservation measures and staged water supply shortage demand management measures.

As discussed in Section 9.2.2, the City metered all customer connections, including separate metering for single-family residential, commercial, industrial, large landscape and institutional/governmental facilities during the past five years. Furthermore, if there was new development within the City, each facility was individually metered. Service charges for the City are based on the customers' connection size.

As discussed in Section 9.2.3, the City has two commodity rates (Budgeted Use and Drought Surcharge) for water for customers within its service area. Readiness-to-Serve Charges are added to the commodity rates to comprise the total water bill and are based on the size of the meter. Water bills are sent out monthly. A water rate sheet showing current rates is provided in Appendix Q.

As discussed in Section 9.2.4, the City developed a public information program to educate the public to the benefits of water conservation. The program involves the dissemination of information through literature provided at City Hall and other City of Ontario facilities, and articles in the City of Ontario newsletter. The City included informational flyers with the water bills periodically to address water conservation and other important matters. The City periodically held public seminars and workshops with other local agencies to promote water conservation. The City also provided water conservation information and updates on its website. As part of a public outreach program for water conservation, City representatives visited schools to discuss water conservation. The City coordinated and/or participated in public education/outreach events from FY 2015-16 through FY 2019-20.

As discussed in Section 9.2.5, the City distributed water conservation literature that alerted customers to be on the lookout for water system leaks and to correct them promptly.

As a part of normal operation and maintenance of the water system, City staff performed preventive maintenance. This included regular checks on valves and meters, and pipeline maintenance. The City monitored the water system for losses by comparing water production to water sales.

As described in Section 9.2.6, the City employed a full time Water Resources Coordinator to oversee all water conservation activities from FY 2015-16 through FY 2019-20. The Water Resources Coordinator is responsible for all matters pertaining to the City's water conservation program including implementation of DMMs. The City plans to continue to provide water conservation program coordination and staffing support.

Other DMMs employed by the City are discussed in Section 9.2.7. Highlights of other DMM implementation over the past five years are described below.

- Landscape Conservation Program – During FY 2015-16 through FY 2019-20, the City routinely hosted seminars and workshops in the community to promote landscape conservation. The City also offered a rebate program for the purchase of landscape related items to both residential and commercial customers to promote water conservation.
- High Efficiency Clothes Washing Machine Rebate Program – The City distributed high efficiency washing machine rebates from FY 2015-16 through FY 2019-20.
- High Efficiency Toilet Rebate Program – The City distributed high efficiency toilet rebates from FY 2015-16 through FY 2019-20.

9.3.2 IMPLEMENTATION TO ACHIEVE WATER USE TARGETS

CWC 10631.

(e)(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

The Demand Management Measures implemented by the City are discussed in Section 9.2. Descriptions regarding the nature and extent of these Demand Management Measures implemented by the City over the past five years are discussed in Section 9.3. The City will continue to implement these Demand Management Measures and other water conservation programs and work collaboratively with IEUA and MWD to provide water conservation programs for its residents.

As discussed in Section 5.5, the City's per-capita water use during FY 2019-20 was 161 GPCD. The City's confirmed 2020 Water Use Target is 196 GPCD. The City's per-capita water use during FY 2019-20 meets the 2020 Water Use Target and is in compliance. The City met the 2020 Water

Use Target through the implementation of the Demand Management Measures discussed in Section 9.2. Continued implementation of these Demand Management Measures will assist the City in meeting water use targets and objectives.

9.4 WATER USE OBJECTIVES (FUTURE REQUIREMENTS)

The City is currently working with DWR to develop Water Use Objectives pursuant to AB 1668 and SB 606. Beginning in 2024, water agencies, including the City, are required to begin reporting compliance of their Water Use Objectives consisting of indoor residential water use, outdoor residential water use, commercial, industrial and institutional, irrigation with dedicated meters, water loss, and other unique local uses. The City plans to meet its Water Use Objectives through continued implementation of the Demand Management Measures discussed in Section 9.2.

Chapter 10

PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

LAY DESCRIPTION – CHAPTER 10

PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Chapter 10 (Plan Adoption, Submittal, and Implementation) of the City's 2020 Plan discusses and provides the following:

- The steps the City has performed to adopt and submit its 2020 Plan are detailed.
- The steps the City has performed to adopt and submit its Water Shortage Contingency Plan are detailed.
- The City coordinated the preparation of its 2020 Plan with the Chino Basin Watermaster, CDA, County of San Bernardino, Cucamonga Valley Water District, Fontana Water Company, IEUA, Jurupa Community Services District, Monte Vista Water District, MWD, Santa Ana Watershed Project Authority, SAWCo, WFA, and the Cities of Chino, Chino Hills, Fontana, Montclair, Pomona, Rancho Cucamonga, and Upland. The City notified these agencies at least sixty (60) days prior to the public hearing of the preparation of the 2020 Plan and invited these agencies to participate in the development of the 2020 Plan.
- The City provided a notice of the public hearing to the same agencies regarding the time, date, and place of the public hearing.
- The City published a newspaper notification of the public hearing, once a week for two successive weeks.
- The City conducted a public hearing to discuss and adopt the City's 2020 Plan and City's Water Shortage Contingency Plan.
- Within 30 days of adoption, the City submitted the 2020 Plan and Water Shortage Contingency Plan to the California Department of Water Resources.
- Within 30 days of adoption, the City submitted all data tables associated with the 2020 Plan to the California Department of Water Resources.
- Within 30 days of adoption, the City submitted a copy of the 2020 Plan to the State of California Library.
- Within 30 days of adoption, the City submitted a copy of the 2020 Plan (and Water Shortage Contingency Plan) to the County of San Bernardino Assessor- Recorder/ Clerk's office and the City Clerk's Office.
- Within 30 days after submittal of the 2020 Plan to the California Department of Water Resources, the City made the 2020 Plan (including the Water Shortage Contingency Plan) available at the City Clerk's Office and on the City's website.

- The steps the City will perform to amend the 2020 Plan and/or the Water Shortage Contingency Plan, if necessary, are provided.

10.1 INCLUSION OF ALL 2020 DATA

The data provided in the City's 2020 Plan and the Water Shortage Contingency Plan is provided on a FY basis through June 30, 2020 (as discussed in Section 2.5).

10.2 NOTICE OF PUBLIC HEARING

The City's public hearing notification process for its 2020 Plan and the Water Shortage Contingency Plan is discussed below.

10.2.1 NOTICE TO CITIES AND COUNTIES

CWC 10621.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

CWC 10642.

…The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area…

10.2.1.1 60 DAY NOTIFICATION

As discussed in Section 2.6.1 and Section 2.6.2, the City coordinated the preparation of the 2020 Plan with the Chino Basin Watermaster, CDA, Cucamonga Valley Water District, Fontana Water Company, IEUA, Monte Vista Water District, MWD, Santa Ana Watershed Project Authority, SAWCo, and WFA. The City notified these agencies, as well as the city and county within which the City provides water supplies, at least sixty (60) days prior to the public hearing of the preparation of the 2020 Plan and invited them to participate in the development of the Plan. A copy of the notification letters sent to these agencies is provided in Appendix D.

10.2.1.2 NOTICE OF PUBLIC HEARING

The City provided a notice of the public hearing to the Chino Basin Watermaster, CDA, Cucamonga Valley Water District, Fontana Water Company, IEUA, Monte Vista Water District, MWD, Santa Ana Watershed Project Authority, SAWCo, and WFA. The notice includes the time and place of the public hearing. In accordance with Government Code Section 7291, if the City's audience for the public hearing includes a substantial number that are not able to speak or understand English, the City will provide interpreters. To ensure that the draft 2020 Plan and the draft Water Shortage Contingency Plan were available for review, the City placed a copy at the City Clerk's Office located at City Hall and made a copy available for review on its website. Copies of the notice of the public hearing are provided in Appendix D.

10.2.1.3 SUBMITTAL TABLES

Table 10-1 summarizes the agencies which were provided notifications by the City.

Table 10-1 Notification to Cities and Counties

Submittal Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Chino	Yes	Yes
Chino Hills	Yes	Yes
Fontana	Yes	Yes
Montclair	Yes	Yes
Pomona	Yes	Yes
Rancho Cucamonga	Yes	Yes
Upland	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
San Bernardino County	Yes	Yes
NOTES:		

10.2.2 NOTICE TO THE PUBLIC

CWC 10642.

…Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies.

Government Code 6066.

Publication of notice pursuant to this section shall be once a week for two successive weeks. Two publications in a newspaper published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the fourteenth day, including therein the first day.

Pursuant to Section 6066 of the Government Code, the City published an English and Spanish notice of public hearing in the newspaper during the weeks of June 1, 2021 and June 8, 2021. A notice of public hearing was also provided to the City Clerk's office and was posted throughout the City of Ontario and on the City's website. A copy of the published notice is provided in Appendix D. To ensure the draft 2020 Plan and the draft Water Shortage Contingency Plan were available for review, the City placed a copy of the Plan at the City Clerk's Office located at City Hall and made a copy available for review on its website.

10.3 PUBLIC HEARING AND ADOPTION

CWC 10642.

…Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon.

CWC 10608.26.

(a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.

(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.

(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

10.3.1 PUBLIC HEARING

Prior to adopting the draft 2020 Plan and the draft Water Shortage Contingency Plan, the City held a public hearing on June 15, 2021 which included input from the community regarding the City's draft 2020 Plan and the draft Water Shortage Contingency Plan. As part of the public hearing, the City adopted a method to determine of its water use targets through selection of Target Method 1 (see Section 5.2.1 and Appendix H). In addition, the City considered the economic impacts of meeting these water use targets; including measures described in Section 8.8.

10.3.2 ADOPTION

CWC 10642.

… After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

Following the public hearing, the City adopted both the draft 2020 Plan and the draft Water Shortage Contingency Plan (included in Chapter 8). A copy of the resolutions adopting the 2020 Plan, the Water Shortage Contingency Plan, and the addendum to the 2015 Urban Water Management Plan are provided in Appendix R.

10.4 PLAN SUBMITTAL

CWC 10621.

(e) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.

CWC 10644.

(a) (1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption.

CWC 10635.

(c) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

The City's submittal process for its 2020 Plan and the Water Shortage Contingency Plan is discussed below.

10.4.1 SUBMITTING A UWMP AND WATER SHORTAGE CONTINGENCY PLAN TO DWR

The City Council adopted the 2020 Plan on June 15, 2021 and within 30 days of adoption and before July 1, 2021, the City submitted the adopted 2020 Plan (including the Water Shortage Contingency Plan) to DWR. The 2020 Plan and Water Shortage Contingency Plan were submitted through DWR's "Water Use Efficiency (WUE) Data Portal" website.

DWR developed a checklist which was used by the City to assist DWR with its determination that the City's 2020 Plan has addressed the requirements of the California Water Code. The City has completed the DWR checklist by indicating where the required CWC elements can be found within the City's 2020 Plan (See Appendix C).

10.4.2 ELECTRONIC DATA SUBMITTAL

CWC 10644.

(a)(2) The plan, or amendments to the plan, submitted to the department ...shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

Within 30 days of adoption of the 2020 Plan and before July 1, 2021, the City submitted all data tables associated with the 2020 Plan through DWR's "Water Use Efficiency Data Portal" website.

10.4.3 SUBMITTING A UWMP, INCLUDING WSCP, TO THE CALIFORNIA STATE LIBRARY

Within 30 days of adoption of the 2020 Plan by the City Council, a copy (CD or hardcopy) of the 2020 Plan was submitted to the State of California Library. A copy of the letter to the State Library will be maintained in the City's file. The 2020 Plan will be mailed to the following address if sent by regular mail:

California State Library
Government Publications Section
Attention: Coordinator, Urban Water Management Plans
P.O. Box 942837
Sacramento, CA 94237-0001

The 2020 Plan will be mailed to the following address if sent by courier or overnight carrier:

California State Library
Government Publications Section
Attention: Coordinator, Urban Water Management Plans
900 N Street
Sacramento, CA 95814

10.4.4 SUBMITTING A UWMP TO CITIES AND COUNTIES

Within 30 days of adoption of the 2020 Plan (including the Water Shortage Contingency Plan) by the City Council, a copy of the 2020 Plan was submitted to the County of San Bernardino Assessor-Recorder/ Clerk's office and the City of Ontario's City Clerk's Office. A copy of the letter to the County of San Bernardino will be maintained in the City's file.

10.5 PUBLIC AVAILABILITY

CWC 10645.

(a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

Within 30 days after submittal of the 2020 Plan to DWR, the City made the 2020 Plan (including the Water Shortage Contingency Plan) available at the City Clerk's Office located at City Hall during normal business hours and on the City's website.

10.6 NOTIFICATION TO PUBLIC UTILITIES COMMISSION

CWC 10621.

(c) An urban water supplier regulated by the Public Utilities Commission shall include its most recent plan and water shortage contingency plan as part of the supplier's general rate case filings.

The City is not regulated by the California Public Utilities Commission (CPUC).

10.7 AMENDING AN ADOPTED UWMP OR WATER SHORTAGE CONTINGENCY PLAN

CWC 10621.

(d)The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

CWC 10644.

(a)(1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

The City's amendment process for its 2020 Plan is discussed below.

10.7.1 AMENDING A UWMP

If the City amends the adopted 2020 Plan, the amended Plan will undergo adoption by the City's governing board. Within 30 days of adoption, the amended Plan will then be submitted to DWR, the State of California Library, the County of San Bernardino Assessor- Recorder/ Clerk's office, and the City of Ontario's City Clerk's Office.

10.7.2 AMENDING A WATER SHORTAGE CONTINGENCY PLAN

CWC 10644.

(b) If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

If the City amends the adopted 2020 Plan (including the Water Shortage Contingency Plan), the amended Plan (and Water Shortage Contingency Plan) will undergo adoption by the City's governing board. Within 30 days of adoption, the amended Plan (and Water Shortage Contingency Plan) will then be submitted to DWR through the WUE portal, the State of California Library, the County of San Bernardino Assessor- Recorder/ Clerk's office, and the City of Ontario's City Clerk's Office.

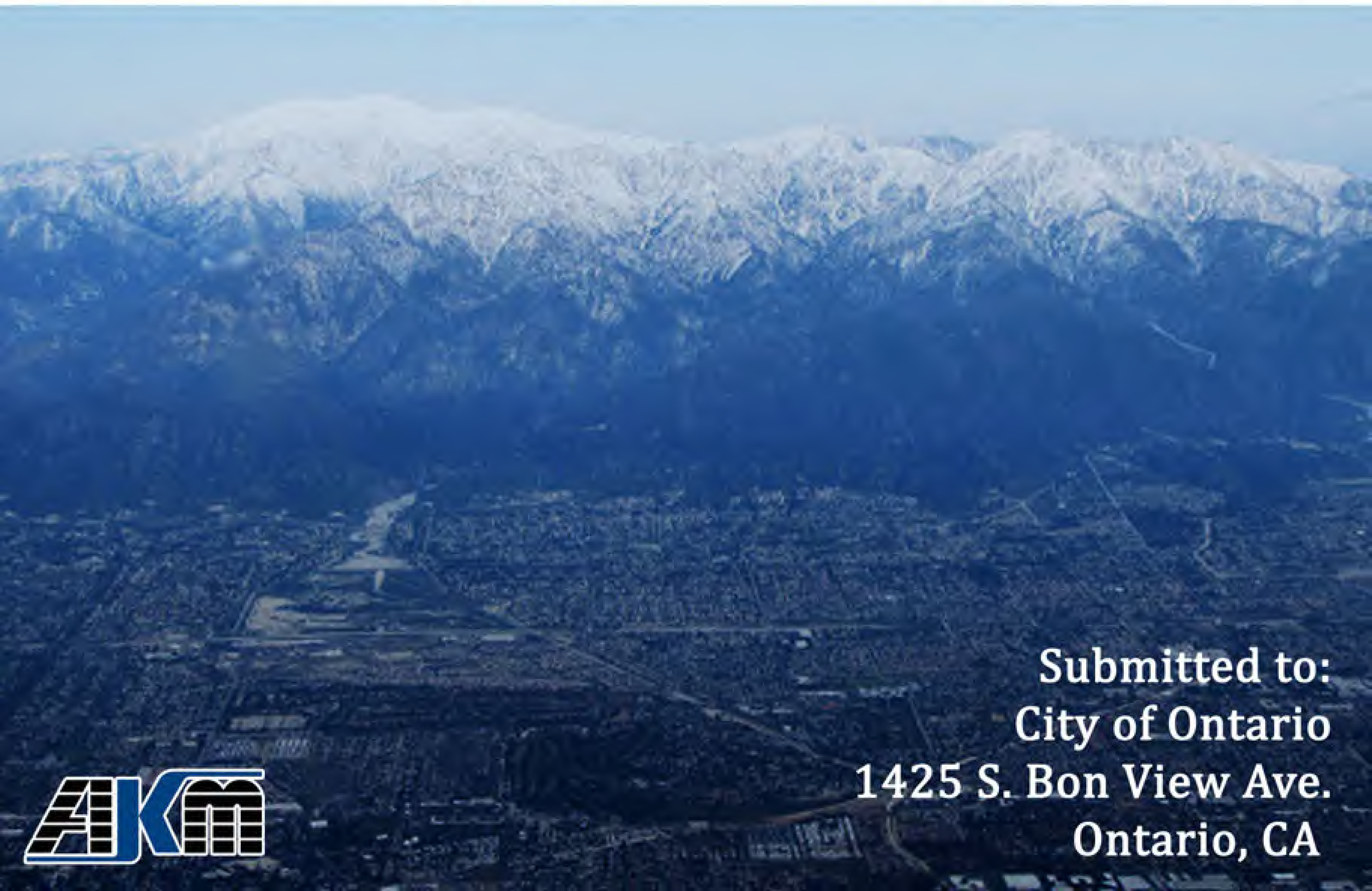
APPENDIX B

2020 City of Ontario Water Master Plan Update

City of Ontario
Water Master Plan Update

June 2020

CITY OF ONTARIO



Submitted to:
City of Ontario
1425 S. Bon View Ave.
Ontario, CA

AKM

CITY OF ONTARIO

WATER MASTER PLAN UPDATE

Date of Signing: 06/04/20

Date of Signing: 06/04/20

Date of Signing: 06/04/20

Submitted to:
City of Ontario
1425 S. Bon View Avenue
Ontario, California 91761

Submitted by:
AKM Consulting Engineers
553 Wald
Irvine, California 92618
(949) 753-7333

June 2020

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APPENDIX

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Abbreviations

Abbreviation	Explanation
Ac, ac	Acre
AC, ACP	Asbestos Cement Pipe
AF	Acre-Foot or Acre Feet
AFY	Acre Feet per Year
AL	Action Level
amsl	Above Mean Sea Level
AWWA	American Water Works Association
BPS	Booster Pump Station
CBWM	Chino Basin Watermaster
ccf	Hundred Cubic Feet
CDA	Chino Basin Desalter Authority
CDA I	Chino Basin Desalter 1
CDA II	Chino Basin Desalter 2
CDPH	State of California Department of Public Health
cfs	Cubic Feet per Second
CII	Commercial, Institutional, Industrial
CIP, cip	Cast Iron Pipe
CIP	Capital Improvement Program
City	City of Ontario
CMLS	Concrete Mortar Lined Steel
CML & CMC	Concrete Mortar Lined & Concrete Mortar Coated
CML & CS	Concrete Mortar Lined & Coated Steel
CML & WS	Concrete Mortar Lined & Welded Steel
Conc	Concrete
CU	Copper
CVWD	Cucamonga Valley Water District
D/DBPR	Disinfectants/Disinfection By-Products Rule
DPH	State of California Department of Public Health
Dia	Diameter
DIP	Ductile Iron Pipe
DU, du	Dwelling Unit
DWR	State of California, Department of Water Resources
DW	Domestic Water

Abbreviation	Explanation
DYY	Dry Year Yield
EL, el	Elevation
ENR	Engineering News Record
EPA	United States Environmental Protection Agency
F	Fahrenheit
FCV	Flow Control Valve
fps	Feet per Second
ft	Feet
FY	Fiscal Year
GIS	Geographic Information System
gpcd	Gallons per Capita per Day
gpd	Gallons per Day
gpm	Gallons per Minute
GSTL	Galvanized Steel
HGE	Hydraulic Grade Elevation
HGL	Hydraulic Grade Line
HP, hp	Horsepower
HWL	High Water Level
IDSE	Initial Distribution System Evaluation
in	Inch
IEUA	Inland Empire Utilities Agency
JCSD	Jurupa Community Services District
LF	Lineal Feet
MCL	Maximum Contaminant Level
MCLG	Federal Maximum Contaminant Level Goal
MG, mg	Million Gallons
mgd	Million Gallons per Day
mg/l	Milligrams per Liter or Parts per Million
MWD	Metropolitan Water District of Southern California
NAVD	National American Vertical Datum
NL	Notification Levels
NOAA	National Oceanic and Atmospheric Administration
OBMP	Optimum Basin Management Program
OFD	Ontario Fire Department

Abbreviation	Explanation
O&M	Operation and Maintenance
OR	Ontario Ranch
OSHA	Occupational Safety & Health Administration
OSY	Operating Safe Yield
PCE	Tetrachloroethylene
PCCP	Pre-Cast Concrete Pipe
PHG	Public Health Goal
PRS	Pressure Regulating Station
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
RCCP	Reinforced Concrete Cylinder Pipe
RL	Response Levels
RPM	Rotations per Minute
RSTL	Riveted Steel
SAWC	San Antonio Water Company
SARWC	Santa Ana River Water Company
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SDWA	Safe Drinking Water Act
SF	Square Feet
SOI	Sphere of Influence
STL, stl	Steel
TCE	Trichloroethylene
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
THAAS	Total Haloacetic Acids
TOC	Total Organic Carbon
TTHM	Total Trihalomethanes
µg/l	Micrograms per Liter or Parts per Billion
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
VFD	Variable Frequency Drive

Abbreviation	Explanation
VOCs	Volatile Organic Compounds
WFA	Water Facilities Authority
WMP	Water Master Plan
WQPP	Water Quality Protection Plan
WS, WSTL	Welded Steel
WTP	Water Treatment Plant

SECTION ES

EXECUTIVE SUMMARY

ES-1 General

The City's latest Water Master Plan was completed in 2012. The intent of the 2020 Water Master Plan Update was to update the City's water model, perform hydraulic analyses, and develop capital improvement project recommendations based on the latest available information. The water model geometry was imported from the City's Water Geodatabase, from March 2019. The existing model demands and diurnal patterns were updated with the recent production, purchase, and water billing data. Future planning data was utilized to estimate future water demands. The hydraulic model was calibrated and used to conduct the existing and future system analyses. Average day demand (ADD), maximum day demand (MDD), peak hour and MDD plus fire flow scenarios were run. Existing and future system deficiencies were identified and improvement project were recommended.

ES-2 Study Area

The water service area coincides with the City of Ontario boundary with the exception of two small areas. The City is divided into two distinct areas, the Original Model Colony (OMC) and Ontario Ranch (OR). The OMC consists of existing residential, commercial, and industrial developments, and the Ontario International Airport. It comprises approximately 37.2 square miles. Ontario Ranch is an agricultural area that was annexed to the City in 1999. It currently consists of approximately 12.8 square miles of primarily agricultural land.

The City's General Plan 2010 details future development of the agricultural lands in Ontario Ranch into a mix of residential, commercial, industrial, and public uses. Development of Ontario Ranch has begun with the development of Edenglen residential community located southeast of the intersection of Riverside Drive and Mill Creek Avenue. Residential communities currently in construction include Park Place development located east of Archibald Avenue and north and south of Merrill Avenue and the New Haven development located southwest of Haven Avenue and Schaefer Avenue.

For this Water Master Plan Update, the future residential population of Ontario Ranch was estimated to reach about 190,594. The total population of the City is estimated to expand to 371,979.

ES-3 Water Supply

The City's existing imported water supply consists of water from the Water Facilities Authority (WFA) and Chino Basin Desalter Authority (CDA), with total entitlements of 25.0 MGD (17,260 AFY) and 8.6 MGD (8,533 AFY), respectively.

The City extracts groundwater from the Chino Groundwater Basin (Chino Basin or Basin), via seventeen (17) existing wells. Per the Chino Basin Judgement, the City of Ontario has appropriative rights to 16,337 AFY (14.6 MGD). The City has secured additional supply through early transfers for unused groundwater, groundwater recharge, and acquisition of groundwater rights.

ES-4 Water Use

Historical water production and purchase data was reviewed between 2007 and 2019, which indicate that there has been a decrease in potable water production in recent years. This may be attributed to the expansion of the City's recycled water system, as well as a conscientious water conservation effort by the customers.

The existing potable water demand is important for evaluating the adequacy of the existing potable water facilities. Upon reviewing current production, purchase, and water billing data, the existing average day demand (ADD) is 19,280 gpm (31,153 AFY, 27.8 MGD) and the maximum day demand (MDD) is 29,790 gpm (48,951 AFY, 42.9 MGD).

To account for future development and redevelopment within the service area, future demands were estimated from specific plans, the General Plan, and the potable water demand factors. The potable water unit demand factors are generally based on the factors that were developed as a part of a study completed in May 2016 entitled "*Ultimate Citywide Water Demand Estimate*", and the revised potable water unit demand factors are shown in Table ES-1

ES-1

Potable Water Unit Demand Factors

Landuse		SAWCO (AFY)	Density (people/ du)[2]	Factors[3]			
				gpd	unit	gpd/ac	gpd/du
Residential							
Rural Residential	RR	2	3.997	172	gpd/person	1,375	687
Low Density Residential (w/o RW)	LDR	4	3.997	123	gpd/person	1,970	492
Low Density Residential (w/ RW)	LDR	5	3.997	95	gpd/person	1,900	380
Low Medium Density Residential (w/o RW)	LMDR	8.5	3.997	105	gpd/person	3,570	420
Low Medium Density Residential (w/ RW)	LMDR	11	3.997	90	gpd/person	3,960	360
Medium Density Residential (w/o RW)	5125.17	0	3.347	90	gpd/person	5,420	301
Medium Density Residential (w/ RW)	5498.09	0	3.347	80	gpd/person	6,690	268
High Density Residential (w/o RW)	5047.38	0	3.347	70	gpd/person	8,200	234
High Density Residential (w/ RW)	5326.91	0	3.347	60	gpd/person	8,030	201
Commercial	5162.38	0					
Business Park (w/o RW)	4911.28	0		103	gpd/job	3,140	
Business Park (w/ RW)	4987.09	0	-	59	gpd/job	1,800	-
General Commercial (w/o RW)	5288.25	0		258	gpd/job	3,140	
General Commercial (w/ RW)	3542.62	443.3	-	148	gpd/job	1,800	-
Hospitality[4] (w/o RW)	3029.19	106.5		155	gpd/room	5,980	
Hospitality[4] (w/ RW)	3038.54	293.83	-	130	gpd/room	5,000	-
Neighborhood Commercial (w/o RW)	4413.48	358.75		99	gpd/job	3,140	
Neighborhood Commercial (w/ RW)	NC	-	-	57	gpd/job	1,800	-
Office Commercial (w/o RW)	OC			53	gpd/job	3,840	
Office Commercial (w/ RW)	OC	-	-	35	gpd/job	2,500	-
Industrial							
Industrial (w/o RW)	IND	-	-	110	gpd/job	2,290	-
Industrial (w/ RW)	IND	-	-	67	gpd/job	1,400	-
Mixed Use[5]							
High Density Residential (w/o RW)	MU-HDR	35	2.000	70	gpd/person	4,900	140
High Density Residential (w/ RW)	MU-HDR	40	2.000	60	gpd/person	4,800	120
Office (w/o RW)	MU-O			53	gpd/job	3,840	
Office (w/ RW)	MU-O	-	-	35	gpd/job	2,500	-
Non-Office (w/o RW)	MU-NO			179	gpd/job	2,690	
Non-Office (w/ RW)	MU-NO	-	-	102	gpd/job	1,800	-

ES-1 (Continued)

Potable Water Unit Demand Factors

Landuse		Max Density (du/ac)[1]	Density (people/du)[2]	Factors[3] gpd	unit	gpd/ac	gpd/du
Open Space							
Open Space Non-Recreational (w/o RW)	OS-NR					2,340	
Open Space Non-Recreational (w/ RW)	OS-NR	-	-	-		1,000	-
Open Space Recreational (w/o RW)	OS-R					2,340	
Open Space Recreational (w/ RW)	OS-R	-	-	-		1,000	-
Public							
Public Facility (w/o RW)	PF					3,040	
Public Facility (w/ RW)	PF	-	-	-		1,700	-
Public Middle or High School (w/o RW)	PS	-	-	50	gpd/student	3,500	-
Public Middle or High School (w/RW)	PS	-	-	10	gpd/student	1,800	-
Public Elementary School (w/o RW)	PS	-	-	30	gpd/student	3,500	-
Public Elementary School (w/RW)	PS	-	-	10	gpd/student	1,800	-

[1] *Max Density per the City's 2010 General Plan (The Ontario Plan) for OMC without recycled water. Density for LDR, LMDR, MDR, and HDR with recycled water (Ontario Ranch) were increased per the City Planning Department recommendation (March 2016).*

[2] *Density per the City's 2010 General Plan (The Ontario Plan)*

[3] *Unit Flow Factor Abbreviations:*

ac = acre *du = dwelling unit* *gpd = gallons per day*

room = hotel/motel room *stu = student* *tsf = thousand square feet*

[4] *If possible it is recommended to use 130 - 155 gpd/room on a case by case basis. It is difficult to estimate the number of rooms or square footage per acre.*

[5] *Mixed Use demands should be based on the types of landuse that make up the specific area and the unit demand factors provided above. The City's 2010 General Plan (The Ontario Plan) provides detailed information on the landuses that make up each mixed use area.*

The future average day demand (ADD) was 35,716 gpm (57,610 AFY, 51.4 MGD) and the maximum day demand (MDD) was 54,778 gpm (88,357 AFY, 78.9 MGD).

ES-5 Diurnal Patterns

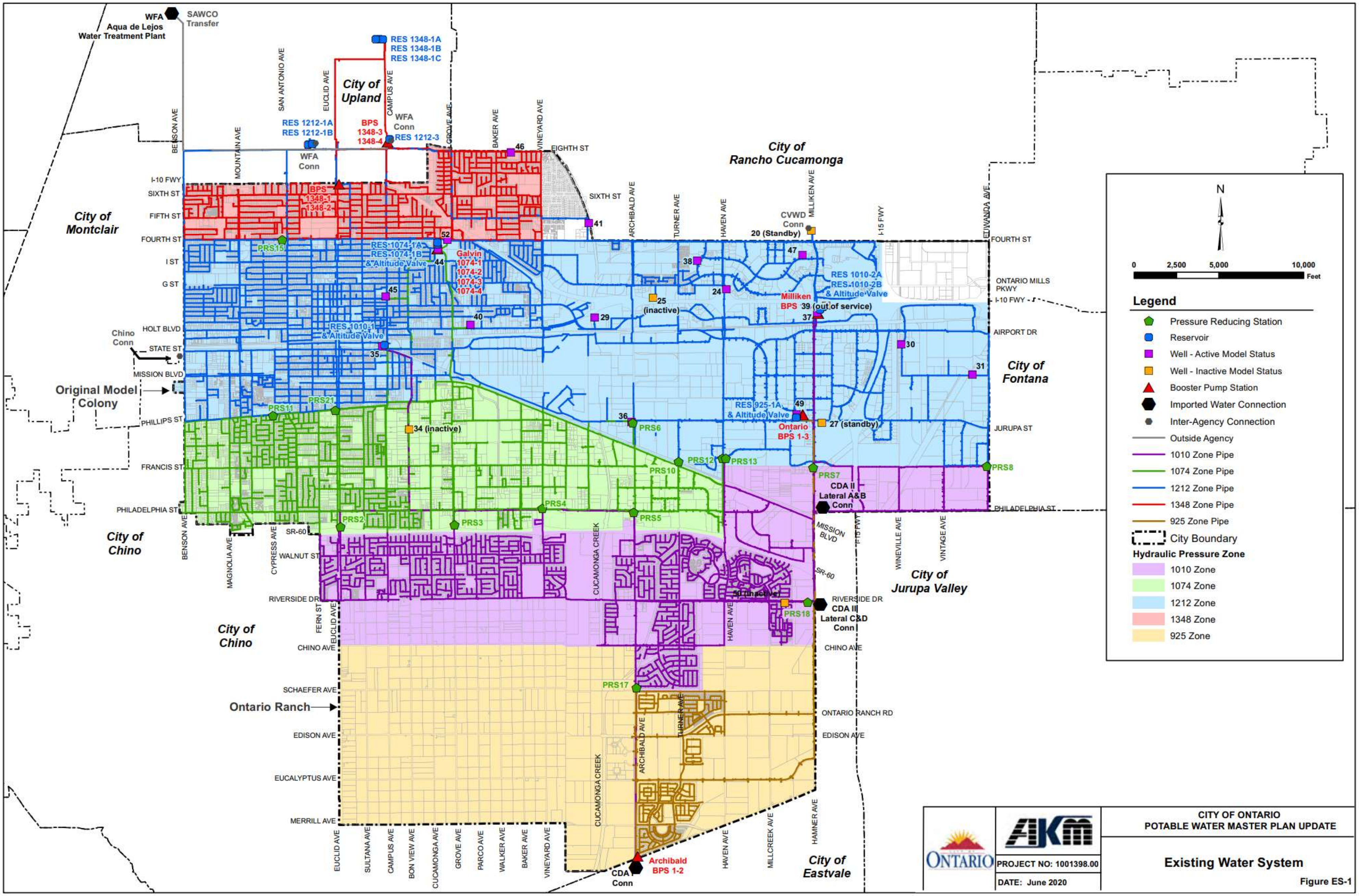
To evaluate the adequacy of the potable water sources of supply, pumping facilities, reservoirs, and the transmission / distribution facilities, it is important to have an understanding of how the potable water demand vary over a 24-hour period. A mass balance of the supply in, flow out, and change in reservoir level was conducted to develop the diurnal demand patterns in 15 minute increments. Diurnal demand patterns were developed by hydraulic zone, by meter type, and for high water users. Since system pressures, pipe velocities and fire flow capabilities can be affected by the usage patterns of customers with historically high water use, specific diurnal patterns were developed for the high water users.

ES-6 Existing System

According to the City's Water Geodatabase from March 2019, the City's existing domestic water system consisted of the following:

- Five (5) primary pressure zones (925, 1010, 1074, 1212, and 1348 Zones)
- Over 3.1 million feet (584 miles) of transmission and distribution pipe, 2 inches through 42 inches in diameter
- 7,277 fire hydrants
- 35,906 water meters
- Seventeen (17) active wells
- Twelve (12) reservoirs with a total volume of 75 MG
- Six (6) active booster pump stations
- Fifteen (15) pressure reducing stations (PRS)
- Two (2) connections to Water Facilities Authority
- Two (2) connections to Chino Desalter Authority
- Five (5) inter-agency connections
- Two (2) Ion Exchange Treatment Facility
- Four (4) altitude valves

The existing potable water system is shown on Figure ES-1.



WFA
Aqua de Lejos
Water Treatment Plant
SAWCO
Transfer
RES 1348-1A
RES 1348-1B
RES 1348-1C
City of Upland
BPS 1348-3 1348-4
WFA Conn
RES 1212-3
RES 1212-1A
RES 1212-1B
WFA Conn
City of Rancho Cucamonga
City of Montclair
BPS 1348-1 1348-2
CVWD Conn
20 (Standby)
RES 1074-1A
RES 1074-1B
& Altitude Valve
Galvin 1074-1 1074-2 1074-3 1074-4
RES 1010-2A
RES 1010-2B
& Altitude Valve
25 (inactive)
Milliken BPS
39 (out of service)
RES 1010-1
& Altitude Valve
Chino Conn
Original Model Colony
City of Fontana
RES 925-1A
& Altitude Valve
Ontario BPS 1-3
27 (standby)
34 (inactive)
CDA II Lateral A&B Conn
City of Chino
City of Jurupa Valley
30 (inactive)
CDA III Lateral C&D Conn
Ontario Ranch
City of Eastvale
Archibald BPS 1-2
CDA Conn
PRS15
PRS11
PRS21
PRS6
PRS12
PRS13
PRS10
PRS7
PRS8
PRS4
PRS5
PRS2
PRS3
PRS18
PRS17
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
EIGHTH ST
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
ONTARIO RANCH RD
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
MAGNOLIA AVE
CYPRESS AVE
FERN ST
CUCAMONGA CREEK
WINEVILLE AVE
VINTAGE AVE
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
MILLCREEK AVE
HAMNER AVE
N
0 2,500 5,000 10,000 Feet
Legend
Pressure Reducing Station
Reservoir
Well - Active Model Status
Well - Inactive Model Status
Booster Pump Station
Imported Water Connection
Inter-Agency Connection
Outside Agency
1010 Zone Pipe
1074 Zone Pipe
1212 Zone Pipe
1348 Zone Pipe
925 Zone Pipe
City Boundary
Hydraulic Pressure Zone
1010 Zone
1074 Zone
1212 Zone
1348 Zone
925 Zone
ONTARIO
AKM
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
PROJECT NO: 1001398.00
DATE: June 2020
Existing Water System
Figure ES-1

ES-7 Performance Evaluation Criteria

Establishing performance criteria is an important part of evaluating existing water systems, as it forms the basis for system analysis and system improvement recommendations. Some criteria are based upon experience and their application is at the discretion of the water purveyor. This includes service pressures, storage capacity, and sources of supply. Other criteria, such as water quality and fire protection, are based on federal, state and local jurisdictional requirements. A summary of the service criteria is listed in Table ES-2.

ES-2

Service Criteria

Description	Criteria	Existing Requirement	Future Requirement
1. Source of Supply			
a. Total	Maximum Day Demand (except for closed zones which shall be Maximum Day Demand plus Fire Flow Demand or Peak Hour, whichever is greater)	29,790 gpm	54,780 gpm
b. Local Supply	Average Day Demand	19,280 gpm	35,700 gpm
2. Reservoir Capacity			
a. Operational Storage	30% of Maximum Day Demand for the OMC and 25% of Maximum Day Demand for Ontario Ranch	TBD	TBD
b. Emergency Storage	100% of Average Day Demand	27.8 mg	39.7 mg
c. Fire Suppression	Highest Fire Flow Requirement		
Residential			
Rural	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Low Density	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Low-Medium Density	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Medium Density	2,000 gpm for 2 hours	0.24 mg	0.24 mg
High Density	3,500 gpm for 4 hours	0.84 mg	0.84 mg
Retail / Service			
Neighborhood Commercial	2,500 gpm for 3 hours	0.45 mg	0.45 mg
General Commercial	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Office Commercial	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Hospitality	4,000 gpm for 4 hours	0.96 mg	0.96 mg
Employment			
Business Park	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Industrial	4,000 gpm for 4 hours	0.96 mg	0.96 mg

ES-8 Hydraulic Model

The hydraulic model was developed to evaluate the adequacy of the existing facilities under the current and future supply and demand conditions.

Generally, the model development steps included the following:

1. Import water system GIS data to modeling software
2. Verify and complete pipe information (pressure zone, diameter, length, roughness)
3. Verify and complete junction information (pressure zone, elevations)
4. Add detailed facility data (wells, pump station, reservoir, imported water turnouts, and pressure reducing stations)

5. Add facility information (dimensions and water level for tank, pump curves for pumps, sizes and pressure settings for pressure reducing valves, and aquifer levels for well pump suction levels)
6. Determine and assign demands to model junctions
7. Develop and assign diurnal demand curves to model junctions
8. Assign controls to facilities (well, booster pump station, and altitude valve start and stop conditions)
9. Model Calibration

ES-9 Model Calibration

The general calibration methodology was to gather as much system information as possible from available SCADA information and pressure measuring equipment temporarily installed in the field. This information was then used for input into the model as well as for comparison of model results. The calibration process was used to verify the accuracy of the model, system configuration, and the hydraulic parameters utilized.

April 18, 2019 was selected as the calibration day. SCADA data, specific to the calibration data, was reviewed to research the initial reservoir levels, well and pump station start and stop times, imported water turnout flowrates, and PRS status. A mass balance analysis was performed for each hydraulic zone to develop the calibration day demand and diurnal patterns. A calibration scenario was created in the hydraulic model, which includes this input data that is specific to April 18, 2019.

The model reservoir levels were compared to the SCADA data over the 24-hour period to verify that model calibration. To further calibrate the model, pressure data was collected by installing portable pressure data loggers throughout the system, during the calibration period. The model pressures were compared to the recorded field pressure at these locations to further verify that the model was well calibrated.

ES-10 Existing System Analysis

The existing system analysis was conducted to identify all necessary potable water system improvements. Planned rehabilitation and replacement projects were identified for facilities with known condition, capacity, operation, and/or maintenance deficiencies. These projects were identified upon review of the city's existing CIP schedule and meetings with City staff. Recommendations include but are not limited to replacement of transmission mains, reservoir rehabilitation, well rehabilitation, reservoir rehabilitation, pump station rehabilitation and groundwater treatment projects. Other projects recommended included PRS improvements, back-up power sources, meter improvements, SCADA upgrades and security improvements.

In addition, the established system criteria and calibrated system computer model were used to analyze the existing system under average day, maximum day, and peak hour conditions. Source of supply, reservoir storage, system pressure, and pipeline velocities were evaluated with the hydraulic model.

The condition of the existing potable water facilities were also evaluated. All facilities have useful lives for which relatively trouble-free service can be expected. Once exceeded, these facilities become less reliable, expensive to maintain and are subject to failure. Therefore, facility age is considered in the assessment of all water systems and in formulating future replacement projects. Wells, pump stations, reservoirs, and pipelines that have reached the end of their useful lives were identified and replacement projects were recommended.

Pipes with small diameters that do not currently meet the City's minimum criteria (8-inches) were recommended for replacement. In addition, fire hydrant laterals that do not meet the City's diameter minimum criteria (6-inches) and older metal hydrant laterals were also recommended for replacement.

The recommendations from the existing system analysis were incorporated into the capital improvement program (CIP).

ES-11 Future System

A future system model scenarios were updated to include the recommendations included from the existing system analysis as well as projects that have been identified for the future water system expansion.

Developer Impact Fee (DIF) projects were provided by the City and incorporated into the future system model and CIP. The DIF projects primarily include reservoirs, wells, pump stations, pipelines, water quality treatment facilities, and pressure reducing stations that will serve the Ontario Ranch (OR) developments in the 925 Zone and the 1010 Zone. The future potable water system is shown on Figure ES-2.

The proposed DIF projects include one additional 6 MG reservoir and two 9 MG reservoirs in the 925 Zone. The proposed 6 MG reservoir will be located adjacent the existing 6 MG reservoir (Dupont Ave and Jurupa St). The two 9 MG reservoirs are planned to be located between Bon View Avenue and Cucamoga Avenue, north of Francis Street. Treatment facilities will be provided at both reservoir sites to treat groundwater before entering the distribution system. The DIF projects also include seven (7) new wells, which will provide an additional 17,000 gpm capacity for the future growth in this area.

The proposed DIF projects were incorporated into the CIP.

ES-12 Future System Analysis

The established system criteria and future system model scenarios were used to analyze the future system under average day, maximum day, peak hour, and maximum day plus fire flow conditions. Source of supply, reservoir storage, system pressure, pipeline velocities, fire flow pressure, and fire flow availability were evaluated with the hydraulic model.

The recommendations from the future system analysis were incorporated into the CIP.

ES-13 Capital Improvement Program

The primary goal of the Capacity Improvement Program (CIP) is to provide the City with a long-range planning tool for implementing its water system improvements in an orderly manner and a basis for financing of these improvements. The CIP consists of projects that will enhance the system to meet the established criteria, properly maintain the system's assets, and replace the facilities that have reached the end of their useful lives.

ES-13.1 Project Categorization

Improvement projects are categorized as follows:

Existing System Improvement Projects include:

- Improvements identified from the hydraulic model analysis, such as velocity and fire flow deficiencies.
- Projects identified from the City's operations and engineering staff, to improve the condition of the main facilities such as reservoirs.
- Projects included on the City's existing DIF maps in the OMC area

Annual Improvement Projects are projects that need to be regularly updated and include:

- Reservoir recoating/repainting/ and repair improvements
- Meter replacement

Condition Projects – Mainline Replacement Program include:

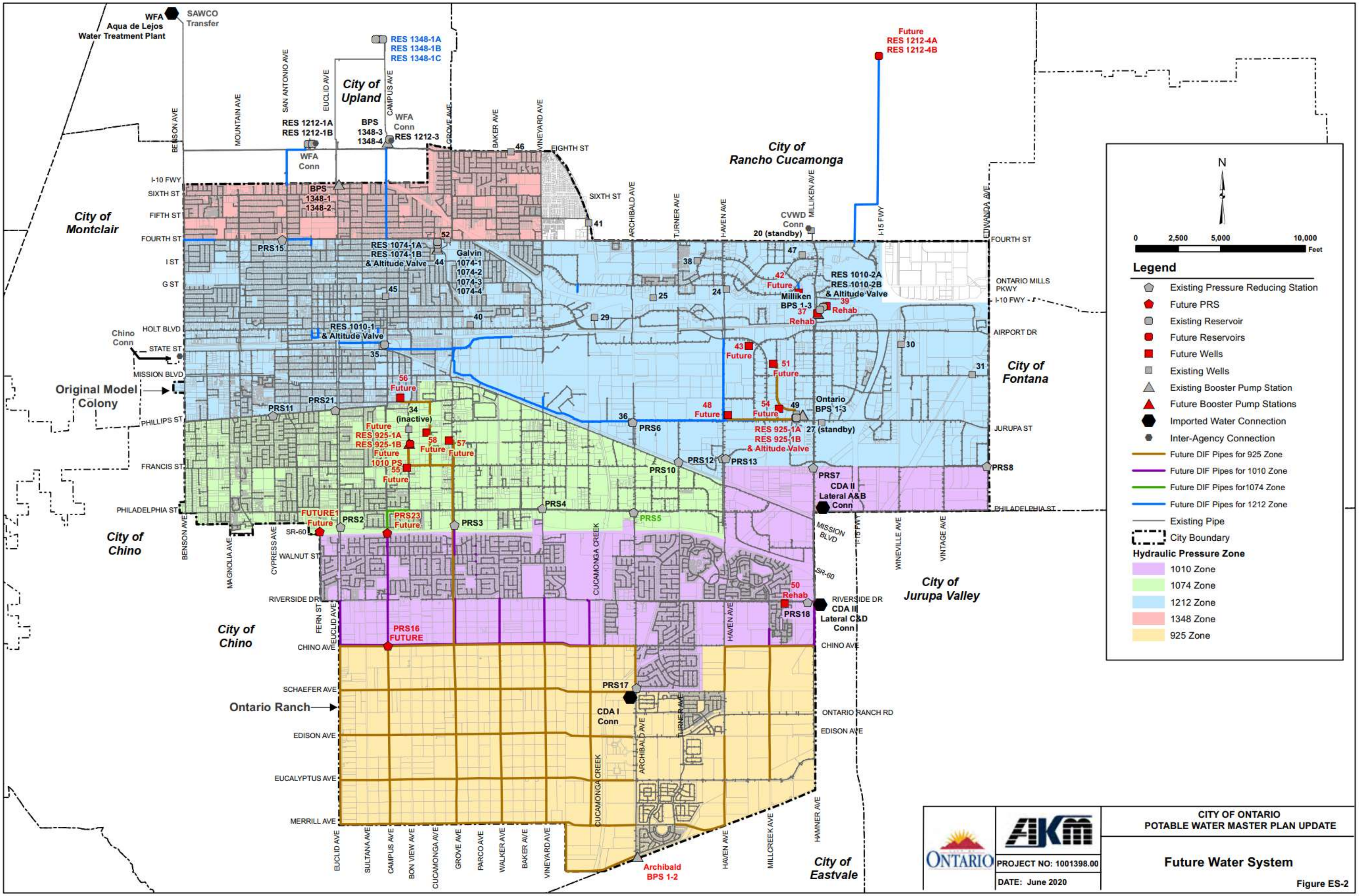
- Small diameter pipes
- Pipes exceeding useful lives

Condition Projects – Facility Improvement Program include:

- Improvements to existing fire hydrant lateral size and/or material
- Wells exceeding useful lives
- Pump stations exceeding useful lives
- Reservoirs exceeding useful lives

Future System Development Projects include:

- DIF projects in the OR area


CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
Future Water System
PROJECT NO: 1001398.00
DATE: June 2020
Figure ES-2
ONTARIO
Legend
Existing Pressure Reducing Station
Future PRS
Existing Reservoir
Future Reservoirs
Future Wells
Existing Wells
Existing Booster Pump Station
Future Booster Pump Stations
Imported Water Connection
Inter-Agency Connection
Future DIF Pipes for 925 Zone
Future DIF Pipes for 1010 Zone
Future DIF Pipes for1074 Zone
Future DIF Pipes for 1212 Zone
Existing Pipe
City Boundary
Hydraulic Pressure Zone
1010 Zone
1074 Zone
1212 Zone
1348 Zone
925 Zone
N
0 2,500 5,000 10,000 Feet
City of Montclair
City of Upland
City of Rancho Cucamonga
City of Fontana
City of Chino
City of Jurupa Valley
City of Eastvale
Original Model Colony
Ontario Ranch
WFA Aqua de Lejos Water Treatment Plant
SAWCO Transfer
RES 1348-1A
RES 1348-1B
RES 1348-1C
Future RES 1212-4A RES 1212-4B
RES 1212-1A RES 1212-1B
BPS 1348-3 1348-4
WFA Conn
RES 1212-3
BPS 1348-1 1348-2
RES 1074-1A RES 1074-1B & Altitude Valve
Galvin 1074-1 1074-2 1074-3 1074-4
RES 1010-1 & Altitude Valve
CVWD Conn
20 (standby)
RES 1010-2A RES 1010-2B & Altitude Valve
Milliken BPS 1-3
Ontario BPS 1-3
27 (standby)
RES 925-1A RES 925-1B & Altitude Valve
Future RES 925-1A RES 925-1B Future 1010 PS
34 (inactive)
Chino Conn
CDA II Lateral A&B Conn
CDA III Lateral C&D Conn
CDA I Conn
Archibald BPS 1-2
PRS2
PRS3
PRS4
PRS5
PRS6
PRS7
PRS8
PRS10
PRS11
PRS12
PRS13
PRS15
PRS16 FUTURE
PRS17
PRS18
PRS21
PRS23 Future
FUTURE1 Future
EIGHTH ST
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
ONTARIO RANCH RD
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
WINEVILLE AVE
VINTAGE AVE
MAGNOLIA AVE
CYPRESS AVE
FERN ST
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
CUCAMONGA CREEK
MILLCREEK AVE
HAMNER AVE

ES-13.2 Project Cost Estimate

The cost estimates are based upon recent information for similar projects in the City of Ontario, and include contingencies for this planning level study. The cost estimates are based on the unit construction costs, detailed in Table ES-3. Pipeline costs take into consideration the size of the pipe as well as whether the construction will be within the OMC or OR areas. OMC is largely developed and there are many existing utilities to consider; therefore, the costs of replacing water pipes will be generally higher than the new construction costs in undeveloped areas such as OR.

Pipe improvements recommendations in the OMC are based on the replacement of the existing pipes. Replacement costs are generally more conservative and will therefore allow the City more flexibility for each project. Preliminary design studies should be conducted, utilizing detailed utility information to identify and evaluate project alternatives such as parallel pipes.

The estimated unit costs for wells include permanent back-up power.

Table ES-3
Unit Cost Summary

Type		Units	OMC	OR
Pipe	6-inch [1]	$/LF	$108.36	$72.00
Pipe	8-inch	$/LF	$144.48	$96.00
Pipe	12-inch	$/LF	$216.72	$144.00
Pipe	16-inch	$/LF	$288.96	$192.00
Pipe	18-inch	$/LF	$325.08	$260.06
Pipe	24-inch	$/LF	$433.44	$331.56
Pipe	30-inch	$/LF	$541.80	$403.05
Pipe	36-inch	$/LF	$650.16	$486.31
Pipe	42-inch	$/LF	$758.52	$557.81
Well		$/LS	$4,000,000.00	
Reservoir		$/MG	$1,444,800.00	
Pump Station		$/HP	$6,000.00	
PRS		$/LS	$680,260.00	
Treatment Plant		$/Well	$6,324,111.00	

[1] *6-inch recommendation for laterals only*

The total costs include construction, contingency, engineering, design, and construction management costs. The individual cost components are calculated as follows:

1. Base Cost = Unit Cost x Recommended Units (such as footage, number of wells, etc.)
2. Contingency Cost = 10% of the Base Cost
3. Construction Cost = Base Cost + Contingency Cost
4. Engineering and Design Cost = 10% of the Construction Cost
5. Construction Management Cost = 5% of the Construction Cost
6. Total Cost = Construction Cost + Engineering and Design Cost + Construction Management Cost

Construction costs can be expected to fluctuate as changes occur in the economy. These costs should therefore be reevaluated and updated annually based upon Engineering News Record (ENR) Index for the Los Angeles area (ENRLA), with the base ENRLA Index of 12,144.49 for January 2020.

The recommended CIP is detailed in Table ES-4. Project locations are shown on Plate 1.

A summary of the total costs are as follows:

Existing System Improvement Projects:	$237,900,000
Condition Projects – Mainline Replacement Program:	$226,200,000
Condition Projects – Facility Improvement Program:	$89,600,000
Future System Development Projects:	$225,600,000
Total CIP cost:	**$779,300,000**
Annual Improvement Projects:	$3,600,000/Year

Table ES-4
Capital Improvement Program

Existing System Capital Improvement Projects															
Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
O01[1]	OMC	Ex	Other	WT-026	1348 Zone Reservoirs Structural Retrofits	N.A.	1	Reservoir	$5,800,000.00	LS	$5,800,000	$580,000	$6,380,000	$638,000	$319,000	$7,337,000
O02	OMC	Ex	Other	WT-026	Reservoir 1010-1A Piping Seismic Retrofits	Completed										
S01[1]	OMC	Ex	Supply	WT-002	CIP Well #43 in the 1212 Zone Equipping of Well drilled in 2008	N.A.	1	Well	$1,600,000.00	$/Well	$1,600,000	$160,000	$1,760,000	$176,000	$88,000	$2,024,000
S02	OMC	Ex	Supply	WT-002	CIP Well #42 in the 1212 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S03	OMC	Ex	Supply	WT-032	Treatment for OMC Wells	N.A.	12	Well	$6,324,111	$/Well	$75,889,328	$7,588,933	$83,478,261	$8,347,826	$4,173,913	$96,000,000
S04[2]	OMC	Ex	Supply	WT-002	18-inch Well #42 Collector Line (1212 Zone)	18	600	ft	$325.08	$/ft	$195,048	$19,505	$214,553	$21,455	$10,728	$246,736
S05	OMC	Ex	Supply	WT-009	18-Inch to PRS23 P-14 (1074 Zone)	18	2,620	ft	$325.08	$/ft	$851,710	$85,171	$936,881	$93,688	$46,844	$1,077,413
Skipped	OMC		Supply	WT-032	Skipped	Skipped										
S07	OMC	Ex	Supply	WT-023	Well #11 Abandon due to continuing sanding problem (1074 Zone)	Completed										
R01	OMC	Ex	Reliability	WT-017	Backup Power for Well 39 (500 KW) - 1010 Zone	Completed										
ST01[1]	OMC	Ex	Storage	WT-026	Reservoir 1212-3, seismic rehabiliation (Improvements included in 2012 Tech Memo)	N.A.	73,100	sq ft	$10.00	$/sq ft	$4,017,694	$401,769	$4,419,463	$441,946	$220,973	$5,082,383
ST02	OMC		Storage	WT-009	Booster Pump Station from 1010 Zone to 1074 Zone - Location to be determined	Removed										
O03	OMC		Other	WT-035	Airport Metering and Backflow Prevention - Planning	Removed										
O04	OMC		Other	WT-035	Airport Metering and Backflow Prevention - Construction	Removed										
R02[1]	OMC	Ex	Reliability	WT-017	Portable Generator Connection and Manual Transfer Switchs at Well 31 and Well 39.	N.A.	1	Well	$300,000.00	Lump Sum	$300,000	$30,000	$330,000	$33,000	$16,500	$379,500
R03[1]	OMC	Ex	Reliability	WT-017	Portable Generators-850 KW	N.A.	1	EA	$670,000.00	$/Genset	$670,000	$67,000	$737,000	$73,700	$36,850	$847,550

Table ES-4 (Continued)
Capital Improvement Program

Existing System Capital Improvement Projects

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
S08	OMC	Ex	Supply	WT-023	Abandon Existing OMC Well #3	Completed										
S09	OMC	Ex	Supply	WT-023	Abandon Existing OMC Well #4	Completed										
S10	OMC	Ex	Supply	WT-023	Abandon Existing OMC Well #16	Completed										
S11	OMC		Supply	WT-023	Skipped	Skipped										
S12	OMC		Supply	WT-025	Abandon John Galvin Facility	2012 Water Master Plan project that is no longer required										
P01[2]	OMC	Ex	DIF 1212 Zone	WT-004	24-inch pipeline in Campus Ave from Eighth St to Fourth St (1212 Zone)	24	5,400	ft	$433.44	$/ft	$2,340,576	$234,058	$2,574,634	$257,463	$128,732	$2,960,829
P02	OMC	Ex	DIF 1212 Zone	WT-004	30-inch pipeline in Eighth St from Reservoir 1212-1A and 1212-1B to San Antonio Ave (1212 Zone)	30	1,650	ft	$541.80	$/ft	$893,970	$89,397	$983,367	$98,337	$49,168	$1,130,872
P03	OMC	Ex	DIF 1212 Zone	WT-004	30-inch pipeline in San Antonio Ave from Eighth St to Fourth St (1212 Zone)	30	2,100	ft	$541.80	$/ft	$1,137,780	$113,778	$1,251,558	$125,156	$62,578	$1,439,292
P04	OMC	Ex	DIF 1212 Zone	WT-004	18-inch pipeline in Fourth St from Elderberry Ave to Benson Ave (1212 Zone)	18	1,800	ft	$325.08	$/ft	$585,144	$58,514	$643,658	$64,366	$32,183	$740,207
P05[2]	OMC	Ex	DIF 1212 Zone	WT-004	18-inch pipeline in Fourth St from San Antonio Ave to Vine Ave (1212 Zone)	18	1,800	ft	$325.08	$/ft	$585,144	$58,514	$643,658	$64,366	$32,183	$740,207
P06[2]	OMC	Ex	DIF 1212 Zone	WT-004	18-inch pipeline in Vine Ave from Fouth St to J St (1212 Zone)	18	700	ft	$325.08	$/ft	$227,556	$22,756	$250,312	$25,031	$12,516	$287,858
P07	OMC	Ex	Pressure	WT-004	18-inch pipeline in J St from Vine Ave to Euclid Ave (1212 Zone)	Completed										
P08	OMC	Ex	Pressure	WT-004	24-inch pipeline in J St east side of Euclid Ave (1212 Zone)	Completed										
P19[2]	OMC	Fut	DIF 1212 Zone	WT-004	16-inch Ontario International Airport Loop (1212 Zone)	16	3,850	ft	$288.96	$/ft	$1,112,496	$111,250	$1,223,746	$122,375	$61,187	$1,407,307
P20[2]	OMC	Fut	DIF 1212 Zone	WT-004	18-inch Ontario International Airport Loop (1212 Zone)	18	33,200	ft	$325.08	$/ft	$10,792,656	$1,079,266	$11,871,922	$1,187,192	$593,596	$13,652,710

Table ES-4 (Continued)
Capital Improvement Program

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
Existing System Capital Improvement Projects																
P09	OMC	Fut	Pressure	WT-036	PRS 21 at Euclid Ave and Phillips St (from 1212 Zone to 1074 Zone)	Completed										
P10	OMC	Fut	Pressure	WT-036	PRS 22 at Vineyard Ave and Mission Blvd (from 1212 Zone to 1074 Zone)	Completed										
P11	OMC	Fut	Pressure	WT-036	12-inch & 18-inch pipeline in Grove Ave from Philips St to Francis St (1074 Zone)	Completed										
P12	OMC	Fut	Pressure	WT-009	12-inch pipeline in Euclid Ave from PRS 2 at SR-60 to Walnut St (1010 Zone)	Completed										
P13[2]	OMC	Fut	DIF 1010 Zone	WT-009	16-inch pipeline in Grove Ave from PRS 3 at SR-60 to Walnut St (1010 Zone)	16	1,850	ft	$288.96	$/ft	$534,576	$53,458	$588,034	$58,803	$29,402	$676,239
P14	OMC	Fut	DIF 1074 Zone	WT-009	PRS 23 at SR-60 and Campus Ave (from 1074 Zone to 1010 Zone)	N.A.	4 and 8	inch	$680,260.00	$/station	$680,260	$68,026	$748,286	$74,829	$37,414	$860,529
P15[2]	OMC	Fut	DIF 1010 Zone	WT-009	8-inch pipeline in Banyan St, west of Parco Ave (1010 Zone)	8	300	ft	$144.48	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
P16[2]	OMC	Fut	DIF 1010 Zone	WT-009	12-inch pipeline in Walnut St, west of Parco Ave (1010 Zone)	12	200	ft	$216.72	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
P17[2]	OMC	Fut	DIF 1010 Zone	WT-009	8-inch pipeline in Maidstone St, west of Parco Ave (1010 Zone)	8	300	ft	$144.48	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
P18[2]	OMC	Fut	DIF 1010 Zone	WT-009	8-inch pipeline in St. Andrews St, west of Parco Ave (1010 Zone)	8	300	ft	$144.48	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
P21	OMC	Fut	DIF 1212 Zone	WT-022	8-inch Miscellaneous Up-Sized Projects (1212 Zone)	8	2700	ft	$144.48	$/ft	$264,218	$26,422	$290,640	$29,064	$14,532	$334,236
P21	OMC	Fut	DIF 1212 Zone	WT-022	12-inch Miscellaneous Up-Sized Projects (1212 Zone)	12	2300	ft	$216.72	$/ft	$421,367	$42,137	$463,504	$46,350	$23,175	$533,030
ST03	OMC	Fut	Storage	WT-006	Reservoir 1212-4A	N.A.	8	MG	$1,444,800.00	$/MG	$11,558,400	$1,155,840	$12,714,240	$1,271,424	$635,712	$14,621,376
ST04	OMC	Fut	Storage	WT-006	Reservoir 1212-4B	N.A.	8	MG	$1,444,800.00	$/MG	$11,558,400	$1,155,840	$12,714,240	$1,271,424	$635,712	$14,621,376
ST05[2]	OMC	Fut	Storage	WT-004	30-inch transmission line from Reservoir 1212-4A and 1212-4B	30	13,750	ft	$541.80	$/ft	$7,449,750	$744,975	$8,194,725	$819,473	$409,736	$9,423,934

Table ES-4 (Continued)
Capital Improvement Program

Existing System Capital Improvement Projects																
Project No.	**OMC/ OR**	**Ex/ Fut**	**Facility Type**	**DIF#**	**Description**	**Replacement Pipe Size (in)**	**Number**	**Unit**	**Unit Cost ($)**	**Unit**	**Base Cost ($)**	**10% Contingency ($)**	**Construction Cost ($)**	**10% Engineering & Admin. ($)**	**5% Construction Mgmt. ($)**	**Total Cost ($)**
ST06[1]	OMC	Ex	Storage	WT-025	Abandon Reservoir 1212-3 (condition/age)	N.A.	10	MG	$148,500.00	$/CY	$1,485,000	$148,500	$1,633,500	$163,350	$81,675	$1,878,525
P22	OMC	Fut	DIF 925 Zone		Future 1010 to 925 PRS at Fern asn SR-60	N.A.	4 and 8	inch	$680,260.00	$/station	$680,260	$68,026	$748,286	$74,829	$37,414	$860,529
P23	OMC	Fut	DIF 925 Zone		Piping of Future 1010 to 925 PRS at Fern and SR-60	12	550	ft	$216.72	$/ft	$119,196	$11,920	$131,116	$13,112	$6,556	$150,783
S48[1]	OMC	Ex	Supply		Well 37 Rehabilitation	N.A.	1	Well		$/Well	$5,811,350	$1,015,000	$6,826,350		$341,318	$7,167,668
S49[1]	OMC	Ex	Supply		Well 39 Rehabilitation	N.A.	1	Well		$/Well	$5,811,350	$1,015,000	$6,826,350		$341,318	$7,167,668
R11	OMC		Reliability	WT-035	Future Emergency Connection (MVWD-1)	2012 Water Master Plan project that is no longer required										
R12	OMC		Reliability	WT-035	Future Emergency Connection (Chino-2)	2012 Water Master Plan project that is no longer required										
R13	OMC		Reliability	WT-035	Future Emergency Connection (FWC-1)	2012 Water Master Plan project that is no longer required										
R14	OMC		Reliability	WT-035	Future Emergency Connection (Upland-2)	2012 Water Master Plan project that is no longer required										
FF1	OMC	Fut	Fire		Fire Flow Improvement: New Looped 6-inch pipe	6	400	ft	$108.36	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
FF1	OMC	Fut	Fire		Fire Flow Improvement: New Looped 8-inch pipe	8	2,350	ft	$144.48	$/ft	$339,528	$33,953	$373,481	$37,348	$18,674	$429,503
FF1	OMC	Fut	Fire		Fire Flow Improvement: New Looped 12-inch pipe	12	1,300	ft	$216.72	$/ft	$281,736	$28,174	$309,910	$30,991	$15,495	$356,396
FF1	OMC	Fut	Fire		Fire Flow Improvement: New Looped 16-inch pipe	16	1,000	ft	$216.72	$/ft	$216,720	$21,672	$238,392	$23,839	$11,920	$274,151
FF2	OMC	Ex	Fire		Fire Flow Improvement: Upsize to 12-inch pipe	12	59,200	ft	$216.72	$/ft	$12,829,824	$1,282,982	$14,112,806	$1,411,281	$705,640	$16,229,727
V1	OMC	Ex	Velocity		Pipe Velocity Improvement: Replace with 12-inch	12	350	ft	$216.72	$/ft	$75,852	$7,585	$83,437	$8,344	$4,172	$95,953
V2	OMC	Ex	Velocity		Pipe Velocity Improvement: Replace with 16-inch	16	4,750	ft	$288.96	$/ft	$1,372,560	$137,256	$1,509,816	$150,982	$75,491	$1,736,288
V3	OMC	Ex	Velocity		Pipe Velocity Improvement: Replace with 24-inch	24	400	ft	$433.44	$/ft	$173,376	$17,338	$190,714	$19,071	$9,536	$219,321
ST11[1]	OMC	Ex	Storage		Seismic Upgrades of Reservoirs 1074-1A, 1074-1B, 1212-1A				$9,200,000.00	LS	$9,200,000	$920,000	$10,120,000	$1,012,000	$506,000	$11,638,000
O05[1]	OMC	Ex	Other	Rate	Facility Security Improvements				$370,000.00	LS	$370,000	$37,000	$407,000	$40,700	$20,350	$468,050

Table ES-4 (Continued)
Capital Improvement Program

Existing System Capital Improvement Projects

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
O10[1]	OMC	Ex	Other		Wellhouse Roof Upgrades				$325,000.00	LS	$325,000	$32,500	$357,500	$35,750	$17,875	$411,125
O07[1]	OMC	Ex	Other		On-site Chlorine Generators				$3,027,000.00	LS	$3,027,000	$302,700	$3,329,700	$332,970	$166,485	$3,829,155
O08[1]	OMC	Ex	Other		Upgrade of existing PRS (New valves, new vaults, and SCADA upgrades)				$2,100,000.00	LS	$2,100,000	$210,000	$2,310,000	$231,000	$115,500	$2,656,500
O09[1]	OMC	Ex	Other		SCADA System Upgrade. Connection to new Ethernet System				$450,000.00	LS	$450,000	$45,000	$495,000	$49,500	$24,750	$569,250
									Total		**$188,351,545**					**$237,897,324**

Annual Improvement Projects

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
ST07[1]	OMC	Ex	Storage	Rate	Reservoir recoating/repainting/repair				$150,000.00	$/year	$150,000	$15,000	$165,000	$16,500	$8,250	$189,750
O07[1]	OMC	Ex	Other	Rate	Water Meter Replacements				$2,000,000.00	$/year	$2,000,000	$200,000	$2,200,000	$220,000	$110,000	$2,530,000
O06[1]	OMC	Ex	Other	Rate	New Meter Installations				$700,000.00	$/year	$700,000	$70,000	$770,000	$77,000	$38,500	$885,500
									Total		**$2,850,000**					**$3,605,250**

Table ES-4 (Continued)
Capital Improvement Program

Condition Improvement Projects - Mainline Replacement Program																
Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
D01	OMC	Ex	Size	WT-021	4" and Due to Pipe Age - Replace Small Diameter Pipes with 8-inch Pipe	8	32,850	ft	$144.48	$/ft	$4,746,168	$474,617	$5,220,785	$522,078	$261,039	$6,003,903
D01	OMC	Ex	Size	WT-021	6" and Due to Pipe Age - Replace Small Diameter Pipes with 8-inch Pipe	8	317,550	ft	$144.48	$/ft	$45,879,624	$4,587,962	$50,467,586	$5,046,759	$2,523,379	$58,037,724
D01	OMC	Ex	Size	WT-021	4" & Less. (Verify Pipe Age) Replace Small Diameter Pipes with 8-inch Pipe	8	72,300	ft	$144.48	$/ft	$10,445,904	$1,044,590	$11,490,494	$1,149,049	$574,525	$13,214,069
D01	OMC	Ex	Size	WT-021	6" (Verify Pipe Age)-Replace Small Diameter Pipes with 8-inch Pipe	8	23,400	ft	$144.48	$/ft	$3,380,832	$338,083	$3,718,915	$371,892	$185,946	$4,276,752
D01	OMC	Ex	Size	WT-021	4" & Less- Replace Small Diameter Pipes with 8-inch Pipe	8	23,750	ft	$144.48	$/ft	$3,431,400	$343,140	$3,774,540	$377,454	$188,727	$4,340,721
D01	OMC	Ex	Size	WT-021	6" -Replace Small Diameter pipes with 8-inch Pipe	8	375,500	ft	$144.48	$/ft	$54,252,240	$5,425,224	$59,677,464	$5,967,746	$2,983,873	$68,629,084
C01	OMC	Ex	Condition/ Age	WT-021	8" Improvements Due to Pipe Age (pipes constructed in or before 1970)- Replace with 8"	8	65,900	ft	$144.48	$/ft	$9,521,232	$952,123	$10,473,355	$1,047,336	$523,668	$12,044,358
C01	OMC	Ex	Condition/ Age	WT-021	10" to 12" Improvements Due to Pipe Age (pipes constructed in or before 1970)- Replace with 12"	12	89,300	ft	$216.72	$/ft	$19,353,096	$1,935,310	$21,288,406	$2,128,841	$1,064,420	$24,481,666
C01	OMC	Ex	Condition/ Age	WT-021	13" to 16"- Improvements Due to Pipe Age (pipes constructed in or before 1970) - Replace with 16"	16	19,950	ft	$288.96	$/ft	$5,764,752	$576,475	$6,341,227	$634,123	$317,061	$7,292,411
C01	OMC	Ex	Condition/ Age	WT-021	17" to 18"- Improvements Due to Pipe Age (pipes constructed in or before 1970) - Replace with 18"	18	50,250	ft	$325.08	$/ft	$16,335,270	$1,633,527	$17,968,797	$1,796,880	$898,440	$20,664,117
C01	OMC	Ex	Condition/ Age	WT-021	19" to 24"- Improvements Due to Pipe Age (pipes constructed in or before 1970) - Replace with 24"	24	12,550	ft	$433.44	$/ft	$5,439,672	$543,967	$5,983,639	$598,364	$299,182	$6,881,185
C01	OMC	Ex	Condition/ Age	WT-021	37" to 42"- Improvements Due to Pipe Age (pipes constructed in or before 1970) - Replace with 42"	42	300	ft	$758.52	$/ft	$227,556	$22,756	$250,312	$25,031	$12,516	$287,858
									Total		**$178,777,746**					**$226,153,849**

Table ES-4 (Continued)
Capital Improvement Program

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
Condition Improvement Projects - Facility Improvement Program																
L1	OMC	Ex	Hydrant Lateral		4" & Less, Small Diameter Hydrant Lateral	6	4,050	ft	$108.36	$/ft	$438,858	$43,886	$482,744	$48,274	$24,137	$555,155
L2	OMC	Ex	Hydrant Lateral		Hydrant Lateral material improvements	6	11,400	ft	$108.36	$/ft	$1,235,304	$123,530	$1,358,834	$135,883	$67,942	$1,562,660
S50	OMC	Ex	Supply		1212 Zone Well 24 Replacement due to age.	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S51	OMC	Ex	Supply		1212 Zone Well 29 Replacement due to age.	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S52	OMC	Ex	Supply		1212 Zone Well 30 Replacement due to age.	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S53	OMC	Ex	Supply		1212 Zone Well 31 Replacement due to age.	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S54	OMC	Ex	Supply		Galvin Booster PS Replacement due to age.	N.A.	1,050	HP	$6,000.00	$/HP	$6,300,000	$630,000	$6,930,000	$693,000	$346,500	$7,969,500
S55	OMC	Ex	Supply		1348 Booster Pump 1 and 2 Replacement due to age.	N.A.	400	BPS	$6,000.00	$/HP	$2,400,000	$240,000	$2,640,000	$264,000	$132,000	$3,036,000
S56	OMC	Ex	Supply		1348 Booster Pump 3 and 4 Replacement due to age.	N.A.	250	BPS	$6,000.00	$/HP	$1,500,000	$150,000	$1,650,000	$165,000	$82,500	$1,897,500
ST12	OMC	Ex	Storage		Reservoir past useful Life 1074-1B	N.A.	2	MG	$1,444,800.00	$/MG	$2,889,600	$288,960	$3,178,560	$317,856	$158,928	$3,655,344
ST13	OMC	Ex	Storage		Reservoir past useful Life 1212-1A	N.A.	20	MG	$1,444,800.00	$/MG	$28,896,000	$2,889,600	$31,785,600	$3,178,560	$1,589,280	$36,553,440
ST14	OMC	Ex	Storage		Reservoir past useful Life 1212-1B	N.A.	2	MG	$1,444,800.00	$/MG	$2,889,600	$288,960	$3,178,560	$317,856	$158,928	$3,655,344
ST15	OMC	Ex	Storage		Reservoir past useful Life 1348-1B	N.A.	2	MG	$1,444,800.00	$/MG	$2,889,600	$288,960	$3,178,560	$317,856	$158,928	$3,655,344
ST16	OMC	Ex	Storage		Reservoir past useful Life 1348-1C	N.A.	3.75	MG	$1,444,800.00	$/MG	$5,418,000	$541,800	$5,959,800	$595,980	$297,990	$6,853,770
									Total		**$70,856,962**					**$89,634,057**

Table ES-4 (Continued)
Capital Improvement Program

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
Future System Development Projects																
ST08	OR	Fut	Storage	WT-014	Reservoir 925-1A	N.A.	9.0	MG	$1,444,800.00	$/gallon	$13,003,200	$1,300,320	$14,303,520	$1,430,352	$715,176	$16,449,048
ST09	OR	Fut	Storage	WT-014	Reservoir 925-1B	N.A.	9.0	MG	$1,444,800.00	$/gallon	$13,003,200	$1,300,320	$14,303,520	$1,430,352	$715,176	$16,449,048
ST10	OR	Fut	Storage	WT-014	Reservoir 925-2B	N.A.	6.0	MG	$1,444,800.00	$/gallon	$8,668,800	$866,880	$9,535,680	$953,568	$476,784	$10,966,032
S13	OR	Fut	Supply	WT-012	Altitude Valve from 1074 Zone to 925 Zone at Reservoir 925-1A and 925-1B	N.A.	1	Valve	$680,260.00	$/LS	$680,260	$68,026	$748,286	$74,829	$37,414	$860,529
S14[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #48 in 925 Zone (Not in DIF)	N.A.	1	Well		$/site						
S15	OR	Fut	Supply	WT-007	NMC Well #48 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S16[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 48 and 54 to Reservoir 925-2A	18	3,250	ft	$325.08	$/ft	$1,056,510	$105,651	$1,162,161	$116,216	$58,108	$1,336,485
S17[2]	OR	Fut	Supply	WT-012	24-inch well collecting line for Well 48 and 54 to Reservoir 925-2A	24	1,000	ft	$433.44	$/ft	$433,440	$43,344	$476,784	$47,678	$23,839	$548,302
S18[2]	OR	Fut	Supply	WT-012	30-inch well collecting line for Well 48 to Reservoir 925-2A	30	600	ft	$541.80	$/ft	$325,080	$32,508	$357,588	$35,759	$17,879	$411,226
S19[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #51 in 925 Zone (Not in DIF)	N.A.	1	Well		$/site						
S20	OR	Fut	Supply	WT-007	NMC Well #51 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S21[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 51 to Reservoir 925-2A	18	4,300	ft	$325.08	$/ft	$1,397,844	$139,784	$1,537,628	$153,763	$76,881	$1,768,273
S22[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #54 in 925 Zone (Not in DIF)	N.A.	1	Well		$/site						
S23	OR	Fut	Supply	WT-007	NMC Well #54 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S24[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 54 to Reservoir 925-2A	18	700	ft	$325.08	$/ft	$227,556	$22,756	$250,312	$25,031	$12,516	$287,858
S25[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #55 in 925 Zone	N.A.	1	Well		$/site						$300,000
S26	OR	Fut	Supply	WT-007	NMC Well #55 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000

Table ES-4 (Continued)
Capital Improvement Program

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
Future System Development Projects																
S27[2]	OR	Fut	Supply	WT-012	18-inch line from Well 55 to intersection of Bonview Ave and Francis St	18	800	ft	$325.08	$/ft	$260,064	$26,006	$286,070	$28,607	$14,304	$328,981
S28[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #56 in 925 Zone	N.A.	1	Well		$/site						$300,000
S29	OR	Fut	Supply	WT-007	NMC Well #56 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S30[2]	OR	Fut	Supply	WT-012	42-inch line from Well 56 to intersection of Bon View Ave and Francis St	42	1,250	ft	$758.52	$/ft	$948,150	$94,815	$1,042,965	$104,297	$52,148	$1,199,410
S31[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 48 to Reservoir 925-2A	18	400	ft	$325.08	$/ft	$130,032	$13,003	$143,035	$14,304	$7,152	$164,490
S32[2]	OR	Fut	Supply	WT-012	30-inch line in Francis St from Bon View Ave to Grove Ave	30	1,200	ft	$541.80	$/ft	$650,160	$65,016	$715,176	$71,518	$35,759	$822,452
S33[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #57 in 925 Zone	N.A.	1	Well		$/site						$300,000
S34	OR	Fut	Supply	WT-007	NMC Well #57 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S35[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 57 to Reservoir 925-1A	18	1,400	ft	$325.08	$/ft	$455,112	$45,511	$500,623	$50,062	$25,031	$575,717
S36[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #58 in 925 Zone	N.A.	1	Well		$/site						$300,000
S37	OR	Fut	Supply	WT-007	NMC Well #58 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S38[2]	OR	Fut	Supply	WT-012	18-inch well collecting line from Well 58 to intersection of Francis St and Cucamonga Ave	24	1,950	ft	$433.44	$/ft	$845,208	$84,521	$929,729	$92,973	$46,486	$1,069,188
S39	OR	Fut	Supply	WT-013	PRS 16 at Campus Ave and Chino Ave (from 1010 Zone to 925 Zone)	N.A.	8 and 12	inch	$680,260.00	$/station	$680,260	$68,026	$748,286	$74,829	$37,414	$860,529
S40	OR	Fut	Supply	WT-032	Water Quality Treatment Facility at the Jurupa 925-2 Reservoir Site	N.A.	4	Site	$6,324,111	$/Well	$25,296,443	$2,529,644	$27,826,087	$2,782,609	$1,391,304	$32,000,000
S46	OR	Fut	Supply	WT-032	Water Quality Treatment Facility at the at the Bon View 925-1 Reservoir Site	N.A.	4	Site	$6,324,111	$/Well	$25,296,443	$2,529,644	$27,826,087	$2,782,609	$1,391,304	$32,000,000
S47[1]	OR	Fut	Supply	WT-008	Water Quality Treatment Facility for Well #50	N.A.	1	Site	$3,100,000.00	$/site	$3,100,000	$310,000	$3,410,000	$341,000	$170,500	$3,921,500

Table ES-4 (Continued)
Capital Improvement Program

Future System Development Projects																
Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
S41	OR		Supply	WT-007	Land Acquisition for Well #59 in 925 Zone	2012 Water Master Plan project that is no longer required										
S42	OR		Supply	WT-007	NMC Well #59 in the 925 Zone	2012 Water Master Plan project that is no longer required										
S43[2]	OR	Fut	Supply	WT-012	18-inch well collecting line from Well 56 in Belmont St and Cucamonga Ave	N.A.	1,950	ft	$325.08	$/ft	$633,906	$63,391	$697,297	$69,730	$34,865	$801,891
S44	OR		Supply	WT-012	18-inch well collecting line from Well 59 in Belmont St and Cucamonga Ave	2012 Water Master Plan project that is no longer required										
S45[2]	OR	Fut	Supply	WT-012	18-inch well collecting line from Well 56 in Belmont St and Cucamonga Ave	18	2,050	ft	$325.08	$/ft	$666,414	$66,641	$733,055	$73,306	$36,653	$843,014
S57	OR	Fut	Supply		New 925 to 1010 BPS	N.A.	400	BPS	$6,000.00	$/HP	$2,400,000	$240,000	$2,640,000	$264,000	$132,000	$3,036,000
T1[2]	OR	Fut	Transmission	WT-011	12-inch distribution lines (925 Zone) Completed Projects removed.	12	115,600	ft	$144.00	$/ft	$16,646,400	$1,664,640	$18,311,040	$1,831,104	$915,552	$21,057,696
T2[2]	OR	Fut	Transmission	WT-011	16-inch distribution lines (925 Zone)	16	44,450	ft	$192.00	$/ft	$8,534,400	$853,440	$9,387,840	$938,784	$469,392	$10,796,016
T3[2]	OR	Fut	Transmission	WT-011	18-inch distribution lines (925 Zone), Chino Ave	18	12,400	ft	$260.06	$/ft	$3,224,744	$322,474	$3,547,218	$354,722	$177,361	$4,079,301
T4[2]	OR	Fut	Transmission	WT-010	24-inch distribution lines (925 Zone), Milliken Ave, Eucalyptus Ave, Archibald Ave, Edison Ave	24	10,850	ft	$331.56	$/ft	$3,597,372	$359,737	$3,957,109	$395,711	$197,855	$4,550,675
T05	OR	Fut	Transmission	WT-010	42-inch distribution lines (925 Zone), Grove Ave btw Reservoir 925-1A and Edison Ave	42	22,700	ft	$557.81	$/ft	$12,662,174	$1,266,217	$13,928,391	$1,392,839	$696,420	$16,017,649
T06[2]	OR	Fut	Transmission	WT-009	12-inch distribution lines (1010 Zone)	12	19,200	ft	$144.00	$/ft	$2,764,800	$276,480	$3,041,280	$304,128	$152,064	$3,497,472
T07[2]	OR	Fut	Transmission	WT-009	18-inch distribution lines (1010 Zone) Campus Ave north of Riverside Ave	18	6,950	ft	$260.06	$/ft	$1,807,417	$180,742	$1,988,159	$198,816	$99,408	$2,286,383
									Total		**$177,395,388**					**$225,605,166**

[1] *Project cost specifically estimated based on more detailed information. The unit costs from Table 13-1 were not used.*
[2] *Project lengths based on existing planning estimates.*

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Existing System Capital Improvement Projects	$188,351,545	$237,897,324
Condition Projects - Mainline Replacement Program	$178,777,746	$226,153,849
Condition Projects - Facility Improvement Program	$70,856,962	$89,634,057
Future System Development Projects	$177,395,388	$225,605,166
Total	**$615,381,641**	**$779,290,395**
Annual Capital Improvement Costs		$3,605,250

SECTION 1

INTRODUCTION

1-1 Purpose

The City of Ontario provides potable water service to residential, commercial, industrial, public and agricultural lands and the Ontario International Airport within its service area. The City recognizes its responsibility to efficiently meet the customers' needs with long range planning efforts. By reviewing its existing water system and future needs, the City can continue to maintain a high service level and reliability in its water system in a cost effective and fiscally responsible manner. This report is intended to update the domestic water analysis of the *2012 Water Master Plan* and to provide a comprehensive planning guide for improving and upgrading the City's domestic water system.

1-2 Previous Studies

Previous studies completed and utilized in the development of this Water Master Plan include the following:

- *The Ontario Plan (General Plan), February 2010*
- *The Ontario Plan Draft Environmental Impact Report, April 2009*
- *City of Ontario Water and Recycled Water Master Plan Update*, *April 2006*
- *City of Ontario Water Master Plan, April 2012*
- *2015 City of Ontario Urban Water Management Plan, July 2016*
- *Ultimate Citywide Water Demand Estimate Technical Memorandum, May 2016*
- *Sanitary Sewer Survey, October 2016*

1-3 Scope of Work

The scope of work for this study consists of the following:

Task 1 – Obtain and Review all Related Information

Task 2 – Review and Update the City's Current Design Criteria

Task 3 - Update Potable Water Hydraulic Model

- Update the City's current model geometry to the most-recent GIS shapefiles
- Update all facilities (wells, pump stations, reservoirs, pressure reducing stations, turnouts and interconnections)
- Update facility operational controls
- Utilize City's existing potable water demand factors that were developed as part of the 2016 Ultimate Citywide Water Demand Estimate Technical Memorandum.
- Develop peaking relationships for demands based on the City's historical production and purchase data.
- Allocation of potable water demands, based on the most recent water billing meter records
- Develop diurnal patterns based on SCADA data, automatic meter read (AMR), and automatic meter infrastructure (AMI) data
- Model calibration consists of making adjustments to the model such that the field data and model results are similar for the chosen 24-hour calibration period.

Task 4 – System Analysis

- Existing and future system analyses are conducted for average day demand, maximum day demand, and maximum day plus fire flow demands.

- Review and update the following:
    - System-wide Supply Analysis
    - Storage Capacity Evaluation
    - Pipeline Replacement Plan

Task 5 – Develop an updated Capital Improvement Program (CIP)

1-4 Organization of Report

The Potable Water Master Plan Update presents the methodology for developing the hydraulic model. A brief outline of the report is as follows:

Section ES: ***Executive Summary***

Section 1: Introduction

Section 2: Study Area

Section 3: Water Supply

Section 4: Water Use

Section 5: Diurnal Patterns

Section 6: Existing System

Section 7: Criteria

Section 8: Hydraulic Model

Section 9: Model Calibration

Section 10: Existing System Analysis

Section 11: Future System

Section 12: Future System Analysis

Section 13: Capital Improvement Program

1-5 Acknowledgements

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- Jeffrey Krizek, Associate Engineer
- Tom O'Neill, Water Production Manager
- Chris Bonadurer, Water Production Supervisor
- Ivan Sanchez, Engineering Assistant/GIS
- Joline Neal, Water Quality Specialist

SECTION 2
STUDY AREA

2-1 Purpose

This section describes the City of Ontario water service area, the land uses within the study area, and population estimates.

2-2 Location

The study area, shown on Figure 2-1, coincides with the City of Ontario boundary with the exception of two small areas in the north central and northeastern portion of the City that are served by Cucamonga Valley Water District (CVWD). It is located approximately 35 miles east of downtown Los Angeles and encompasses approximately 50 square miles (32,060 acres) of residential, commercial, industrial, public and agricultural lands and the Ontario International Airport. It is bordered by the Cities of Chino and Montclair on the west; the Cities of Upland and Rancho Cucamonga on the north; the Cities of Fontana, Eastvale, and Jurupa Valley on the east; and the Cities of Chino and Eastvale on the south. The major highways crossing through portions of the study area include the San Bernardino Freeway (I-10) on the north, the Pomona Freeway (SR-60) on the south, and the Ontario Freeway (I-15) on the east.

The City is divided into two distinct areas, the Original Model Colony (OMC) and Ontario Ranch (OR). The two areas are generally divided by Riverside Drive. The OMC consists of existing residential, commercial, and industrial developments, and the Ontario International Airport. It comprises approximately 37.2 square miles (23,776 acres). Ontario Ranch is an agricultural area that was annexed to the City in 1999. It currently consists of approximately 12.8 square miles (8,182 acres) of agricultural land. The City's 2010 General Plan details plans to develop the agricultural lands in Ontario Ranch into a mix of residential, commercial, industrial, and public uses. The future residential population of Ontario Ranch is expected to reach about 181,385. Development of Ontario Ranch has begun with the development of Edenglen residential community located southwest and south east of the intersection of Riverside Drive and Mill Creek Avenue. Residential communities currently in construction include the Park Place development located southeast of Archibald Avenue and Merrill Avenue and the New Haven development located southwest of Haven Avenue and Schaefer Avenue.

2-3 Topographic Description and Geology

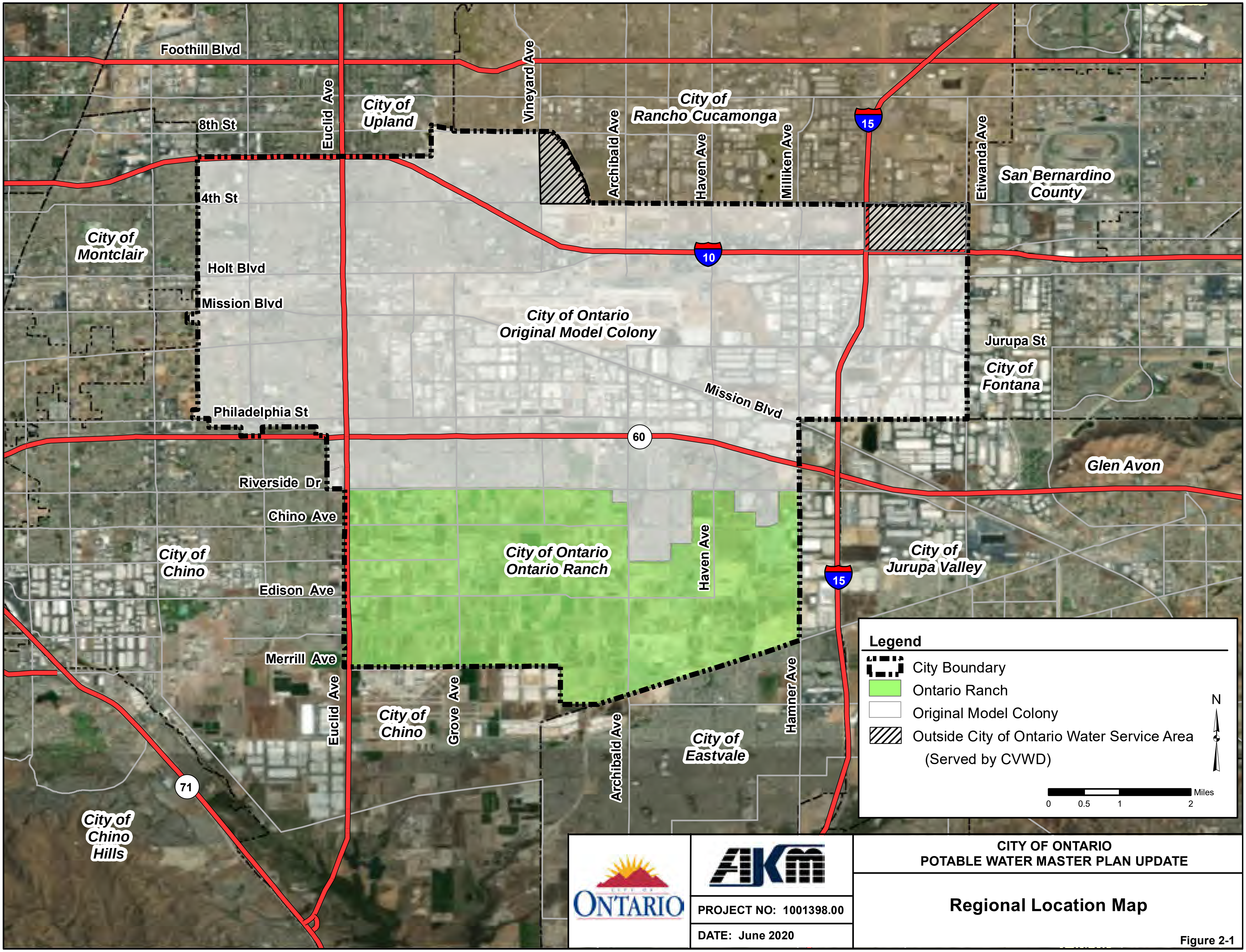
2-3.1 General Area

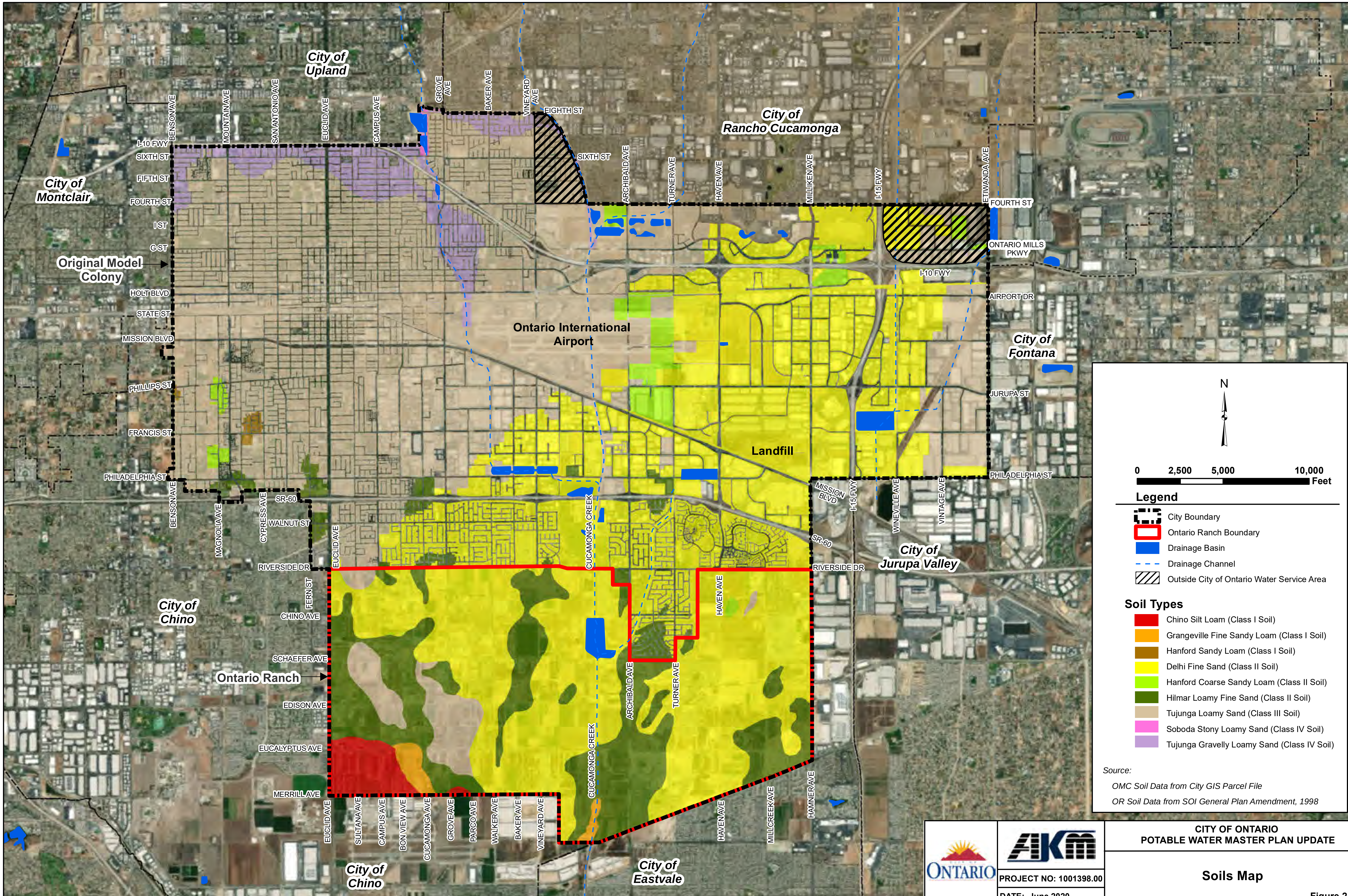
The City's water service area is located in the San Bernardino Plain, which is an expanse of sand, gravel and boulders. Dominating the valley are Mt. San Antonio, Cucamonga Peak, and Ontario Peak. Cucamonga Peak is visibly flat on top which represents sections of the original valley floor. Loose dirt and gravel flows swiftly from the slopes of these young mountains with the sometimes torrential rains.

The valley and plain has taken more than 10 million years to form. Geologists place the beginning of the area's geologic history between 12 and 28 million years ago, the same time the San Andreas Fault is believed to have been formed. The San Gabriel Mountains are part of the east-west trending transverse ranges, which run across the north-south grain of California. The San Gabriel Mountains are intersected 25 miles east of Ontario at the Cajon Pass by the San Andreas Fault. These mountains were partially formed by geologic activity along this fault.

Visible to the south of Ontario is a portion of the peninsular range consisting of the Santa Ana Mountains, the base of which is carved by the Santa Ana River. Several blocks of the peninsular range are separated by faults generally attributed to the San Andreas Fault system. Small rolling hills make up the north and west portions of the valley (Chino Hills, Diamond Bar, and the Covina Hills).

The transverse and peninsular ranges meet in the San Gorgonio Pass area, 50 miles east of Ontario. Mount San Gorgonio is the tallest peak in Southern California and is frequently visible from Ontario.


Foothill Blvd
8th St
4th St
Holt Blvd
Mission Blvd
Philadelphia St
Riverside Dr
Chino Ave
Edison Ave
Merrill Ave
Euclid Ave
Vineyard Ave
Archibald Ave
Haven Ave
Milliken Ave
Etiwanda Ave
Grove Ave
Hamner Ave
Jurupa St
10
15
60
71
City of Upland
City of Rancho Cucamonga
San Bernardino County
City of Montclair
City of Ontario Original Model Colony
City of Fontana
Glen Avon
City of Chino
City of Ontario Ontario Ranch
City of Jurupa Valley
City of Eastvale
City of Chino Hills
Legend
City Boundary
Ontario Ranch
Original Model Colony
Outside City of Ontario Water Service Area
(Served by CVWD)
N
Miles
0
0.5
1
2
ONTARIO
PROJECT NO: 1001398.00
DATE: June 2020
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
Regional Location Map
Figure 2-1



City of Upland
City of Rancho Cucamonga
City of Montclair
Original Model Colony
Ontario International Airport
City of Fontana
Landfill
City of Jurupa Valley
City of Chino
Ontario Ranch
City of Chino
City of Eastvale
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
EIGHTH ST
SIXTH ST
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
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ETIWANDA AVE
FOURTH ST
ONTARIO MILLS PKWY
I-10 FWY
AIRPORT DR
JURUPA ST
PHILADELPHIA ST
MISSION BLVD
WINEVILLE AVE
VINTAGE AVE
SR-60
RIVERSIDE DR
FIFTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
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CYPRESS AVE
WALNUT ST
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SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
CUCAMONGA CREEK
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
MILLCREEK AVE
HAMNER AVE
N
0 2,500 5,000 10,000 Feet
Legend
City Boundary
Ontario Ranch Boundary
Drainage Basin
Drainage Channel
Outside City of Ontario Water Service Area
Soil Types
Chino Silt Loam (Class I Soil)
Grangeville Fine Sandy Loam (Class I Soil)
Hanford Sandy Loam (Class I Soil)
Delhi Fine Sand (Class II Soil)
Hanford Coarse Sandy Loam (Class II Soil)
Hilmar Loamy Fine Sand (Class II Soil)
Tujunga Loamy Sand (Class III Soil)
Soboda Stony Loamy Sand (Class IV Soil)
Tujunga Gravelly Loamy Sand (Class IV Soil)
Source:
OMC Soil Data from City GIS Parcel File
OR Soil Data from SOI General Plan Amendment, 1998
ONTARIO
AKM
PROJECT NO: 1001398.00
DATE: June 2020
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
Soils Map
Figure 2-2

2-3.2 Elevations

The topography of the region generally slopes in a southwesterly direction. The highest point in the service area is west of Grove Avenue and north of 8th Street at 1180 feet above mean sea level (amsl), and the lowest point is at the intersection of Euclid Avenue and Merrill Avenue (633 feet amsl).

2-3.3 Soils

Native soils, shown on Figure 2-2, consist of the following:

Class I Soils	• Chino Silt Loam • Grangeville Fine Sandy Loam • Hanford Sandy Loam
Class II Soils	• Delhi Fine Sand • Hanford Coarse Sandy Loam • Hilmar Loamy Fine Sand
Class III Soils	• Tujunga Loamy Sand
Class IV Soils	• Soboda Stony Loamy Sand • Tujunga Gravelly Loamy Sand

Due to the presence of predominantly dairy industries over a long period of time, prime agricultural soils, high in salts and nitrates, cover approximately 2,999 acres or 36 percent of the total area in the Ontario Ranch (SOI General Plan Amendment, 1998). Organic materials (manure and feed) are reportedly present in thickness of up to six feet.

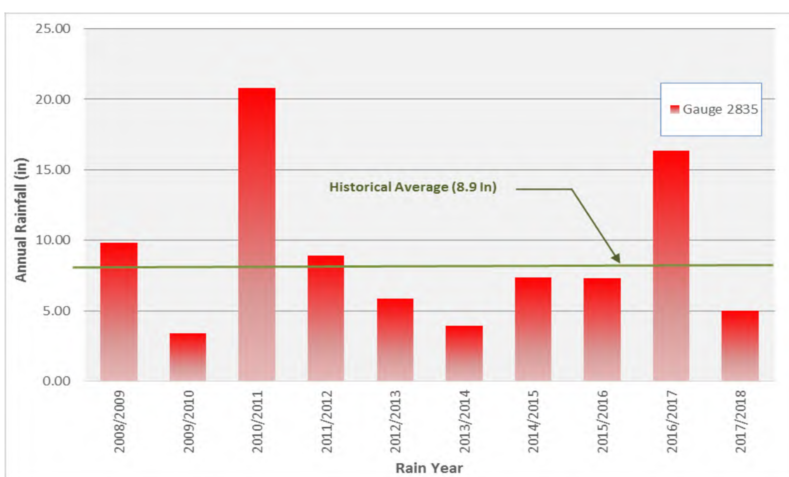
Ontario Ranch is located within the Chino Groundwater Basin, which has been found to maintain a relatively shallow water table. The SOI General Plan Amendment reported findings of groundwater elevations ranging from 530 to 590 feet in 1991. Water depths observed in 1991 were about 100 feet (SOI General Plan Amendment).

2-4 Climate

According to the National Oceanic and Atmospheric Administration (NOAA), the climate in the study area is generally Mediterranean with hot summers and warm winters. The average median temperature is approximately 66° F.

The historical average annual rainfall is about 8.9 inches. Most of the rainfall typically occurs between October and April. Figure 2-3 shows the seasonal rainfall from 2008 to 2018 as measured by the San Bernardino County Rain Gauge Stations 2835, which is located at Ontario Fire Station #4 on Mountain Avenue, south of Fourth Street.

Figure 2-3
Seasonal Rainfall 2008-2018



2-5 Land Use

The land use information utilized in the preparation of the Water Master Plan is primarily based upon the City's GIS parcel land use data and newly approved General Plan data. This information was supplemented by aerial photographs, field reviews, and information provided by City staff.

2-5.1 Existing Land Use

The City is a well planned urban community with a balance of residential, commercial, and industrial land uses. The City's land use GIS shapefile from May 2017 was considered current and has been used for reporting purposes. Within the service area, the residential land uses are 5,973 acres or 19 percent of the total. Industrial uses are 5,235 acres or 17 percent of the total. Approximately 6,741 acres or 22 percent of the total service area is Agricultural Multi-Use which primarily resides in the Ontario Ranch area. Table 2-1 provides a summary of the existing land uses. Figure 2-4 shows the locations of the land uses.

The total number of housing units in the City is estimated at 51,283. With a population of 182,871 and a 3.7 percent vacancy rate, the average number of persons per household is estimated at 3.69 (Ref: *California Department of Finance, Demographic Research Unit, Table E-5, 2020*).

Table 2-1

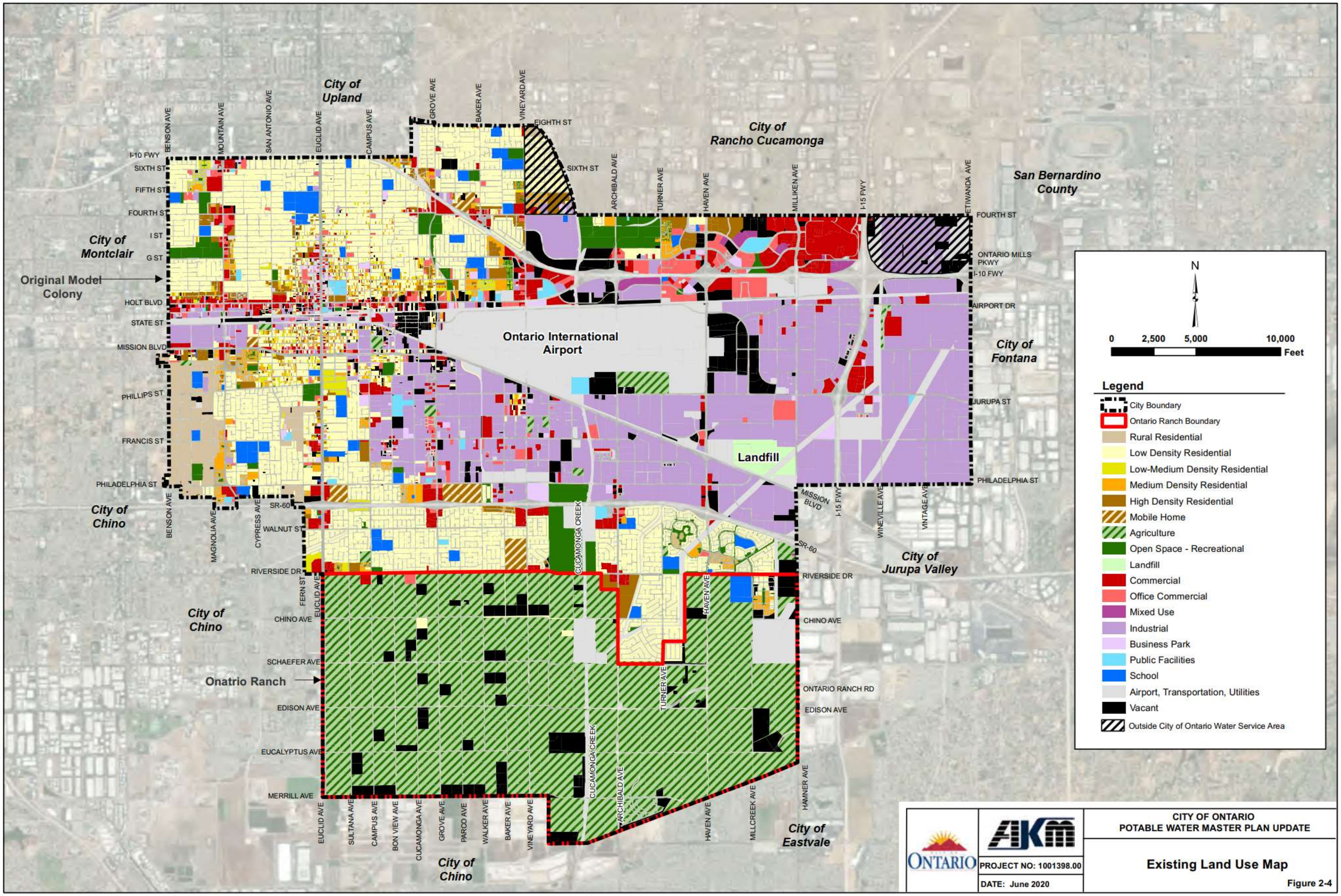
Existing Study Area Land Uses

Landuse Description	Service Area				Outside Service Area		Total City	
	OMC[1] (Ac)	OR[2] (Ac)	Total (Ac)	% of Total	Total (Ac)	% of Total	Total (Ac)	% of Total
Low Density Residential	4,300	54.6	4,355	14.0%	114.2	14.7%	4,469	14.1%
Low-Medium Density Residential	180	0.0	180	0.6%	0.0	0.0%	180	0.6%
Medium Density Residential	364	0.0	364	1.2%	9.7	1.3%	374	1.2%
High Density Residential	446	0.0	446	1.4%	0.0	0.0%	446	1.4%
Rural Residential	449	0.0	449	1.4%	0.0	0.0%	449	1.4%
Mobile Home	174	0.0	174	0.6%	27.3	3.5%	202	0.6%
Group Quarters	1	0.0	1	0.0%	0.0	0.0%	1	0.0%
Other Residential	3	0.0	3	0.0%	0.0	0.0%	3	0.0%
Total Residential	**5,919**	**54.6**	**5,973**	**19.3%**	**151.2**	**19.5%**	**6,124**	**19.3%**
Commercial	1,185	8.7	1,194	3.9%	118.8	15.3%	1,313	3.8%
Business Park	33	0.0	33	0.1%	4.5	0.6%	38	0.1%
Office	436	0.0	436	1.4%	0.9	0.1%	437	1.4%
Admin./Prof.	140	0.0	140	0.5%	2.5	0.3%	143	0.4%
Misc. Service Org.	71	8.8	80	0.3%	0.0	0.0%	80	0.3%
Total Commercial	**1,866**	**17.5**	**1,883**	**6.1%**	**126.7**	**16.3%**	**2,010**	**6.0%**
Industrial	1,795	0.0	1,795	5.8%	46.4	6.0%	1,842	5.8%
Industrial_Meredith	135	0.0	135	0.4%	0.0	0.0%	135	0.4%
Manufacturing	1,646	0.0	1,646	5.3%	67.2	8.7%	1,714	5.4%
Warehousing	1,658	0.0	1,658	5.3%	149.4	19.3%	1,807	5.7%
Total Industrial	**5,235**	**0.0**	**5,235**	**16.9%**	**263.0**	**33.9%**	**5,498**	**17.3%**
Mixed Use	75	0.0	75	0.2%	0.0	0.0%	75	0.2%
School	497	0.0	497	1.6%	0.0	0.0%	497	1.6%
Public Facilities	165	0.0	165	0.5%	0.0	0.0%	165	0.5%
Transp/Utilities	1,164	335.4	1,499	4.8%	118.8	15.3%	1,618	5.1%
Transp/Utilities/Airport	1,483	0.0	1,483	4.8%	0.0	0.0%	1,483	4.7%
Parks/Rec/Cultural	754	0.0	754	2.4%	0.9	0.1%	754	2.4%
Street/Parking	241	0.0	241	0.8%	23.5	3.0%	264	0.8%
Ag. Multi-Use	184	6,556.4	6,741	21.7%	0.8	0.1%	6,742	21.2%
Landfill	137	0.0	137	0.4%	0.0	0.0%	137	0.4%
Vacant	1,031	661.3	1,692	5.5%	0.0	0.0%	1,692	5.5%
Right-of-Way[3]	4,310	324.2	4,634	14.9%	90.0	11.6%	4,724	15.0%
Total Other	**10,040**	**7,877**	**17,918**	**57.8%**	**234.0**	**30.2%**	**18,152**	**57.4%**
Grand Total	**23,059**	**7,949**	**31,009**	**100%**	**775**	**100%**	**31,784**	**100%**

[1] *OMC refers to Original Model Colony*

[2] *OR refers to Ontario Ranch*

[3] *Right-of-Way acreage estimated by subtracting totalparcel areas from the City and Service Area Boundaries*



City of Upland
City of Rancho Cucamonga
San Bernardino County
City of Montclair
Original Model Colony
Ontario International Airport
Landfill
City of Fontana
City of Chino
City of Jurupa Valley
Onatrio Ranch
City of Chino
City of Eastvale
City of Chino
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
EIGHTH ST
SIXTH ST
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
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ETIWANDA AVE
FOURTH ST
ONTARIO MILLS PKWY
I-10 FWY
AIRPORT DR
JURUPA ST
PHILADELPHIA ST
MISSION BLVD
WINEVILLE AVE
VINTAGE AVE
SR-60
RIVERSIDE DR
CHINO AVE
ONTARIO RANCH RD
EDISON AVE
HAMNER AVE
MILLCREEK AVE
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
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HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
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WALNUT ST
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CHINO AVE
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CUCAMONGA CREEK
SULTANA AVE
CAMPUS AVE
BON VIEW AVE
CUCAMONGA AVE
GROVE AVE
PARCO AVE
WALKER AVE
BAKER AVE
VINEYARD AVE
ARCHIBALD AVE
N
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2,500
5,000
10,000
Feet
Legend
City Boundary
Ontario Ranch Boundary
Rural Residential
Low Density Residential
Low-Medium Density Residential
Medium Density Residential
High Density Residential
Mobile Home
Agriculture
Open Space - Recreational
Landfill
Commercial
Office Commercial
Mixed Use
Industrial
Business Park
Public Facilities
School
Airport, Transportation, Utilities
Vacant
Outside City of Ontario Water Service Area
ONTARIO
AKM
PROJECT NO: 1001398.00
DATE: June 2020
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
Existing Land Use Map
Figure 2-4

2-5.2 Future Land Uses

The future land uses are generally based upon the City's latest general plan document entitled *The Ontario Plan (2010).* Revisions have been incorporated by the City's planning department, for specific developments that have been developed or planned that may differ from the 2010 document. Table 2-2 provides a summary of the future land uses. Figure 2-5 shows the locations of future land use according to the City's GIS land use shapefile from May 2017. The residential area will increase to 10,869 acres (34.2 percent of total). The employment area, including business parks and industrial uses, is expected to entail about 7,818 acres (24.6 percent of total).

- ***Residential Land Uses:*** The Ontario Plan defines five residential land use categories: Rural, Low Density, Low-Medium Density, Medium Density, and High Density. The plan provides densities for each of the residential land use categories, which are summarized in Table 2-2.
- ***Retail / Service:*** Four retail / service uses are defined: Neighborhood Commercial, General Commercial, Office Commercial, and Hospitality. The intensities for each commercial use are shown in Table 2-3.
- ***Employment:*** Two employment uses are defined: Business Park and Industrial. The intensities for each employment use are shown in Table 2-3.
- ***Open Space:*** Open Space land use designations include Non-Recreational Open Space, Recreational Open Space and Water Open Space (i.e. lakes, ponds, etc.).
- ***Public:*** Public land use designations include Public Facility and Public School.
- ***Other:*** Other land use designations include the Ontario International Airport, Landfill, Railroad and Roadways.

It should be noted that Table 2-2 is general in nature for the entire City. It has been found that many of the newer developments constructed and proposed in Ontario Ranch exceed the densities (dwelling unit per acre) anticipated when the 2012 Water Master Plan was completed. Therefore, the maximum densities for the Ontario Ranch area were increased in Table 2-2 (per the City Planning Department).

For the 2020 Potable Water Master Plan Update, the future land uses and associated sewer loads were estimated using more detailed information, such as specific plans and detailed development information, when available. This is especially important in the east portion of Ontario Ranch which is already being developed and the City has development proposals under review. Details of how future water loads were calculated and allocated in the hydraulic model are described in Section 4-7.3.

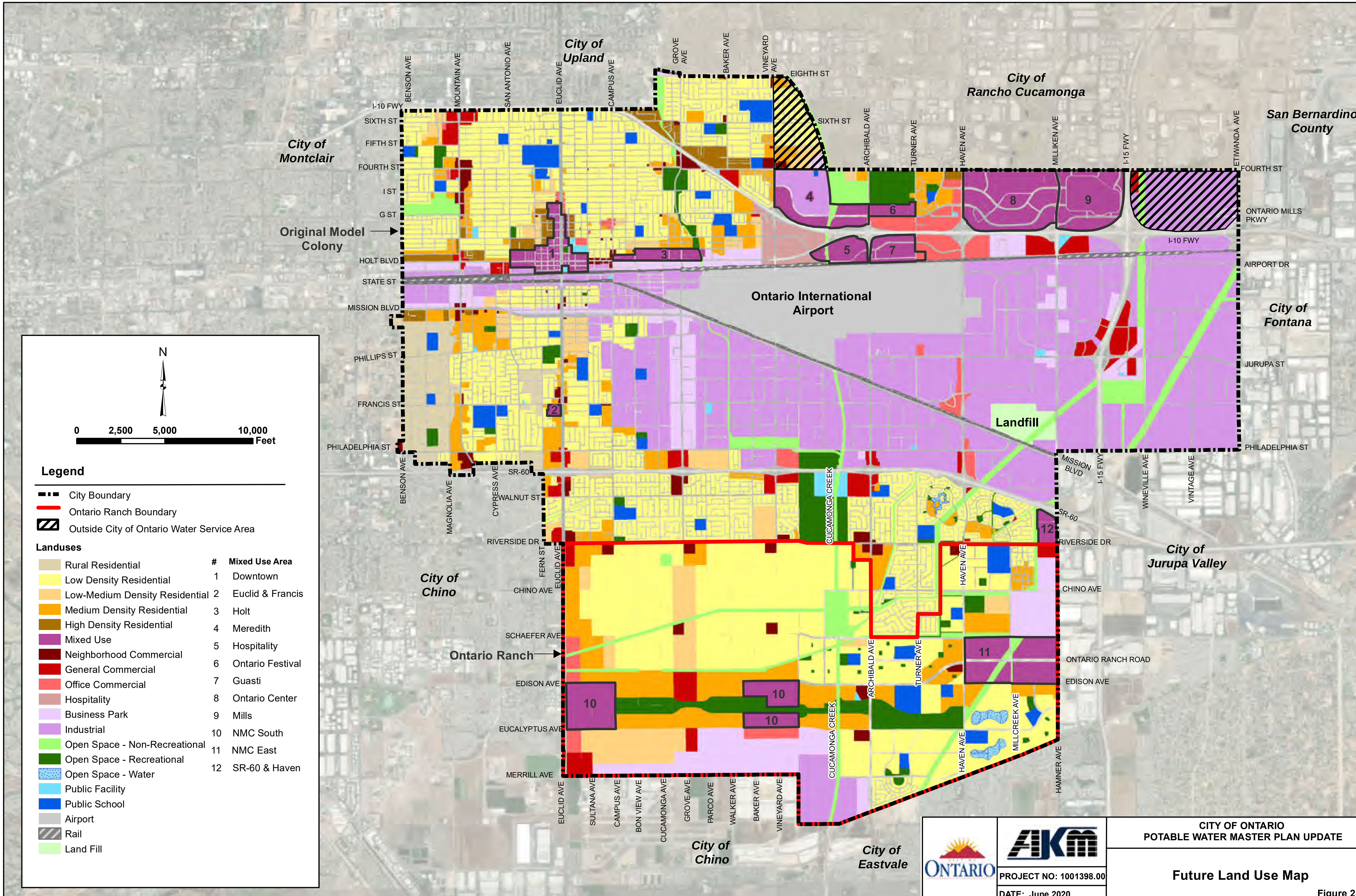
2-6 Population

Since its incorporation in 1890, the City of Ontario has grown from a population of 683 to approximately 182,871 in 2020 (*Ref: California Department of Finance, Table E-5, 2020*). The historical population increase from 1890 to 2020, as well as future projections are depicted on Figure 2-6.

It should be noted that the estimates shown on Figure 2-6 for the year 2000 through 2035 includes Ontario Ranch, which was annexed by the City in 1999. The population shown also includes the 628 acres of land (5,770 persons) within the Ontario Ranch, but served water by the Cucamonga Valley Water District (CVWD).

Projections for 2020 and 2035 are based on South California Association of Government future projections.

The future population in Ontario Ranch is expected to be approximately 181,385. The future population in the OMC is estimated at 190,594. The total future population is estimated at 371,979 which will nearly double the existing population.



Future Land Use Map

Figure 2-5

Table 2-2

Future Study Area Land Uses[1]

Land Use Category	Acres	% of Total Area	Density (du/ac)	Intensity (FAR)	Units	Population	Square Feet (Office)	Square Feet (Non-Office)	Total Square Feet	Jobs (Office)	Jobs (Non-Office)	Total Jobs
Residential												
Rural Res	458.3	1.4	2.0		917	3,663						
LDR (OMC)[2]	4,243.3	13.4	4.0		16,973	67,842						
LDR (OR)[3]	3,126.6	9.8	5.0		15,633	62,486						
LMDR (OMC)[2]	336.7	1.1	8.5		2,862	11,438						
LMDR (OR)[3]	573.8	1.8	11.0		6,311	25,227						
MDR (OMC)[2]	882.3	2.8	18.0		15,881	60,621						
MDR (OR)[3]	1,014.0	3.2	25.0		25,350	83,096						
HDR (OMC)[2]	233.7	0.7	35.0		8,178	27,373						
Subtotal	***10,868.6***	***34.2***			***92,105***	***341,746***						
Mixed Use												
Downtown	112.0	0.4	35.0		2,352	4,704	780,665	780,665	1,561,330	2,233	561	2,793
East Holt	57.1	0.2	30.0		428	856	1,243,202	497,281	1,740,483	3,556	357	3,913
Euclid & Francis	10.4	0.0	30.0		156	312	0	181,210	181,210	0	419	419
Guasti	77.4	0.2	30.0		465	929	1,180,650	1,011,986	2,192,636	3,377	727	4,103
Inland Empire	36.8	0.1	20.0		368	736	240,451	112,211	352,662	688	81	768
Meredith	93.0	0.3	37.4		800	1,600	340,291	832,497	1,172,788	973	489	1,462
Multi-Modal	76.1	0.2	60.0		457	913	1,491,712	1,491,712	2,983,424	4,266	1,071	5,337
NMC east	263.7	0.8	25.0		1,978	3,956	1,206,111	1,378,413	2,584,524	3,449	990	4,439
NMC west/south	315.3	1.0	35.0		3,311	6,621	5,768,477	961,413	6,729,889	16,498	690	17,188
Ontario Center (E. of Haven)	344.9	1.1	40.0		4,139	8,278	7,511,922	1,502,384	9,014,306	21,484	1,079	22,563
Ontario Mills	239.5	0.8	40.0		479	958	1,564,893	3,912,233	5,477,126	4,476	2,809	7,285
SR60 & Hamner	41.0	0.1	25.0		185	369	669,735	254,499	924,234	1,915	183	2,098
Subtotal	***1,667.2***	***5.2***			***15,116***	***30,232***	***21,998,109***	***12,916,503***	***34,914,612***	***62,915***	***9,454***	***72,368***
Retail/Service												
Neighborhood Commercial	244.5	0.8		0.30			639,104	2,556,414	3,195,518	1,546	6,186	7,732
General Commercial	614.9	1.9		0.30			803,564	7,232,080	8,035,644	747	6,719	7,465
Office Commercial	527.3	1.7		0.75			12,059,052	5,168,166	17,227,218	26,743	11,461	38,204
Hospitality	144.9	0.5		1.00			1,262,543	5,050,172	6,312,715	1,447	5,790	7,237
Subtotal	***1,531.7***	***4.8***					***14,764,263***	***20,006,832***	***34,771,095***	***30,483***	***30,155***	***60,638***
Employment												
Business Park	1,594.9	5.0		0.40			13,894,333	13,894,333	27,788,666	24,377	24,377	48,755
Industrial	6,223.4	19.6		0.55			14,909,926	134,189,333	149,099,259	13,100	117,902	131,002
Subtotal	***7,818.2***	***24.6***					***28,804,259***	***148,083,666***	***176,887,925***	***37,477***	***142,279***	***179,756***
Other												
Open Space - Non Recreational	1,221.0	3.8										
Open Space - Parkland	950.1	3.0										
Open Space - Water	59.2	0.2										
Public Facility	96.6	0.3										
Public School	631.9	2.0										
Airport	1,671.9	5.3										
Landfill	136.9	0.4										
Rail	250.7	0.8										
Right-of-Way	4,880.0	15.4										
Subtotal	***9,898.2***	***31.1***										
Total	***31,783.9***	***100.0***			***107,221***	***371,979***	***65,566,631***	***181,007,001***	***246,573,632***	***130,875***	***181,888***	***312,763***

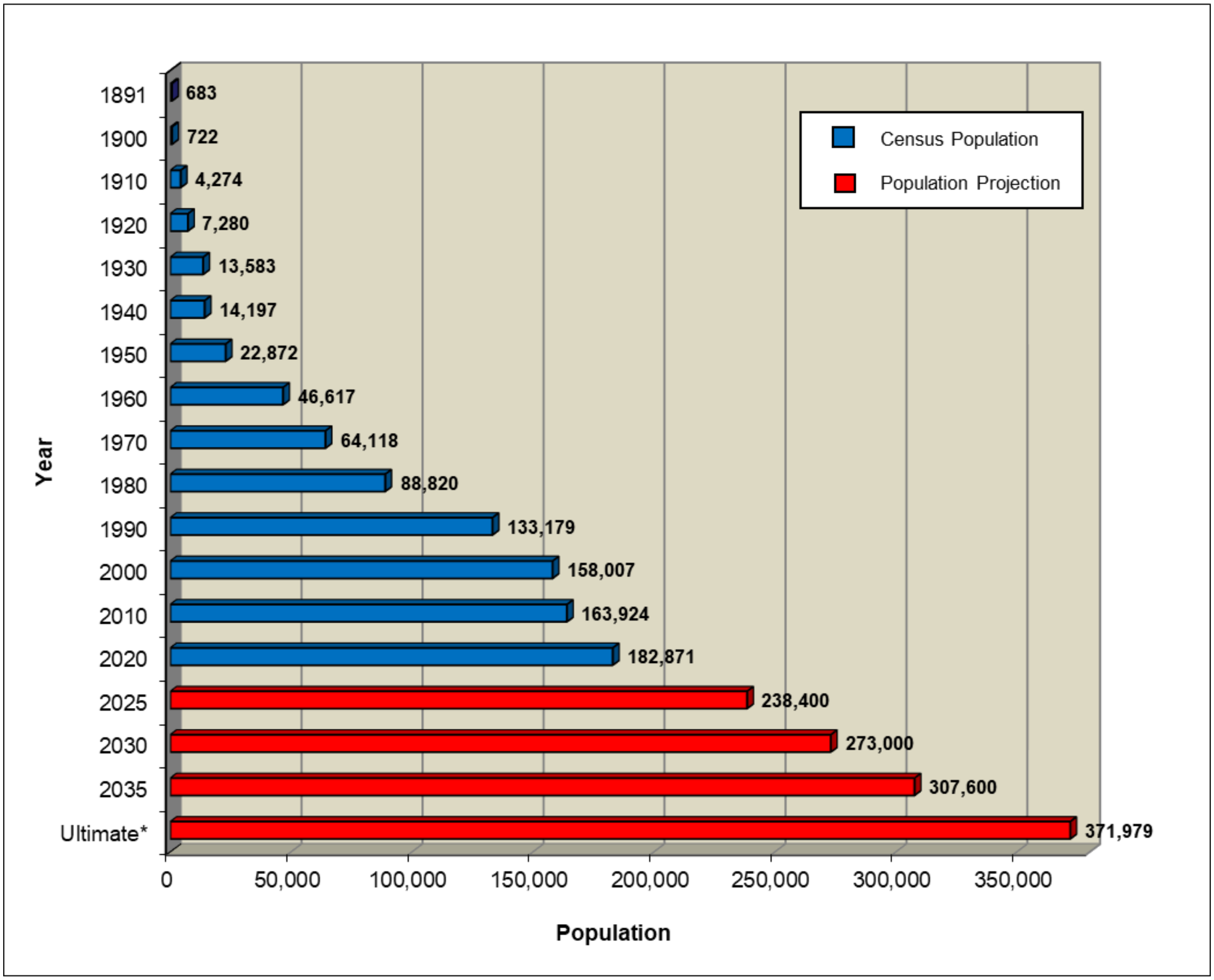
[1] Landuses from City Buildout Table (April 2015)

[2] OMC refers to Original Model Colony. Density (du/ac) per the City Buildout Table (April 2015)

[3] OR refers to Ontario Ranch. Density (du/ac) is considered maximum per City Planning Department (January 2016)

Figure 2-6

City of Ontario Population History and Projections



References:

Historical population data from California State Department of Finance

2020 and 2035 Population projections from SCAG Adopted 2012 Regional Transportation Plan Growth Forecast

Ultimate population from Table 2-2

SECTION 3
WATER SUPPLY

3-1 Source of Supply

The City's existing potable water supply consists of imported water from the Water Facilities Authority (WFA) and Chino Basin Desalter Authority (CDA) and the groundwater from Chino Basin, extracted via the City's wells. The City has seventeen (17) active wells. Over the last twelve years, the City has imported an average of 12,253 AFY and pumped 23,100 AFY from the groundwater basin. Therefore, about 35 percent of the City's water supply is imported.

3-2 Imported Water Supply

Water is imported into Southern California through two major water supply systems:

1. The Colorado River Aqueduct, constructed and operated by Metropolitan Water District of Southern California (MWD), transports water from the Colorado River to MWD's service area.
2. The State Water Project, owned and operated by the State of California Department of Water Resources (DWR), transports water from the Sacramento-San Joaquin Delta through the California Aqueduct.

The City's imported water supply over the last ten years is shown in Table 3-1.

Table 3-1

Imported Water Supply

Year	CDA Supply		WFA Supply		SAWCO		Total Imported Water Supply	
	(AFY)	(mgd)	(AFY)	(mgd)	(AFY)	(mgd)	(AFY)	(mgd)
2007	5,125	4.6	12,734	11.4	0	0.0	17,859	15.9
2008	5,498	4.9	8,740	7.8	0	0.0	14,238	12.7
2009	5,047	4.5	3,494	3.1	0	0.0	8,541	7.6
2010	5,327	4.8	7,666	6.8	0	0.0	12,993	11.6
2011	5,162	4.6	8,883	7.9	0	0.0	14,046	12.5
2012	4,911	4.4	10,415	9.3	0	0.0	15,326	13.7
2013	4,987	4.5	10,967	9.8	0	0.0	15,954	14.2
2014	5,288	4.7	10,135	9.0	0	0.0	15,423	13.8
2015	3,543	3.2	6,413	5.7	443	0.4	10,399	9.3
2016	3,029	2.7	2,398	2.1	107	0.1	5,534	4.9
2017	3,039	2.7	3,035	2.7	294	0.3	6,367	5.7
2018	4,413	3.9	5,589	5.0	359	0.3	10,361	9.3
Average	**4,614**	**4.1**	**7,539**	**6.7**	**100**	**0.1**	**12,253**	**10.9**

3-2.1 Water Facilities Authority

The Water Facilities Authority (WFA) was formed in 1980 as a Joint Powers Authority by the Cities of Chino, Chino Hills, Ontario and Upland, and the Monte Vista Water District. It was formed to construct and operate water treatment facilities that provide a supplemental supply of potable water to its member agencies. The WFA currently owns and operates the Agua de Lejos Water Treatment Plant located at the Benson Avenue and 18th Street, in the City of Upland. It is a conventional surface water treatment facility that treats and disinfects imported water supplies, primarily State Water Project water that is purchased from MWD through WFA. The current rated capacity of the plant is 81 mgd. The City of Ontario owns 25 mgd, or 31.4 percent of the treatment plant capacity.

The water from Agua de Lejos Water Treatment Plant is conveyed to two locations that connect with the City's existing water system. The first turnout (Turnout 1) is located adjacent the 1212-1A and 1212-1B Reservoirs at the northwest corner of Eighth Street and Fern Avenue. The City has access to 16 mgd from the WFA Turnout 1, available to the 1212 Zone.

The second WFA connection (Turnout 2) is through the 1348 Zone and is located adjacent to the 1212-3 at the southeast corner of Campus Avenue and A Street. The City has an internal subconnection (Turnout 2A) that takes the water from Turnout 2 and feeds the 1212 Zone. The City has access to 9 mgd from the WFA Turnout 2. The maximum volume of water that the City can receive from their WFA connections is therefore 25 mgd. According to the City's operations staff, the WFA turnouts can currently be taken at a maximum flowrate of 17,260 AFY (15.4 mgd)

Based on historical records for 2007 through 2018, the average annual WFA supply has been 6,905 AFY (6.2 mgd), as shown in Table 3-1. The maximum annual supply was 10,967 AFY (9.8 mgd) in 2013. The minimum annual supply was 2,398 AFY (2.1 mgd) in 2016.

3-2.2 Chino Basin Desalter Authority

The City of Ontario is a member of the Chino Basin Desalter Authority (CDA), a joint powers agency created on September 25, 2001. Other members of the CDA include Jurupa Community Services District (JCSD), Santa Ana River Water Company (SARWC), IEUA, Western Municipal Water District (WMWD) and the Cities of Chino, Chino Hills, and Norco. The CDA purifies brackish groundwater extracted from the lower Chino Basin with the Chino 1 and Chino 2 Desalter facilities and distributes drinking water to member agencies. The treatment of the brackish groundwater, high in salts and nitrates, provide the members of the CDA a reliable source of water, as well as protects the downstream Santa Ana River of contamination. Each of the member agencies has "take or pay" contracts to purchase water produced by the CDA.

CDA owns and operates the two groundwater treatment desalination systems, Chino Desalter 1 (CDA I) and Chino Desalter 2 (CDA II). Both facilities include groundwater extraction wells, pumps and pipelines that provide water to advanced treatment facilities that include processes for pretreatment, filtration, air stripping of volatile organic compounds, ion exchange for removal of nitrates, and reverse osmosis for removal of salts. The treated water is then blended and disinfected to produce high quality drinking water that is delivered to member agencies through pipelines, pumps, and reservoirs.

CDA I is located in the City of Chino south of Kimball Avenue, west of Euclid Avenue. CDA I produces 14.2 mgd or 15,900 AFY of high-quality drinking water. In 2018, the City received 655AFY of water from the CDA I facility. The point of connection from CDA's facilities to the City's potable water system (1010 Zone) is located near the intersection of Archibald Avenue and the Remington Avenue. Water is pumped to the City from the JCSD system at the Archibald Pump Station. The water is a blend of CDA I water and JCSD system water.

CDA II is located at 11202 Harrel Street in Mira Loma, California. CDA has recently completed the Chino Desalter Phase 3 Expansion, which was planned to increase the existing capacity of CDA II by an additional 9.4 mgd or 10,500 AFY. Prior to the Phase 3 expansion, the City had a contract entitlement of 5,000 AFY (4.5 mgd). With the recent expansion the City's contract entitlement was increased to 8,533 AFY (8.6 mgd). Since the agreement is set up as "take or pay", the City tries to utilize the full entitlement.

The City has four points of connection to the CDA II system at the following locations:

- CDA II Lateral A – Philadelphia Street and Milliken Avenue (925 Zone)
- CDA II Lateral B – Philadelphia Street and Milliken Avenue (1010 Zone)

- CDA II Lateral C – Riverside Drive and Hamner Avenue (925 Zone)
- CDA II Lateral D – Riverside Drive and Hamner Avenue (1010 Zone)

The water at Laterals A and B consist of a blend of CDA II water and JCSD system water. The water at Laterals C and D consist water from CDA II alone.

3-2.3 Inter-Agency Connections

The City of Ontario has inter-agency connections with the following agencies:

- Cucamonga Valley Water District (CVWD) can provide water to the 1212 Zone, at the intersection of Milliken Avenue and Fourth Street. Water cannot be delivered to CVWD at this connection.
- City of Chino, can receive water from the City of Ontario's 1212 Zone, at reservoir near Benson Avenue and State Street. Water cannot be provided to the City at this connection.

3-3 Groundwater Supply

The City extracts groundwater from the Chino Groundwater Basin (Chino Basin or Basin), which is one of the largest groundwater basins in the Southern California area with storage capacity estimated at five to seven million acre-feet. It collects roughly 140,000 acre-feet of water each year. Chino Basin encompasses about 235 square miles of the upper Santa Ana River watershed and lies within portions of San Bernardino, Riverside, and Los Angeles counties. The location of the groundwater basin is illustrated in Figure 3-1.

3-3.1 Chino Basin Judgement

The Chino Basin Judgement (Judgement) was entered by the California State Superior Court for San Bernardino County on January 27, 1978. The Judgement adjudicates water rights in the Chino Basin and establishes the Chino Basin Watermaster (Watermaster) to account for and implement the management of the basin. The Judgement declared that the initial operation safe yield of the Chino Basin is 145,000 AFY. There are three pools of water users: agricultural, non-agricultural (industrial users), and appropriative (water municipalities and other government entities). The safe yield is allocated at 82,800 AFY to the agricultural pool, 7,366 AFY to the non-agricultural pool, and 54,834 AFY to the appropriative pool. The Judgement was expanded in 2000 and 2007 with the addition of Peace Agreements I and II, respectively, which further clarified the Watermaster's operations.

Per the Judgement, the City of Ontario has appropriative rights to 16,337 AFY and its share of the initial operating safe yield is 11,373 AFY or 21 percent of the 54,834 AFY appropriative pool rights. The City has secured additional supply through the following:

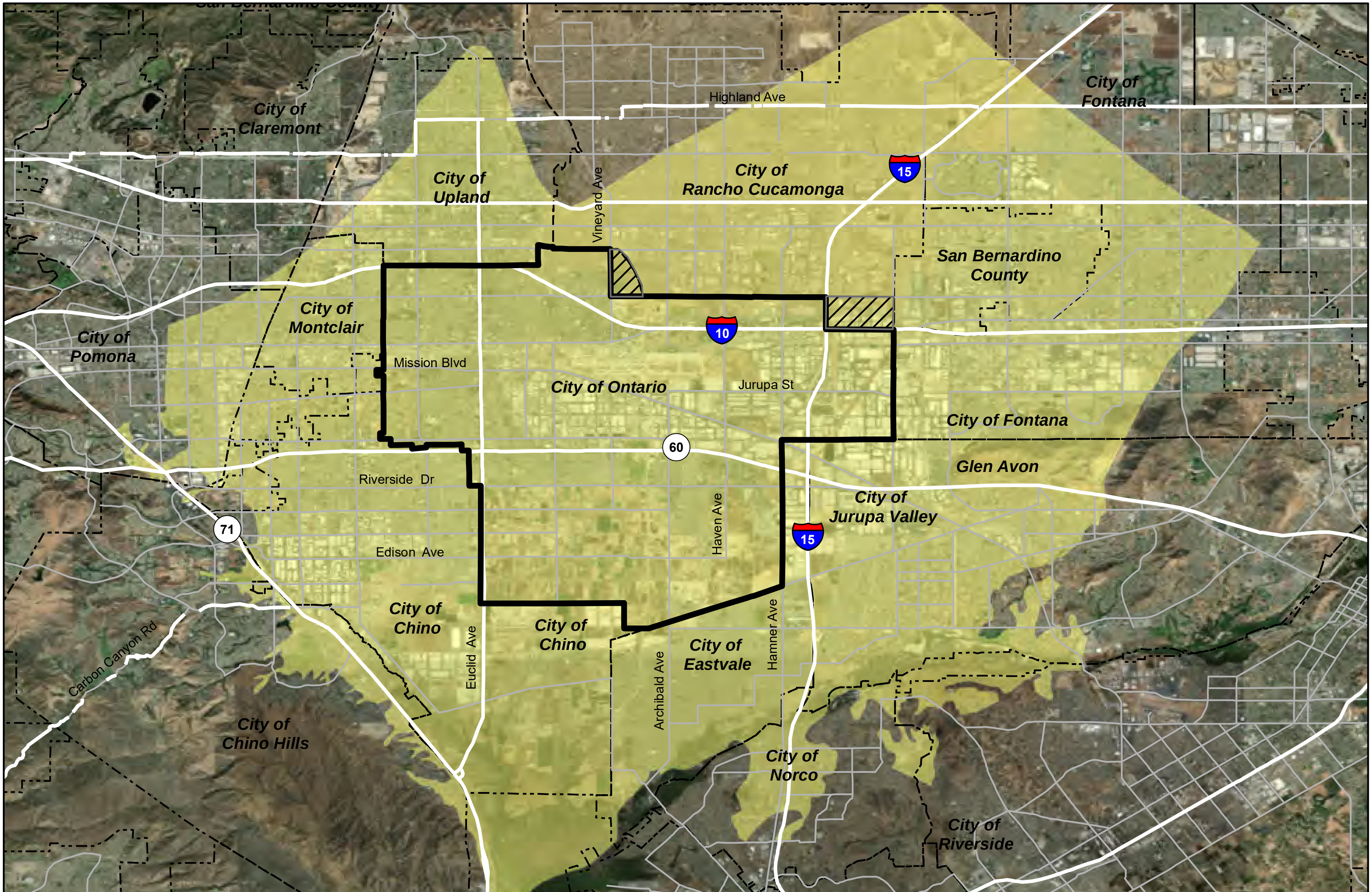
- Annual early transfers, which is expected water not used by agricultural pool
- Groundwater recharge from recycled water and storm water
- Purchased groundwater recharge rights from the City of Fontana
- Acquisition of San Antonio Water Company rights, available through the WFA connection

3-3.2 Watermaster

The Chino Basin Watermaster (Watermaster) is a governmental body responsible for managing water use and supplies within Chino Basin. The Watermaster's primary responsibilities include the following:

- Maintain and increase the water supply
- Sustain and improve water quality
- Ensure that water will be fairly shared
- Provide cooperative leadership
- Study and increase understanding of the basin

The Watermaster is comprised of three stakeholder groups based on how they use water obtained from the basin. The groups are called Pools and are represented by Pool Committees:



Legend

- Service Area Boundary
- Chino Groundwater Basin

ONTARIO

AKM

PROJECT NO: 1001398.00

DATE: June 2020

CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE

Chino Groundwater Basin

Figure 3-1

- Overlying Agricultural Pool Committee, representing dairymen, farmers, and the State of California;
- Overlying Non-Agricultural Pool Committee, representing area industries;
- Appropriative Pool Committee, representing local cities, public water districts, and private water companies.

Representatives from the three Pools form an Advisory Committee to oversee the regular activities of the Watermaster. The Pool Committees handle business affecting their own members and then make recommendations to the Advisory Committee. The Advisory Committee, in turn makes recommendations to the Watermaster Board of Directors, consisting of nine members appointed by the San Bernardino County Superior Court.

3-3.3 Optimum Basin Management Program

The Optimum Basin Management Program (OBMP) was adopted by the Watermaster after a 1998 court decree required the development of a detailed plan outlining issues facing Chino Basin and solutions to resolve them. The program was supposed to address water quality problems within the Chino groundwater basin and increase and improve the water supply available from this source. The OBMP identifies groundwater recovery in the southern portion of the basin as a way to improve basin water supplies.

The OBMP and the specific actions contained within it, has guided the Watermaster's activities ever since its adoption. The OBMP includes nine major tasks:

1. Comprehensive monitoring program for documenting changes in water level, quality, and flow by testing at wells within the Basin
2. Comprehensive recharge program
3. Water supply plan for the impaired areas of the Basin to improve water quality and supply
4. Regional supplemental water program
5. Comprehensive groundwater management plan for monitoring zone 1 to stop land subsidence
6. Cooperative programs with the Regional Board and other agencies to improve Basin management
7. Salt management program
8. Groundwater storage management program
9. Conjunctive use programs

3-3.4 Dry Year Yield Storage Program

The Dry Year Yield (DYY) Storage Program is a cooperative conjunctive use program involving MWD, IEUA, CBWM, Three Valleys Municipal Water District (TVMWD) and Chino Basin groundwater producers. Under the DYY Program, MWD is allowed to store up to 100,000 AFY of water in the Chino Basin when surplus water is available during wet years and to produce 33,000 AFY in dry, drought, or emergency periods.

The City of Ontario authorized execution of an agreement with IEUA to participate in the DYY program in 2003. Participation means that the City agrees to reduce its use of imported water compared to the previous year by a fixed amount, known as their "shift obligation". The City's shift obligation is 8,076 AFY. This means that during years when MWD calls for extraction, the City's WFA production would be reduced by 8,076 AFY compared to the previous year and it would extract this amount from the designated DYY wells.

DYY funds were used for the construction of three groundwater wells (Wells 45, 46, and 47) and an ion-exchange facility located at John Galvin Park to treat water extracted from Well 44 and Well 52. When MWD calls for stored water delivery, the City will operate these facilities, to meet its shift obligation. MWD would pay for the cost of operations and the City would pay MWD (through IEUA) the full service water rate. The City can use the DYY facilities to meet its normal water demands during other periods but is responsible for the O&M costs.

This program allows the City to be less reliant upon imported water supplies. The additional groundwater capacity allows the City to increase the percentage of groundwater supply used to meet peak demands.

3-4 Water Quality

Imported water quality and local groundwater quality per the City's 2018 Water Quality Report is shown in Table 3-2.

Imported water is generally of good quality with nitrate and total dissolved solid concentrations well below the established maximum contaminant levels.

The City's groundwater contains the following water quality issues for perchlorate, nitrates, 1,2,3 Trichloropropane (TCP), and bacterial constituents.

- Wells 3, 4, 9, 15, 31, 35, and 50 were removed from service due to high nitrate and/or perchlorate concentrations.
- Well 34 was removed from service due to (TCP) water quality issues.
- The operations of Wells 44 and 52 are limited due to the migration of the bacterial groundwater plume when these wells are used too frequently.
- Well 25 was taken out of service due to a PFOA detection, which was below the PFOA interim notification level.

Areas of high nitrate concentrations are shown on Figure 3-2.

The City is anticipating that all existing wells will require improvements to provide the necessary treatment capabilities for the various water quality issues with the groundwater source. Capital improvement projects are recommended for water quality treatment near Reservoir 925-2A, near future Reservoirs 925-1A and 925-1B, and for wells in the OMC.

Table 3-2
City of Ontario 2018 Water Quality Report

Ontario Municipal Utilities Company - 2018 Distribution System							
Constituent	Units	MCL or (AL) or (MRDLG)	PHG or (MCLG) or (MRDLG)	CA DLR (MRL)	Range Average	Distribution	Major Sources in Drinking Water
Microbiological							
Total Coliforms	% Positive per month	5% Positive per month	[0]	NA	Highest Monthly % Positive	0.65%	Erosion of natural deposits; residue from some surface water treatment processes
					# of months in Violation	0	
Heterotrophic Plate Count (HPC)	CFU/mL	TT	NA	[1]	# HPC>500 cfu/mL	1	Naturally present in the environment
					Lowest Monthly %	99.30%	
Physical Parameters							
Odor	Units	3	NA	1	Range	ND TO 62	Naturally-occurring organic materials
					Average	0.19	
pH	pH Unit	6.5-6.8	NA	[1]	Range	6.88 to 8.71	Measurement of hydrogen ion activity
					Average	7.56	
Turbidity	NTU	5	NA	0.1	Range	ND TO 0.76	Soil runoff
					Average	0.04	
Disinfetion By-Products and Disinfectant Residuals							
Haloacetic Acids (HAA5)	ppb	LRAA = 60	NA	2.0*	Range	ND TO 13	Byproduct of drinking water disinfection
					Highest LRAA	9	
Total Trihalomethanes	ppb	LRAA = 80	NA	1	Range	ND TO 69	Byproduct of drinking water disinfection
					Highest LRAA	59	
Chlorine Residual	ppm	(4)	(4)	NA	Range	0.02 TO 1.78	Drinking water disinfectant added for treatment
					Average	0.73	
Metals at Consumers Plumbing							
Copper	ppb	[1300]	300	50	NA	90th percentile: 160 PPB (0 exceeded AL/57 samples)	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead	ppb	[15]	0.2	5	NA	90th percentile: ND (0 exceeded AL/57 samples	Internal corrosion of household plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Unregulated Contaiminant Monitoring Rule 4 (2018)							
Anatoxin-a	ppb	NA	NA	[0.03]	Range	NR	
					Average	ND	
Cylindrospermopsin	ppb	NA	NA	[0.09]	Range	NR	
					Average	ND	
Total Microcystins	ppb	NA	NA	[0.3]	Range	NR	
					Average	ND	

*DLR =1.0 ppb for each HAA5 analyte except for monochloroacetic acid which has a DLR = 2.0ppb.

Unregulated contaminant monitoring helps USEPA and the State Water Resources Control Board to determine where certin contaminants occur and whether the contaminants need to be regulated.

Table 3-2

City of Ontario 2018 Water Quality Report (Continued)

CONSTITUENT	UNITS	MCL [NL]	PHG or [MCLG]	CA DLR [MRL]	Local Ground Ave.	Local Ground Range	Imported Water, Average	Imported Water, Range	Major Sources in Drinking Water
PRIMARY STANDARDS - Mandatory Health-Related Standards									
CLARITY									
Combined Filter Effluent	NTU and %	TT = 1 NTU	NA	NA	NA	NA	0.2 Highest		Soil Runoff
		TT					% ≤ 0.3	100%	
MICROBIOLOGICAL									
Total Coliform	%	5	[0]	NA	ND	ND to 1.1	ND	NR	Erosion of natural deposits; residue from some surface water treatment process.
Heterotrophic Plate Count (HPC)	# HPCs>500 cfu/mL	TT	NA	[1]	14	ND to 90	NA	NA	Erosion of natural deposites; runoff from orchards; glass and electronics production wastes.
ORGANIC CHEMICALS									
Dibromochloropropane	ppt	200	1.7	10	17	ND to 30	NA	NA	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit.
Ethylene Dibromibe	ppt	50	10	20	7	ND to 21	NA	NA	Discharge from pertoleum refineries; underground gas tank leaks; banned nematocide that may still be present in soils due to runoff and leaching from grain and fruit crops.
INORGANIC CHEMICAL									
Aluminum	ppb	1000	600	50	ND	NR	38	ND to 97	Erosion of natural deposits; residue from some surface water treatment processes
Barium	ppm	1	2	0.1	0.7	0.3 to 0.8	NA	NA	Discharges of oil drilling wastes and from metal.
Cadmium	ppb	5	0.04	1	0.4	NR	NA	NA	Internal corrosion of galvanized pipes; erosions of natural deposits; discharge from electroplating and industrial chemical factories, and metal refineries; runoff from waste batteries and paints.
Chromium, Total	ppb	50	[100]*	10	3.7	2.2 to 6.0	NA	NA	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits.
Hexavalent Chromium	ppb	**	0.02	[1]	3.6	2.1 to 6.0	ND	NR	Discharge from electroplating factories, leather tanneries, wood preservation, chemical synthesis, refractory production, and textile manufacturing facilities; erosion of natural deposits.
Fluoride (naturally-occuring)	ppm	2	1	0.1	0.2	0.1 to 0.3	0.15	ND to 0.41	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories.
Nitrate (as Nitrogen)	ppm	10	10	0.4	2.7	0.9 to 5.5	0.8	ND to 2.1	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits.
Nitrate and Nitrite (as Nitrogen)	ppm	10	10	[0.2]	2.6	1.2 to 4.1	0.8	ND to 2.1	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits.
Perchlorate	ppb	6	1	4	1.8	ND to 4.1	NA	NA	Perchlorate is an inorganic chemical used in solid rocket propellant, fireworks, explosives, flares, matches, and a variety of industries. It usually gets into drinking water as a result of environmental contamination from historic aerospace or other industrial operations that used or use, store, or dispose of perchlorate and its salts.

Table 3-2
City of Ontario 2018 Water Quality Report (Continued)

CONSTITUENT	UNITS	MCL [NL]	PHG or [MCLG]	CA DLR [MRL]	Local Ground Ave.	Local Ground Range	Imported Water, Average	Imported Water, Range	Major Sources in Drinking Water
DISINFECTION BY-PRODUCTS, DISINFECTANT RESIDUALS, AND DISINFECTION BY-PRODUCTS PRECURSORS									
Haloacetic Acids (HAA5)	ppb	LRAA = 60	NA	2	NA	NA	11	7 to 13	By-product of drinking water chlorination
Total Trihalomethanes (TTHMs)	ppb	LRAA = 80	NA	1	NA	NA	54	29 to 60	By-product of drinking water chlorination
Chlorine Residual	ppm	MRDL = 4	MRDLG = 4	NA	NA	NA	1.31	0.54 to 2.10	Drinking water disinfectant added for treatment
SECONDARY STANDARDS - Aesthetic Standards									
Aluminum	ppb	200	600	50	ND	NR	38	ND to 97	Erosion of natural deposits; residue from some surface water treatment processes
Chloride	ppm	500	NA	[1]	7.6	3.7 to 15	49	3.3 to 89	Runoff/leaching from natural deposits; seawater influence
Iron	ppb	300	NA	100	ND	NR	ND	NR	Leaching from naturla deposits; industrial wastes
Odor Threshold	TON	3	NA	1	ND	NR	1.3	ND to 2.0	Naturally-occurring organic materials
Specific Conductance	µS/cm	1600	NA	[1]	357	310 to 450	442	380 to 500	Substances that form ions when in water; seawater influence
Sulfate	ppm	500	NA	0.5	14	5.5 to 36	35	25 to 49	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids	ppm	1000	NA	NA	221	190 to 270	262	230 to 290	Runoff/leaching from natural deposits
Turbidity	NTU	5	NA	[0.10]	0.1	0.1 to 0.2	0.09	0.05 to 0.3	Soil runoff
OTHER PARAMETERS									
Alkalinity (Total)	ppm	NA	NA	[3]	143	130 to 160	103	58 to 180	Naturally-occurring carbonate; measures the water's ability to neutralize acid.
Bicarbonate	ppm	NA	NA	[3]	143	130 to 160	126	70 to 220	
Boron	ppb	[1000]	NA	100	NA	NA	68	ND to 160	Naturally-occurring element; Runoff/leaching from natural deposits and fertilizer use; industrial wastes.
Calcium	ppm	NA	NA	[1]	43	35 to 55	32	18 to 60	Naturally-occurring mineral
Corrosivity (Aggressiveness Index)	AI	NA	NA	NA	NA	NA	12	12 to 12.1	Elemental balance in water; affected by temperature, other factors
Corrosivity (Saturation Index)	SI	NA	NA	NA	NA	NA	0.36	0.29 to 0.43	Elemental balance in water; affected by temperature, other factors
Hardness	ppm	NA	NA	[3]	138	120 to 180	124	86 to 190	Naturally-occurring mineral; the sum of calcium and magnesium present in water
Magnesium	ppm	NA	NA	[1]	7.5	6.0 to 10	10.2	7.8 to 12	Naturally-occurring mineral
pH	pH units	NA	NA	[1]	8.2	8.0 to 8.3	8.47	8.1 to 8.8	Measurement of hydrogen ion activity
Potassium	ppm	NA	NA	[1]	1.8	1.5 to 2.1	2.4	1.9 to 2.8	Naturally-occurring mineral
Sodium	ppm	NA	NA	[1]	19	14 to 27	39	11 to 58	Naturally-occurring mineral; seawater influence
Total Organic Carbon (TOC)	ppm	TT	NA	0.3	NA	NA	2.3	1.8 to 2.8	Various natural and man-made sources
Vanadium	ppb	[50]	NA	3	NA	NA	3.4	ND to 4.9	Naturally-occurring elemental metal; used as vanadium pentoxide which is a chemical intermediate and a catalyst

Table 3-2

City of Ontario 2018 Water Quality Report (Continued)

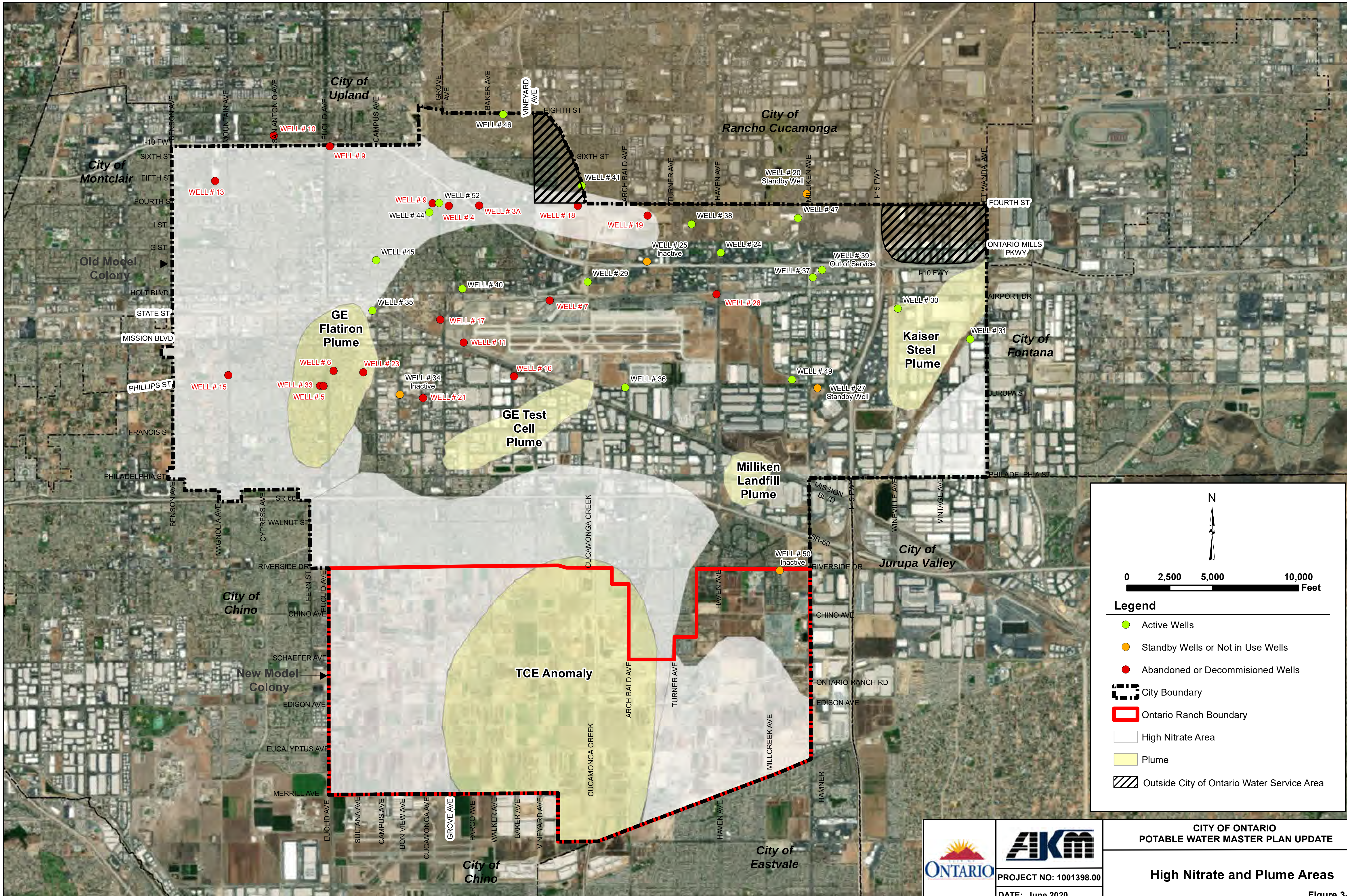
					Imported Water, JCSD						
					CDA 1		CDA 2		Ion Exchange		
CONSTITUENT	**UNITS**	**MCL [NL]**	**PHG or [MCLG]**	**CA DLR [MRL]**	**Ave**	**Range**	**Ave**	**Range**	**Ave**	**Range**	**Major Sources in Drinking Water**
PRIMARY STANDARDS - Mandatory Health-Related Standards											
INORGANIC CHEMICALS											
Chromium (total)	ppb	50	[100]*	10	ND	ND	0.9	ND to 4.5	3.8	3.0 to 5.8	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
Fluoride (Naturally -occurring)	ppm	2	1	0.1	ND	ND	ND	ND to 0.16	ND	ND to 0.16	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate (as Nitrogen)	ppm	10	10	0.4	5	4.5 to 5.5	5.1	3.8 to 5.8	6	4.2 to7.4	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
radiological											
Uranium	pCI/L	20	0.43	NA	ND	ND	ND	ND	1.7**	1.7**	Some people who drink water containing uranium in excess of the MCL over many years may have kidney problems or an increased risk of getting cancer.
DISINFECTION BY-PRODUCTS, DISINFECTNAT RESIDUALS, AND DISINFECTION BY-PRODUCTS PRECURSORS											
Haloacetic Acids (HAA5)	ppb	LRAA=60	NA	2	ND	ND	ND	ND	2.9	2.0 to 3.8	By-product of drinking water chlorination
Total Trihalomethanes (TTHMs)	ppb	LRAA = 80	NA	1	ND	ND	ND	ND	8.9	8.9	By-product of drinking water chlorination
Chlorine Residual	ppm	MRDL = 4	MRDLG = 4	NA	0.84	0.61 to 1.54	1.4	0.65 to 1.85	1.35	0.62 to 1.70	Drinking water disinfectant added for treatment
SECONDARY STANDARDS - Asethtic Standards											
Chloride	ppm	500	NA	[1]	108	96 to 120	68	13 to 79	63	23 to 110	Runoff/leaching from natural deposits; seawater influence
Color	Units	15	NA	3	3	3	ND	ND	ND	ND	Naturally occuring organic material
Specific Conductance	µS/cm	1600	NA	[1]	601	570 to 631	5.1	3.8 to 5.8	553	470 to 650	Substances that form ions when in water; seawater influence
Sulfate	ppm	500	NA	0.5	4.7	4.4 to 5.0	10	7.4 to 14	23	18 to 27	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (TDS)	ppm	1000	NA	NA	525	520 to 530	344	230 to 390	423	290 to 580	Runoff/leaching from natural deposits
Turbidity	NTU	5	NA	[0.10]	ND	ND to 0.17	ND	ND	ND	ND	Soil runoff
Surfactants	ppb	500	NA	NA	45	ND TO 90	50	ND TO 0100	ND	ND	

Table 3-2

City of Ontario 2018 Water Quality Report (Continued)

					Imported Water, JCSD						
					CDA 1		CDA 2		Ion Exchange		
CONSTITUENT	UNITS	MCL [NL]	PHG or [MCLG]	CA DLR [MRL]	Ave	Range	Ave	Range	Ave	Range	Major Sources in Drinking Water
OTHER PARAMETERS											
1,4-dioxane (1)	ppb	NA	NA	[0.07]	ND	ND	0.24	0.17 to 0.24	0.19	0.09 to 0.31	Cyclic aliphatic ether; used as a solvent or solvent stabilizer in manufacture and processing of paper, cotton, textile products, automotive coolant, cosmetics and shampoos.
Alkalinity (Total)	ppm	NA	NA	[3]	104	87 to 120	108	106 to 120	151	120 to 180	Naturally-occurring carbonate; measures the water's ability to neutralize acid.
Calcium	ppm	NA	NA	[1]	57	57	51	43 to 58	70	62 to 81	Naturally-occurring mineral.
Chlorate (1)	ppb	[800]	NA	[20]	23	21 to 25	42	27 to 57	71	31 to 170	Byproduct of drinking water disinfection; industrial process.
Hardness	ppm	NA	NA	[3]	190	190	158	130 to 180	206	108 to 240	Naturally-occurring mineral; the sum of calcium and magnesium present in water.
Hexavalent Chromium	ppb	***	0.02	[1]	ND	ND	ND	ND	3.5	3.0 to 5.1	Discharge from electroplating factories, leather tanneries, wood preservation, chemical synthesis, refractory production, and textile manufacturing facilities; erosion of natural deposits.
Magnesium	ppm	NA	NA	[1]	12	12	7.9	5.6 to 9.4	7.6	5.8 to 9.5	Naturally-occurring mineral.
Molybdenum (1)	ppb	NA	NA	[1]	ND	ND	1.9	ND to 3.9	0.9	ND to 1.7	Naturally-occurring element found in ores and present in plants, animals and bacteria; commonly used form molybdenum trioxide used as a chemical reagent.
N-Nitrosodimethylamine (NDMA)	ppt	[10]	NA	NA	7.2	7.2	ND	ND	ND	ND	
pH	pH units	NA	NA	[1]	7.7	7.5 to 7.9	8	7.9 to 8.1	8.1	7.9 to 8.2	Measurement of hydrogen ion activity.
Potassium	ppm	NA	NA	[1]	1.3	1.2 to 1.3	1.6	1.1 to 2.0	1.9	1.7 to 2.2	Naturally-occurring mineral.
Sodium	ppm	NA	NA	[1]	28	27 to 28	25	23 to 28	24	21 to 28	Naturally-occurring mineral; seawater influence.
Strontium (1)	ppb	NA	NA	[0.3]	370	360 to 380	351	270 to 440	515	360 to 680	Naturally-occurring element; historically, commercial use of strontium has been in the faceplate glass of cathode-ray tube televisions to block x-ray emissions.
Total Silica	ppm	NA	NA	NA	11	11	20	14 to 25	20	20	
Vandaium (1)	ppb	[50]	NA	[0.2]	1.4	1.3 to 1.4	1.5	1.0 to 1.9	3.3	2.1 to 4.4	Naturally-occurring elemental metal; used as vanadium pentoxide which is a chemical intermediate and a catalyst.

(1) Data was collected in 2014



CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE

PROJECT NO: 1001398.00

DATE: June 2020

High Nitrate and Plume Areas

Figure 3-2

SECTION 4
WATER USE

4-1 Historic Water Production and Purchase

The City obtains its potable water supply from groundwater wells in Chino Basin and imported water from the Water Facilities Authority (WFA) and the Chino Basin Desalter Authority (CDA). Currently, the City operates seventeen (17) active wells.

The total annual water production and purchase from January 2007 to December 2018 is shown in Table 4-1 and on Figure 4-1. Figure 4-2 illustrates the historic water production and purchase by month. Over the last twelve years, the annual supply has averaged a total of 35,774 AFY (31.9 mgd). The average groundwater production is 23,520 AFY (21.0 mgd). Per the Chino Basin Watermaster 41st Annual Report, the City of Ontario has appropriative rights to 16,337 AFY, and its share of the initial operating safe yield is 11,374 AFY or 21 percent of the appropriative pool rights. The City has secured additional supply through transfers, purchase, and groundwater recharge. The average amount of imported water purchased is 12,253 AFY (10.9 mgd).

There has been a decrease in production over the past twelve years. This may be attributed to the expansion of the City's recycled water system, as well as a conscientious water conservation effort by the customers. Water conservation is discussed further in Section 4-9.

Table 4-1

Historic Water Production and Purchase (Annual)

	Imported Water Purchased						Groundwater Well Production					Total Production and Purchase	
Calendar Year	CDA (AFY)	WFA (AFY)	SAWCO (AFY)	Total (AFY)	Total (mgd)	% of Total	Local (AFY)	DYY Shift (AFY)	Total (AFY)	mgd	% of Total	AFY	mgd
2007	5,125	12,734	0	17,859	15.9	40%	26,946	0	26,946	24.1	60%	44,806	40.0
2008	5,498	8,740	0	14,238	12.7	33%	27,064	2,000	29,064	25.9	67%	43,302	38.7
2009	5,047	3,494	0	8,541	7.6	22%	28,996	2,000	30,996	27.7	78%	39,537	35.3
2010	5,327	7,666	0	12,993	11.6	37%	20,955	1,043	21,997	19.6	63%	34,990	31.2
2011	5,162	8,883	0	14,046	12.5	41%	20,442	0	20,442	18.3	59%	34,488	30.8
2012	4,911	10,415	0	15,326	13.7	43%	20,226	0	20,226	18.1	57%	35,552	31.7
2013	4,987	10,967	0	15,954	14.2	44%	19,967	0	19,967	17.8	56%	35,921	32.1
2014	5,288	10,135	0	15,423	13.8	43%	20,274	0	20,274	18.1	57%	35,697	31.9
2015	3,543	6,413	443	10,399	9.3	35%	19,544	0	19,544	17.5	65%	29,943	26.7
2016	3,029	2,398	107	5,534	4.9	19%	24,132	0	24,132	21.5	81%	29,666	26.5
2017	3,039	3,035	294	6,367	5.7	20%	25,797	0	25,797	23.0	80%	32,164	28.7
2018	4,413	5,589	359	10,361	9.3	31%	22,860	0	22,860	20.4	69%	33,221	29.7
Average	**4,614**	**7,539**	**100**	**12,253**	**10.9**	**34%**	**23,100**	**420**	**23,520**	**21.0**	**66%**	**35,774**	**31.9**

Figure 4-1

Historical Water Production and Purchase (Annual)

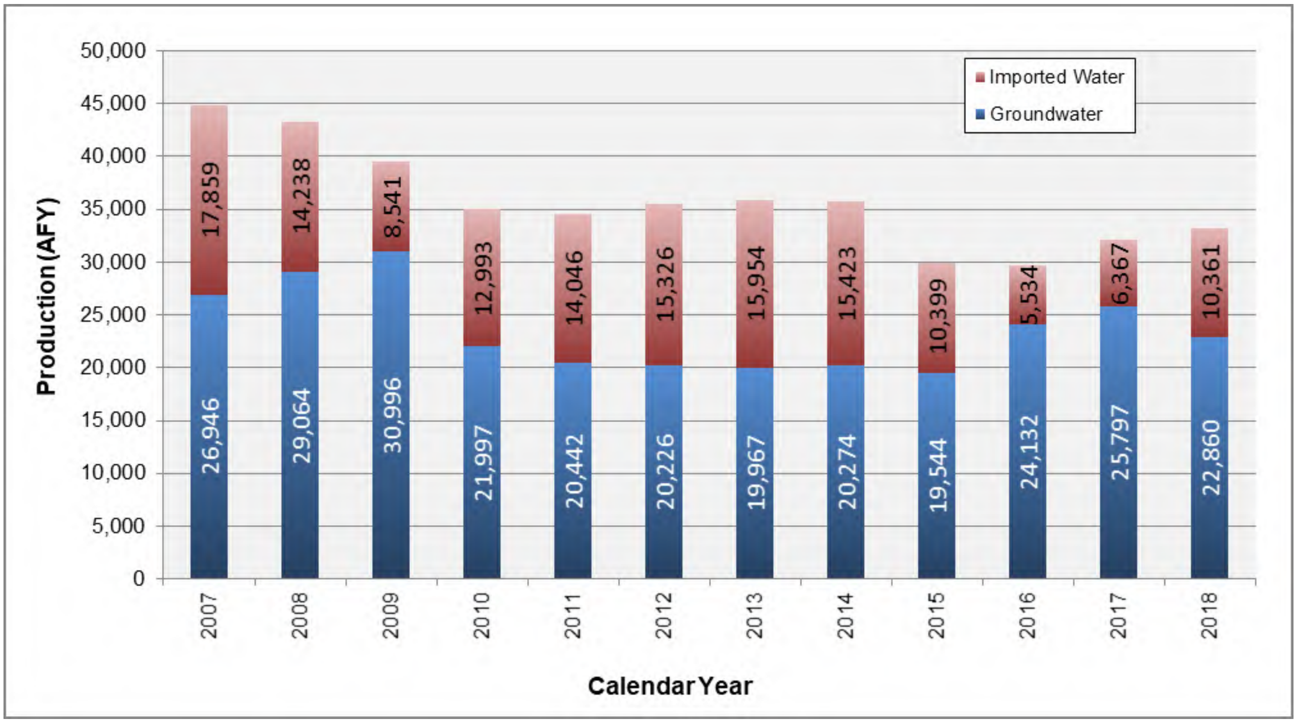
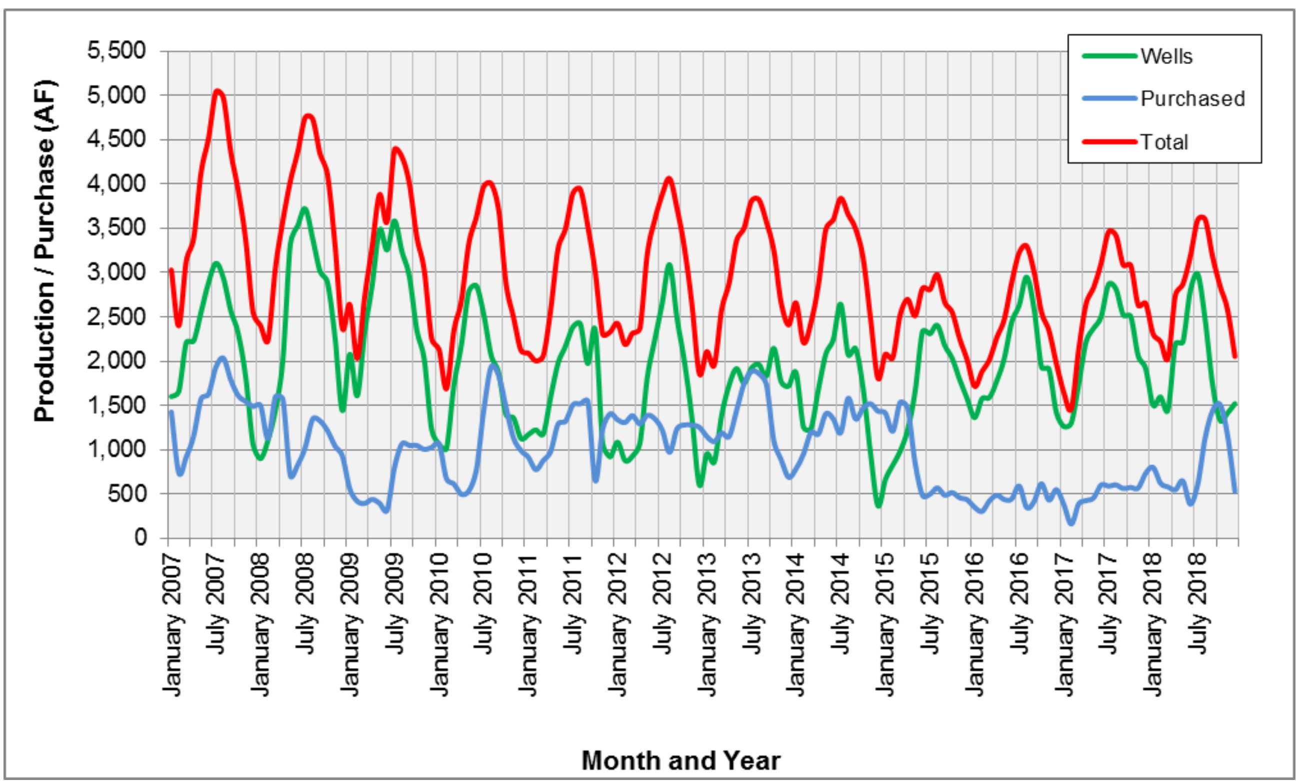


Figure 4-2

Historical Water Production and Purchase (Monthly)



4-2 Water Consumption versus Water Production / Purchase

The City typically purchases/produces more water than the quantity measured by the customer meters. Table 4-2 summarizes the difference between the measured consumption and production from 2007 to 2018. Figure 4-3 graphically shows the City's water consumption versus production/purchase.

Table 4-2

Water Consumption versus Water Production/Purchase

Calendar Year	Water Consumption[1] (AFY)	Water Production/ Purchase[2] (AFY)	Non-Revenue Water (%)	Population[3]	Per Capita Production/ Purchase (gpcd)	Per Capita Consumption (gpcd)
2007	44,286	44,806	1.2%	158,405	253	250
2008	42,072	43,302	2.8%	158,181	244	237
2009	37,708	39,537	4.6%	157,539	224	214
2010	35,403	34,990	-1.2%	158,154	198	200
2011	37,735	34,488	-9.4%	160,723	192	210
2012	37,652	35,552	-5.9%	160,827	197	209
2013	34,212	35,921	4.8%	161,812	198	189
2014	35,160	35,697	1.5%	162,778	196	193
2015[4]	29,346	29,943	2.0%	164,389	163	159
2016[4]	29,056	29,666	2.1%	165,966	160	156
2017[4]	30,817	32,164	4.2%	169,387	170	162
2018[4]	33,026	33,221	0.6%	171,819	173	172
Average	**35,539**	**35,774**	**2.6%**	**162,498**	**197**	**196**

[1] *Consumption from annual Department of Water Resources Public Water System Statistics Report.*

[2.] *Water Production/Purchase data extracted from City's Anuual System Operations Data*

[3] *Population data from California Department of Finance, E-5 Population and Housing Estimates for Cities 2000-2018, excluding estimate of population for areas in Ontario served by CVWD.*

[4] *Water consumption estimates are from monthly water billing data.*

Per the historical records, the consumption between 2010 and 2012 was more than the amount of water produced and/or purchased, which could not have actually happened. Possible explanations for the discrepancy in data include the following:

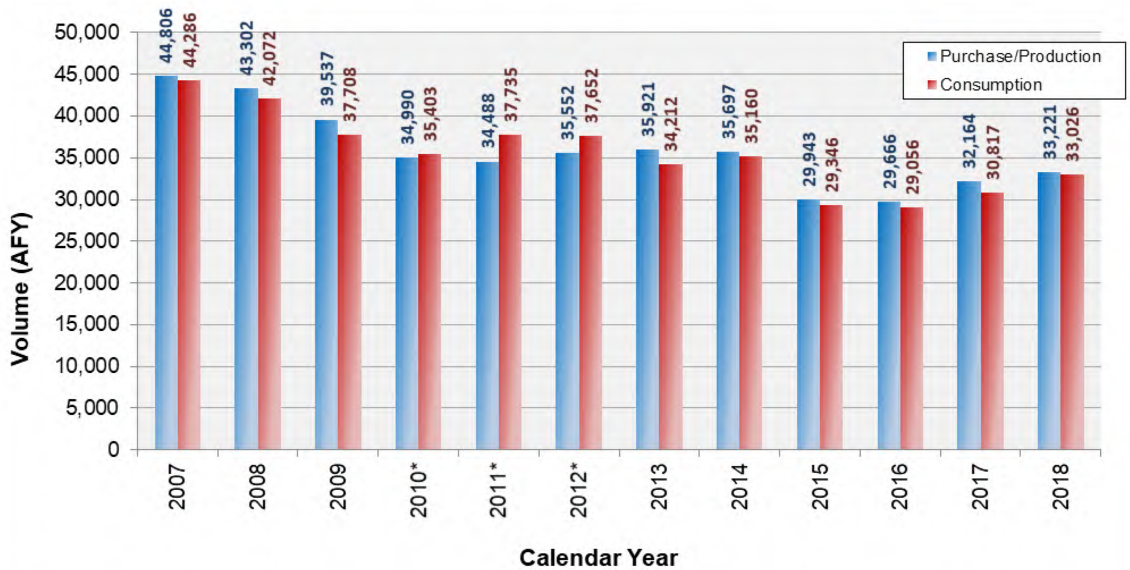
- During this time, the City was expanding its recycled water system. Some customers were converted from potable water use to recycled water use. Some of the consumption data might have actually been a combination of the potable and recycled water use.
- City staff has been updating and reclassifying meter types in its billing database. Some of the data provided in the historical DWR reports might have been misclassified at the time the report was created.
- Meters are not always perfectly calibrated. The margin of error in few large meters that measure production and purchase amounts or the thousands of small meters measuring consumption could contribute to the discrepancy in data.

The water consumption data before the 2015 Calendar Year is based on Department of Water Resources Public Water System Statistics Reports. After the 2015 Calendar Year, the consumption data is based on the monthly water billing data. Non-revenue water makes up between 0.6% and 4.8% of the total production and purchase supply, respectively. The City strives to keep the percentage as low as possible. The City's non-revenue water is 2.6%, on average.

Non-revenue water occurs in all water systems. There will be differences in the accuracies of the few large meters which measure purchases and production, and the thousands of small customer meters which measure sales. Non-revenue water can also be due to unmeasured uses such as water main flushing and other maintenance related tasks. The remainder may be due to leaks from the system. The City's average non-revenue water rate of 2.6%.

Figure 4-3

Water Consumption versus Water Production/Purchase



** Data discrepancy possibly doe to conversion of potable meters to recycled water system, reclassification of meters in billing database, and/or error in meter reads*

4-3 Water Demand Variations

Demand variations through a year are influenced by seasonal effects such as temperature, humidity, and precipitation. System demand variations throughout a day are influenced by the customer base and the daily lifestyles of the customers. In primarily residential areas, the peak demands within a day typically occur in the morning hours between 6:00 am and 9:00 am, when customers wake to begin their daily routine. In largely commercial and industrial areas, the peaks may occur mid-day or the demand may even remain relatively constant throughout the work day. For this study, the variations are expressed as a ratio to the average demand, with the average demand being equal to one.

For the purpose of this master plan, the average day demand was based on the most recent twelve consecutive months of production and purchase data that was available at the time the hydraulic model was created. The average day demand is summarized in Table 4-3.

Table 4-3
Average Day Demand for the Hydraulic Water Model

	AF	MGD	gpm
September 2018	3,179	34.53	23,980
October 2018	2,850	29.95	20,800
November 2018	2,583	28.06	19,483
December 2018	2,053	21.58	14,988
January 2019	1,915	20.13	13,980
February 2019	1,503	17.49	12,147
March 2019	1,831	19.25	13,366
April 2019	2,708	29.41	20,425
May 2019	2,682	28.19	19,574
June 2019	2,966	32.22	22,373
July 2019	3,404	35.78	24,847
August 2019	3,479	36.57	25,397
Total	**31,153**	**27.76**	**19,280**

4-4 Monthly Demand Variations

Typical of most Southern California communities, the City's water consumption exhibits a distinct seasonal pattern. Peak and low monthly consumption occur during the dry summer months and wet winter months, respectively. Monthly demand totals and factors for 2007 to 2018 are shown in Table 4-4. Peak demands typically occur in July and August. Low demands typically occur in February. The highest and lowest monthly demand factor for the 2018 Calendar year is 1.46 and 0.82, respectively.

The maximum month factor is estimated to be 1.46 times the ADD, which is representative of the OMC demands, since there is very little existing usage in the OR area. The OR maximum day peaking factor was estimated to be 1.36, which was developed by excluding a portion of the water use that is expected to be served through the recycled water system.

Table 4-4

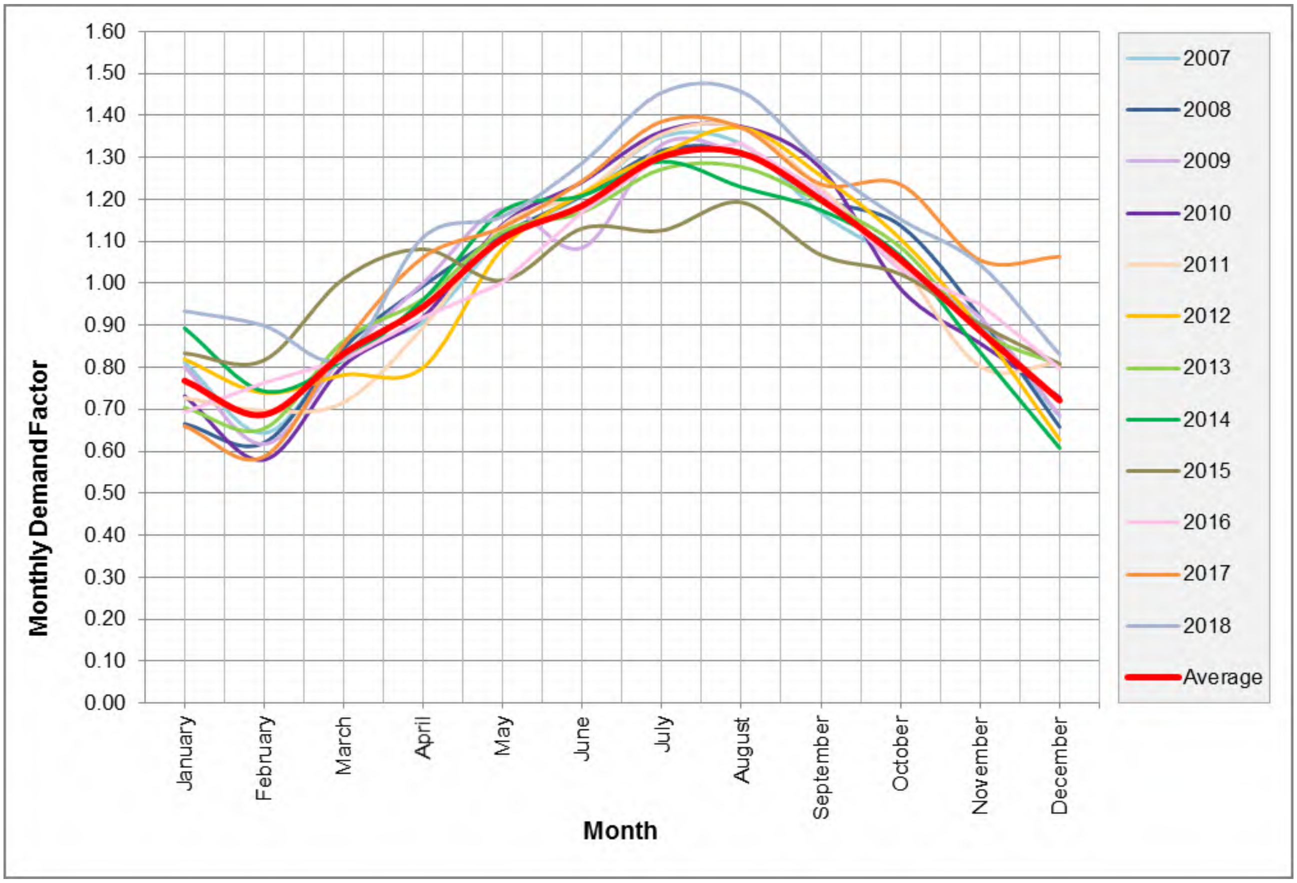
Monthly Water Demand Totals and Factors

	2007		2008		2009		2010		2011		2012		2013	
Month	**AF**	**Factor**	**AF**	**Factor**	**AF**	**Factor**	**AF**	**Factor**	**AF**	**Factor**	**AF**	**Factor**	**AF**	**Factor**
January	3,031	0.81	2,402	0.67	2,639	0.80	2,134	0.73	2,090	0.73	2,427	0.82	2,108	0.70
February	2,402	**0.64**	2,238	**0.62**	2,033	**0.62**	1,690	**0.58**	2,004	**0.70**	2,190	0.74	1,958	**0.65**
March	3,127	0.84	3,055	0.85	2,726	0.83	2,345	0.80	2,060	0.72	2,317	0.78	2,583	0.86
April	3,387	0.91	3,588	0.99	3,297	1.00	2,683	0.92	2,574	0.90	2,369	0.80	2,883	0.96
May	4,132	1.11	4,032	1.12	3,880	1.18	3,325	1.14	3,267	1.14	3,212	1.08	3,362	1.12
June	4,511	1.21	4,363	1.21	3,574	1.08	3,621	1.24	3,493	1.22	3,597	1.21	3,500	1.17
July	5,039	**1.35**	4,750	**1.32**	4,385	**1.33**	3,970	1.36	3,895	1.36	3,881	1.31	3,808	1.27
August	4,974	1.33	4,733	1.31	4,307	1.31	4,005	**1.37**	3,939	**1.37**	4,061	**1.37**	3,824	**1.28**
September	4,359	1.17	4,338	1.20	4,008	1.22	3,714	1.27	3,524	1.23	3,722	1.26	3,574	1.19
October	3,925	1.05	4,105	1.14	3,403	1.03	2,878	0.99	3,004	1.05	3,276	1.11	3,251	1.09
November	3,369	0.90	3,323	0.92	3,028	0.92	2,500	0.86	2,307	0.80	2,641	0.89	2,657	0.89
December	2,549	0.68	2,374	0.66	2,257	0.69	2,125	0.73	2,331	0.81	1,860	**0.63**	2,411	0.81
Average	**3,734**		**3,609**		**3,295**		**2,916**		**2,874**		**2,963**		**2,993**	

	2014		2015		2016		2017		2018		Average	
Month	**AF**	**Factor**	**AF**	**Factor**	**AF**	**Factor**	**AF**	**Factor**	**AF**	**Factor**	**AF**	**Factor**
January	2,657	0.89	2,080	0.83	1,717	0.69	1,647	0.66	2,309	0.93	2,270	0.77
February	2,210	0.74	2,039	0.82	1,884	**0.76**	1,465	**0.59**	2,223	0.90	2,028	**0.69**
March	2,434	0.82	2,523	1.01	2,020	0.82	2,133	0.85	2,034	**0.82**	2,446	0.83
April	2,859	0.96	2,698	1.08	2,271	0.92	2,650	1.06	2,744	1.11	2,834	0.94
May	3,487	1.17	2,513	1.01	2,476	1.00	2,830	1.13	2,867	1.16	3,282	1.11
June	3,596	1.21	2,822	1.13	2,890	1.17	3,104	1.24	3,181	1.29	3,521	1.19
July	3,838	**1.29**	2,809	1.13	3,226	1.30	3,458	**1.39**	3,596	1.45	3,888	1.30
August	3,657	1.23	2,977	**1.19**	3,301	**1.34**	3,421	1.37	3,601	**1.46**	3,900	**1.31**
September	3,494	1.17	2,664	1.07	3,008	1.22	3,085	1.24	3,179	1.29	3,556	1.20
October	3,168	1.07	2,550	1.02	2,554	1.03	3,083	1.24	2,850	1.15	3,171	1.06
November	2,488	0.84	2,252	0.90	2,347	0.95	2,634	1.06	2,583	1.04	2,677	0.89
December	1,809	**0.61**	2,016	**0.81**	1,973	0.80	2,654	1.06	2,053	0.83	2,201	0.72
Average	**2,975**		**2,495**		**2,472**		**2,680**		**2,768**		**2,981**	

Figure 4-4

Monthly Demand Factors



4-5 Daily Demand Variations

In the predominately developed OMC service area, the MDD is estimated to be 1.60 times the ADD. The OR maximum day peaking factor was estimated to be 1.50, which was developed by excluding a portion of the water use that is expected to be served through the recycled water system. The MDD estimate is summarized in Table 4-5.

In the hydraulic model, demands and patterns for high water users were allocated based on field data that was captured during the calibration period. For modeling purposes, the calibration diurnal pattern and demands were used for the ADD and MDD scenarios.

Table 4-5

Maximum Day Demand Summary

	ADD (gpm)			MDD/ADD Peaking Factor	MDD (gpm)		
	Non-HWU	HWU[1]	Total		Non-HWU	HWU[1]	Total
Original Model Colony (OMC)	17,196	1,691	18,887	1.6	27,512	1,691	29,202
Ontario Ranch (OR)	391	2	393	1.5	586	2	588
Total	17,587	1,693	19,280		28,097	1,693	29,790

[1] *High water user demand and diurnal patterns are based on the calibration period*

4-6 Hourly Demand Variations

Knowledge of accurate demand variations over a 24-hour period is essential for proper analysis of water systems. For this study, diurnal use patterns were developed for each hydraulic zone. Customer specific diurnal patterns were developed for high water users. The development of diurnal use patterns are described in detail in Section 5 (Diurnal Patterns) of this report.

4-7 System Demands and Peaking Factors

It is important to evaluate a water system during various incremental peak demands. Typically, a water system is designed to meet the maximum demands placed on it. The system components must be designed to cope with these demands as they occur. Maximum month and maximum day demands are important factors in sizing a system's supply capability. Maximum day demands usually dictate the design criteria for both system transmission and storage needs. Peak hour criterion is a measure of the system's overall adequacy with respect to its transmission and distribution elements, as well as its operational storage capacity.

The peaking factors for Ontario Ranch (OR) was further refined to account for the fact that it is planned to be largely residential in nature and there were a dual recycled water system constructed in all major streets. The City anticipates a target of 12 percent of the total water use in low density residential areas to be provided by the recycled water system. It is expected that this percentage will increase as the residential density increases. With more recycled water and less irrigation use on the domestic water system, the peaking factors in OR are reduced as detailed in Table 4-6. These factors are utilized for future demand estimates in Ontario Ranch. The relationships between the peaking factors developed for this study with respect to the average day demand estimate are displayed graphically on Figure 4-5.

Table 4-6

Existing Water System Demands and Peaking Factors

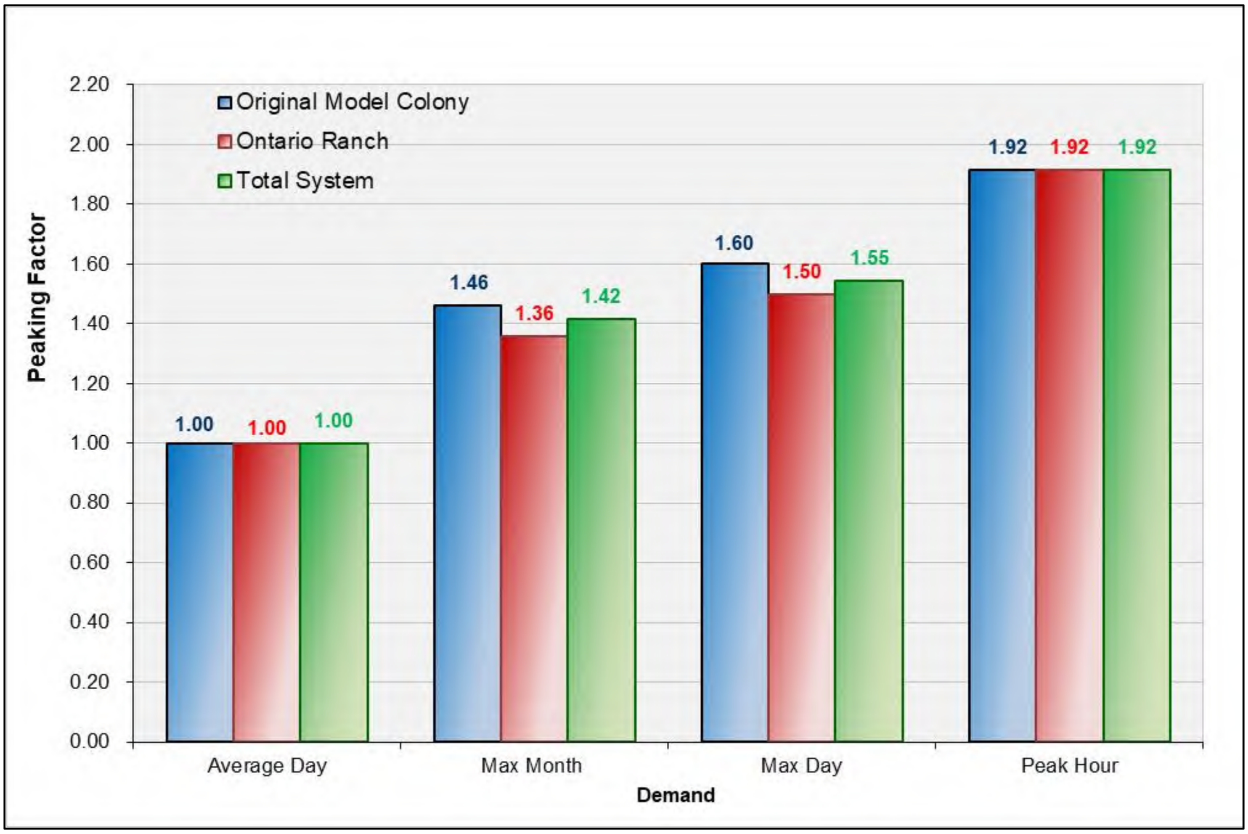
Demand Description	OMC Demand	OR Demand	HWU Demand[1]	Total System Demand			(OMC) Peaking Factor	(OR) Peaking Factor	Total System Peaking Factor
	(gpm)	(gpm)	(gpm)	(gpm)	(mgd)	(AFY)			
Average Day	17,196	391	1,693	19,280	27.76	31,098	1.00	1.00	1.00
Max Month	25,107	531	1,693	27,331	39.36	44,085	1.46	1.36	1.42
Max Day	27,512	586	1,693	29,790	42.90	48,051	1.60	1.50	1.55
Peak Hour[2]	N.A.	N.A.	N.A.	36,934	53.19	59,575	N.A.	N.A.	1.98

[1] *High water user demand and diurnal patterns are based on the calibration period*

[2] *System Wide Peak Hour Factor was developed with multiple diurnal patterns that differ by zone, meter type, and for high water users.*

Figure 4-5

Water Demand Peaking Factors



4-7.1 Existing Demands

- **Average Day -** As detailed in Table 4-2, the average day demand is based on the City of Ontario's average daily production and purchase data between September 2018 and August 2019. As shown in Table 4-5, the average day demand is 31,153 AFY (19,280 gpm).
- **Maximum Month -** As detailed in Table 4-6, the maximum month peaking factor for OMC and OR are 1.46 and 1.36, respectively. The maximum month demand is estimated as 45,341 AFY (28,109 gpm).
- **Maximum Day -** As detailed in Table 4-6, the maximum day peaking factor for OMC and OR are 1.6 and 1.5, respectively. The maximum day demand is estimated as 48,051 AFY (29,790 gpm).
- **Peak Hour Demands -** Modeled peak hour demands were based upon the diurnal patterns that were developed for the hydraulic model, as detailed in Section 5. The overall peak hour system demand is estimated to be 1.98 times the average day demand or 61,656 AFY (38,224 gpm). This factor varies by zone depending on the diurnal patterns developed by zone, meter type, and for high water users.
- **Existing Water Demands by Zone -** Existing water demands by zone are shown in Table 4-5. These estimates are based upon the demand distribution generated from water billing historical data linked to the City's meter geodatabase. The average day demands (ADD) were distributed in the model using the 12-month consumption data from the City's billing department, adjusted to the most-recent production and purchase data (31,094 AFY; 27.8 mgd; 19,280 gpm) which takes into consideration non-revenue water.

  Generally, the ADD were increased with the factors included in Table 4-6 to develop the Maximum Day Demands (MDD), which are summarized by zone in Table 4-7. It should be noted that the MDD model demands for the high water users are based on actual field data collected during the calibration period, and they are not estimated with the MDD peaking factor included in Table 4-6. The MDD total 48,051 AFY (42.9 mgd; 29,790 gpm).

Table 4-7

Existing Water Demands by Zone

Zone	Average Day Demand				Maximum Day Demand[1]			
	gpm	mgd	AFY	% of Total	gpm	mgd	AFY	% of Total
1348	2,059	2.96	3,321	10.7%	3,273	4.71	5,280	11.0%
1212	8,947	12.88	14,432	46.4%	13,718	19.75	22,127	46.0%
1074	3,839	5.53	6,192	19.9%	5,939	8.55	9,579	19.9%
1010	4,153	5.98	6,698	21.5%	6,439	9.27	10,386	21.6%
925	282	0.41	455	1.5%	422	0.61	680	1.4%
Total	**19,280**	**27.76**	**31,098**	**100.0%**	**29,790**	**42.90**	**48,051**	**100.0%**

[1] *MDD for high water users model demands are based on actual field data collected, not MDD peaking factors included in Table 4-6*

4-7.2 Water Unit Demand Factors

Existing consumption data was used in this study to represent the water use of existing customers. For future developments, water unit demand factors were used to estimate future water use. Potable water unit demand factors are generally based on the factors that were developed as a part of a study completed in May 2016 entitled "*Ultimate Citywide Water Demand Estimate*".

The revised potable water unit demand factors are shown in Table 4-8.

The residential unit demand factors were first developed in terms of gpd/person. Then the maximum densities (people/du and du/ac) were applied to determine the factors in other units. The resulting unit factors in terms of gpd/du and gpd/ac represent the maximum expected demand factors.

The 2016 study included maximum residential densities in the Ontario Ranch area, which were based on historical development projections that were provided by the City's planning department. Some of the recent actual projections are higher than those included in the Ontario Plan, which needed to be updated to appropriately develop the demand factors and the future demand estimate.

Table 4-8

Potable Water Unit Demand Factors

Landuse		Max Density (du/ac)[1]	Density (people/du)[2]	Domestic Water Unit Demand Factors[3]			
				gpd	unit	gpd/ac	gpd/du
Residential							
Rural Residential	RR	2	3.997	172	gpd/person	1,375	687
Low Density Residential (w/o RW)	LDR	4	3.997	123	gpd/person	1,970	492
Low Density Residential (w/ RW)	LDR	5	3.997	95	gpd/person	1,900	380
Low Medium Density Residential (w/o RW)	LMDR	8.5	3.997	105	gpd/person	3,570	420
Low Medium Density Residential (w/ RW)	LMDR	11	3.997	90	gpd/person	3,960	360
Medium Density Residential (w/o RW)	MDR	18	3.347	90	gpd/person	5,420	301
Medium Density Residential (w/ RW)	MDR	25	3.347	80	gpd/person	6,690	268
High Density Residential (w/o RW)	HDR	35	3.347	70	gpd/person	8,200	234
High Density Residential (w/ RW)	HDR	40	3.347	60	gpd/person	8,030	201
Commercial							
Business Park (w/o RW)	BP			103	gpd/job	3,140	
Business Park (w/ RW)	BP	-	-	59	gpd/job	1,800	-
General Commercial (w/o RW)	GC			258	gpd/job	3,140	
General Commercial (w/ RW)	GC	-	-	148	gpd/job	1,800	-
Hospitality[4] (w/o RW)	HOS			155	gpd/room	5,980	
Hospitality[4] (w/ RW)	HOS	-	-	130	gpd/room	5,000	-
Neighborhood Commercial (w/o RW)	NC			99	gpd/job	3,140	
Neighborhood Commercial (w/ RW)	NC	-	-	57	gpd/job	1,800	-
Office Commercial (w/o RW)	OC			53	gpd/job	3,840	
Office Commercial (w/ RW)	OC	-	-	35	gpd/job	2,500	-
Industrial							
Industrial (w/o RW)	IND	-	-	110	gpd/job	2,290	-
Industrial (w/ RW)	IND	-	-	67	gpd/job	1,400	-
Mixed Use[5]							
High Density Residential (w/o RW)	MU-HDR	35	2.000	70	gpd/person	4,900	140
High Density Residential (w/ RW)	MU-HDR	40	2.000	60	gpd/person	4,800	120
Office (w/o RW)	MU-O			53	gpd/job	3,840	
Office (w/ RW)	MU-O	-	-	35	gpd/job	2,500	-
Non-Office (w/o RW)	MU-NO			179	gpd/job	2,690	
Non-Office (w/ RW)	MU-NO	-	-	102	gpd/job	1,800	-
Open Space							
Open Space Non-Recreational (w/o RW)	OS-NR					2,340	
Open Space Non-Recreational (w/ RW)	OS-NR	-	-	-		1,000	-
Open Space Recreational (w/o RW)	OS-R					2,340	
Open Space Recreational (w/ RW)	OS-R	-	-	-		1,000	-

Table 4-8 (Continued)

Potable Water Unit Demand Factors

Landuse		Max Density (du/ac)[1]	Density (people/du)[2]	Domestic Water Unit Demand Factors[3]			
				gpd	unit	gpd/ac	gpd/du
Public							
Public Facility (w/o RW)	PF					3,040	
Public Facility (w/ RW)	PF	-	-	-		1,700	-
Public Middle or High School (w/o RW)	PS	-	-	50	gpd/student	3,500	-
Public Middle or High School (w/RW)	PS	-	-	10	gpd/student	1,800	-
Public Elementary School (w/o RW)	PS	-	-	30	gpd/student	3,500	-
Public Elementary School (w/RW)	PS	-	-	10	gpd/student	1,800	-

[1] Max Density per the City's 2010 General Plan (The Ontario Plan) for OMC without recycled water. Density for LDR, LMDR, MDR, and HDR with recycled water (Ontario Ranch) were increased per the City Planning Department recommendation (March 2016).

[2] Density per the City's 2010 General Plan (The Ontario Plan)

[3] Unit Flow Factor Abbreviations:

ac = acre	*du = dwelling unit*	*gpd = gallons per day*
room = hotel/motel room	*stu = student*	*tsf = thousand square feet*

[4] If possible it is recommended to use 130 - 155 gpd/room on a case by case basis. It is difficult to estimate the number of rooms or square footage per acre.

[5] Mixed Use demands should be based on the types of landuse that make up the specific area and the unit demand factors provided above. The City's 2010 General Plan (The Ontario Plan) provides detailed information on the landuses that make up each mixed use area.

4-7.3 Future Demands

The City of Ontario's Future water system demands utilized in this study are detailed in Table 4-9 by zone. Generally, the ADD were increased with the factors included in Table 4-6 to develop the Maximum Day Demands (MDD), which are summarized by zone in Table 4-7. It should be noted that the MDD model demands for the high water users are based on actual field data collected during the calibration period, and they are not estimated with the MDD peaking factor included in Table 4-6. The MDD total 48,051 AFY (42.9 mgd; 29,790 gpm).

Table 4-9

Future Water demands by Zone

Zone	Average Day Demand				Maximum Day Demand[1]			
	gpm	mgd	AFY	% of Total	gpm	mgd	AFY	% of Total
1348	2,137	3.08	3,446	6.0%	3,398	4.89	5,481	6.2%
1212	11,298	16.27	18,224	31.6%	17,481	25.17	28,196	31.9%
1074	4,103	5.91	6,618	11.5%	6,361	9.16	10,261	11.6%
1010	6,292	9.06	10,149	17.6%	9,706	13.98	15,657	17.7%
925	11,886	17.12	19,172	33.3%	17,831	25.68	28,762	32.6%
Total	**35,716**	**51.43**	**57,610**	**100.0%**	**54,778**	**78.88**	**88,357**	**100.0%**

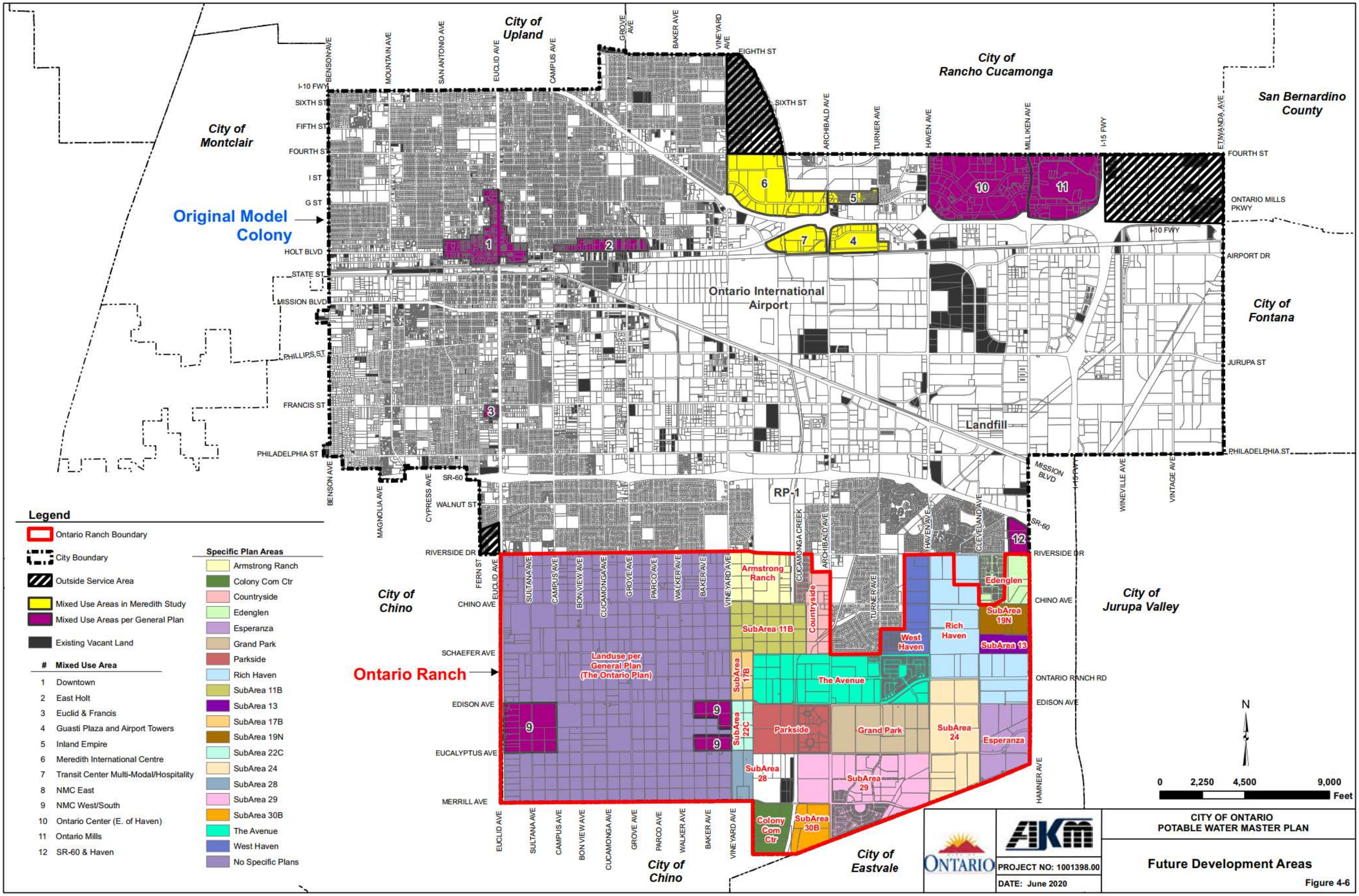
[1] MDD for high water users model demands are based on actual field data collected, not MDD peaking factors included in Table 4-6

The increase in future water demand is due to development of Ontario Ranch, anticipated densification in land use and population per the City's 2010 General Plan, and the assumption that the area within the service area will be fully occupied (vacant land will be built upon and occupied).

The total water maximum day demand for the future system is estimated 54,778 gpm (78.88 mgd; 88,357 AFY). This Subsection describes the process of developing the future system demands for the areas that are going to be developed or redeveloped and distributing the demands in the hydraulic model. The existing demands remained the same unless an area was going to be redeveloped.

In summary, the following steps were used to estimate the future demands:

1. Existing meter data was used for existing uses.
2. Used Water Demand Factors included in Table 4-7 to estimate demand for the vacant and future densification areas. In areas of redevelopment the existing demands were updated with the estimated flows for the future development.
3. The "City Buildout Table" approved in April 2015 (*Appendix 4-1*) provided the population and job estimates for all future mixed use areas as defined by the Ontario Plan (General Plan). The unit flow factors provided in Table 4-7 were used to estimate the total average day water demand for mixed use areas. Any existing water demands were deducted from the total future average water demand estimate. If the existing demands were greater than the calculated future demands, the existing water demand was maintained in the hydraulic model. The difference was then applied to the hydraulic model in the specific mixed use area.
4. In the Original Model Colony, future average water demands were calculated for currently vacant parcels, assuming that they will be developed in the future per the land use designated in the General Plan. The parcel acreage and the water demand factors provided in Table 4-7 were utilized to estimate the total water demand.
5. All available specific plans and other more current planning information were utilized for Ontario Ranch. The specific plan areas are shown on Figure 4-6. The City compiled the information and provided table specifying the proposed land uses (*Appendix 4-1: Ontario Ranch Proposed Land Uses per Specific Plans*). The detailed land use information and the water demand factors provided in Table 4-7 were utilized for calculating the future water demands. Demands were applied to the nearest model junction. If less than 50 percent of a specific plan area was constructed at the time of this study, all existing water demand was removed and replaced with the projected future water demand. If a specific plan area was mostly constructed, the difference in existing and future water demand was added to the model in that particular area.
6. On the west side of Ontario Ranch, where no specific plans yet exist, the future water demands were calculated utilizing the General Plan land uses, parcel acreages, and the water demand factors provided in Table 4-7. Demands were applied to the nearest model junction.


City of Upland
City of Rancho Cucamonga
San Bernardino County
City of Montclair
Original Model Colony
Ontario International Airport
City of Fontana
Landfill
RP-1
City of Chino
City of Jurupa Valley
Ontario Ranch
City of Eastvale
City of Chino
Landuse per General Plan (The Ontario Plan)
Armstrong Ranch
SubArea 11B
Countryside
West Haven
Rich Haven
Edenglen
SubArea 19N
SubArea 13
The Avenue
SubArea 17B
SubArea 22C
Parkside
Grand Park
SubArea 24
Esperanza
SubArea 28
SubArea 29
Colony Com Ctr
SubArea 30B
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
EIGHTH ST
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
ONTARIO RANCH RD
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
MAGNOLIA AVE
CYPRESS AVE
FERN ST
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
CUCAMONGA CREEK
CLEVELAND AVE
WINEVILLE AVE
VINTAGE AVE
HAMNER AVE
Legend
Ontario Ranch Boundary
City Boundary
Outside Service Area
Mixed Use Areas in Meredith Study
Mixed Use Areas per General Plan
Existing Vacant Land
Mixed Use Area
1 Downtown
2 East Holt
3 Euclid & Francis
4 Guasti Plaza and Airport Towers
5 Inland Empire
6 Meredith International Centre
7 Transit Center Multi-Modal/Hospitality
8 NMC East
9 NMC West/South
10 Ontario Center (E. of Haven)
11 Ontario Mills
12 SR-60 & Haven
Specific Plan Areas
Armstrong Ranch
Colony Com Ctr
Countryside
Edenglen
Esperanza
Grand Park
Parkside
Rich Haven
SubArea 11B
SubArea 13
SubArea 17B
SubArea 19N
SubArea 22C
SubArea 24
SubArea 28
SubArea 29
SubArea 30B
The Avenue
West Haven
No Specific Plans
N
0 2,250 4,500 9,000 Feet
ONTARIO
AKM
PROJECT NO: 1001398.00
DATE: June 2020
CITY OF ONTARIO
POTABLE WATER MASTER PLAN
Future Development Areas
Figure 4-6

4-8 Recycled Water

The City's recycled water use was 9,653 AFY (3,042 gpm) in Fiscal Year 2018. The recycled water is supplied by Inland Empire Utilities Agency (IEUA). Recycled water from IEUA's treatment plants are conveyed through IEUA's pipe conveyance system to the City's recycled distribution system. According to the City's billing data, there are approximately 370 recycled customer meters in the City.

The City's Recycled Water Master Plan was last updated in April 2006. It is being updated concurrent to this master plan. Potable water customers that are anticipated to be converted to the recycled water system in the future will be identified as part of the recycled water master plan update.

4-9 Water Conservation

Title 6, Chapter 8A, The Emergency Water Conservation Plan of the City's Municipal Code addresses water conservation issues. The reference for this Chapter is Ordinance 2907, which became effective June 16, 2009.

Voluntary conservation is encouraged to limit the amount of water used to the amount absolutely necessary for health, business, and irrigation. The following elements of conservation apply at all times on a voluntary basis:

- Avoid hose washing of sidewalks, walkways, driveways, parking areas or other paved surfaces, except as required for sanitary purposes.
- Wash motor vehicles, trailers, boats and other types of mobile equipment using a hand held bucket or a hose equipped with a positive shutoff nozzle for quick rinses, or at the immediate premises of a commercial car wash or with recycled wastewater for approved uses.
- Avoid using water to clean, fill or maintain levels in decorative fountains, ponds, lakes or other similar aesthetic structures unless such water is part of a recycling system.
- Encourage restaurants, hotels, cafés, cafeterias or other public places where food is sold, served or offered for sale, to serve drinking water only to those customers expressly requesting water.
- Promptly repair all leaks from indoor and outdoor plumbing fixtures.
- Avoid watering lawn, landscape or other turf area more often than every other day and during the hours between 6:00 a.m. and 6:00 p.m.
- Avoid causing or allowing the water to run off landscape areas into adjoining streets, sidewalks or other paved areas due to incorrectly directed or maintained sprinklers or excessive watering.

The City maintains water conservation information on their website for viewing by the public. Information includes water use efficiency and conservation tips, links to other websites pertaining to water conservation, and links to IEUA's website where indoor and outdoor rebates are offered for residents of the IEUA service area. Indoor and outdoor rebates are also offered to commercial businesses

4-9.1 California Water Conservation

A variety of executive orders have been issued since 2009 regarding water conservation in the state of California. The following is a brief summary:

1. **November 2009 – Senate Bill SBx7-7 (i.e. The Water Conservation Act of 2009) enacted**
   - Requires State of California Department of Water Resources (DWR) in consultation with other state agencies, to develop a single standardized water use reporting form that can be used by both urban and agricultural water agencies.
   - For urban water conservation, the legislation sets an overall goal of reducing per capita urban water use by 20 percent by December 31, 2020.
2. **April 2014 Proclamation**
   - Governor declares a drought State of Emergency to exist in California due to severe drought conditions.

- Calls on Californians to reduce their water usage by 20 percent.
- Suspends California Environmental Quality Act to allow the emergency regulation and other actions to take place as quickly as possible

3. **December 2014 - Executive Order B-28-14**
   - Extends the California Environmental Quality Act suspension through May 2016
4. **April 2015 - Executive Order B-29-15**
   - Imposes restrictions on urban water suppliers to achieve a statewide 25 percent reduction in potable urban usage through February 2016
   - Requires commercial, industrial, and institutional users to implement water efficiency measures
   - Prohibits irrigation with potable water of ornamental turf in public street medians
   - Prohibits irrigation with potable water outside newly constructed homes and buildings that is not delivered by drip or microspray systems
   - Directs urban suppliers to develop rate structures and other pricing mechanisms to promote water conservation
   - Requires urban suppliers to increase enforcement against water waste
5. **November 2015 – Executive Order B-26-15**
   - Directs State agencies to prioritize and accelerate approvals for projects that enhance the ability of a local or state agency to capture high precipitation events
   - Extends drought restrictions through October 2016
6. **May 2016 - Executive Order B-37-16**
   - Aims to bolster California's climate and drought resilience by instructing State agencies to help Californians adopt permanent changes to use water more wisely.
   - Directs the State Water Resources Control Board to develop new mandatory water conservation regulations
   - Directs the Department of Water Resources to update new water use targets for urban water agencies. These new targets will build upon the existing requirement to achieve 20% reduction in usage by 2020. The executive order states that new targets would be developed no later than 2020, with the goal of reaching full compliance by 2025.
   - Directs the State Water Resources Control Board to eliminate water waste by
     - **i.** permanently prohibits practices that waste potable water
     - **ii.** directing actions to minimize water system leaks
     - **iii.** directing urban and agricultural water suppliers to accelerate data collection, improve water system management and prioritize capital projects to reduce water waste
   - Directs the Department of Water Resources to strengthen local drought resilience by updating requirements for Water Shortage Contingency Plans
   - Directs the Department of Water Resources to improve agricultural water use efficiency and drought planning
7. **April 2017 – Executive Order B-40-17 was issued**
   - Terminates the January 17, 2014 Drought State of Emergency
   - Rescinds Executive Orders B-26-14, B-28-14, B-29-15, and B-36-15

- Most of Executive Order B-37-16 (Making Water Conservation a California Way of Life) remains in full force. The Department of Water Resources and State Water Resources Control Board continues to:

  i. develop permanent prohibitions on wasteful water use and requirements for reporting water use by urban water agencies. Permanent restrictions include:

  - ✓ Hosing off sidewalks, driveways and other hardscapes
  - ✓ Washing automobiles with hoses not equipped with shut-off nozzle
  - ✓ Using non-recirculated water in a fountain or other decorative water feature
  - ✓ Watering lawns in a manner that causes runoff, or within 48 hours after measurable precipitation
  - ✓ Irrigating ornamental turf on public street medians

  ii. develop standards that urban water suppliers will use to set new urban water use efficiency targets

  iii. direct actions to minimize water system leaks that waste large amounts of water.

  iv. direct urban and agricultural water suppliers to accelerate their data collection, improve water system management, and prioritize capital projects to reduce water waste

  v. work with agencies and suppliers to identify mechanisms that would encourage and facilitate the adoption of rate structures and other pricing mechanisms that promote water conservation

8. Assembly Bill No. 606 – May 31, 2018

- authorizes State Water Resources Control Board (SWRCB), along with the Department of Water Resources (DWR) to issue regulation requiring wholesale water suppliers, urban retail water suppliers, or distributors of public water supply to submit information relating to water production, water use, or water conservation.
- require urban water suppliers to submit a urban water usage objective report by November 1, 2023
- updates the requirements of the urban water management plans

9. Assembly Bill No. 1668 – May 31, 2018

- authorizes State Water Board, along with the Department of Water Resources (DWR) to issue regulation requiring wholesale water suppliers, urban retail water suppliers, or distributors of public water supply to submit information relating to water production, water use, or water conservation.
- establishes 55 gallons per capita daily as the standard for indoor residential water use beginning January 1, 2025 and 50 gallons per capita daily beginning January 1, 2030
- require DWR and SWRCB to adopt standards to monitor the performance of commercial, industrial, and institutional water use.
- Includes penalties of $1,000 to $10,000 per day to the water supplier for violations to this order

SECTION 5

DIURNAL PATTERNS

5-1 General

Knowledge of accurate demand variations over a 24-hour period is essential for proper analysis of water systems. For this study, 15-minute demand variations were represented by the development of diurnal demand patterns based on recorded field data. The diurnal demand patterns are used to develop an extended period hydraulic model simulation. The model analysis is used to determine the adequacy of the sources of supply, pumping facilities, reservoirs, and the transmission / distribution facilities. For this study, diurnal patterns were created for each hydraulic pressure zone for residential usage, non-residential usage, and high water users (HWUs).

5-2 Diurnal Patterns Areas

SCADA data was collected from April 8, 2019 to April 22, 2019. An electronic database with the following information for each facility was provided for use in developing the diurnal patterns.

1. Reservoirs – levels
2. Booster Pump Stations – total flow
3. Wells – flow
4. Turnouts - flow
5. Flow Control Facilities - flow

The SCADA information was utilized in calculating the demands for each diurnal pattern area in 15 minute increments over a typical 24-hour period (average weekday excluding days with odd usages and/or missing data). Diurnal patterns were based on data for April 18, 2019, for each of the following pressure zones:

1. 925 Zone
2. 1010 Zone
3. 1074 Zone
4. 1212 Zone
5. 1348 Zone

It should be noted that the diurnal patterns start at 12 am and end at 12 am of the following day. As the model runs, the first time step represents 12 am midnight.

The mass balance of the supply in, flow out, and change in reservoir level for each of the hydraulic pressure zones is summarized in Table 5-1. The diurnal patterns for each of the five pressure zones are shown on Figure 5-1.

Section 5-3 to Section 5-5 detail the processes used to develop use patterns for residential, non-residential, and high water users.

Figure 5-1
Total Zone Diurnal Patterns

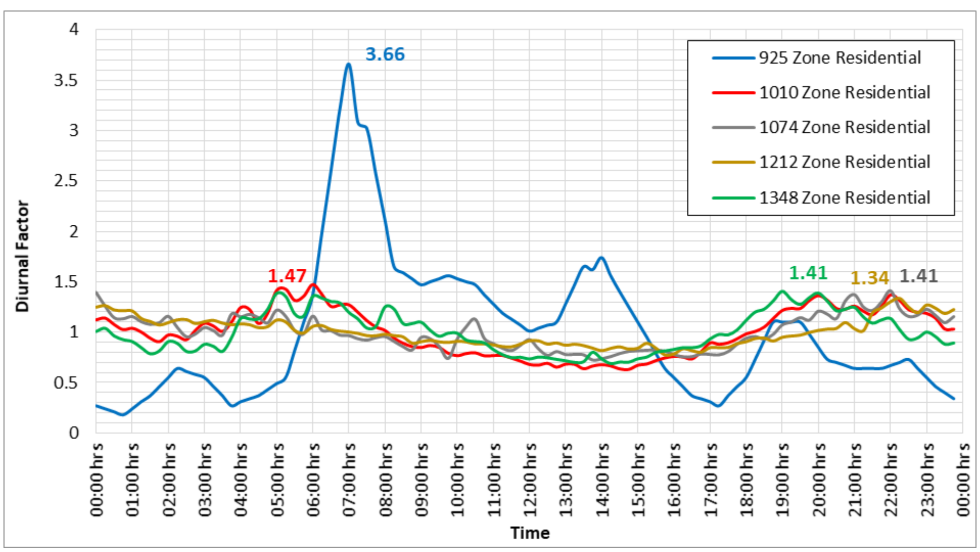


Table 5-1

Diurnal Pattern Mass Balance Summary

Hydraulic Zones	Reservoirs (Supply In or Out)	Supply In	Supply Out
925	Reservoir 925-2A	CDAII Lat A	CDA Ontario Booster 1, Booster 2, and Booster 3
		CDAII Lat C	
		Well 49	
		AV-925-2	
		PRS17	
		PRS18	

Hydraulic Zones	Reservoirs (Supply In or Out)	Supply In	Supply Out
1010	Reservoir 1010-1	Well 34[1]	CDA Milliken Booster 1, Booster 2, and Booster 3.
	Reservoir 1010-2A	Well 39[1]	PRS17
	Reservoir 1010-2B	Well 50[3]	PRS18
		CDAII Lat B	
		CDAII Lat D	
		CDA1 (Archibald Ranch Booster Pump Station 1010-1 and 1010-2)	
		AV-1010-1	
		AV-1010-2	
		PRS2	
		PRS3	
		PRS4	
		PRS5	
		PRS7	
		PRS8	
		PRS13	

Table 5-1 (Continued)

Diurnal Pattern Mass Balance Summary

Hydraulic Zones	Reservoirs (Supply In or Out)	Supply In	Supply Out
	Reservoir 1074-1A	Well 35[3]	Galvin Booster 1074-1, 1074-2, 1074-3
	Reservoir 1074-1B	Well 36	Galvin Booster 1074-4
		Well 40[2]	AV-1010-1
		Well 44[4]	PRS2
		Well 45	PRS3
		Well 52	PRS4
		AV-1074-1	PRS5
		PRS6	
		PRS10	
		PRS11	
		PRS12	
1074		PRS21	

Hydraulic Zones	Reservoirs (Supply In or Out)	Supply In	Supply Out
	Reservoir 1212-1A	WFA 1	Booster 1348-1 and 1348-2
	Reservoir 1212-1B	WFA 2A	Booster 1348-3 and 1348-4
	Reservoir 1212-3	Well 20[1]	AV-1010-2
		Well 24	AV-1074-1
		Well 25[1]	AV-925-2
		Well 27[1]	PRS6
		Well 29[2]	PRS7
		Well 30	PRS8
		Well 31 [3]	PRS10
		Well 37	PRS11
		Well 38	PRS12
		Well 41	PRS13
		Well 47	PRS21
		Galvin Booster 1074-1, 1074-2, 1074-3	
		CDA Milliken Booster 1, Booster 2, and Booster 3.	
		CDA Ontario Booster 1, Booster 2, and Booster 3	
1212		PRS15	

Table 5-1 (Continued)

Diurnal Pattern Mass Balance Summary

Hydraulic Zones	Reservoirs (Supply In or Out)	Supply In	Supply Out
1348	Reservoir 1348-1A	WFA 2	WFA 2A
	Reservoir 1348-1B	1348 Well 46	PRS15
	Reservoir 1348-1C	Booster 1348-1 and 1348-2	
		Booster 1348-3 and 1348-4	
		Galvin Booster 1074-4	

[1] *Well is currently inactive, but could be placed back in service*

[2] *Well use is restricted due to high operation and energy costs*

[3] *Well usage is restricted due to water quality*

[4] *Ion exchange treatment is necessary*

5-3 Residential Diurnal Patterns

The service area is predominately residential to the west and industrial to the east. To account for the variations in usage by type, diurnal patterns were developed for the residential customers.

Automatic meter infrastructure (AMI) data was gathered for approximately 4,000 meters, which were predominately single family residential meters located in the OMC area. Multi-family residential usage was not included with the residential diurnal pattern, since there was limited AMI data and its usage pattern was not consistent with the single family residential use patterns. Hourly data was gathered between April 8, 2019 and April 22, 2019. The residential diurnal pattern was developed for each pressure zone by summarizing the total residential water usage for each hour for the April 18, 2019 calibration day. The residential diurnal patterns for each pressure zone are detailed on Figure 5-2.

During the calibration period, the demands in the 925 Zone were only 282 gpm (455 AFY), as detailed in Table 4-7. The existing land use is predominately residential, with several large developments that were under construction at that time. It is understood that the diurnal pattern developed from the mass balance estimate is representative of residential land use, and it is used for model calibration and existing system analyses. As illustrated on Figure 5-1, the residential demand factor variation in the 925 Zone is greater than those developed for the other zones. This difference can be attributed to the overall low demand in this zone, which may be heavily influenced by several high water users. As the development in the 925 Zone is expanded, the intermittent peaks will lessen as the future customer's peak usage offset each other to develop a more appropriate diurnal pattern. For the future demand scenario, the 1010 Zone residential diurnal pattern was applied to the residential customers in the 925 Zone. As development expands and becomes occupied, it is recommended that the City reevaluate the residential diurnal patterns in the 925 Zone, and make model updates, as necessary.

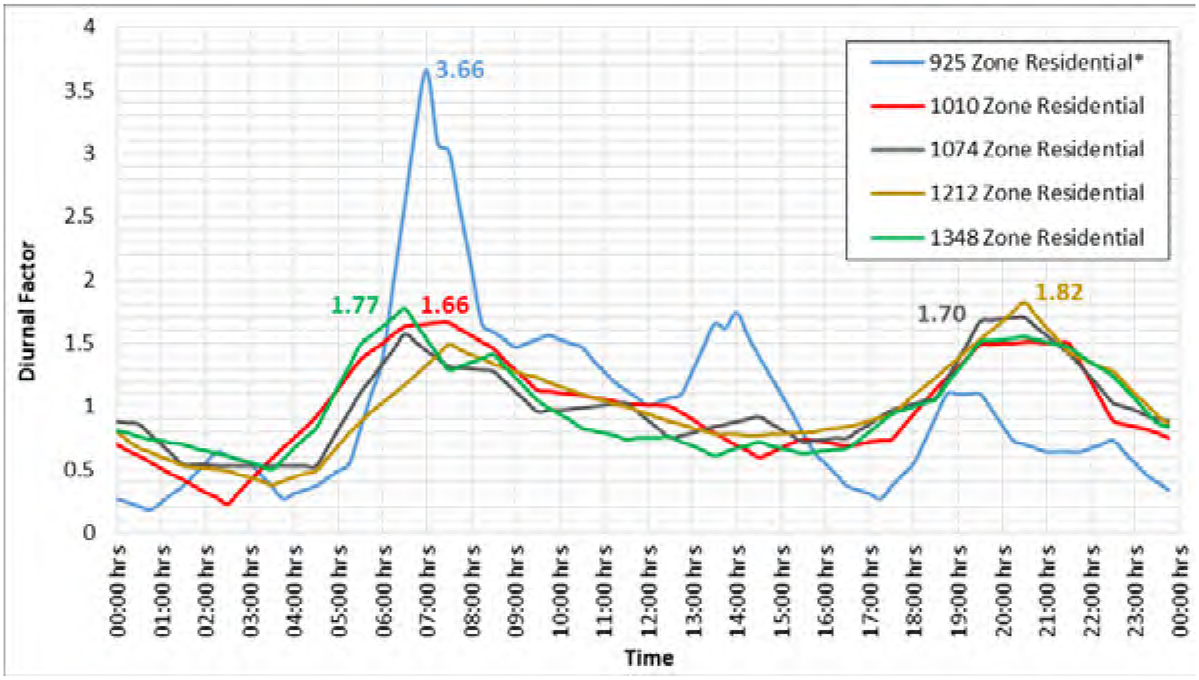
5-4 Non-Residential Diurnal Patterns

To create the non-residential patterns for each pressure zone, the residential use were subtracted from the total use patterns for each zone over the 24-hour period. In addition, the demand for customers with high water use were also excluded when developing the non-residential diurnal pattern, since diurnal patterns were developed specifically for each of these high water use customers. Multi-family residential usage was included in the non-residential diurnal pattern, since there was limited AMI data and its usage pattern was not consistent with the residential use patterns. The non-residential diurnal patterns for each pressure zone are detailed on Figure 5-3.

During the time of calibration, there was insufficient non-residential usage within the 925 Zone. For the future demand scenario, the 1010 Zone non-residential diurnal pattern was applied to the residential customers in the 925 Zone. As development expands and becomes occupied, it is recommended that the City reevaluate the residential diurnal patterns in the 925 Zone, and make model updates, as necessary.

Figure 5-2

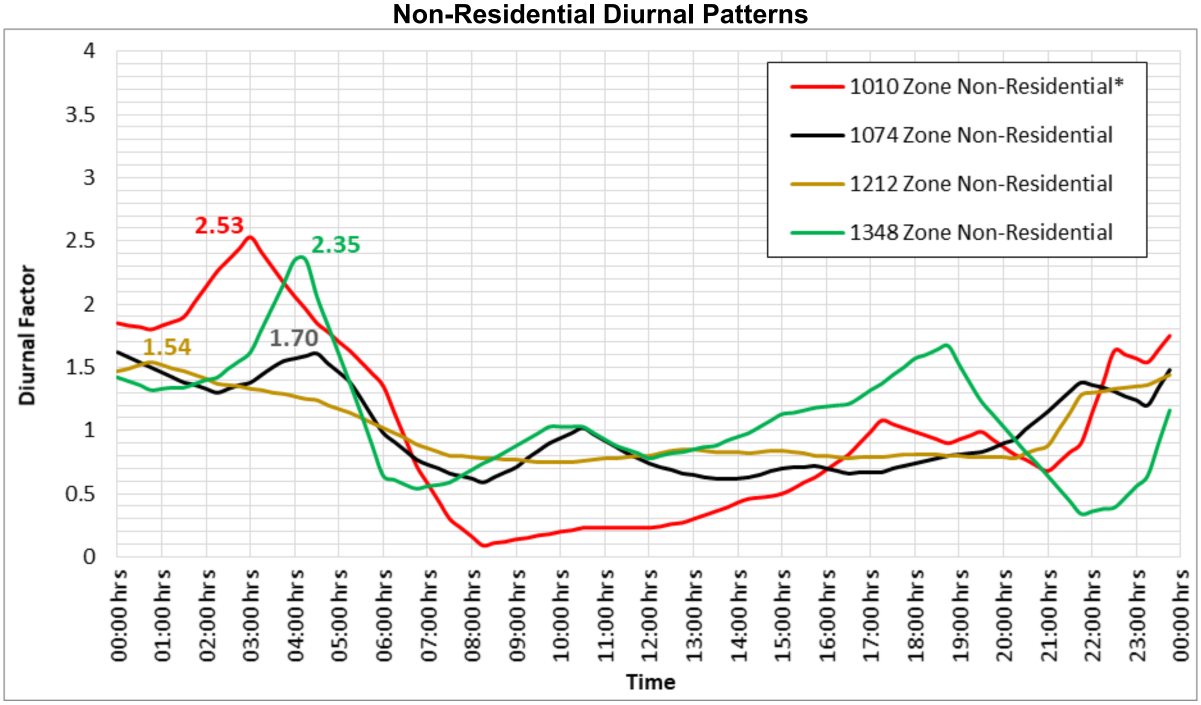
Residential Diurnal Patterns



**Future 925 Zone demands are represented with the 1010 Zone diurnal pattern.*

Figure 5-3

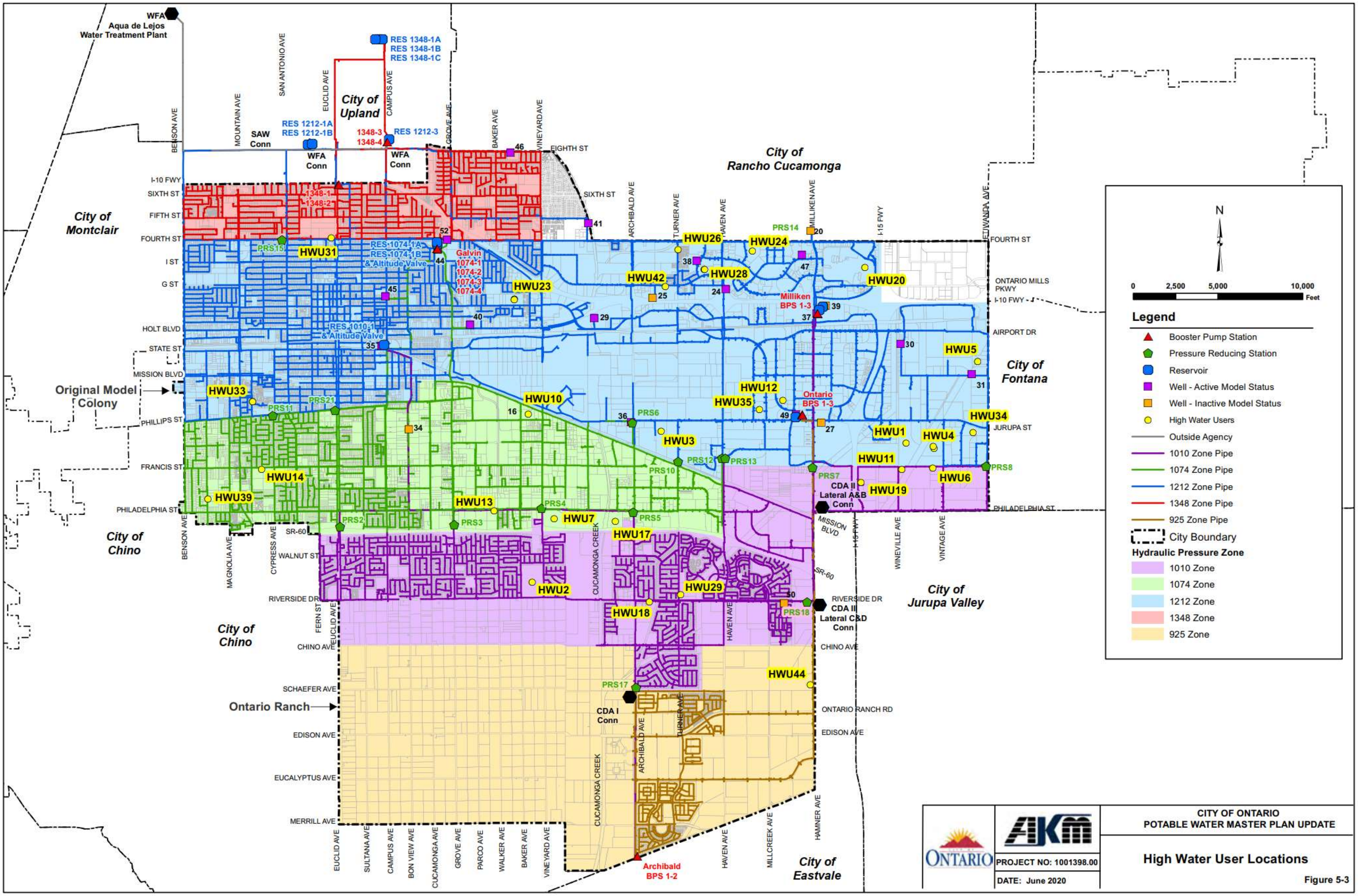
Non-Residential Diurnal Patterns



**Future 925 Zone demands are represented with the 1010 Zone diurnal pattern.*

5-5 High Water User Diurnal Patterns

To further refine the demand distribution, specific diurnal patterns were developed for the customers with the highest water use. Billing records from 2016 were reviewed to identify the high water use customers. To capture the total flow for some of these customers, multiple meters were needed. Automatic meter reading (AMR) data was gathered by the City's operations staff. Data was captured in hour increments between April 8, 2019 and April 22, 2019. The summary of high water user location is detailed on Figure 5-4, and summarized in Table 5-2. Specific use patterns for these high water users is detailed in Appendix 5-1.



WFA Aqua de Lejos Water Treatment Plant
RES 1348-1A
RES 1348-1B
RES 1348-1C
City of Upland
RES 1212-1A
RES 1212-1B
SAW Conn
WFA Conn
1348-3
1348-4
RES 1212-3
1348-1
1348-2
City of Montclair
City of Rancho Cucamonga
RES 1074-1A
RES 1074-1B
& Altitude Valve
Galvin 1074-1 1074-2 1074-3 1074-4
RES 1010-1
& Altitude Valve
Milliken BPS 1-3
Ontario BPS 1-3
City of Fontana
Original Model Colony
City of Chino
City of Jurupa Valley
CDA II Lateral A&B Conn
CDA II Lateral C&D Conn
CDA I Conn
Ontario Ranch
Archibald BPS 1-2
City of Eastvale
EIGHTH ST
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
ONTARIO RANCH RD
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
MAGNOLIA AVE
CYPRESS AVE
FERN ST
CUCAMONGA CREEK
WINEVILLE AVE
VINTAGE AVE
HAMNER AVE
MILLCREEK AVE
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
HWU1 HWU2 HWU3 HWU4 HWU5 HWU6 HWU7 HWU10 HWU11 HWU12 HWU13 HWU14 HWU17 HWU18 HWU19 HWU20 HWU23 HWU24 HWU26 HWU28 HWU29 HWU31 HWU33 HWU34 HWU35 HWU39 HWU42 HWU44
PRS2 PRS3 PRS4 PRS5 PRS6 PRS7 PRS8 PRS10 PRS11 PRS12 PRS13 PRS14 PRS15 PRS17 PRS18 PRS21
N
0 2,500 5,000 10,000 Feet
Legend
Booster Pump Station
Pressure Reducing Station
Reservoir
Well - Active Model Status
Well - Inactive Model Status
High Water Users
Outside Agency
1010 Zone Pipe
1074 Zone Pipe
1212 Zone Pipe
1348 Zone Pipe
925 Zone Pipe
City Boundary
Hydraulic Pressure Zone
1010 Zone
1074 Zone
1212 Zone
1348 Zone
925 Zone
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POTABLE WATER MASTER PLAN UPDATE
PROJECT NO: 1001398.00
DATE: June 2020
High Water User Locations
Figure 5-3

Table 5-2
High Water Use Locations

ID	Model ID	Pattern	Model Demand (gpm)	Name	Address	SP_ID	Meter Type	Pressure Zone	2016 Average Demand (gpm)
1	N24DB103	CAL_Z1212_HWU_1	362.6	New Indy Ontario	5100 E Jurupa St	6557400761	WATERIND	1212 Zone	305.7
2	R17FIT153	CAL_Z1010_HWU_2	91.1	Country Meadows	1855 E Riverside Dr	3836400013	WATERMF	1010 Zone	110.1
3	WMP2019_FIT00514	CAL_Z1212_HWU_3	41.5	Ventura Foods	2900 E Jurupa St	8194400106	WINDNWW	1212 Zone	100.9
4	N25FIT124	CAL_Z1212_HWU_4	147.2	Coca Cola USA	1650 S Vintage Av	3435400799	WATERIND	1212 Zone	88.3
	N25FIT123	CAL_Z1212_HWU_4	90.7	Coca Cola USA	1650 S Vintage Av	3435400843	WATERIND	1212 Zone	75.3
5	L25FIT114	CAL_Z1212_HWU_5	69.1	Unifirst Corp	700 S Etiwanda Av	7506400929	WATERCOM	1212 Zone	80.6
6	N25FIT136	CAL_Z1010_HWU_6	106.5	Crothall Healthcare Inc	5410 E Francis St	5227400881	WATERCOM	1010 Zone	74.0
7	WMP2019_FIT00257	CAL_Z1074_HWU_7	101.3	Kaiser Permanente	2295 S Vineyard Av	0000008490	WATERCOM	1074 Zone	68.3
10	M17FIT137	CAL_Z1074_HWU_10	102.3	Clement Pappas	1755 E Acacia St	0000014757	WINDNWW	1074 Zone	47.6
11	N24FIT148	CAL_Z1010_HWU_11	56.1	Cintas / US Energy Services	1851 S Wineville Av	5127400837	WCOMNWW	1010 Zone	47.2
12	M21SV132	CAL_Z1212_HWU_12	65.4	KTR Management Services	3855 E Jurupa St	6323200917	WATERIND	1212 Zone	46.9
13	P16FIT164	CAL_Z1074_HWU_13	56.6	Rancho Ontario Corp	1456 E Philadelphia St	2014400145	WATERMF	1074 Zone	49.9
14	N11FIT152	CAL_Z1074_HWU_14	32.7	Chaffey High School	901 W Francis St (ontario HS)	9907400664	WATERCOM	1074 Zone	41.6
17	P18RE102	CAL_Z1074_HWU_17	39.7	Niagara Bottling LLC	2560 E Philadelphia St	3125400330	WATERIND	1074 Zone	42.1
18	R19FIT138	CAL_Z1010_HWU_18	65.5	ROC III CA TERRACINA LLC	2800 E Riverside Dr	9816400796	WATERMF	1010 Zone	35.5
19	O23RE100	CAL_Z1010_HWU_19	1.7	Culligan Ontario	1925 S Burgundy Pl	1546400928	WINDNWW	1010 Zone	37.5
20	H23RE100	CAL_Z1212_HWU_20	15.6	Ontario Mills Limited Partnership	1 E Mills Cr	8774100869	WATERCOM	1212 Zone	32.6
23	J16FIT170	CAL_Z1212_HWU_23	23.4	AMC LLC	1701 E D St	0255400823	WATERMF	1212 Zone	34.6
	J16FIT169	CAL_Z1212_HWU_23	12.0	AMC LLC	1701 E D St	0255400841	WATERMF	1212 Zone	21.1
24	WMP2019_FIT02505	CAL_Z1212_HWU_24	35.8	Camden Development Inc	950 N Duesenberg Dr	3267900593	WATERMF	1212 Zone	27.9
26	H20FIT222	CAL_Z1212_HWU_26	8.8	Laing's First Edition HOA	1032 N Turner Av	9989300053	WATERMF	1212 Zone	19.9
28	I20FIT196	CAL_Z1212_HWU_28	18.7	Park Centre	850 N Center Av	8185400442	WATERMF	1212 Zone	29.3
29	R20FIT119	CAL_Z1010_HWU_29	2.1	Grace Yokley School	2947 S Turner Av	3344300682	WATERCOM	1010 Zone	31.2
31	H13SV190	CAL_Z1348_HWU_31	34.3	Chaffey High School	150 W Fourth St (Chaffey)	6742200100	WATERCOM	1348 Zone	26.1
33	M11FIT246	CAL_Z1212_HWU_33	44.2	Park Vista	1031 S Palmetto Av	2793400168	WATERMF	1212 Zone	24.5
34	M26FIT123	CAL_Z1212_HWU_34	37.1	GSWA	5772 E Jurupa St	4816400515	WATERCOM	1212 Zone	25.3
35	M22DE127	CAL_Z1212_HWU_35	0.1	Ecopet Plastics Inc	1351 S Doubleday Av	0457400950	WATERCOM	1212 Zone	25.4
39	O10FIT125	CAL_Z1074_HWU_39	6.1	Parks Dept	2055 S Oaks Av	0484400476	IRRIGATN	1074 Zone	22.6
42	I19FIT177	CAL_Z1212_HWU_42	22.3	Ap-Transpark LLC	2990 E Inland Empire Bl	2784400489	WATERCOM	1212 Zone	21.6
44	WMP2019_WNJ00137	CAL_Z925_HWU_44	2.1	SCE/Mira Loma Peaker Plant	13568 S Hamner Av	7778216217	WATERCOM	925 Zone	0.0

SECTION 6
EXISTING SYSTEM

6-1 General

According to the City's Water Geodatabase from March 2019, the City's existing domestic water system consisted of the following:

- Five (5) primary pressure zones (925, 1010, 1074, 1212, and 1348 Zones)
- Over 3.1 million feet (584 miles) of transmission and distribution pipe, 2 inches through 42 inches in diameter
- 7,277 fire hydrants
- 35,906 water meters
- Seventeen (17) active wells
- Twelve (12) reservoirs with a total volume of 75 MG
- Six (6) active booster pump stations
- Fifteen (15) pressure reducing stations
- Two (2) connections to Water Facilities Authority
- Five (5) connections to Chino Desalter Authority
- Two (2) inter-agency connections
- Two (2) Ion Exchange Treatment Facility
- Four (4) altitude valves

A breakdown of the water meters by customer classes are shown in Table 6-1.

The existing domestic water system is shown on Figure 6-1. The hydraulic schematic of the existing water system is shown on Figure 6-2.

Table 6-1
Potable Water Meter Type

Meter Type	Number of Meters
Residential	28,906
Multifamily Residential	2,014
Irrigation	1,192
Commercial	2,999
Industrial	337
Departmental/Government	294
Hydrant (Construction)	164
Total	**35,906**

6-2 Pressure Zones

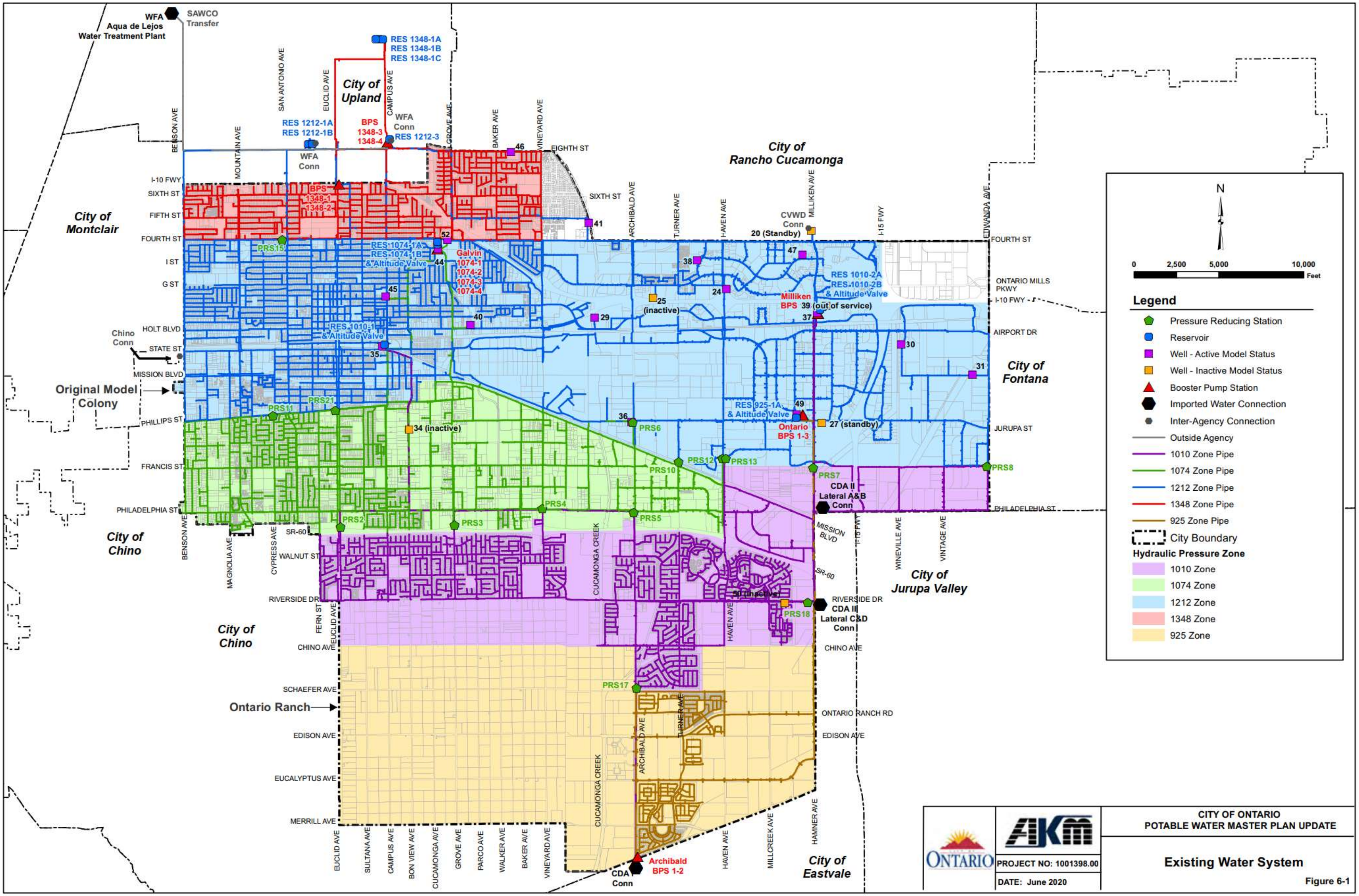
The existing system is divided into the five (5) pressure zones entitled: 925 Zone, 1010 Zone, 1074 Zone, 1212 Zone, 1348 Zone. It should be noted that the 925 Zone has very minimal existing demands. The 925 Zone will serve the future OR developments. The largest pressure zone in the system is the 1212 Zone, which covers about 38 percent of the existing water service area. A summary of all pressure zones are detailed in Table 6-2.

Table 6-2
City of Ontario Pressure Zones

Pressure Zone Name[1]	Area (sq. mi.)	Area (Ac)	Pipe Length (ft)	Hydraulic Grade Line (ft)	Ground Elevation Range (ft)	Static Pressure Range[2] (psi)
1348	3.0	1,913	365,426	1,348	1036 - 1177	74 - 135
1212	18.7	11,952	1,271,132	1,212	860 - 1096	50 - 152
1074	7.5	4,776	582,667	1,074	825 - 940	58 - 108
1010	9.1	5,793	676,705	1,010	735 - 880	56 - 119
925	10.6	6,801	193,221	925	650 - 776	65 - 119
	48.8	**31,235**	**3,089,151**			

[1] *Nomenclature used in this report.*

[2] *Calculated based on HGL and ground elevation range.*



City of Upland
City of Rancho Cucamonga
City of Montclair
City of Fontana
City of Chino
City of Jurupa Valley
City of Eastvale
Original Model Colony
Ontario Ranch
WFA Aqua de Lejos Water Treatment Plant
SAWCO Transfer
RES 1348-1A
RES 1348-1B
RES 1348-1C
RES 1212-1A
RES 1212-1B
RES 1212-3
BPS 1348-3 1348-4
BPS 1348-1 1348-2
WFA Conn
RES 1074-1A
RES 1074-1B
& Altitude Valve
Galvin 1074-1 1074-2 1074-3 1074-4
RES 1010-1 & Altitude Valve
RES 1010-2A
RES 1010-2B
& Altitude Valve
Milliken BPS
39 (out of service)
RES 925-1A & Altitude Valve
Ontario BPS 1-3
27 (standby)
20 (Standby)
CVWD Conn
25 (inactive)
34 (inactive)
30 (inactive)
CDA II Lateral A&B Conn
CDA III Lateral C&D Conn
Archibald BPS 1-2
CDA Conn
Chino Conn
N
0 2,500 5,000 10,000 Feet
Legend
Pressure Reducing Station
Reservoir
Well - Active Model Status
Well - Inactive Model Status
Booster Pump Station
Imported Water Connection
Inter-Agency Connection
Outside Agency
1010 Zone Pipe
1074 Zone Pipe
1212 Zone Pipe
1348 Zone Pipe
925 Zone Pipe
City Boundary
Hydraulic Pressure Zone
1010 Zone
1074 Zone
1212 Zone
1348 Zone
925 Zone
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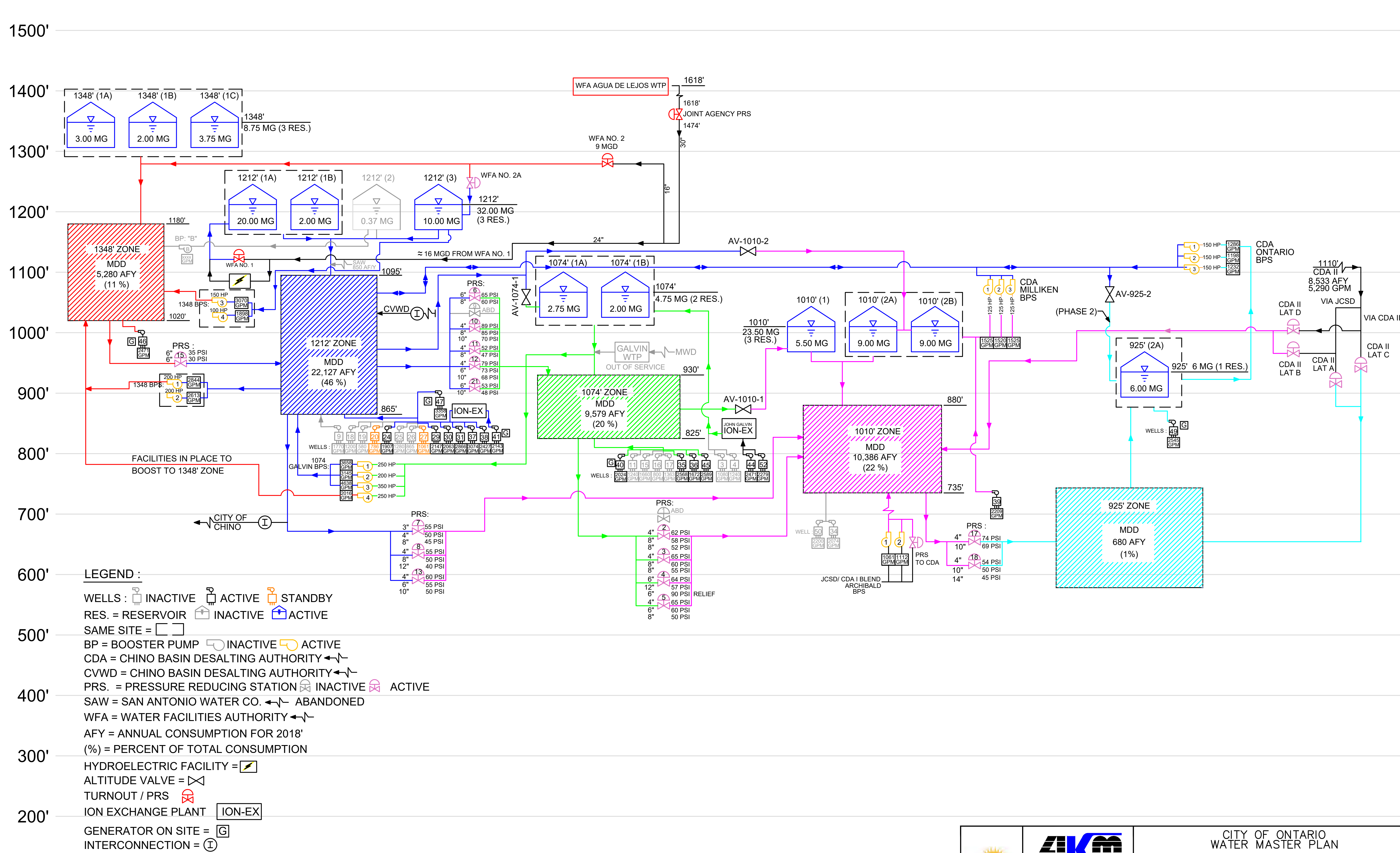
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
PROJECT NO: 1001398.00
DATE: June 2020
Existing Water System
Figure 6-1



ONTARIO

AKM

PROJECT NO. 1001398.00

DATE: June 2020

CITY OF ONTARIO
WATER MASTER PLAN

Existing Water System
Hydraulic Schematic

Figure 6-2

6-3 Transmission and Distribution System

The potable water system includes approximately 584 miles of transmission and distribution pipe that is ranging in size from 2-inches through 42-inches. A summary of the system pipes by diameter, material, and date of construction is shown on Figure 6-3, Figure 6-4 and Figure 6-5, respectively.

Figure 6-3

Length of Pipe by Size

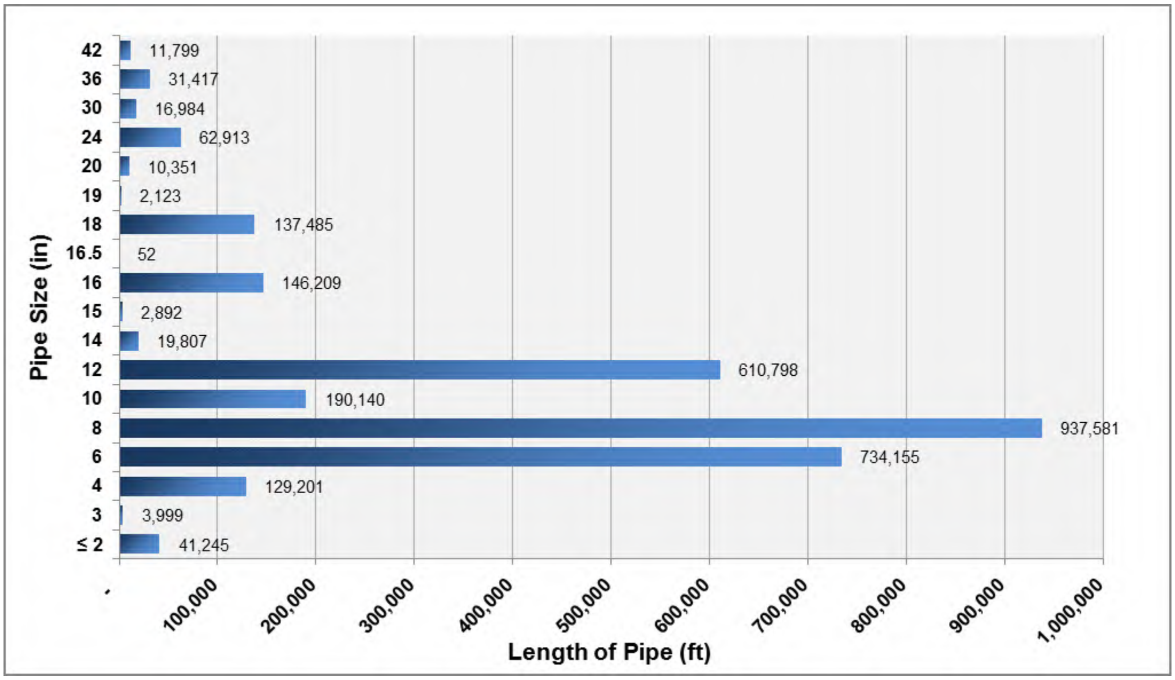


Figure 6-4

Length of Pipe by Material

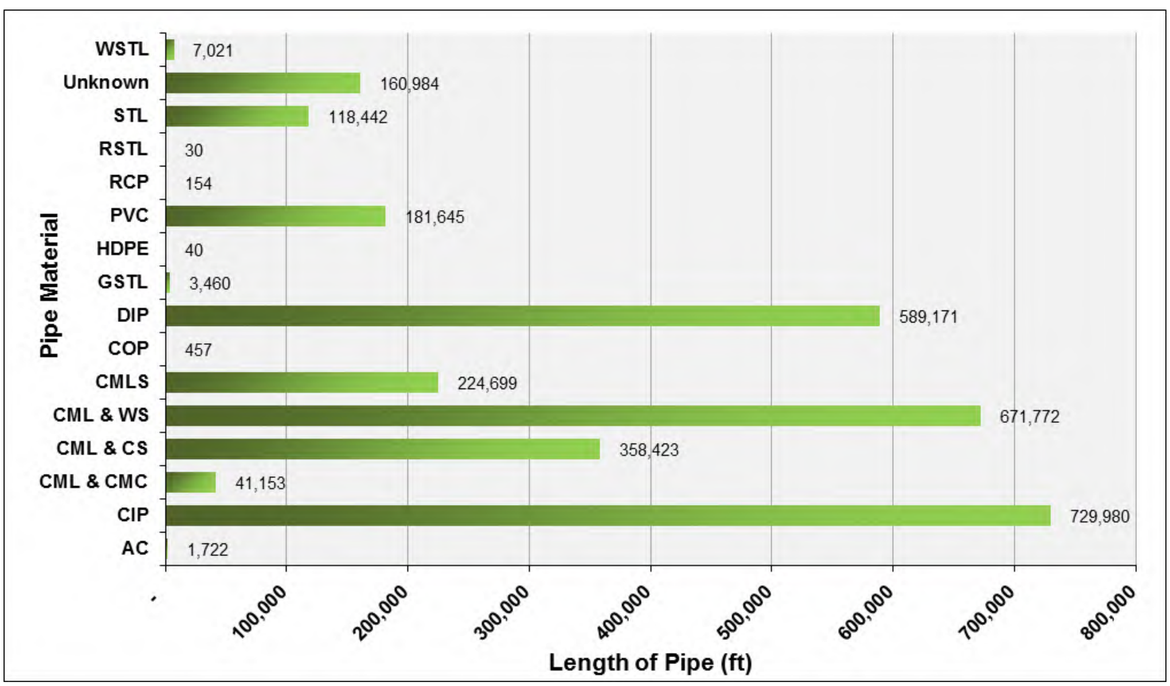
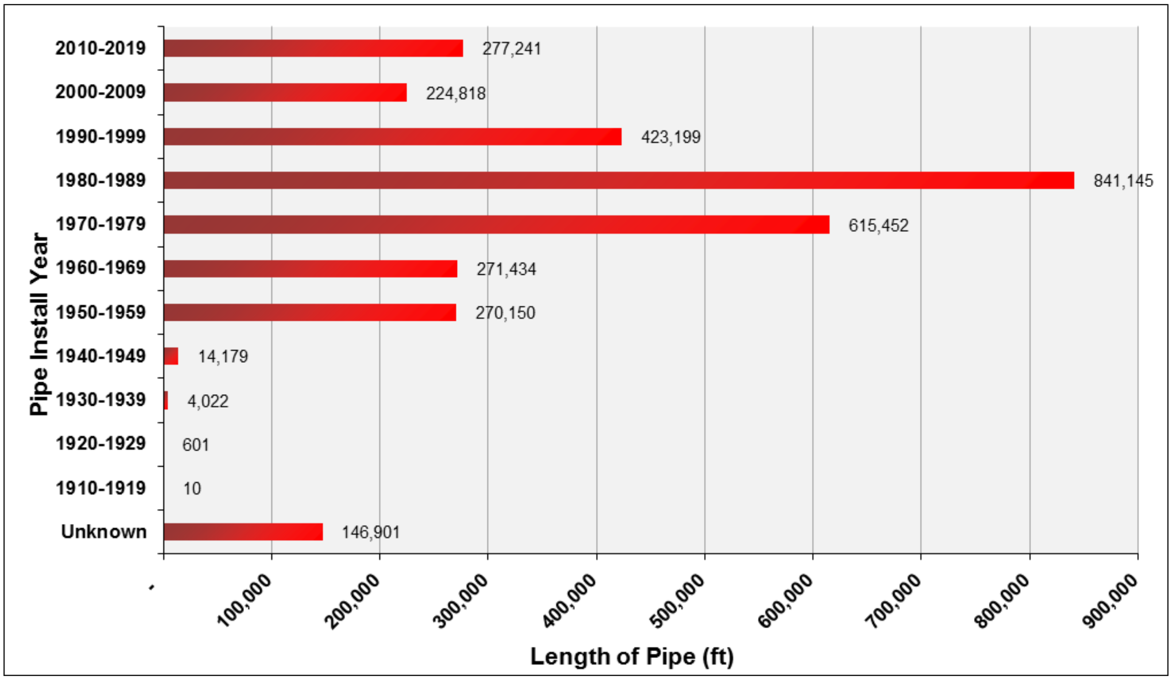


Figure 6-5

Length of Pipe by Decade of Construction



6-4 Wells

The total well capacity is about 38,600 gpm or 55.6 mgd. Well information and characteristics are provided in Table 6-3. There are currently seventeen (17) active wells.

The following wells are active but may either require treatment or are unreliable due to poor water quality.

- Wells 29 and 31 production need to be treated for nitrates, which requires higher costs for production. Currently, the City only uses these wells as needed during the warmer high demand periods.
- Well 35 is not reliable. In the past, this well did not meet the minimum water quality requirements and could not be used. As of September 2019, the samples passed all regulations and Well 35 was operating continuously.
- Well 40 needs to be treated for perchlorate, which requires higher costs for production. Currently the City only uses this well as needed during the warmer high demand periods.
- Recently treatment processes added to Well 41 have allowed the City to use this source consistently.
- Wells 44 and 52 are treated for nitrate and perchlorate removal by the Dry Year Yield Ion Exchange Plant.
- Wells 37 is currently not used due to water quality. It is scheduled to be placed back in service once additional treatment is provided. The discharge piping for Well 37 will connect to the 1010 Zone instead of the 1212 Zone.
- Well 39 is active, but placed out of service, due to poor water quality. It is scheduled to be placed back in service once additional treatment is provided.

The status of the inactive wells is summarized below:

- Well 20 and 27 are physically separated from the system, and are on the City's standby status. These wells were put on emergency use only due to their age and their low production. These wells could be rehabilitated and reconnected to the system if needed. These wells are not planned to be upgraded in the future.

- Wells 50 is currently inactive due to water quality. It is planned to be placed back in service once additional treatment is provided.
- Wells 34 is currently inactive due to 1,2,3 Trichloropropane (TCP). This well is not planned to be placed back in service.
- The pump at Well 25 has burned up, and the City does not plan to reactivate this well, at this time.

Additional information regarding the wells is as follows:

- Well 11 was constructed in 1958. It is located at the Ontario International Airport property. While the water quality meets the primary and secondary standards, it produces sand even after a new sand separator was installed in 2003. It is inactive and will be abandoned.
- Well 16, constructed in 1960, is inactive due to the production of sand and traces of oil from the oil-lubricated pump. There are no plans to reactivate this well.
- Wells 3, 4, 9, 15, 17, and 19, have been abandoned and Well 18 was destroyed due to high nitrates and perchlorates, and facility condition.
- Well 3 (1962) and Well 4 (1919) were abandoned due to high levels of nitrate and perchlorate. These wells had also exceeded their useful lives. The production of Wells 3 and 4 were replaced by Wells 44 and 52.
- Well 9 was abandoned due to high nitrates and perchlorates. The Well 9 property is large enough for the construction of a new well and a treatment facility.
- Well 15 was abandoned due to high nitrates and perchlorates.
- Wells 26 is currently inactive and will be abandoned.

6-5 Reservoirs

The City's water system includes twelve (12) reservoirs ranging in capacity from 2 million gallons to 20 million gallons. The City's total reservoir capacity is currently 75 MG, of which approximately 32 MG is within the 1212 Zone. The hydraulic gradient in each pressure zone is controlled by the high water elevation of the reservoirs that feed the zones by gravity. The characteristics of each existing storage reservoir are shown in Table 6-4.

All the existing reservoirs are less than 65 years old with the exception of Reservoir 1212-3, which was constructed in 1926. The average life expectancy of concrete reservoirs and steel tanks is about 100 years, provided that reservoirs are properly maintained and repainted or recoated every 15-20 years. Thus, most of the City reservoirs are expected to be in fairly good condition and no improvements based on age are recommended except for Reservoir 1212-3, due to its age and condition.

6-6 Booster Pump Stations

The City's system includes five (5) booster pump stations. Details of each booster station are summarized in Table 6-5.

The John Galvin Pump Station is adjacent to the 1074 Zone reservoirs, east of Cucamonga Avenue and south of Fourth Street. It was constructed in 1960. It takes suction from the 1074 Zone. Booster Pump Galvin 1074-1, Galvin 1074-2, and Galvin 1074-3 are vertical turbine pumps that pump into the 1212- Zone. Booster Pump Galvin 1074-4 is a vertical turbine pump that pumps into the 1348 Zone. Currently, these pumps are rarely used.

The booster pump station housing booster pumps 1348-3 and 1348-4 is located adjacent Reservoir 1212-3, on Campus Avenue, north of Eighth Street. It was constructed in 1959 and rehabilitated in 2004. It takes suction from Reservoir 1212-3. There are two horizontal split case pumps that pump into the 1348 Zone.

The booster pump station housing booster pumps 1348-1 and 1348-2 is located east of Euclid Avenue just south of the I-10 Freeway. It was constructed in 1960. It takes suction from the 1212 Zone. There are two horizontal split case pumps that pump into the 1348 Zone.

Table 6-3
Existing Wells Summary Table

Well Data								Efficiency Test					Motor Specifications									
Well Number	Location	Year Drilled	Pressure Zone	Pump Model	Pump Mfg	No of Stages	Pump RPM	Capacity (gpm)	TDH (ft)	Static GWL (ft)	Draw-down (ft)	Test Date	Motor Mfgr	HP	Motor RPM	Backup Power (Y/N)	WQ Issues	Model ID	Model Pump Curve ID	Existing Model Status	Future Model Status	Comments
49	1495 S. Dupont Ave.	Unknown	925	14MD	Peerless	5	1780	2,545	341	292	23	9/9/16	US	350	Unknown	Y	Yes	M22WE101_WELL_49	WELL_49	Active	Active	
							Zone 925 Capacity	**2,545**														
34	1425 S. Bon View Ave.	1983	1010	15EHM	Ingersoll Dresser	12	1175	2,074	-	-	-	-	GE	500	1180	N	Yes	M14WE101_WELL_34		Inactive	Inactive	Well could be equipped and place back in service, but unlikely.
50	3900 W. Riverside Dr.	-	1010	14MD	Peerless	6	1,780	2,274	475	218	38	6/30/09	-	-	-	N	Yes			Inactive	Active	Perchlorate issues". Inactive during existing model, but will be placed back into service for the future model.
39	4397 Guasti Ave.	2002	1010	15EMM	Ingersoll Dresser	4	1775	2,209	406	339	24	9/13/16	US	350	Unknown	N	Yes	J23WE100_WELL_39		Active	Active	Needs treatment; directly connected to reservoir at 1010 reservoirs. Currently Active, but not in service. Place back into service for future model, as treatment will be provided.
							Zone 1010 Capacity	**0**														
35	652 E. Main St.	1983	1074	17 MQH	Byron Jackson	11	1170	2,568	548	351	65	3/18/18	US	500	1180	N	Yes	K14WE100_WELL_35	WELL_35	Active	Active	The City indicated that there are water quality issues and the water, quality is not reliable. This well is currently in service.
36	1400 S. Archibald Ave.	1986	1074	Unknown				1,672	532	268	62	3/18/18	US	350	1770	N		M19WE100_WELL_36	WELL_36	Active	Active	
40	1335 East Holt Bl.	2003	1074	14R	L&B Verti-line	6	1785	2,024	503	360	39	3/18/18	US	600	1785	Y		J16WE100_WELL_40	WELL_40	Active	Active	Not sequenced to start and stop. Typically only used in summer months. High operation and energy costs.
44	964 Cucamonga Ave.	2003	1074	15ETMH	Flowserve	7	1770	2,471	644	421	80	4/18/18	USEM	600	1800	N	Yes	H15WE106_WELL_44	WELL_44	Active	Active	Ion Exchange Plant. at 1074 Reservoirs. Water quality makes this plant unreliable. Clearwell is planned for future.
45	665 N .Campus Ave.	2006	1074	17MQL	Flowserve	5	1775	2,589	516	395	40	8/10/18	Unknown	500	Unknown	N		I14WE100_WELL_45	WELL_45	Active	Active	
52	1230 E. 4th St,	Unknown	1074	15ETMH	Flowserve	7	1770	2,279	672	420	114	4/18/18	USEM	600	1800	N	Yes	H15WE107_WELL_52	WELL_52	Active	Active	Ion Exchange Plant. at 1074 Reservoirs. Water quality makes this plant unreliable. Clearwell is planned for future.
							Zone 1074 Capacity	**13,603**														
20	9600 S. Milliken Ave.	1977	1212	-	-	-	-	-	-	-	-	-	-	-	-	N				Inactive	Inactive	Not physically connected to system
27	4300 E. Jurupa St.	1971	1212	-	-	-	-	-	-	-	-	-	-	-	-	N				Inactive	Inactive	Not physically connected to system
24	700 N. Haven Ave.	1969	1212	14KHM	Aurora	11	1770	1,907	599	351	21	2/18/18	US	450	1780	N		I21WE100_WELL_24	WELL_24	Active	Active	
29	2400 E. Airport Dr.	1979	1212	Unknown				2,147	657	318	71	9/16/16	GE	500	Unknown	N		J18WE100_WELL_29	WELL_29	Active	Active	Not sequenced to start and stop. Typically only used in summer months. High operation and energy costs.
30	220 S. Wineville Ave.	1978	1212	14M160	Ingersoll Dresser	7	1775	2,063	597	314	31	4/18/18	Westing-house	600	1800	N		K24WE100_WELL_30	WELL_30	Active	Active	
31	5719 E. Santa Ana St,	1979	1212	16KHL	Verti-Line	8	1770	2,866	606	283	36	4/18/18	US	600	Unknown	N	Yes	L25WE100_WELL_31	WELL_31	Active	Active	There are water quality issues. It is used as an emergency backup well.
37	4327 E. Guasti	1994	1212	15EHM	Ingersoll Dresser	6	1775	3,074	601	331	30	3/18/18	USEM	600	1780	N	Yes	J22WE100_WELL_37	WELL_37	Active	Active	Currently connected to 1212' zone but will be moved to 1010' zone
38	837 N. Center	1997	1212	15MQH	Byron Jackson	7	1770	2,427	663	369	44	3/18/18	US	500	1775	N		H20WE100_WELL_38	WELL_38	Active	Active	
41	1252 North Hellman Ave.	2003	1212	Unknown				2,143	703	391	46	4/18/18	US	600	Unknown	Y		G18WE100_WELL_41	WELL_41	Active	Active	Treatment was added to well.
47	4255 E. Concours St.	Unknown	1212	17MQH	Flowserve	5	1775	3,358	632	373	57	3/18/18	Unknown	800	Unknown	Y		H22WE100_WELL_47	WELL_47	Active	Active	
							Zone 1212 Capacity	**19,985**														
46	1670 W. 8th St.	2006	1348	17MQL	Flowserve	8	1775	2,471	847	486	82	3/18/18	Unknown	800	Unknown	Y		E16WE100_WELL_46	WELL_46	Active	Active	
							Zone 1348 Capacity	**2,471**														
							Total Capacity	**38,604**														

Table 6-4

Existing Storage Reservoir Summary Table

Pressure Zone	Reservoir ID	Reservoir Name	Old Reservoir Name	Location	Shape[1]	Volume (MG)	Bottom Elevation (ft)	High Water Elevation (ft)	Height (ft)	Width x Length[1] (ft)	Dia (ft)	Material	Year of Const.	Model ID	Comment
925	2A	Reservoir 925-2A		Northeast corner of Dupont Ave and Jurupa St	Cylindrical	6.00	893	925	32.0	-	188	Concrete	2003	M22RS101_925_2A	
					Total Zone 925 Volume	6.00									
1010	1	Reservoir 1010-1	Reservoir 10	Southwest corner of Campus Ave and Main St	Cylindrical	5.50	979.3	1,009.3	30.0	-	178	Steel	1982	K14RS101_1010_1	
1010	2A	Reservoir 1010-2A	Reservoir 11	Southeast corner of Miliken Ave and San Bernardino Freeway	Cylindrical	9.00	980	1,010	30.0	-	226	Concrete	2001	J23RS101_1010_2A	
1010	2B	Reservoir 1010-2B	Reservoir 10		Cylindrical	9.00	980	1,010	30.0	-	226	Concrete	2007	J22RS101_1010_2B	
					Total Zone 1010 Volume	23.50									
1074	1A	Reservoir 1074-1A	Reservoir 8	Southeast corner of Cucamonga Ave and Fourth St	Rectangular	2.75	1,054.4	1,074	19.6	140 x 140	-	Concrete	1978	H15RS103_1074_EQUIV_TANK	
1074	1B	Reservoir 1074-1B	Reservoir 9	Southeast corner of Cucamonga Ave and Fourth St	Rectangular	2.00	1,058.8	1,074	15.2	118 x 158	-	Concrete	1957		
					Total Zone 1074 Volume	4.75									
1212	1A	Reservoir 1212-1A	Reservoir 4	Southwest corner of Fern Ave and Euclid Pl	Rectangular	20.00	1,188	1,214	26.0	278 x 458	-	Concrete	1959	E12RS102_1212_1A	Elevations were verified from surveying data.
1212	1B	Reservoir 1212-1B	Reservoir 5	Southwest corner of Fern Ave and Euclid Pl	Rectangular	2.00	1,202	1,214	11.5	166 x 180	-	Concrete	1958	E12RS101_1212_1B	Plans show depth 12' - 1.1.5'.
1212	3	Reservoir 1212-3	Reservoir 7	East side of Campus Ave, north of 8th Street	Irregular	10.00	1,189	1,213	24.3	218 x 398	-	Concrete	1926	E14RS101_1212_3	Elevations were verified from surveying data.
					Total Zone 1212 Volume	32.00									
1348	1A	Reservoir 1348-1A	Reservoir 1	Southwest corner of Campus Ave and 13th St	Rectangular	3.00	1,328.4	1,347.7	19.3	125.5 x 162.5	-	Concrete	1972	B14RS104_EQUIV_TANK_1348	
1348	1B	Reservoir 1348-1B	Reservoir 2		Rectangular	2.00	1,327.6	1,348.0	20.5	107 x 125.5	-	Concrete	1955		
1348	1C	Reservoir 1348-1C	Reservoir 3		Rectangular	3.75	1,328.9	1,349.5	20.6	125.5 x 199.5	-	Concrete	1958		
					Total Zone 1348 Volume	8.75									
					Total System Volume	75.00									

[1] Reservoirs with hopper bottoms and sloped walls are considered regular shapes (rectangular/cylindrical) as these irregularities in the shape account for insignificant impact on volume.

Table 6-5

Existing Booster Pump Station Summary Table

Pump Data											Efficiency Test						
Location of Booster Pump Station	Date of Construction	Name	Old Name	Suction Zone	Discharge Zone	Pump Model	Pump Mfg	Stages	Pump Type	RPM	Capacity (gpm)	TDH (ft)	Test Date	Horse Power	Model ID	Model Pump Curve ID	Comment
John Galvin Pump Station 960 N Cucamonga Ontario, CA 91764	1960	Galvin 1074-1	Galvin Booster 1A	1074	1212	14FHC	Goulds	3	VT	1800	3,658	152	4/18/18	250	H15BP102_GALVIN_1212_1	GALVIN_BPS_P1_1A	
		Galvin 1074-2	Galvin Booster 1B	1074	1212	16ENL	Flowserve	2	VT	1780	3,145	147	7/1/13	200	H15BP103_GALVIN_1212_2	GALVIN_BPS_P2_1B	
		Galvin 1074-3	Galvin Booster 1C	1074	1212	Unknown		2	VT	1770	4,638	164	4/18/18	350	H15BP104_GALVIN_1212_3		Modeled pump with design point
		Galvin 1074-4	Booster 2	1074	1348	14HMC	Goulds	4	VT	1800	2,016	334	4/18/18	250	H15BP101_GALVIN_1348_4	GALVIN_BPS_P4_2	
1212 Reservoir (10MG) 140 s. Campus, Upland, CA 91786	1959	Booster 1348-3	Booster 3	1212	1348	8A-16	Peerless	-	HSC	1770	3,070	157	4/18/18	150	E14BP101_BOOSTER_1348_3		Modeled pump with design point
		Booster 1348-4	Booster 4	1212	1348	6AE16	Peerless	-	HSC	1760	1,898	161	4/18/18	100	E14BP102_BOOSTER_1348_4	BOOSTER_1348_4	
1559 N. Columbia Ave, Ontario, CA 91764	1960	Booster 1348-1	Booster 9A	1212	1348	411-BF	Aurora	-	HSC	1775	2,844	214	4/18/18	200	F13BP101A_BOOSTER_1348_1		Modeled pump with design point
		Booster 1348-2	Booster 9B	1212	1348	411-BF	Aurora	-	HSC	1778	2,613	226	8/10/18	200	F13BP101B_BOOSTER_1348_2		Modeled pump with design point
4251 East Jurupa Ave, east of Dupont Ave	2008	CDA Ontario Booster Pump 1	N.A.	925	1212	Unknown					1,286	302	4/18/18	150	M22BP100_ONTARIO_1212_1	ONTARIO_BPS_P1	
		CDA Ontario Booster Pump 2	N.A.	925	1212	Unknown					1,198	295	4/18/18	150	M22BP101_ONTARIO_1212_3	ONTARIO_BPS_P2	
		CDA Ontario Booster Pump 3	N.A.	925	1212	Unknown					1,232	295	4/18/2018	150	M22BP102_ONTARIO_1212_2	ONTARIO_BPS_P3	
4301 E Guasti Rd, east of Milliken Ave	N.A.	CDA Milliken Booster 1	N.A.	1010	1212	12ENL	Flowserve	5	VT	1770	1,525	203	12/18/2014	125	WMP2019_BP00001_MILLIKAN_1212_1	MILLIKEN_BPS_P1	
		CDA Milliken Booster 2	N.A.	1010	1212	12ENL	Flowserve	5	VT	1770	1,520	202	12/18/2014	125	WMP2019_BP00002_MILLIKAN_1212_2	MILLIKEN_BPS_P2	
		CDA Milliken Booster 3	N.A.	1010	1212	12ENL	Flowserve	5	VT	1770	1,525	204	12/18/2014	125	WMP2019_BP00003_MILLIKAN_1212_3	MILLIKEN_BPS_P3	
Archibald Ave, north of Cloverfield Rd. (Owned by CDA)	N.A.	Archibald -1	N.A.	CDA	1010		Fairbanks Morse				1061	166	4/18/2018	75	WMP2019_BP00004_ARCHIBALD_1010_1		Modeled pump with design point
		Archibald -2	N.A.	CDA	1010		Fairbanks MOrse				1,112	164	4/18/2018	75	WMP2019_BP00005_ARCHIBALD_1010_2		Modeled pump with design point

The Ontario Booster Pump Station was constructed in 2008 and is located at 4251 East Jurupa Avenue, east of Dupont Avenue. It currently takes suction from Reservoir 925-2A, which was constructed to ultimately serve the 925 Zone (Ontario Ranch). Currently, there is little demand in New Model Colony. Per the “take or pay” agreement with CDA, the City tries to utilize 8,533 AFY from CDA, which is routed through the 925 Zone. Historically, the imported water supply has exceeded the 925 Zone demand, and the Ontario Booster Pump Station was constructed to move this water to the 1212 zone, which has an abundance of storage.

Milliken Booster Pump Station is located at 4301 E. Guasti Road, east of Milliken Avenue. It currently takes suction from Reservoir 1010-2A and Reservoir 1010-2B. Per the “take or pay” agreement with CDA, the City tries to utilize 8,533 AFY, which can be served to the 1010 Zone through CDA 2, Lateral D. As the imported water supply can exceed the total 1010 Zone demand, and the Milliken Booster Pump Station was constructed as a way to move the imported water to the 1212 Zone, which has an abundance of storage

6-7 Pressure Reducing Stations

The City’s system includes fifteen (15) pressure reducing stations (PRS), The details of each PRS are shown in Table 6-6. Most of the stations have two or more pressure reducing valves (PRVs), a main valve and one or more bypass valves. The main valve, the smallest in diameter, typically has the highest pressure setting. Bypass valves are larger in diameter and have slightly lower pressure settings than the main valve. The bypass valve will open when the system pressure drops below the main valve’s pressure setting and the main valve cannot supply enough water. If the downstream pressure continues to fall below the bypass valve pressure setting, the second bypass valve will open to provide additional water.

Pressure relief valves are present at PRS4, PRS12, and PRS13. These valves protect the water system from abnormally high pressures should the reducing valves fail to work properly.

Table 6-6

Existing Pressure Reducing Stations Summary Table

Station No.	From Zone	To Zone	Location	Diameter (inch)	Pressure Setting (psi)	Ground Elevation (feet)	Model ID
2	1074’	1010’	Euclid Ave, south of Philadelphia St (east side of street)	4	62	840	P13PR102_PRV_2
				8	58		
				8	52		
3	1074’	1010’	Grove Ave, south of Philadelphia St	4	65	834	P15PR101_PRV_3
				8	60		
				8	55		
4	1074’	1010’	Philadelphia St at Vineyard Ave	6	64	838	P17PR103_PRV_4
				12	57		
			Pressure Relief	6	90		
5	1074’	1010’	Archibald Ave at Philadelphia St	4	65	830	P19PR101_PRV_5
				6	60		
				8	50		
6	1212’	1074’	Archibald Ave at Jurupa St (adjacent Well 36)	6	65	893	M19PR101_PRV_6
				8	60		
7	1212’	1010’	Milliken Ave south of Francis St	3	55	876	N22PR101_PRV_7
				4	50		
				8	45		
8	1212’	1010’	Francis St at Etiwanda Ave	4	55	878	N26PR101_PRV_8
				8	50		
				12	40		

Table 6-6 (Continued)

Pressure Reducing Stations

Station No.	From Zone	To Zone	Location	Diameter (inch)	Pressure Setting (psi)	Ground Elevation (feet)	Model ID
10	1212’	1074’	Mission Blvd at Turner Ave	4	80	856	N20PR101_PRV_10
				8	75		
				10	70		
11	1212’	1074’	Phillips Street at Cypress Ave	4	52	918	M12PR101_PRV_11
				8	47		
12	1212’	1074’	Haven Ave at Francis St (west side of street)	4	79	866	N21PR102_PRV_12
				6	73		
				10	68		
			Pressure Relief		-		
13	1212’	1010’	Haven Ave at Francis St (east side of street)	4	60	866	N21PR101_PRV_13
				6	55		
				10	50		
			Pressure Relief		-		
15	1348’	1212’	Fourth St at San Antonio Ave	6	35	1,094	H12PR100_PRV_15
				6	30		
17	1010'	925'	Archibald Ave at Schaefer Ave	4	74	728	U19PR100_PRV_17
				10	69		
18	1010'	925'	Riverside Dr, west of Milliken Ave	4	54	788	R22PR100_PRV_18
				10	50		
				14	45		
21	1212'	1074'	Euclid St at Phillips St	6	53	930	M13PR100_PRV_21
				10	48		

6-8 Altitude Valves

The existing system has four (4) altitude valves that regulate reservoir operations. The altitude valves are operated based on levels in City reservoirs. Details are shown in Table 6-7.

Table 6-7

Altitude Valves

ID	From Zone	To Zone	Location	Model ID	Diameter
AV-1010-2	1212	1010	Reservoir 1010-2A & 1010-2B	WMP2019_VL00003_ALT_1212_1010	12
AV-1010-1	1074	1010	Reservoir 1010-1	WMP2019_VL00004_ALT_1074_1010	12
AV-1074-1	1212	1074	Reservoir 1074-1A & 1074-1B	WMP2019_VL00002_ALT_1212_1074	12
AV-925-2	1212	925	Reservoir 925-2A	M22PR100_ALT_1212_925	10

6-9 Imported Water Connections

The City has two (2) Water Facilities Authority (WFA) turnouts and five (5) points of connection with the Chino Basin Desalter Authority (CDA). The locations and details are listed in Table 6-8.

Table 6-8

Imported Water Connections

ID	To Zone	Location	Model ID	Connection Comment	Supply Agency Comment
WFA Turnout 1	1212	Northwest corner of Eighth St and Fern Ave (adjacent Reservoir 1212-1A and 1212-1B)	E12PR101_WFA_1	16 mgd (16,800 AFY) Capacity	City plans for 15 mgd (17,900 AFY) maximum to be taken from turnout.
WFA Turnout 2	1348	Southeast corner of Campus Ave and A St (adjacent Reservoir 1212-3)	WMP2019_VL00001_WFA_2	9 mgd (10,100 AFY) Capacity. This supply can be directed into the 1212-3A Reservoir through WFA 2A. This flow can be directed into the 1212-3A Reservoir through WFA 2A	
CDA I[1]	1010	Intersection of Archibald Ave and extension of Schaefer St	WMP2019_VL00009_CDA_1	Blend of CDA II water and JCSD Water. Not used much due to additional pumping cost and water quality concerns.	CDA entitlement is 8.6 MGD (8,533 AFY) through CDA I and CDA II combined.
CDA II - Lat A[2]	925	Intersection of Philadelphia St and Milliken Ave	WMP2019_VL00006_CDA_2_LAT_A	Blend of CDA II water and JCSD Water. Currently not used much, since Laterals C and D are a direct connection to CDA II.	
CDA II - Lat B[2]	1010	Intersection of Philadelphia St and Milliken Ave	WMP2019_VL00005_CDA_2_LAT_B		
CDA II - Lat C[2]	925	Intersection of Riverside Dr and Milliken Ave	WMP2019_VL00007_CDA_2_LAT_C	Newly constructed connection provides the majority of the CDA supply.	
CDA II - Lat D[2]	1010	Intersection of Riverside Dr and Milliken Ave	WMP2019_VL00008_CDA_2_LAT_D		

[1] CDA I is the Chino Basin Desalter Facility No. 1

[2] CDA II is the Chino Basin Desalter Facility No. 2

6-10 Inter-Agency Connections

The City's water system has two (2) inter-agency connections with neighboring cities or water utilities. These inter-agency connections allow the City to obtain water from or provide water to adjacent water systems. The inter-agency connections and their locations are listed in Table 6-9.

Table 6-9

Inter-Agency Connections

No.	Location	From	To	Connection Size (in)	Comments
1	Milliken Ave & 4th St.	CVWD	City of Ontario 1212 Zone	4" and 8"	PRS 14
2	Benson Ave & State St	City of Ontario 1212 Zone	City of Chino	10	Connected to City of Chino Reservoir

6-11 Water Treatment

Operated by the City for over thirty (30) years to treat raw Colorado River water from the MWD Upper Feeder, the John Galvin Water Treatment Plant was deactivated in 1993 because the treatment process did not meet the requirements of the Surface Water Treatment Rule.

As a part of participating in the DYY program, the John Galvin Water Treatment Plant site (southeast corner of Cucamonga Avenue and Fourth Street) was chosen for the location of a new ion-exchange facility. The John Galvin Ion Exchange Treatment Facility was commissioned on April 29, 2009. The treatment facility extracts raw groundwater with nitrate and perchlorate concentrations in excess of or near 80% of the MCL from either Well 44 and Well 52. The City's domestic water supply permit allows the operation of either Well 44 or Well 52 or both wells at once, depending on the water quality concentrations experienced when the facility is in operation. The facility's final chlorinated product is comprised of a small portion of raw water (either Well 44 or Well 52 or both wells, depending at the time of operation) that is bypassed and blended with treated water from the treatment facility before delivery into Reservoirs 1074-1A & 1074-1B. In addition, the facility includes a bypass blending system where the facility's final chlorinated product can be blended with Zone 1212 water prior to entering Reservoirs 1074-1A and 1074-1B. The maximum well water concentrations are 70 milligrams per liter (mg/L) nitrate and 8 micrograms/L (µg/L) perchlorate. The treatment facility's final chlorinated product has nitrate concentrations, on average of 25 mg/L and perchlorate concentrations of 2.8 (µg/L), on average.

SECTION 7

CRITERIA

7-1 General

Performance criteria are established to evaluate the adequacy of various water system components through a systematic analysis. Necessary improvements are identified and recommended for inclusion in a Capital Improvement Program (CIP). Some criteria are based upon experience and their application is at the discretion of the water purveyor. This includes service pressures, storage capacity, and sources of supply. Other criteria, such as water quality and fire protection, are based on federal, state and local jurisdictional requirements. This section details the criteria which will serve as the benchmark for evaluating the City's water system. A summary of the service criteria is listed in Table 7-1.

Table 7-1

Service Criteria

Description	Criteria	Existing Requirement	Future Requirement
1. Source of Supply			
a. Total	Maximum Day Demand (except for closed zones which shall be Maximum Day Demand plus Fire Flow Demand or Peak Hour, whichever is greater)	29,790 gpm	54,780 gpm
b. Local Supply	Average Day Demand	19,280 gpm	35,700 gpm
2. Reservoir Capacity			
a. Operational Storage	30% of Maximum Day Demand for the OMC and 25% of Maximum Day Demand for Ontario Ranch	TBD	TBD
b. Emergency Storage	100% of Average Day Demand	27.8 mg	39.7 mg
c. Fire Suppression	Highest Fire Flow Requirement		
Residential			
Rural	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Low Density	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Low-Medium Density	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Medium Density	2,000 gpm for 2 hours	0.24 mg	0.24 mg
High Density	3,500 gpm for 4 hours	0.84 mg	0.84 mg
Retail / Service			
Neighborhood Commercial	2,500 gpm for 3 hours	0.45 mg	0.45 mg
General Commercial	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Office Commercial	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Hospitality	4,000 gpm for 4 hours	0.96 mg	0.96 mg
Employment			
Business Park	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Industrial	4,000 gpm for 4 hours	0.96 mg	0.96 mg

Table 7-1

Service Criteria (continued)

Description	Criteria	Existing Requirement	Future Requirement
Other			
Airport	4,000 gpm for 4 hours	0.96 mg	0.96 mg
Mixed Use	3,500 gpm for 4 hours	0.84 mg	0.84 mg
Open Space	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Public Facility	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Public School	2,500 gpm for 3 hours	0.45 mg	0.45 mg
3. Booster Pump Stations	➢ Capable of delivering Maximum Day Demand plus Fire Flow or Peak Hour Demand of service area, whichever is greater ➢ Stand-by pump equal in size to the largest duty pump ➢ Flow meters, suction and discharge pressure gauges, and telemetry equipment for alarm and status notification at each station ➢ Provisions for emergency power at all stations		
4. Minimum Pipe Size	12-inch in commercial and industrial areas 8-inch in all other areas		
5. Maximum Velocities	➢ 5 ft/s at Average Day Demand ➢ 7 ft/s at Maximum Day Peak Hour Demand (5 ft/s for PVC pipe) ➢ 10 ft/s at Maximum Day plus Fire Flow Demand		
6. Static Pressures	➢ Minimum 40 psi ➢ Desired 60 - 80 psi ➢ With pressure regulation over 80 psi		
7. Dynamic Pressures	Minimum 40 psi during Peak Hour Demand		
8. Fire Flows and Pressures			
Residential			
Rural	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
Low Density	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
Low-Medium Density	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
Medium Density	2,000 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
High Density	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Retail / Service			
Neighborhood Commercial	2,500 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
General Commercial	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
Office Commercial	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
Hospitality	4,000 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Employment			
Business Park	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
Industrial	4,000 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Other			
Airport	4,000 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Mixed Use	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant		
Open Space	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant		
Public Facility	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant		
Public School	2,500 gpm for 3 hours with 20 psi residual pressure at fire hydrant		

7-2 Service and Operational Criteria

7-2.1 Source of Supply

Any water system must be capable of meeting all demands imposed upon the system. This can be achieved through multiple supply sources, storage, or a combination of both. Generally, the determination is based upon water availability, existing storage capacity, and economics. It is prudent to secure water supplies from multiple sources so that demands can be met at reasonable levels when one or more water sources are not available.

California Code of Regulations Related to Drinking Water require a minimum source of supply to meet the service area's maximum day demand. Also since the City serves more than 1,000 meters, the system must be capable of providing four hours of peak hourly demand through a combination of source capacity, storage capacity, and emergency source capacity. Under this criterion, reservoirs are typically needed to regulate hourly fluctuations in demand, provide fire flow and supplement supply during an outage of a source for an extended duration.

As much of the average day demand shall be supplied by local sources as feasible.

7-2.2 Storage

Typically for a water system, three categories of storage are of importance: operational, emergency, and fire suppression. The entire system as well as each individual pressure zone is evaluated to determine the system's ability to meet storage criteria.

The required storage requirements for each pressure zone are anticipated to be met with reservoir capacity and well water. For pressure zones with multiple reservoirs, there is the potential that the high water elevations will differ between the two reservoirs. There may be unusable space, which will be accounted for in the storage analysis.

Operational Storage

Operational storage serves to equalize variations in sources of supply and demand over short periods of time (daily or weekly). Utilizing the daily demand hydrograph, the component of operational storage needs to account for the difference in supply and demand, which can be determined with an extended period simulation of the system over a day or a week, etc.

The operational storage might typically be based on one maximum day demand if groundwater storage is not available. For the City of Ontario's system, operational storage criterion is based on 30 percent of the maximum day demand for Ontario Ranch (OR) and 25 percent of the maximum day demand for the Original Model Colony (OMC). Greater daily demand fluctuations are anticipated in OR due to its residential character compared to the mixed residential and industrial character of OMC.

Emergency Storage

Emergency storage is used in the event of an interruption in the primary water supply source. It is assumed that most outages can be mitigated within 7 days. Accordingly, many agencies that depend solely on imported water utilize 7 average days of storage as their emergency storage criterion. It is reasonable to expect that groundwater sources will be available during an outage of the imported water supply. Therefore, the required emergency storage volumes may typically be reduced by an agency's groundwater supply capacity. The City of Ontario's emergency storage volume can be reduced by the actual production capacity of its wells. The only requirement would be that the facilities be capable of pumping the water needed during an emergency from the wells to the higher zones. Since the City's well capacity of 38,604 gpm exceeds the existing average day demand (20,600 gpm), the emergency storage criteria is set to one average day demand.

Operational and fire storage shall be available for each individual zone while emergency storage shall be available system-wide. Again, the only the requirement be that the facilities are capable of moving the water needed during an emergency, from the location of the storage to all other zones.

Fire Suppression Storage

Fire suppression storage, shown in Table 7-1, is the volume required to supply the service area with the required fire flows, which range from 1,500 to 4,000 gpm for a duration of two (2) to four (4) hours.

7-2.3 Booster Pump Stations

Booster pump stations are typically sized to deliver the maximum day demand plus fire flow or the peak hour demand of the service areas, whichever is greater. The exception is closed service zones supplied by either a hydropneumatic pumping system or a variable speed pumping system. Under these circumstances, the booster pumps must meet maximum day demand plus fire flow requirements or there must be a separate fire pump installed to meet the fire flow requirements.

All booster pump stations shall incorporate a standby pump of the same size as the largest duty pump. This ensures that there is a replacement for the largest duty pump during maximum day demand conditions, while one of the pumps at the station is being repaired or replaced. It typically takes pump manufacturers 12 to 16 weeks for delivery of a new pump and motor unit once the order is placed and shop drawings are approved.

7-2.4 System Pressures

Most water utilities set 60 to 80 pounds per square inch (psi) as the average static pressure throughout the system. The water system shall also be capable of maintaining a minimum residual pressure of 40 psi during the peak hour demand. A residual pressure of 20 psi must be maintained at the fire hydrant outlet in developed areas during fire flow.

In areas where pressures exceed 80 psi, the Uniform Plumbing Code requires customers to install “an approved type pressure regulator preceded by an adequate strainer” on their service connections to protect domestic plumbing and water heaters.

7-2.5 Transmission and Distribution Pipelines

The distribution system shall be sized and designed to provide redundant service at adequate pressures for normal use as well as at fire flow conditions. In most cases, this can be accomplished by looping the system. Looping through easements or other areas which are not easily accessible shall be avoided. Provisions shall be made for supplying each service zone from at least two sources where feasible.

In order to maintain adequate system pressures and prolong the life of the pipe, flow velocities shall be limited. The system shall operate at velocities of 1 to 3 feet per second (fps) normally, with a maximum velocity of 7 fps at intermittent peak flows for all pipes other than VCP pipes. Velocity in PVC pipes shall not exceed 5 fps. The pipe velocity at fire flows shall not exceed 10 fps for all pipes.

The pressure in the system at any given point for a particular flow is dependent on a number of variables including pipe size, roughness and length. These components all contribute to the magnitude of pressure losses in the system. The system shall be designed and operated to maintain system losses to less than 10 feet for each 1000 feet of pipe length under any condition, subject to satisfying all other criteria.

All pipes shall be sized to provide adequate fire flows. To achieve this, when a single, unlooped pipe provides fire service to an area, a minimum diameter of 8-inch shall be maintained to the last hydrant. All mains shall be constructed with a minimum diameter of 8-inches. In commercial and industrial areas, the minimum diameter required is 12-inches. These pipe size recommendations shall be adhered to for all new design and construction projects, as well as any waterline replacement/upgrade projects.

7-2.6 Fire Suppression

The fire flow requirements used for this study are based upon the 2016 California Fire Code, which is adopted by the City’s municipal code (Section 4-4.01).

Fire flows shown in Table 7-1 are required to be delivered at a minimum residual pressure of 20 psi at the fire hydrant outlet. The requirements in the California Fire Code are specific to each building on a given parcel of land and based on several factors, including land use, building construction methods and materials, and whether or not automatic sprinklers are present. These specific requirements are shown in Appendix 7-1.

As this Potable Water Master Plan is a planning level document, an evaluation of whether California Fire Code requirements are met at each parcel was not performed. Instead, selected typical requirements as a function of land use are used to establish minimum fire flow availability at each system hydrant. The minimum required fire flow was generally established based on the adjacent land use having the highest fire flow requirement. Table 7-1 is a summary of the selected fire flow criteria for the various land uses within the City. These requirements were established as performance evaluation criteria and used in developing system improvement recommendations.

For specific future development planning and design, the criteria should be adjusted on a case by case basis per the latest California Fire Code.

The 2016 California Fire Code requires the 20 psi minimum residual pressures at the fire hydrant outlet. Per the requirements of the City's fire department, the potable water system must be capable of maintaining this pressure, while providing the full fire flow requirement through a single fire hydrant. System pressures are estimated using the City's potable water hydraulic model, which has been updated and calibrated as part of this master plan effort.

7-2.7 Service Life of Facilities

All facilities have useful lives for which relatively trouble-free service can be expected. Once exceeded, these facilities become less reliable, expensive to maintain and are subject to failure. Therefore, facility age is considered in the assessment of all water systems and in formulating future replacement projects.

The determination of the useful life is dependent upon multiple considerations. Table 7-2 shows the useful lives that are generally accepted as prudent planning criteria. They shall be one of the considerations in determining the phasing of facility replacement.

7-2.8 Operational Flexibility

Operational Flexibility is achieved by providing multiple sources of supply, back-up or stand-by facilities, and looped distribution system piping. Criteria to be applied include:

- Provide multiple sources of supply
- Provide looped system whenever possible
- For wells, provide standby generators and automatic transfer switches to deliver at least the average day demand into the system. For other wells, provide portable generator connection and manual transfer switches.
- Provide standby generators and automatic transfer switches at all booster pump stations
- Provide emergency interconnections with neighboring agencies

7-2.9 Distribution System Maintenance Program

Regular maintenance of a distribution system is an essential part of a properly operated water distribution system. Maintenance shall include periodic flushing and cleaning of the system, servicing of valves and hydrants, conducting leak surveys, replacement and repairs, and disinfection of repaired sections. Each maintenance and repair activity shall be documented. This work shall be performed in accordance with the Title 22, Chapter 16 (California Waterworks Standards) and AWWA G200 Standards.

<u>Flushing and Cleaning</u>

Flushing shall be performed to remove any accumulated sediments or other impurities which have been deposited in the system pipes. It will also help to restore system capacity. It is important that system flushing be performed systematically to remove the debris. The minimum flushing velocity shall be 2.5 fps.

Table 7-2
Planning Criteria for Facility Useful Life

Facility	Useful Life (Years)
Steel Reservoirs	40
Concrete Reservoirs	50
Lined and Coated Ductile Iron/Steel Pipe	50
PVC Pipe	50
Asbestos Cement Pipe	50
Cast Iron and Steel Pipe (Lining or coating of non-current practice)	35
Pump Stations/Wells/Treatment Facilities	
Structure	50
Piping	40
Valves	20
Mechanical	15
Electrical	15
Well Casing	20 - 60

Cleaning, will require proper access to the pipelines, shall be conducted on the sections that require it based upon the information collected and documented during regular maintenance activities.

Servicing of Valves and Hydrants

Valves are often found inaccessible, inoperable, or closed and shall therefore be tested and exercised regularly. In the event of a line break, it is important that valves operate properly so that the break can be isolated for repair. Records of repair shall require a notation of the time at which valves are closed and reopened so that valves do not remain closed inadvertently. The City's valves are scheduled to be exercised every five years.

Hydrants shall be periodically inspected for leaks at the hose outlets. Leaking hydrants shall be removed and/or reconditioned and then replaced. Valve exercising and hydrant maintenance programs can be implemented in conjunction with the flushing program.

Leak Surveys

Comparison of pumping and purchase records, and customer meter readings and other uses such as system flushing can indicate if excessive leakage is occurring in the system. Leak surveys shall be conducted when excessive leakage is suspected.

Water Main Replacement and Repair

Water mains shall be repaired and/or replaced when pipes are found to be broken, corroded, or leaking. The method of repair shall consider if the line is scheduled for replacement, its location in the system, and the conditions which led to the failure. Following the repair or replacement of any pipe, the line shall be flushed and disinfected in accordance with the applicable requirements.

7-2.10 Storage Tank and Reservoir Maintenance

The storage tanks shall be inspected periodically by a qualified diver at no more than 5 year intervals. The reports from diving inspections shall be utilized in scheduling the subsequent inspection program, as well as the maintenance/repair projects.

7-3 Design Criteria

7-3.1 Wells

The wells shall be designed in accordance with the Water Well Standards: State of California Bulletin 74-81 and Bulletin 74-90 (supplement to Bulletin 74-81), the most recent AWWA Standard A-100, Department of Public Health requirements, and sound engineering judgment.

The pumps shall be placed low enough in the casing so that subsequent lowering shall not be necessary. All well screens shall be below the pump intake to preclude cascading of water into the well casing even with the lowest expected pumping water level. The casing diameter shall be at least 4 inches larger than the largest pump/column pipe dimension, and maximum velocity shall not exceed 5 fps. Total screen area shall be sized to maintain a velocity of less than 0.1 foot per second at the maximum anticipated flow. Additionally, the casings diameters shall be selected to allow lining the wells in the future without losing significant capacity. The use of higher grade materials, such as stainless steel shall be considered to increase the useful life of the wells.

The well design shall include a 4-inch diameter camera tube extending to below the pump intake elevation, and a sounding tube. A separate air line with a depth gauge and an air connection shall be provided at every well. Flow meters, pressure gauges, and telemetry equipment shall be included to continuously monitor the wells. Either permanent emergency generators with automatic transfer switches or portable generator connections with manual transfer switches shall be provided at each well site. Sufficient standby power generation capacity shall be provided to pump at least the average day demand into the system.

7-3.2 Booster Pump Station

The pump stations shall be equipped with modern pump controllers, flow meters, suction and discharge pressure gauges, proper isolation valves, and telemetry equipment. Facilities that will minimize pressure transients at start-up, shut-down, and power failure shall be provided. Flow meters and pressure gauges are essential tools for monitoring pump performance and demand conditions in the service area. Telemetry equipment is used to remotely monitor the status of the facility, and notify personnel in the event of a failure.

Pump stations shall be constructed of fireproof materials and be provided with peripheral sprinkler systems to prevent fire damage. Furthermore, power to the pump stations shall be provided through underground service to minimize possibility of damage during fires.

Standby generators and automatic transfer switches shall be provided to operate the pump stations during commercial power outages.

7-3.3 Pressure Reducing Stations

Pressure reducing stations supplying service zones shall be constructed with sufficient valves to deliver the entire range of demands and the fire flows within their proper operating range. Wherever possible, a minimum of two pressure reducing stations shall serve these zones. Pressure reducing stations shall be constructed with a pressure relief valve at the downstream end to preclude excessive pressures in the service area in case of malfunctioning of the pressure regulating valves. Each pressure reducing station shall be equipped with flow meters and telemetry equipment so that their operation can be remotely monitored through the SCADA system, and alarm conditions, such as open pressure relief valve can be addressed in a timely manner.

SECTION 8

HYDRAULIC MODEL

8-1 General

A computer model of the City's water system was developed in the Innovyze Infowater software platform. It was utilized to aid in the evaluation of the adequacy of the existing facilities under the current and future supply and demand conditions.

Generally, the model development steps included the following:

1. Import water system GIS data to modeling software
2. Verify and complete pipe information (pressure zone, diameter, length, roughness)
3. Verify and complete junction information (pressure zone, elevations)
4. Add detailed facility data (wells, pump station, reservoir, imported water turnouts, and pressure reducing stations)
5. Add facility information (dimensions and water level for tank, pump curves for pumps, sizes and pressure settings for pressure reducing valves, and aquifer levels for well pump suction levels)
6. Determine and assign demands to model junctions
7. Develop and assign diurnal demand curves to model junctions
8. Assign controls to facilities (pump start and stop conditions)

The City's Water GIS and atlas sheets were used as the basis of the geometry of the potable water model. Water system facilities (reservoir, pump station, wells, pressure reducing stations, and turnouts) were added to the model based on as-built construction plans and provided facility information, such as pump curves, efficiency tests, ground water levels, and operational controls. The City consistently updates its Water GIS as new developments are constructed and as improvement projects are completed. The potable water model was generated from the City's water geodatabase from March 2019.

The model includes the potable water pipelines that are owned by the City. Water service laterals are not included. Fire hydrant laterals are included. Modeling information associated with each pipe includes diameter, length, and roughness factor. Other pipe information included in the model database are year of installation, pressure zone, and pipe material. Modeling information associated with each junction includes ground elevation, water demand, and diurnal pattern of demand. Model junction elevations were obtained from the City's latest 5-foot contour data (GIS Shapefile).

8-2 Demand Distribution

Existing Demands

Customer water meter data was geocoded/linked to the City's GIS meter shapefile by Service Profile Identification (SPID) number. Next, service laterals were used to spatially join the the meters to the mainline junctions within the associated pressure zone. This enabled each water meter and its demand to be assigned to the closest model junction ID.

The existing average day demand (ADD) distribution was based upon water meter data provided for the period between September 2018 and August 2019. The existing maximum day demand (MDD) distribution was based upon peaking factors described in Section 4-5. In the OMC service area the MDD to ADD peaking factor is 1.6, while in the OR service area the peaking factor is 1.5.

After the ADD were loaded onto model junctions, they were adjusted so that the total demand matched the existing water production estimates (see Table 4-3). MDD were developed using the peaking factors. The method of distributing demands inherently accounted for any high water users within the existing service area as well as non-revenue water.

The water demands are assigned to the following database fields within the model:

- Demand Type 1: Existing residential demand
- Demand Type 2: Existing non-residential demand
- Demand Type 3: Existing high water user Demand
- Demand Type 4: Future residential demand
- Demand Type 5: Future non-residential demand

Future Demands

The increase in future water demand is due to the development of Ontario Ranch, anticipated densification in land use and population per the City's 2010 General Plan, and the assumption that the area within the service area will be fully occupied (vacant land will be built upon and occupied).

The existing loads remained the same unless an area was going to be redeveloped. Future demands were estimated using the water demand factors summarized in Table 4-7.

8-3 Diurnal Patterns

The developed diurnal demand patterns discussed in Section 5 were specified at each node.

8-4 Model Scenarios

The accuracy of the hydraulic model for the existing system was verified during the calibration process, as described in Section 10 of this report. Within the model software, new data sets and query sets were created to represent different operating conditions. The following five scenarios were created.

- Calibration Day Scenario (CALIBRATION_2019_04_18)
- Existing Average Day Demand Scenario (EXISTING_ADD)
- Existing Maximum Day Demand Scenario (EXISTING_MDD)
- Future Average Day Demand Scenario (FUTURE_ADD)
- Future Maximum Day Demand Scenario (FUTURE_MDD)

Data sets change as conditions in each scenario need to be changed. For example, separate demand sets were created to represent the various demand conditions. Separate control sets were created to define the initial status and controls of facilities (pumps and valves). The data sets associated with each scenario are shown in Table 8-1.

Table 8-1

Existing Data Sets

Data Set	Calibration Day Scenario (CALIBRATION_2019_04_18)	Existing Scenarios		Future Scenarios	
		Average Day Demand Scenario (EXISTING_ADD)	Maximum Day Demand Scenario (EXISTING_MDD)	Average Day Demand Scenario (FUTURE_ADD)	Maximum Day Demand Scenario (FUTURE_MDD)
Demand Set	CALIBRATION_2019_04_18	EXISTING_ADD	EXISTING_MDD	FUTURE_ADD	FUTURE_MDD
Tank Set	CALIBRATION_2019_04_18	EXISTING_ADD	EXISTING_MDD	FUTURE_ADD	FUTURE_ADD
Reservoir Set	EXISTING	EXISTING	EXISTING	EXISTING	EXISTING
Pump Set	EXISTING	EXISTING	EXISTING	EXISTING	EXISTING
Pipe Set	EXISTING	EXISTING	EXISTING	FUTURE	FUTURE
Valve Set	CALIBRATION_2019_04_18	EXISTING_ADD	EXISTING_MDD	FUTURE_ADD	FUTURE_MDD
Control Set	CALIBRATION_2019_04_18	EXISTING_ADD	EXISTING_MDD	FUTURE_ADD	FUTURE_MDD
Logical Set	BASE	EXISTING_ADD	EXISTING_MDD	FUTURE_ADD	FUTURE_MDD

8-5 System Operations

The hydraulic model was used to analyze the existing and future systems under average day demands (ADD) and maximum day demands (MDD).

For a potable water system as large as the City's, there are numerous ways that the system can be operated. There are multiple sources of water to each major zone. The day-to-day operations of the system take into consideration, but are not limited to the following issues: water quality, well production goals, imported water goals, and energy costs.

The operational settings and facility statuses for the ADD and MDD scenarios were developed per meetings with the City's Operations staff, review of SCADA data, historic water use and operations data.

It is important to note that the controls in the developed model are largely based on SCADA information. Controls will need to be reevaluated and updated for additional scenarios created and analyses conducted by the City in the future.

Some of the well and pump station facilities are enrolled in a time of use (TOU) rate through Southern California Edison. TOU rates are broken down into the following 4 categories: Super Off Peak, Off Peak, Mid Peak, and Peak. TOU rates vary the time of day energy is used, as well as between weekdays and weekends. TOU rates also vary seasonally with increased rates, during the warm summer months (June 1st to September 31st).

8-6 Wells

The City's water system currently has seventeen (17) active wells. Table 8-2 and Table 8-3 describe the existing and future operation control settings of the wells, respectively. The summary tables detail operations for the ADD and MDD scenarios.

Groundwater levels at the wells were represented in the model by constant level, unlimited capacity reservoirs. The groundwater levels for wells were based on the most-recent groundwater level readings.

8-7 Imported Water Connections

Imported water connections were simulated using flow control valves with the settings included in Table 8-4.

Table 8-2
Existing Well Operational Settings

Well Number	Location	Pressure Zone	Model Reservoir ID	Groundwater Pumping Elevation (ft)	Model Pump ID	Model Pump Curve ID	Capacity (gpm)	TDH (ft)	ADD Operational Settings							MDD Operational Settings						
									Reference Reservoir	Action	If Reference Reservoir is	[1]Level (Off Peak)	[2]Level (Mid Peak)	[3]Level (Peak)	[4]Level (Super Peak)	Reference Reservoir	Action	If Reference Reservoir is	[1]Level (Off Peak)	[2]Level (Mid Peak)	[3]Level (Peak)	[4]Level (Super Peak)
Zone 925																						
49	1495 S. Dupont Ave.	925	WMP2019_RE00020_WELL49	586	M22WE101_WELL_49	WELL_49	2545	341.1	925-2A	closed	above	25.0	25.0	18.0	18.0	925-2A	closed	above	25.0	25.0	18.0	18.0
										open	below	21.0	21.0	16.0	16.0		open	below	21.0	21.0	16.0	16.0
Zone 1010																						
34	1425 S. Bon View Ave.	1010	WMP2019_RE00018_WELL34	522	M14WE101_WELL_34	WELL_34	2074	-	1010-1A	Inactive						1010-1A	Inactive					
39	4397 Guasti Ave.	1010	WMP2019_RE00014_WELL39	621	J23WE100_WELL_39	WELL_39	2209	406.1	1010-2A	Out of Service						1010-2A	Out of Service					
50	3900 W. Riverside Dr.	1010	N.A.	N.A.	N.A.	N.A.	2274	475	N.A.	Inactive						N.A.	Inactive					
Zone 1074																						
35	652 E. Main St.	1074	WMP2019_RE00015_WELL35	562	K14WE100_WELL_35	WELL_35	2568	548.1	1074-1A	Manually Off						1074-1A	Manually Off					
36	1400 S. Archibald Ave.	1074	WMP2019_RE00019_WELL36	561	M19WE100_WELL_36	WELL_36	1672	532	1074-1A	closed	above	11.0	11	11	11	1074-1A	closed	above	11.0	11	11	11
										open	below	9.5	9.5	9.5	9.5		open	below	9.5	9.5	9.5	9.5
40	1335 East Holt Bl.	1074	WMP2019_RE00011_WELL40	582	J16WE100_WELL_40	WELL_40	2024	503.3	1074-1A	Manually On						1074-1A	Manually On					
44	964 Cucamonga Ave.	1074	WMP2019_RE00004_WELL44	558	H15WE106_WELL_44	WELL_44	2471	644.2	1074-1A	Manually On						1074-1A	Manually On					
45	665 N .Campus Ave.	1074	WMP2019_RE00008_WELL45	587	I14WE100_WELL_45	WELL_45	2589	515.6	1074-1A	closed	above	11.5	11.5	11.5	11.5	1074-1A	closed	above	11.5	11.5	11.5	11.5
										open	below	10.0	10	10	10		open	below	10.0	10	10	10
52	1230 E. 4th St,	1074	WMP2019_RE00005_WELL52	519	H15WE107_WELL_52	WELL_52	2279	672.1	1074-1A	MANUALLY OFF						1074-1A	MANUALLY OFF					
Zone 1212																						
20	9600 S. Milliken Ave.	1212	N.A.	N.A.	N.A.	N.A.	-	-	1212-3	Standy Wells						1212-3	Standy Wells					
27	4300 E. Jurupa St.	1212	N.A.	N.A.	N.A.	N.A.	-	-	1212-3	Standy Wells						1212-3	Standy Wells					
24	700 N. Haven Ave.	1212	WMP2019_RE00010_WELL24	618	I21WE100_WELL_24	WELL_24	1907	599.4	1212-3	closed	above	20.5	20.5	17.2	17.3	1212-3	closed	above	20.0	20.0	17.2	17.2
										open	below	19.5	19.5	16.0	16.0		open	below	19.0	19.0	16.0	16.0
29	2400 E. Airport Dr.	1212	WMP2019_RE00012_WELL29	572	J18WE100_WELL_29	WELL_29	2147	657.1	1212-3	Manually Off						1212-3	Manually On					
30	220 S. Wineville Ave.	1212	WMP2019_RE00016_WELL30	622	K24WE100_WELL_30	WELL_30	2063	596.5	1212-1	closed	above	21.0	21.0	17.0	17.5	1212-3	closed	above	20.3	20.3	18.6	17.5
										open	below	20.0	20.0	16.5	16.5		open	below	19.3	19.3	17.6	16.5
31	5719 E. Santa Ana St,	1212	WMP2019_RE00017_WELL31	619	L25WE100_WELL_31	WELL_31	2866	605.7	1212-3	Manually Off						1212-3	Manually Off					
37	4327 E. Guasti	1212	WMP2019_RE00013_WELL37	616	J22WE100_WELL_37	WELL_37	3074	600.7	1212-3	closed	above	21.5	21.5	18.0	18.0	1212-3	closed	above	20.8	20.8	19.5	19.5
										open	below	20.5	20.5	17.0	17.0		open	below	19.8	19.8	18.5	18.5
38	837 N. Center	1212	WMP2019_RE00006_WELL38	600	H20WE100_WELL_38	WELL_38	2427	662.8	1212-3	closed	above	21.2	21.2	17.8	17.8	1212-3	closed	above	20.6	20.6	18.8	17.8
										open	below	20.2	20.2	16.8	16.8		open	below	19.6	19.6	17.8	16.8
41	1252 North Hellman Ave.	1212	WMP2019_RE00003_WELL41	595	G18WE100_WELL_41	WELL_41	2143	703	1212-3	Manually On						1212-3	Manually On					
47	4255 E. Concours St.	1212	WMP2019_RE00007_WELL47	586	H22WE100_WELL_47	WELL_47	3358	631.8	1212-3	Manually On						1212-3	closed	above	21.0	21	21	21
																	open	below	20.0	20	20	20
Zone 1348																						
46	1670 W. 8th St.	1348	WMP2019_RE00002_WELL46	567	E16WE100_WELL_46	WELL_46	2471	847.4	1348-1A	closed	above	15.5	15.5	15.5	16	1348-1A	closed	above	18	18	18	18
										open	below	14.5	14.5	13.5	13.5		open	below	17	17	17	17

[1]ADD Off Peak time is from 8:15 am to 3:30 pm
[2]ADD Mid Peak time is from 9:15 pm to 8:15 am
[3]ADD Peak time is from 3:30 pm to 9:15 pm
[4]ADD Super Peak time is not used for low use periods.

[5]MDD Off Peak time is not used for high use periods
[6]MDD Mid Peak time is from 9:15 pm to 3:30 pm
[7]MDD Peak time is not used for high use periods
[8]MDD Super Peak time is from 3:30 pm to 9:15 pm

Table 8-3
Future Well Operational Settings

Well Number	Location	Pressure Zone	Model Reservoir ID	Groundwater Pumping Elevation (ft)	Model Pump ID	Model Pump Curve ID	Capacity (gpm)	TDH (ft)	ADD Operational Settings: Reference Reservoir	Action	If Reference Reservoir is	[1]Level (Off Peak)	[2]Level (Mid Peak)	[3]Level (Peak)	[4]Level (Super Peak)	MDD Operational Settings: Reference Reservoir	Action	If Reference Reservoir is	[1]Level (Off Peak)	[2]Level (Mid Peak)	[3]Level (Peak)	[4]Level (Super Peak)
Zone 925																						
49	1495 S. Dupont Ave.	925	WMP2019_RE00020_WELL49	586	M22WE101_WELL_49	WELL_49	2,545	341.1	925-2A	closed	above	25.0	25.0	18.0	18.0	925-2A	closed	above	27	27	18	18
										open	below	21.0	21.0	16.0	16.0		open	below	25.5	25.5	16	16
48 Future	3595 W. Jurupa St.	925	WMP2019_FUTRE00002_WELL_48	635	WMP2019_FUTWE00003_WELL_48	Design Point	2,500	Future	925-2A	closed	above	25.2	25.2	18.2	18.2	925-2A	closed	above	27.2	27.2	18.2	18.2
										open	below	21.2	21.2	16.2	16.2		open	below	25.7	25.7	16.2	16.2
51 Future	600 N. Doubleday Ave.	925	WMP2019_FUTRE00005_WELL_51	579	WMP2019_FUTWE00005_WELL_51	Design Point	2,500	Future	925-2A	closed	above	25.4	25.4	18.4	18.4	925-2A	closed	above	27.4	27.4	18.4	18.4
										open	below	21.4	21.4	16.4	16.4		open	below	25.9	25.9	16.4	16.4
54 Future	Jurupa and Dupont	925	WMP2019_FUTRE0004_WELL_54	625	WMP2019_FUTWE00004_WELL_54	Design Point	2,000	Future	925-2A	closed	above	25.6	25.6	18.6	18.6	925-2A	closed	above	27.6	27.6	18.6	18.6
										open	below	21.6	21.6	16.6	16.6		open	below	26.1	26.1	16.6	16.6
55 Future	Francis and Bon View	925	WMP2019_FUTRE0009_WELL_55	625	WMP2019_FUTWE00009_WELL_55	Design Point	2,500	Future	925-1A	closed	above	17.0	17.0	15.0	15.0	925-1A	closed	above	17.0	17.0	15.0	15.0
										open	below	12.0	12.0	13.0	13.0		open	below	12.0	12.0	13.0	13.0
56 Future	Belmont, east of Campus	925	WMP2019_FUTRE00007_WELL_56	625	WMP2019_FUTWE00007_WELL_56	Design Point	2,500	Future	925-1A	closed	above	17.2	17.2	15.2	15.2	925-1A	closed	above	17.2	17.2	15.2	15.2
										open	below	12.2	12.2	13.2	13.2		open	below	12.2	12.2	13.2	13.2
57 Future	Grove and Locust	925	WMP2019_FUTRE00011_WELL_57	625	WMP2019_FUTWE00011_WELL_57	Design Point	2,500	Future	925-1A	closed	above	17.4	17.4	15.4	15.4	925-1A	closed	above	17.4	17.4	15.4	15.4
										open	below	12.4	12.4	13.4	13.4		open	below	12.4	12.4	13.4	13.4
58 Future	Cucamonga, south of Acacia	925	WMP2019_FUTRE00010_WELL_58	625	WMP2019_FUTWE00010_WELL_58	Design Point	2,500	Future	925-1A	closed	above	17.6	17.6	15.6	15.6	925-1A	closed	above	17.6	17.6	15.6	15.6
										open	below	12.6	12.6	13.6	13.6		open	below	12.6	12.6	13.6	13.6
Zone 1010																						
34	1425 S. Bon View Ave.	1010	WMP2019_RE00018_WELL34	522	M14WE101_WELL_34	WELL_34	2,074	-	1010-1A	Inactive						1010-1A	Inactive					
37	4327 E. Guasti	1010	WMP2019_RE00013_WELL37	616	J22WE100_WELL_37	Design Point	3,200	600.7	1010-2A	closed	above	28.5	28.5	28.5	12.0	1010-2A	closed	above	26.5	26.5	26.5	12.0
										open	below	24.0	24.0	24.0	9.0		open	below	24.0	24.0	24.0	9.0
39	4397 Guasti Ave.	1010	WMP2019_RE00014_WELL39	621	J23WE100_WELL_39	WELL_39	2,200	406.1	1010-2A	closed	above	28.5	28.5	28.5	12.0	1010-2A	closed	above	26.5	26.5	26.5	12.0
										open	below	24.0	24.0	24.0	9.0		open	below	24.0	24.0	24.0	9.0
50	3900 W. Riverside Dr.	1010	WMP2019_FUTRE00001_WELL_50	625	R22WE100_WELL_50	Design Point	2,200	475	1010-1A	closed	above	27.0	27	27	27	1010-1A	closed	above	27.0	27	27	27
										open	below	25.0	25	25	25		open	below	25.0	25	25	25
Zone 1074																						
35	652 E. Main St.	1074	WMP2019_RE00015_WELL35	562	K14WE100_WELL_35	WELL_35	2,568	548.1	1074-1A	closed	above	12.0	12	12	12	1074-1A	closed	above	12.0	12	12	12
										open	below	10.5	10.5	10.5	10.5		open	below	10.5	10.5	10.5	10.5
36	1400 S. Archibald Ave.	1074	WMP2019_RE00019_WELL36	561	M19WE100_WELL_36	WELL_36	1,672	532	1074-1A	closed	above	11.0	11	11	11	1074-1A	closed	above	11.0	11	11	11
										open	below	9.5	9.5	9.5	9.5		open	below	9.5	9.5	9.5	9.5
40	1335 East Holt Bl.	1074	WMP2019_RE00011_WELL40	582	J16WE100_WELL_40	WELL_40	2,024	503.3	1074-1A	Manually Off						1074-1A	Manually On					
44	964 Cucamonga Ave.	1074	WMP2019_RE00004_WELL44	558	H15WE106_WELL_44	WELL_44	2,471	644.2	1074-1A	Manually On						1074-1A	Manually On					
45	665 N .Campus Ave.	1074	WMP2019_RE00008_WELL45	587	I14WE100_WELL_45	WELL_45	2,589	515.6	1074-1A	closed	above	11.5	11.5	11.5	11.5	1074-1A	closed	above	11.5	11.5	11.5	11.5
										open	below	10.0	10	10	10		open	below	10.0	10	10	10
52	1230 E. 4th St,	1074	WMP2019_RE00005_WELL52	519	H15WE107_WELL_52	WELL_52	2,279	672.1	1074-1A	Manually Off						1074-1A	Manually Off					
Zone 1212																						
20	9600 S. Milliken Ave.	1212	N.A.	N.A.	N.A.	N.A.	-	-	1212-3	Standby						1212-3	Standby					
27	4300 E. Jurupa St.	1212	N.A.	N.A.	N.A.	N.A.	-	-	1212-3	Standby						1212-3	Standby					
24	700 N. Haven Ave.	1212	WMP2019_RE00010_WELL24	618	I21WE100_WELL_24	WELL_24	1,907	599.4	1212-3	closed	above	20.5	20.5	17.2	17.3	1212-3	closed	above	20.0	20.0	17.2	17.2
										open	below	19.5	19.5	16.0	16.0		open	below	19.0	19.0	16.0	16.0
29	2400 E. Airport Dr.	1212	WMP2019_RE00012_WELL29	572	J18WE100_WELL_29	WELL_29	2,147	657.1	1212-3	Manually Off						1212-3	Manually On					
30	220 S. Wineville Ave.	1212	WMP2019_RE00016_WELL30	622	K24WE100_WELL_30	WELL_30	2,063	596.5	1212-3	closed	above	21.0	21.0	17.0	17.5	1212-3	closed	above	20.3	20.3	18.6	17.5
										open	below	20.0	20.0	16.5	16.5		open	below	19.3	19.3	17.6	16.5
31	5719 E. Santa Ana St,	1212	WMP2019_RE00017_WELL31	619	L25WE100_WELL_31	WELL_31	2,866	605.7	1212-3	closed	above	21.3	21.3	18.0	18.0	1212-3	closed	above	20.8	20.8	19.0	18.0
										open	below	20.3	20.3	17.0	17.0		open	below	19.8	19.8	18.0	17.0
38	837 N. Center	1212	WMP2019_RE00006_WELL38	600	H20WE100_WELL_38	WELL_38	2,427	662.8	1212-3	closed	above	21.2	21.2	17.8	17.8	1212-3	closed	above	20.6	20.6	18.8	17.8
										open	below	20.2	20.2	16.8	16.8		open	below	19.6	19.6	17.8	16.8
41	1252 North Hellman Ave.	1212	WMP2019_RE00003_WELL41	595	G18WE100_WELL_41	WELL_41	2,143	703	1212-3	Manually On						1212-3	Manually On					
47	4255 E. Concours St.	1212	WMP2019_RE00007_WELL47	586	H22WE100_WELL_47	WELL_47	3,358	631.8	1212-3	Manually On						1212-3	Manually On					
42 Future	4100 E. Inland Empire Blvd.	1212	WMP2019_FUTRE00002_WELL_42	650	WMP2019_FUTWE00001_WELL_42	Design Point	2,500	Future	1212-3	closed	above	20.7	20.7	17.5	17.5	1212-3	closed	above	20.2	20.2	17.4	17.4
										open	below	19.7	19.7	16.2	16.2		open	below	19.2	19.2	16.2	16.2
43 Future	3650 E. Airport Drive	1212	WMP2019_FUTRE00002_WELL_43	579	WMP2019_FUTWE00002_WELL_43	Design Point	2,700	Future	1212-3	closed	above	20.5	20.5	17.2	17.3	1212-3	closed	above	20.0	20.0	17.2	17.2
										open	below	19.5	19.5	16.0	16.0		open	below	19.0	19.0	16.0	16.0
Zone 1348																						
46	1670 W. 8th St.	1348	WMP2019_RE00002_WELL46	567	E16WE100_WELL_46	WELL_46	2,471	847.4	1348-1A	closed	above	15.5	15.5	15.5	16	1348-1A	closed	above	18	18	18	18
										open	below	14.5	14.5	13.5	13.5		open	below	17	17	17	17

[1]ADD Off Peak time is from 8:15 am to 3:30 pm
[2]ADD Mid Peak time is from 9:15 pm to 8:15 am
[3]ADD Peak time is from 3:30 pm to 9:15 pm
[4]ADD Super Peak time is not used for low use periods.
[5]MDD Off Peak time is not used for high use periods
[6]MDD Mid Peak time is from 9:15 pm to 3:30 pm
[7]MDD Peak time is not used for high use periods
[8]MDD Super Peak time is from 3:30 pm to 9:15 pm

Table 8-4
Imported Water Connection Operational Settings

ID	To Zone	Location	Model ID	Existing ADD Scenario (gpm)	Existing MDD Scenario (gpm)	Future ADD Scenario (gpm)	Future MDD Scenario (gpm)
CDA I[1]	1010	Intersection of Archibald Ave and extension of Schaefer St	WMP2019_VL00009_CDA_1	0	0	0	0
CDA II - Lat A[2]	925	Intersection of Philadelphia St and Milliken Ave	WMP2019_VL00006_CDA_2_LAT_A	0	0	0	0
CDA II - Lat B[2]	1010	Intersection of Philadelphia St and Milliken Ave	WMP2019_VL00005_CDA_2_LAT_B	0	0	0	0
CDA II - Lat C[2]	925	Intersection of Riverside Dr and Milliken Ave	WMP2019_VL00007_CDA_2_LAT_C	1,000	1,200	1,000	1,000
CDA II - Lat D[2]	1010	Intersection of Riverside Dr and Milliken Ave	WMP2019_VL00008_CDA_2_LAT_D	4,500	4,500	4,500	4,500
WFA Turnout 1	1212	Northwest corner of Eighth St and Fern Ave (adjacent Reservoir 1212-1A and 1212-1B)	E12PR101_WFA_1	0	2,000	0	4,500
WFA Turnout 2[3]	1348	Southeast corner of Campus Ave and A St (adjacent Reservoir 1212-3)	WMP2019_VL00001_WFA_2	2,000	6,000	2,000	6,200
WFA Turnout 2A[3]	1212	Southeast corner of Campus Ave and A St (adjacent Reservoir 1212-3)	E14PR101_WFA_2A	0	5,000	0	2,800

[1] *CDA I is the Chino Basin Desalter Facility No. 1*

[2] *CDA II is the Chino Basin Desalter Facility No. 2*

[3] *WFA2 is upstream of WFA2*

8-8 Reservoirs

All active reservoirs are included in the hydraulic model. The reservoirs are designated as “tanks” because they have a known finite volume and water surface levels that change with time as water flows into or out of them. (Note the model software defines “reservoirs” as sources of water that remain at a constant water level irrespective of the flow. They have an unlimited volume and are generally used to represent a lake or other inexhaustible supply source.)

The initial reservoir levels for the ADD and MDD scenarios for the existing and future models are summarized in Tables 8-5 and 8-6, respectively.

8-9 Booster Pumps

Tables 8-7 and 8-8 describes the existing and future operation control settings of the booster pumps, respectively. The ADD and MDD operational settings were determined after meeting with the City’s Operations staff and review of existing SCADA data.

Table 8-5

Existing Model Tank Summary

Pressure Zone	Reservoir Name	Existing Model Tank ID	Bottom Elevation (ft)	Model Tank Type	Model Tank Diameter (ft)	Model Volume to Depth Curve ID	Model Tank Min. Level (ft)	Model Tank Max. Level (ft)	Existing ADD Initial Tank Level (ft)	Existing MDD Initial Tank Level (ft)
925	Reservoir 925-2A	M22RS101_925_2A	893.0	0: Cylindrical	188		5.0	32.0	26.0	26.0
1010	Reservoir 1010-1	K14RS101_1010_1	979.3	0: Cylindrical	178		5.0	30.0	20.2	20.2
1010	Reservoir 1010-2A	J23RS101_1010_2A	980.0	0: Cylindrical	226		5.0	30.0	25.5	25.5
1010	Reservoir 1010-2B	J22RS101_1010_2B	980.0	0: Cylindrical	226		5.0	30.0	25.5	25.5
1074	Reservoir 1074-1A	H15RS103_1074_EQUIV_TANK	1054.4	1: Variable Area	0	1074_RES_EQUIV_TANKS	5.0	20.4	11.5	11.5
1074	Reservoir 1074-1B									
1212	Reservoir 1212-1A	E12RS102_1212_1A	1188.0	1: Variable Area	0	1212_RES_4	5.0	26.0	20.5	17.8
1212	Reservoir 1212-1B	E12RS101_1212_1B	1202.0	1: Variable Area	0	1212_RES_5	2.0	11.5	7.0	3.8
1212	Reservoir 1212-3	E14RS101_1212_3	1189.0	1: Variable Area	0	1212_RES_7	5.0	24.3	23.0	23.0
1348	Reservoir 1348-1A	B14RS104_EQUIV_TANK_1348	1328.3	1: Variable Area	0	1348_RES_EQUIVALENT	5.0	20.6	15.0	17.2
1348	Reservoir 1348-1B									
1348	Reservoir 1348-1C									

Table 8-6

Future Model Tank Summary

Pressure Zone	Reservoir Name	Existing Model Tank ID	Bottom Elevation (ft)	Model Tank Type	Model Tank Diameter (ft)	Model Volume to Depth Curve ID	Model Tank Min. Level (ft)	Model Tank Max. Level (ft)	Future ADD Initial Tank Level (ft)	Future MDD Initial Tank Level (ft)
925	Reservoir 925-1A	004_RES_925_1A_1B	905.0	0: Cylindrical	391.4		5.0	20.0	6.3	6.3
925	Reservoir 925-1B									
925	Reservoir 925-2A	001_RES_925_2A_2B	893.0	0: Cylindrical	252.7		5.0	32.0	21.3	21.3
925	Reservoir 925-2B									
1010	Reservoir 1010-1	K14RS101_1010_1	979.3	0: Cylindrical	178.0		5.0	30.0	20.2	20.2
1010	Reservoir 1010-2A	J23RS101_1010_2A	980.0	0: Cylindrical	226.0		5.0	30.0	25.5	25.5
1010	Reservoir 1010-2B	J22RS101_1010_2B	980.0	0: Cylindrical	226.0		5.0	30.0	25.5	25.5
1074	Reservoir 1074-1A	H15RS103_1074_EQUIV_TANK	1,054.4	1: Variable Area	0.0	1074_RES_EQUIV_TANKS	5.0	20.4	11.5	11.5
1074	Reservoir 1074-1B									
1212	Reservoir 1212-1A	E12RS102_1212_1A	1,188.0	1: Variable Area	0.0	1212_RES_4	5.0	26.0	20.5	20.5
1212	Reservoir 1212-1B	E12RS101_1212_1B	1,202.0	1: Variable Area	0.0	1212_RES_5	2.0	11.5	7.0	7.0
1212	Reservoir 1212-3	E14RS101_1212_3	1,189.0	1: Variable Area	0.0	1212_RES_7	5.0	24.3	23.0	23.0
1212	Reservoir 1212-4A	WMP2019_FUTTA00001_RES_1212_4A_	1,188.0	0: Cylindrical	336.9		0.0	24.0	16.8	16.8
1212	Reservoir 1212-4B									
1348	Reservoir 1348-1A		1,328.3	1: Variable Area	0.0	1348_RES_EQUIVALENT	5.0	20.6	15.0	15.0
1348	Reservoir 1348-1B	B14RS104_EQUIV_TANK_1348								
1348	Reservoir 1348-1C									

Table 8-7

Pump Station Operational Settings Summary

			ADD settings (Existing and Future)							MDD settings (Existing and Future)						
Booster Pump	**Model Pump ID**	**Model Pump Curve**	**Reference Reservoir**	**Action**	**If Reference Reservoir is**	**[1]Level (Off Peak)**	**[2]Level (Mid Peak)**	**[3]Level (Peak)**	**[4]Level (Super Peak)**	**Reference Reservoir**	**Action**	**If Reference Reservoir is**	**[1]Level (Off Peak)**	**[2]Level (Mid Peak)**	**[3]Level (Peak)**	**[4]Level (Super Peak)**
Galvin 1074-1	H15BP102_GALVIN_1212_1	GALVIN_BPS_P1_1A	1074-1A	closed	below	11.2	11.2	11.2	11.2	1074-1A	closed	below	11.2	11.2	11.2	11.2
				open	above	12.8	12.8	12.8	12.8		open	above	12.8	12.8	12.8	12.8
Galvin 1074-2	H15BP103_GALVIN_1212_2	GALVIN_BPS_P2_1B	1074-1A	closed	below	12.0	12.0	12.0	12.0	1074-1A	closed	below	12.0	12.0	12.0	12.0
				open	above	13.5	13.5	13.5	13.5		open	above	13.5	13.5	13.5	13.5
Galvin 1074-3	H15BP104_GALVIN_1212_3	Design Point	1074-1A	closed	below	11.5	11.5	11.5	11.5	1074-1A	closed	below	11.5	11.5	11.5	11.5
				open	above	13.0	13.0	13.0	13.0		open	above	13.0	13.0	13.0	13.0
Galvin 1348-4	H15BP101_GALVIN_1348_4	GALVIN_BPS_P4_2	1074-1A	closed	below	11.8	11.8	11.8	11.8	1074-1A	closed	below	11.8	11.8	11.8	11.8
				open	above	13.2	13.2	13.2	13.2		open	above	13.2	13.2	13.2	13.2
Booster 1348-3	E14BP101_BOOSTER_1348_3	Design Point	1348-1A	closed	above	15.0	15.0	15.0	15.5	1348-1A	closed	above	15.0	15.0	15.0	15.5
				open	below	14.0	14.0	13.0	13.0		open	below	14.0	14.0	13.0	13.0
Booster 1348-4	E14BP102_BOOSTER_1348_4	BOOSTER_1348_4	1348-1A	closed	above	12.5	12.5	12.5	12.5	1348-1A	closed	above	12.5	12.5	12.5	12.5
				open	below	10.5	10.5	10.5	10.5		open	below	10.5	10.5	10.5	10.5
Booster 1348-1	F13BP101A_BOOSTER_1348_1	Design Point	1348-1A	closed	above	15.5	15.5	15.5	16.0	1348-1A	closed	above	15.5	15.5	15.5	16.0
				open	below	14.5	14.5	13.5	12.5		open	below	14.5	14.5	13.5	13.5
Booster 1348-2	F13BP101B_BOOSTER_1348_2	Design Point	1348-1A	closed	above	14.5	14.5	14.5	14.5	1348-1A	closed	above	14.5	14.5	14.5	14.5
				open	below	13.5	13.5	12.5	12.5		open	below	13.5	13.5	12.5	12.5
Ontario Booster Pump 1	M22BP100_ONTARIO_1212_1	ONTARIO_BPS_P1	925-2A	closed	below	25.5	25.5	25.5	25.5	925-2A	closed	below	27.0	27.0	27.0	27.0
				open	above	26.5	26.5	26.5	26.5		open	above	28.0	28.0	28.0	28.0
Ontario Booster Pump 2	M22BP102_ONTARIO_1212_2	ONTARIO_BPS_P2	925-2A	closed	below	26.0	26.0	26.0	26.0	925-2A	closed	below	26.5	26.5	26.5	26.5
				open	above	27.0	27.0	27.0	27.0		open	above	27.5	27.5	27.5	27.5
Ontario Booster Pump 3	M22BP101_ONTARIO_1212_3	ONTARIO_BPS_P3	925-2A	closed	below	26.5	26.5	26.5	26.5	925-2A	closed	below	27.5	27.5	27.5	27.5
				open	above	27.5	27.5	27.5	27.5		open	above	28.5	28.5	28.5	28.5
Miliken Booster Pump 1	WMP2019_BP00001_MILLIKAN_1212_1	MILLIKEN_BPS_P1	1010-2A	closed	below	27.0	27.0	27.0	27.0	1010-22A	closed	below	27.0	27.0	27.0	27.0
				open	above	28.0	28.0	28.0	28.0		open	above	28.0	28.0	28.0	28.0
Miliken Booster Pump 2	WMP2019_BP00002_MILLIKAN_1212_2	MILLIKEN_BPS_P2	1010-2A	closed	below	26.0	26.0	26.0	26.0	1010-22A	closed	below	26.0	26.0	26.0	26.0
				open	above	27.0	27.0	27.0	27.0		open	above	27.0	27.0	27.0	27.0
Miliken Booster Pump 3	WMP2019_BP00003_MILLIKAN_1212_3	MILLIKEN_BPS_P3	1010-2A	closed	below	26.5	26.5	26.5	26.5	1010-22A	closed	below	26.5	26.5	26.5	26.5
				open	above	27.5	27.5	27.5	27.5		open	above	27.5	27.5	27.5	27.5
Future PS 1010	WMP2019_PS1010	Design Point	925	closed	below	Backup				925	closed	below	Backup			
				open	above	Backup					open	above	Backup			

[1]*ADD Off Peak time is from 8:15 am to 3:30 pm*

[2]*ADD Mid Peak time is from 9:15 pm to 8:15 am*

[3]*ADD Peak time is from 3:30 pm to 9:15 pm*

[4]*ADD Super Peak time is not used for low use periods.*

[5]*MDD Off Peak time is not used for high use periods*

[6]*MDD Mid Peak time is from 9:15 pm to 3:30 pm*

[7]*MDD Peak time is not used for high use periods*

[8]*MDD Super Peak time is from 3:30 pm to 9:15 pm*

8-10 Pressure Reducing Stations

The pressure reducing stations (PRS) are needed to increase pressure during peak hour demands, as well as to provide additional flow during an emergency fire flow event. The PRS controls settings were provided by the City's Operations staff and are summarized in Table 8-8.

The Innovyze InfoWater hydraulic model software has known difficulties modeling valves in parallel. Upon speaking with Innovyze technical support, it was recommended that one valve be modeled at each location representing a pressure reducing station. Therefore, the larger valve at each pressure reducing station was modeled with the highest pressure setting of that station.

Table 8-8

Pressure Reducing Stations Summary Table

PRS ID	Model Valve ID	Status	US Zone	DS Zone	Model Elevation (ft)	Model Pressure Reducing Setting (psi)
2	P13PR102_PRV_2	Existing	1074'	1010'	840.0	62.0
3	P15PR101_PRV_3	Existing	1074'	1010'	834.0	65.0
4	P17PR103_PRV_4	Existing	1074'	1010'	838.0	64.0
5	P19PR101_PRV_5	Existing	1074'	1010'	830.0	65.0
6	M19PR101_PRV_6	Existing	1212'	1074'	893.0	65.0
7	N22PR101_PRV_7	Existing	1212'	1010'	876.0	55.0
8	N26PR101_PRV_8	Existing	1212'	1010'	878.0	55.0
10	N20PR101_PRV_10	Existing	1212'	1074'	856.0	80.0
11	M12PR101_PRV_11	Existing	1212'	1074'	918.0	52.0
12	N21PR102_PRV_12	Existing	1212'	1074'	866.0	79.0
13	N21PR101_PRV_13	Existing	1212'	1010'	866.0	60.0
15	H12PR100_PRV_15	Existing	1348'	1212'	1094.0	35.0
16	WMP2019_FUTVL00002_PRS_16	Future	1010'	925'	761.1	55.0
17	U19PR100_PRV_17	Existing	1010'	925'	728.0	74.0
18	R22PR100_PRV_18	Existing	1010'	925'	788.0	54.0
21	M13PR100_PRV_21	Existing	1212'	1074'	930.0	53.0
23	WMP2019_FUTVL00001_PRS_23	Future	1074'	1010'	834.0	55.0
Future 1010	WMP2019_VL00001_FUTURE1	Future	1074'	1010'	845.0	50.0

8-11 Altitude Valves

For master planning purposes, altitude valves refer to valves with flow control capabilities. These valves are set to open when downstream reservoir levels lower passed the flow control operational set point, which will allow water to pass the upstream zones to downstream zones.

The altitude valve operational settings were provided by the City's Operations staff and are summarized in Table 8-8.

Table 8-9

Altitude Valve Operational Settings Summary

ID	Model ID	Reference Reservoir	Level Setting (ft)	Existing and Future ADD Flow Setting (gpm)	Existing and Future MDD Flow Setting (gpm)
AV-1010-2	WMP2019_VL00003_ALT_1212_1010	Reservoir 1010-2A	Open < 22 ft Closed > 24 ft	3,000	3,000
AV-1010-1	WMP2019_VL00004_ALT_1074_1010	Reservoir 1010-1	Open < 20 ft Closed > 22 ft	2,000	3,000
AV-1074-1	WMP2019_VL00002_ALT_1212_1074	Reservoir 1074-1A	Open < 7 ft Closed > 9 ft	2,500	3,500
AV-925-2	M22PR100_ALT_1212_925	Reservoir 925-2A	Open < 19 ft Close > 20.5	2000	2000

8-12 Pipes

The friction factors established in the 2012 Water Master Plan was utilized in the hydraulic model for this study as well. The friction factors used are shown in Table 8-10.

Table 8-10

C-factors used in the Model

Diameter	AC Pipes	PVC Pipes	Mortar Lined Pipes	Steel/ Cast Iron Pipes (before 1950)	Steel/ Cast Iron Pipes (after 1950)
<= 4-inch	125	135	110	80	110
6-inch	125	135	110	80	110
8-10 inch	125	135	110	80	110
12-16 inch	130	140	115	90	115
16-20 inch	130	140	115	90	115
20-24 inch	130	140	115	90	115
24-30 inch	140	150	120	100	120
30-36 inch	140	150	120	100	120

SECTION 9

MODEL CALIBRATION

9-1 General

The general calibration methodology was to gather as much system information as possible from either available SCADA information and pressure measuring equipment temporarily installed in the field. This information was then used for input into the model as well as for comparison of model results. The calibration process was used to verify the accuracy of the model, system configuration, and the hydraulic parameters utilized. Typical indicators of an accurate model include the following:

- Pressure differences of 5 percent or less
- Pressure reducing station flow differences of 5 percent or less (if flow information is available)
- Booster pump station flow differences of 5 percent or less
- Well flow differences of 5 percent or less
- Reservoir level differences of about 1 foot or less

9-2 SCADA Data Collection

SCADA data was collected from April 8, 2019 to April 22, 2019 and used in calibrating the 24-hour extended period simulation. The data was recorded in 5-minute intervals. Based on the data gathered, a time period was selected where the information gathered indicated flow and pressures without noticeable anomalies and/or significant variation. The selected calibration day was Thursday, April 18, 2019.

<u>Supervisory Control and Data Acquisition (SCADA) Data</u>

SCADA data collected generally included the following:

a. Reservoirs - level

b. Booster Pump Stations - flow at pump station, suction pressure, discharge pressure

c. Wells - flow, discharge pressure

d. Turnouts - flow

e. Flow Control Facilities - flow, upstream pressure, downstream pressure

9-3 Calibration Scenario

The existing water system model was calibrated to verify the accuracy of the model, system configuration, and the hydraulic parameters utilized.

<u>Demands</u>

Demand allocation for the calibration scenario was based on the distribution represented by the water billing data during the period April 2018 to May 2018. The model demands were then, globally adjusted to match the total average daily supply for each hydraulic pressure zone, during the calibration period.

The high-water user demands were excluded from the global adjustment because those demands and diurnal patterns were individually assigned to the appropriate model nodes. Then the diurnal patterns were assigned to the remaining demands, based on hydraulic pressure zone and meter type (residential and non-residential).

The total demand during the calibration period was 20,574 gpm, which was the daily production and purchase total for the selected calibration day (April 18, 2019).

<u>Reservoirs</u>

Initial reservoir levels were set to match those of calibration day (April 18, 2019 at 12 am), as shown in Table 9-1. Reservoirs 1074-1A and 1074-1B are located close to each other at Cucamonga Avenue and Fourth Street. The hydraulic model has difficulty modeling multiple reservoirs that are in close proximity to each other. The reservoir levels sporadically increase and decrease between each time step as the model tries to move water between the storage facilities that are in close proximity to each other. For this reason, the 1074 Zone reservoirs are modeled as one equivalent sized tank. Likewise, Reservoirs 1348-1A, 1348-1B, and 1348-1C are modeled as one equivalent sized tank.

The City's operations staff identified that some of the reservoir level sensors are inaccurate. Per the City's operational staff recommendations, the SCADA level data information was adjusted as follows:

1. Reservoir 1010-2A level data was disregarded and instead assumed to be similar to that of Reservoir 1010-2B.
2. Reservoir 1074-1A and Reservoir 1074-1B level data was increased by 5 feet.
3. Reservoir 1212-1B level data was reduced by 14 feet.

Turnouts

The turnouts were modeled by utilizing a flow control valve and a flow pattern to simulate the volume of water entering the system on the calibration day per SCADA information. A summary of the turnout flows is detailed in Table 9-2.

Wells

The wells were operated by time controls per the calibration day SCADA information, as detailed in Table 9-3. The groundwater elevation at each well was calculated by subtracting the static ground water depth and the drawdown depth from the ground surface elevation. The static ground water levels were recorded at the time of the calibration effort. The drawdown levels were determined from the most recent efficiency tests.

Altitude Valves

The altitude valves were modeled utilizing a flow control valve and a flow pattern to simulate the volume of water through the facility on calibration day per SCADA information. A summary of the altitude valves for the calibration day are shown in Table 9-4.

Pump Stations

The booster pumps were operated by time controls per the calibration day SCADA information, as detailed in Table 9-5.

Pressure Reducing Stations

As discussed in Section 6, the larger pressure reducing valve at each station feeding a reduced zone was modeled with the highest pressure setting of that station. A summary of the pressure reducing stations for the calibration day are shown in Table 9-6.

Table 9-1

Calibration Initial Reservoir Levels

Pressure Zone	Facility Name	Location	Model ID	Model Calibration: Bottom of Tank Elevation[1]	Model Calibration: Initial Level (ft)	Model Calibration: Initial HGL (ft)
925	Reservoir 925-2A	Northeast corner of Dupont Ave and Jurupa St	M22RS101_925_2A	893.0	26.0	919.0
1010	Reservoir 1010-1	Southwest corner of Campus Ave and Main St	K14RS101_1010_1	979.3	20.2	999.6
	Reservoir 1010-2A	Southeast corner of Milliken Ave and San Bernardino	J23RS101_1010_2A	980.0	25.5	1,005.5
	Reservoir 1010-2B		J22RS101_1010_2B	980.0	25.5	1,005.5
1074	Reservoir 1074-1A	Southeast corner of Cucamonga Ave and Fourth	H15RS103_1074_EQUIV_TANK	1,054.4	15.7	1,070.1
	Reservoir 1074-1B					
1212	Reservoir 1212-1A	Southwest corner of Fern Ave and Euclid Pl	E12RS102_1212_1A	1,187.5	20.0	1,207.5
	Reservoir 1212-1B		E12RS101_1212_1B	1,202.3	6.0	1,208.3
	Reservoir 1212-3	East side of Campus Ave, north of 8th Street	E14RS101_1212_3	1,189.0	20.2	1,209.2
1348	Reservoir 1348-1A	Southwest corner of Campus Ave and 13th St	B14RS104_EQUIV_TANK_1348	1,327.6	18.1	1,345.6
	Reservoir 1348-1B					
	Reservoir 1348-1C					

[1] *Bottom elevation was combined for equivalent reservoirs using lowest bottom elevation of target reservoirs*

Table 9-2

Calibration Turnout Summary

ID	Source	Location	Model ID	Imported Water Connection Capacity (gpm)[3]	Model Calibration	
					24-Hr Average Flowrate (gpm)	Model Flow Control Pattern
WFA Turnout 1	WFA	Northwest corner of Eighth St and Fern Ave (adjacent Reservoir 1212-1A and 1212-1B)	E12PR101_WFA_1	10,417	N.A.	Closed
WFA Turnout 2	WFA	Southeast corner of Campus Ave and A St (adjacent Reservoir 1212-3)	WMP2019_VL00001_WFA_2		1,869	Pattern: CAL_WFA_2
CDA I	CDA I[1]	Intersection of Archibald Ave and extension of Schaefer St	WMP2019_VL00009_CDA_1	5,278	N.A.	Closed
CDA II - Lat A	CDA II[2]	Intersection of Philadelphia St and Milliken Ave	WMP2019_VL00006_CDA_2_LAT_A		N.A.	Closed
CDA II - Lat B	CDA II[2]	Intersection of Philadelphia St and Milliken Ave	WMP2019_VL00005_CDA_2_LAT_B		N.A.	Closed
CDA II - Lat C	CDA II[2]	Intersection of Riverside Dr and Milliken Ave	WMP2019_VL00007_CDA_2_LAT_C		974	Pattern: CAL_CDA_2_LAT_C
CDA II - Lat D	CDA II[2]	Intersection of Riverside Dr and Milliken Ave	WMP2019_VL00008_CDA_2_LAT_D		4,180	Pattern: CAL_CDA_2_LAT_D
			Total	**15,694**	**7,024**	

[1] *CDA I is the Chino Basin Desalter Facility No. 1*

[2] *CDA II is the Chino Basin Desalter Facility No. 2*

[3] *Based on annual average maximimum capacity*

Table 9-3

Calibration Well Summary

Discharge Pressure Zone	Well Number	Location	Model ID	Ground Elevation (ft)	Ground-water Elevation (ft)[1]	Model Pump Type	Model Pump Curve ID	Capacity (gpm)[2]	TDH (ft)[2]	Model Calibration			
										24-Hr Average Flowrate (gpm)	Model Time Based Control Pattern	Time Start	Time Stop
925	49	1495 S. Dupont Ave.	M22WE101_WELL_49	901	586	3: Multiple Point Curve	WELL_49	2545	341.1	N.A.	Closed	N.A.	N.A.
1074	35	652 E. Main St.	K14WE100_WELL_35	978	562	3: Multiple Point Curve	WELL_35	2568	548.1	N.A.	Closed	N.A.	N.A.
	36	1400 S. Archibald Ave.	M19WE100_WELL_36	891	561	3: Multiple Point Curve	WELL_36	1672	532	54	CAL_WELL_36	10:00 A.M.	10:45 A.M.
	40	1335 East Holt Bl.	J16WE100_WELL_40	981	582	3: Multiple Point Curve	WELL_40	2024	503.3	1,979	CAL_WELL_40	12:00 A.M.	12:15 P.M.
	44	964 Cucamonga Ave.	H15WE106_WELL_44	1059	558	3: Multiple Point Curve	WELL_44	2471	644.2	2,521	CAL_WELL_44	12:00 A.M.	12:15 P.M.
	45	665 N .Campus Ave.	I14WE100_WELL_45	1022	587	3: Multiple Point Curve	WELL_45	2589	515.6	1,156	CAL_WELL_45	12:00 A.M.	3:45 A.M.
												9:00 A.M.	12:15 P.M.
												8:30 P.M.	11:59 P.M.
	52	1230 E. 4th St.	H15WE107_WELL_52	1053	519	3: Multiple Point Curve	WELL_52	2279	672.1	N.A.	Closed	N.A.	N.A.
1212	24	700 N. Haven Ave.	I21WE100_WELL_24	990	618	3: Multiple Point Curve	WELL_24	1907	599.4	305	CAL_WELL_24	12:00 A.M.	1:15 A.M.
												9:15 P.M.	11:59 P.M.
	29	2400 E. Airport Dr.	J18WE100_WELL_29	961	572	3: Multiple Point Curve	WELL_29	2147	657.1	N.A.	Closed	N.A.	N.A.
	30	220 S. Wineville Ave.	K24WE100_WELL_30	967	622	3: Multiple Point Curve	WELL_30	2063	596.5	464	CAL_WELL_30	12:00 A.M.	2:30 A.M.
												9:15 P.M.	11:59 P.M.
	31	5719 E. Santa Ana St.	L25WE100_WELL_31	938	619	3: Multiple Point Curve	WELL_31	2866	605.7	N.A.	Closed	N.A.	N.A.
	37	4327 E. Guasti	J22WE100_WELL_37	977	616	3: Multiple Point Curve	WELL_37	3074	600.7	2,300	CAL_WELL_37	12:00 A.M.	3:15 P.M.
												9:30 P.M.	11:59 P.M.
	38	837 N. Center	H20WE100_WELL_38	1013	600	3: Multiple Point Curve	WELL_38	2427	662.8	987	CAL_WELL_38	12:00 A.M.	8:30 A.M.
												10:45 P.M.	11:59 P.M.
	41	1252 North Hellman Ave.	G18WE100_WELL_41	1032	595	3: Multiple Point Curve	WELL_41	2143	703	N.A.	Closed	N.A.	N.A.
	47	4255 E. Concours St.	H22WE100_WELL_47	1016	586	3: Multiple Point Curve	WELL_47	3358	631.8	3,320	CAL_WELL_47	12:00 A.M.	12:15 P.M.
1348	46	1670 W. 8th St.	E16WE100_WELL_46	1135	567	3: Multiple Point Curve	WELL_46	2471	847.4	N.A.	Closed	N.A.	N.A.
									Total	**13,086**			

Table 9-4

Calibration Altitude Valve Summary

ID	U/S Zone	D/S Zone	Location	Model ID	Valve Elevation (ft)	Model Valve Type	Size (in)	Model Calibration	
								24-Hr Average Flowrate (gpm)	Model Flow Control Pattern/ Time Based Control
AV-1010-2	1212	1010	Reservoir 1010-2A & 1010-2B	WMP2019_VL00003_ALT_1212_1010	983	3: Flow Control Valve	12	N.A.	Closed
AV-1010-1	1074	1010	Reservoir 1010-1	WMP2019_VL00004_ALT_1074_1010	979	3: Flow Control Valve	12	1,794	Pattern: CAL_ALT_VLV_1074_1010
AV-1074-1	1212	1074	Reservoir 1074-1A & 1074-1B	WMP2019_VL00002_ALT_1212_1074	1,061	3: Flow Control Valve	12	N.A.	Closed
AV-925-2	1212	925	Reservoir 925 1A	M22PR100_ALT_1212_925	907	3: Flow Control Valve	12	N.A.	Closed

Table 9-5

Calibration Pump Station Summary

Location	Facility Name	Pump Model ID	Suction Zone	Discharge Zone	Model Pump Type	Model Pump Curve ID	Capacity (gpm)[2]	TDH (ft)[2]	Model Calibration: 24-Hr Average Flowrate (gpm)	Model Calibration: Model Flow Control Pattern/ Time Based Control	Time Start	Time Stop
John Galvin Pump Station 960 N Cucamonga Ontario, CA 91764	Galvin 1074-1	H15BP102_GALVIN_1212_1	1074	1212	3: Multiple Point Curve	GALVIN_BPS_P1_1A	3,658	151.8	N.A.	Closed		
	Galvin 1074-2	H15BP103_GALVIN_1212_2	1074	1212	3: Multiple Point Curve	GALVIN_BPS_P2_1B	3,145	146.7	N.A.	Closed		
	Galvin 1074-3	H15BP104_GALVIN_1212_3	1074	1212	1: Design Point Curve	No pump curve	4,638	164.0	N.A.	Closed		
	Galvin 1074-4	H15BP101_GALVIN_1348_4	1074	1348	3: Multiple Point Curve	GALVIN_BPS_P4_2	2,016	334.0	N.A.	Closed		
1212 Reservoir (10MG) 140 S. Campus, Upland, CA	Booster 1348-3	E14BP101_BOOSTER_1348_3	1212	1348	1: Design Point Curve	No pump curve	3,070	156.8	N.A.	Closed		
	Booster 1348-4	E14BP102_BOOSTER_1348_4	1212	1348	3: Multiple Point Curve	BOOSTER_1348_4	1,898	160.8	N.A.	Closed		
1559 N. Columbia Ave, Ontario, CA 91764	Booster 1348-1	F13BP101A_BOOSTER_1348_1	1212	1348	1: Design Point Curve	No pump curve	2,844	213.9	N.A.	Closed		
	Booster 1348-2	F13BP101B_BOOSTER_1348_2	1212	1348	1: Design Point Curve	No pump curve	2,613	225.7	N.A.	Closed		
4251 East Jurupa Ave, east of Dupont Ave	CDA Ontario Booster Pump 1	M22BP100_ONTARIO_1212_1	925	1212	3: Multiple Point Curve	ONTARIO_BPS_P1	1,286	301.7	N.A.	Closed		
	CDA Ontario Booster Pump 2	M22BP102_ONTARIO_1212_2	925	1212	3: Multiple Point Curve	ONTARIO_BPS_P2	1,198	294.8	616	Pattern: CAL_ONT_BPS	12:00 A.M. 12:30 P.M. 11:00 P.M.	5:00 A.M. 6:00 P.M. 11:59 P.M.
	CDA Ontario Booster Pump 3	M22BP101_ONTARIO_1212_3	925	1212	3: Multiple Point Curve	ONTARIO_BPS_P3	1,232	295.0	N.A.	Closed		
4301 E Guasti Rd, east of Milliken Ave	CDA Milliken Booster 1	WMP2019_BP00001_MILLIKAN_1212_1	1010	1212	3: Multiple Point Curve	MILLIKEN_BPS_P1	1,525	203.0	N.A.	Closed		
	CDA Milliken Booster 2	WMP2019_BP00002_MILLIKAN_1212_2	1010	1212	3: Multiple Point Curve	MILLIKEN_BPS_P2	1,520	201.6	1,529	Pattern: CAL_MILLIKEN_BPS	12:00 A.M.	11:59 P.M.
	CDA Milliken Booster 3	WMP2019_BP00003_MILLIKAN_1212_3	1010	1212	3: Multiple Point Curve	MILLIKEN_BPS_P3	1,525	203.9	N.A.	Closed		
Archibald Ave, north of Cloverfield Rd. (Owned by CDA)	Archibald -1	WMP2019_BP00004_ARCHIBALD_1010_1	CDA	1010	1: Design Point Curve	No pump curve	1,061	165.6	N.A.	Closed		
	Archibald -2	WMP2019_BP00005_ARCHIBALD_1010_2	CDA	1010	1: Design Point Curve	No pump curve	1,112	164.0	N.A.	Closed		

[2] *Based on current efficiency tests*

Table 9-6

Calibration Pressure Reducing Valve Summary

Station No.	U/S Zone	D/S Zone	Location	Valve Elevation (ft)	Model ID	Model Valve Type	Model Size (in)	24-Hr Average Flowrate (gpm)	Model Flow Control Pattern/ Time Based Control
2	1074	1010	Euclid Ave, south of Philadelphia St (east side of street)	840	P13PR102_PRV_2	0: Pressure Reducing Valve	8	N.A.	Closed
3	1074	1010	Grove Ave, south of Philadelphia St	834	P15PR101_PRV_3	0: Pressure Reducing Valve	8	N.A.	Closed
4	1074	1010	Philadelphia St at Vineyard Ave	838	P17PR103_PRV_4	0: Pressure Reducing Valve	12	N.A.	Closed
5	1074	1010	Archibald Ave at Philadelphia St	830	P19PR101_PRV_5	0: Pressure Reducing Valve	8	N.A.	Closed
6	1212	1074	Archibald Ave at Jurupa St (adjacent Well 36)	893	M19PR101_PRV_6	0: Pressure Reducing Valve	8	N.A.	Closed
7	1212	1010	Milliken Ave south of Francis St	876	N22PR101_PRV_7	0: Pressure Reducing Valve	8	N.A.	Closed
8	1212	1010	Francis St at Etiwanda Ave	878	N26PR101_PRV_8	0: Pressure Reducing Valve	12	N.A.	Closed
10	1212	1074	Mission Blvd at Turner Ave	856	N20PR101_PRV_10	0: Pressure Reducing Valve	10	N.A.	Closed
11	1212	1074	Phillips Street at Cypress Ave	918	M12PR101_PRV_11	0: Pressure Reducing Valve	8	N.A.	Closed
12	1212	1074	Haven Ave at Francis St (west side of street)	866	N21PR102_PRV_12	0: Pressure Reducing Valve	10	N.A.	Closed
13	1212	1010	Haven Ave at Francis St (east side of street)	866	N21PR101_PRV_13	0: Pressure Reducing Valve	10	N.A.	Closed
15	1348	1212	Fourth St at San Antonio Ave	1094	H12PR100_PRV_15	0: Pressure Reducing Valve	6	N.A.	Closed
17	1010	925	Archibald Ave at Schaefer Ave	728	U19PR100_PRV_17	0: Pressure Reducing Valve	10	N.A.	Closed
18	1010	925	Riverside Dr, west of Milliken Ave	788	R22PR100_PRV_18	0: Pressure Reducing Valve	14	N.A.	Closed
21	1212	1074	Euclid St at Phillips St	930	M13PR100_PRV_21	0: Pressure Reducing Valve	10	129	Pattern: CAL_PRS_21

9-4 Reservoir Level Comparison

Upon running the calibration scenario, the first comparisons made were the levels at all reservoirs. Initially, not all reservoir levels matched well. Adjustments/corrections to the model were made to resolve these situations. Actions taken to adjust/correct the model included the following:

a. Verified system geometry, including pipe connections, pipe sizes, and closed valve locations. We identified locations where the existing GIS did not accurately reflect the pipe connections and pipe sizes. The model was adjusted to include changes in pipe sizes per City's GIS information and verification. AKM and City staff utilized atlas sheets, as-built plans, and field investigation to determine if system geometry was incorrect and how to fix it in the hydraulic model.

b. Verified the facility information, including reservoir dimensions, pump curves, elevations, and valve settings.

c. Verified allocation of zone demand

d. Verified reservoir level controls

In general, the reservoir levels recorded in the field matched the reservoir levels that were calculated by the hydraulic model. Factors that may have contributed to the difference in levels include, but are not limited to; closed or partially closed isolation valves; inaccurate PRV settings; differences in billing data and the calibration day demands. The comparison of reservoir levels for the calibration scenario is graphically shown on Figures 9-1 through 9-9. A discussion of any discrepancies between the model and the field data is discussed following the associated reservoir level comparison figure.

Figure 9-1

Reservoir 925-2A Level Comparison

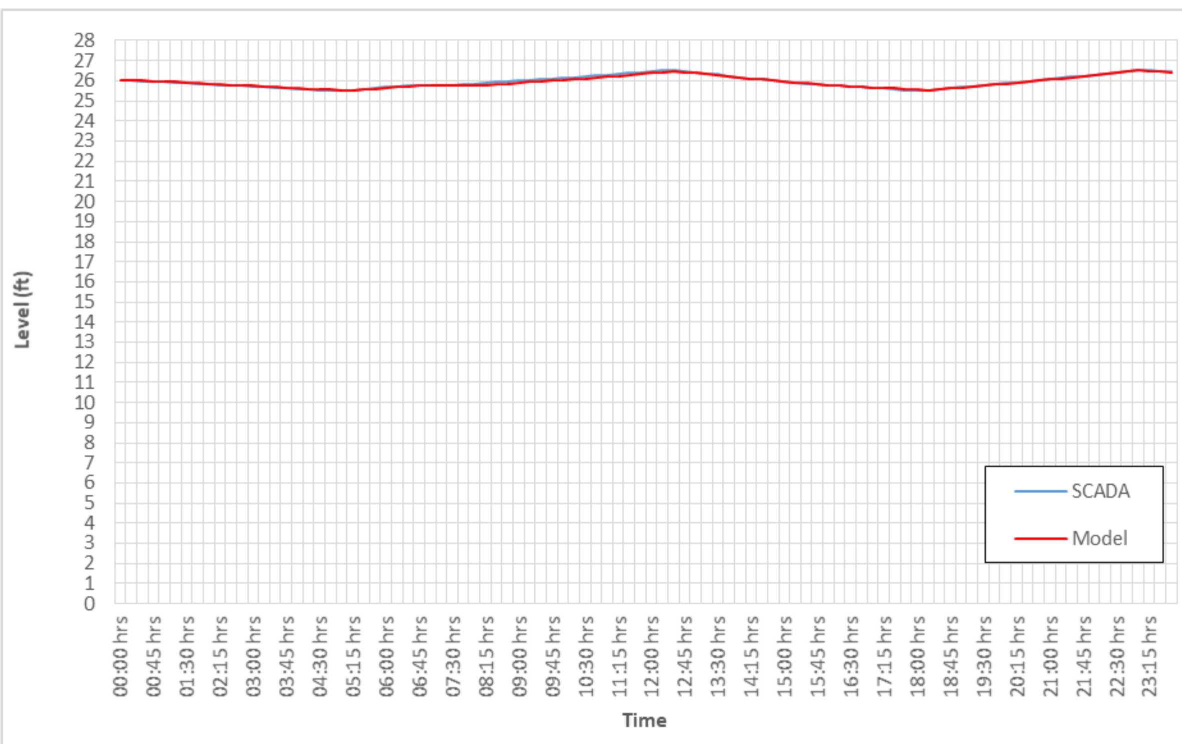


Figure 9-2

Reservoir 1010-1 Level Comparison

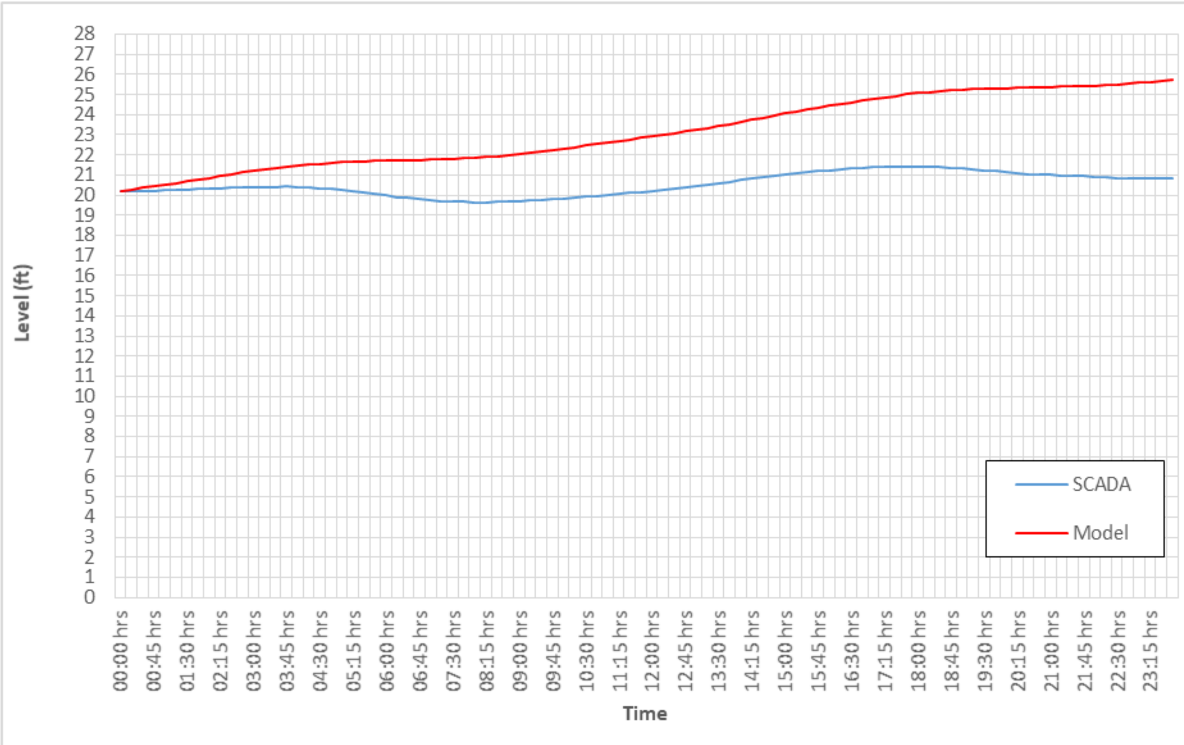


Figure 9-3

Reservoir 1010-2A Level Comparison

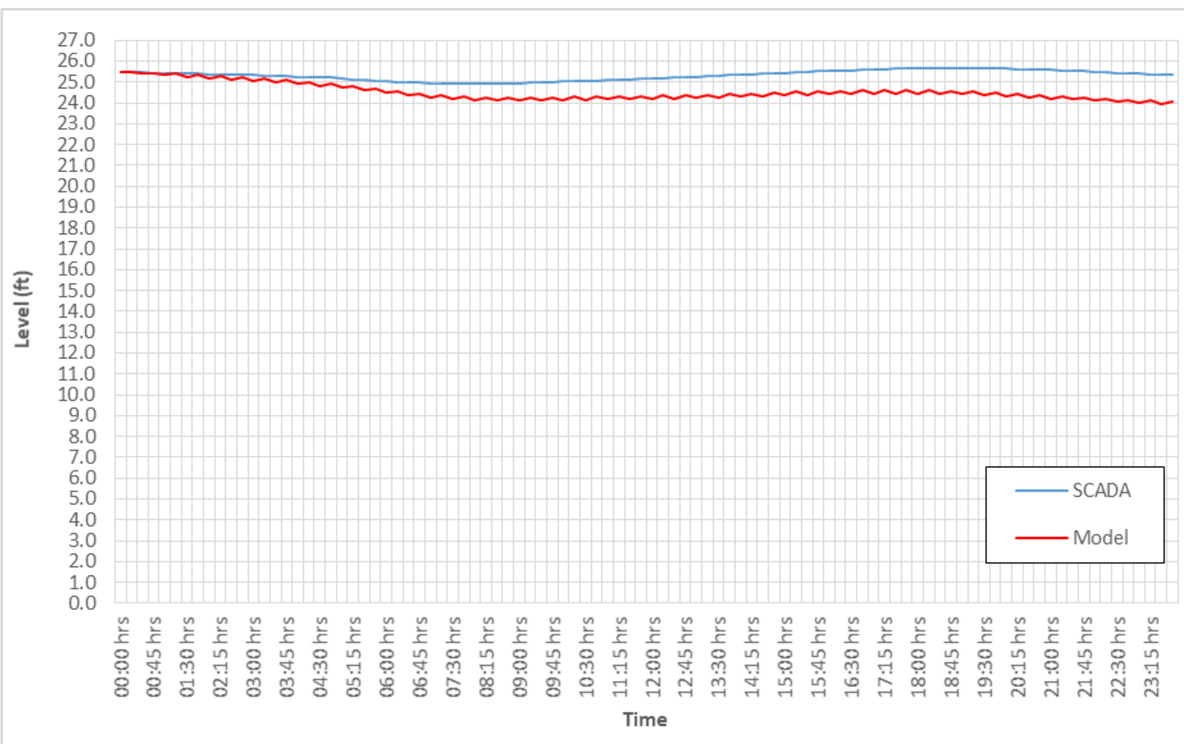
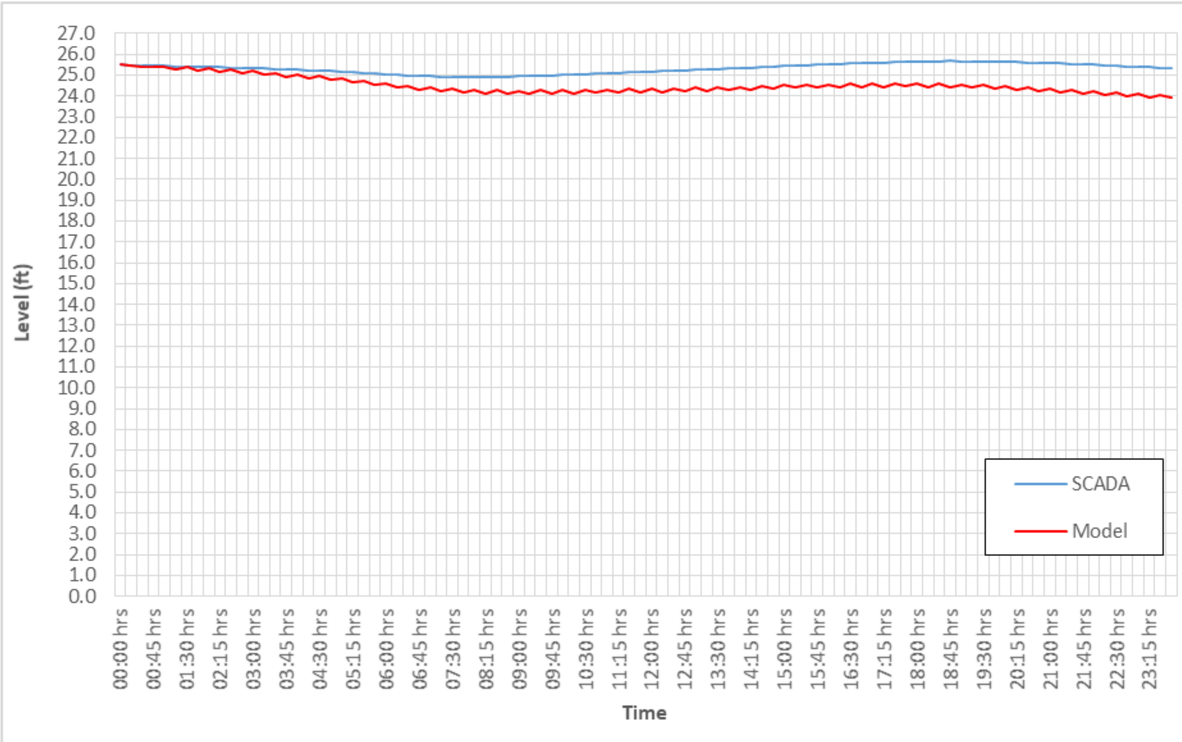


Figure 9-4

Reservoir 1010-2B Level Comparison



Reservoir levels from SCADA data did not match the model estimated levels in the 1010 Zone. The Reservoir 1010-1A is located on the west side of the service area, and the Reservoirs 1010-2A and 1010-2B are located at the same site on the east side of the service area. The City's operations staff stated that the east and the west side of the 1010 Zone are generally operated as two separate systems because the reservoir sites are located so far apart and connected by two pipelines that are not able to convey water back and forth efficiently between the two sides of the zone.

During the calibration period, Reservoir 1010-1A was supplied water via the AV-1010B altitude valve, while the Reservoir 1010-2A and 1010-2B were supplied water via the CDA II Lateral D. It is believed that there may be some closed and/or partially closed valves that are restricting flow between the 1010 Zone reservoirs on the east and the west side of the service area. It is recommended that the City verify that all valves in the 1010 Zone are fully opened and not restricting flow. For the purpose of this hydraulic analysis, the model valves in the 1010 Zone are fully open.

Figure 9-5

Reservoirs 1074-1A and 1B Equivalent Tank Level Comparison

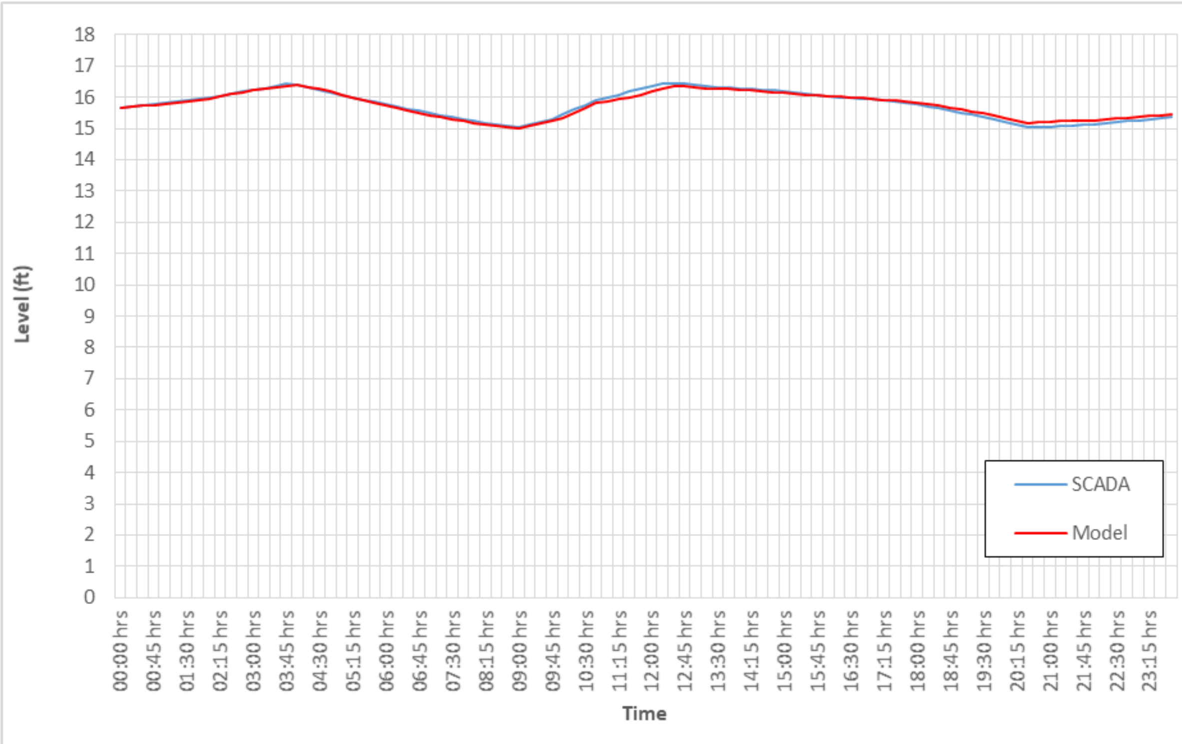


Figure 9-6

Reservoir 1212-1A Level Comparison

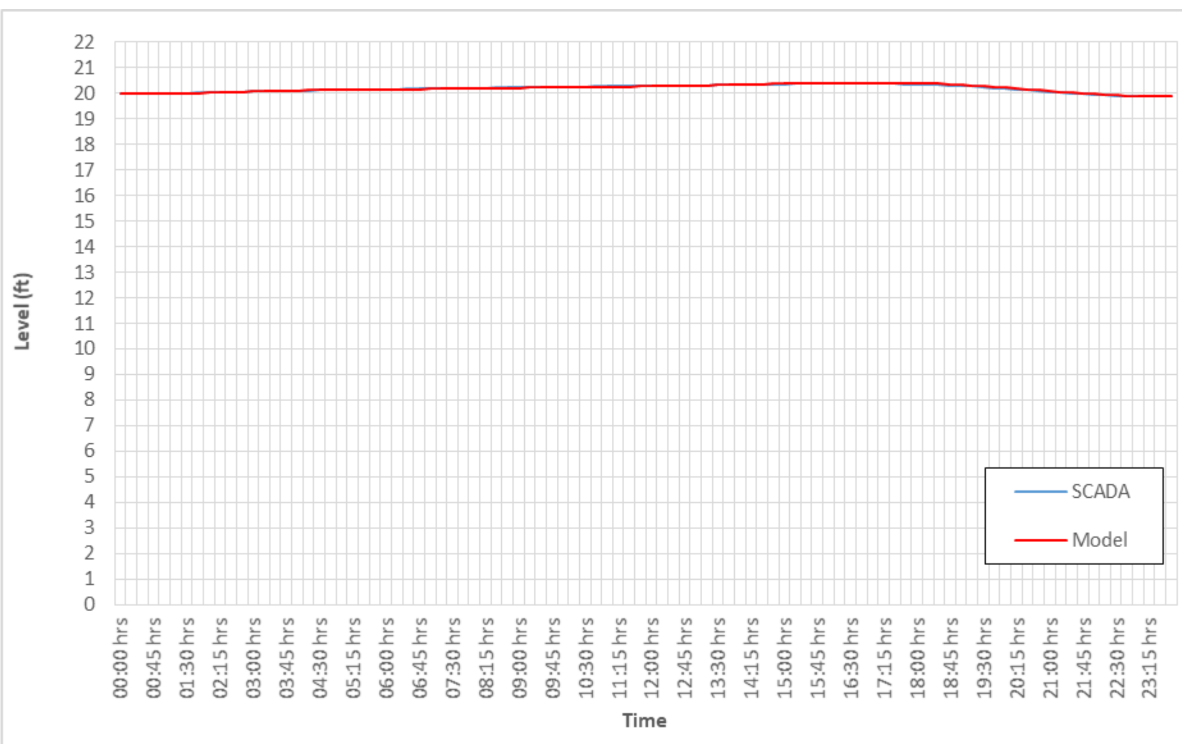


Figure 9-7

Reservoir 1212-1B Level Comparison

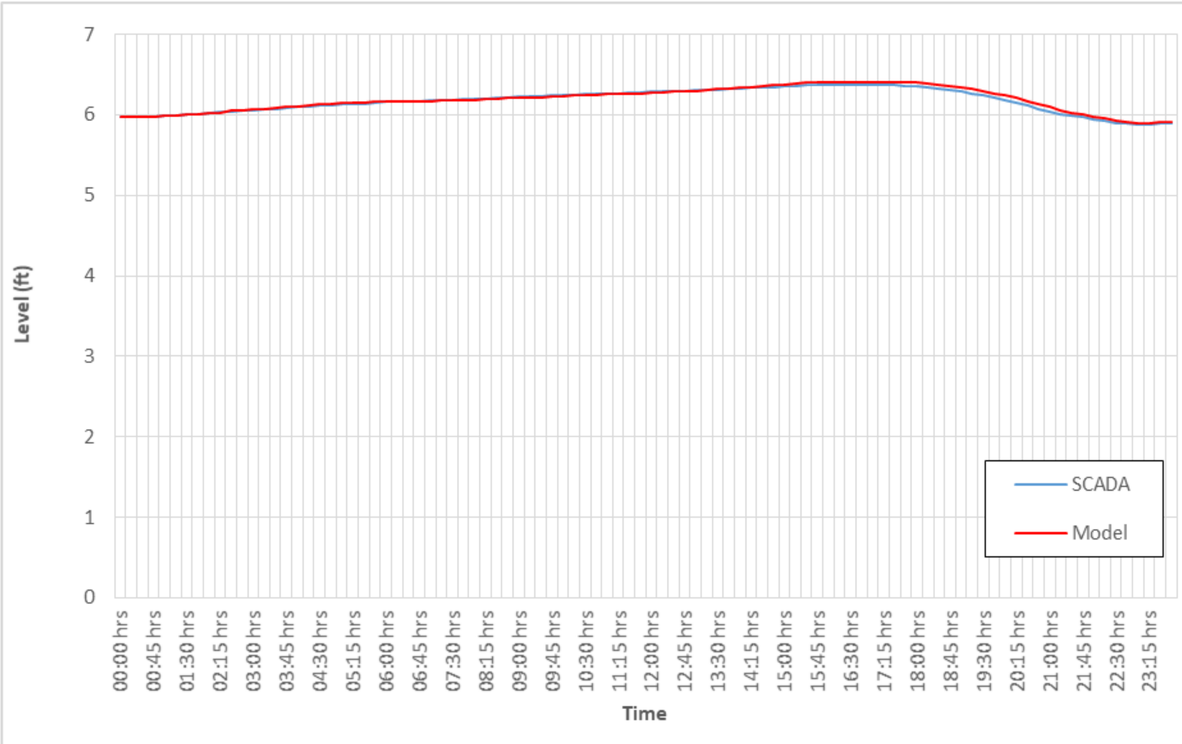


Figure 9-8

Reservoir 1212-3 Level Comparison

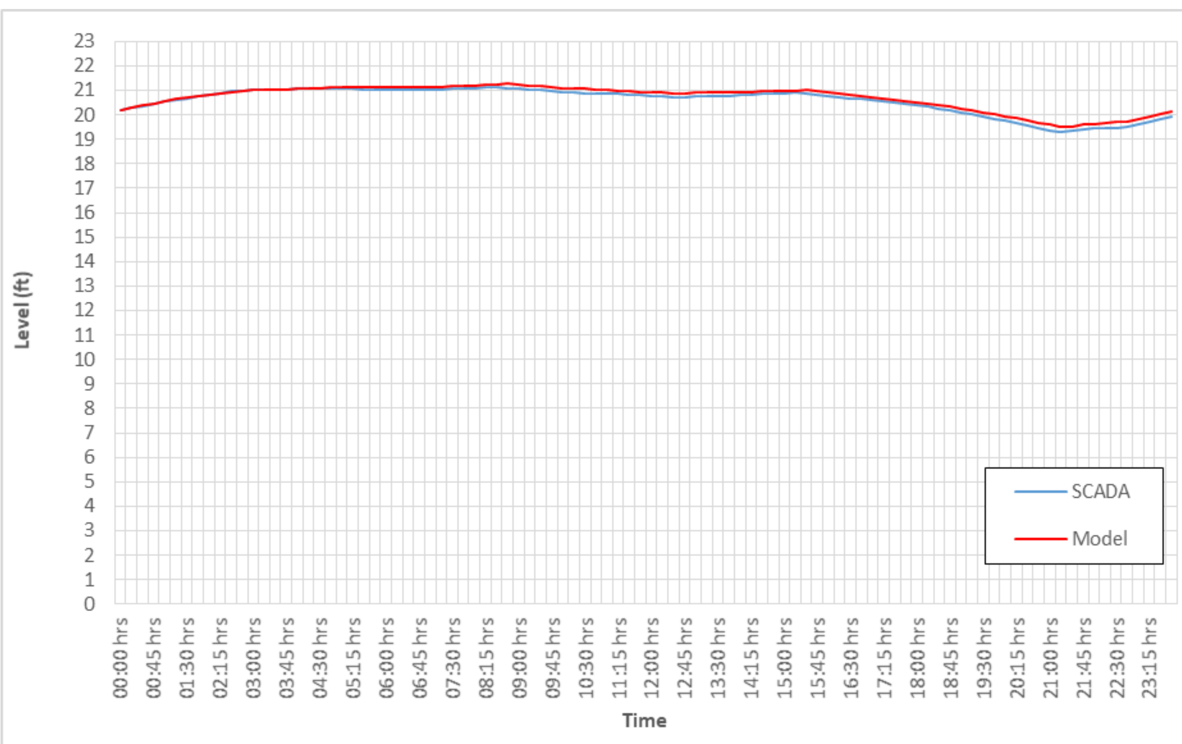
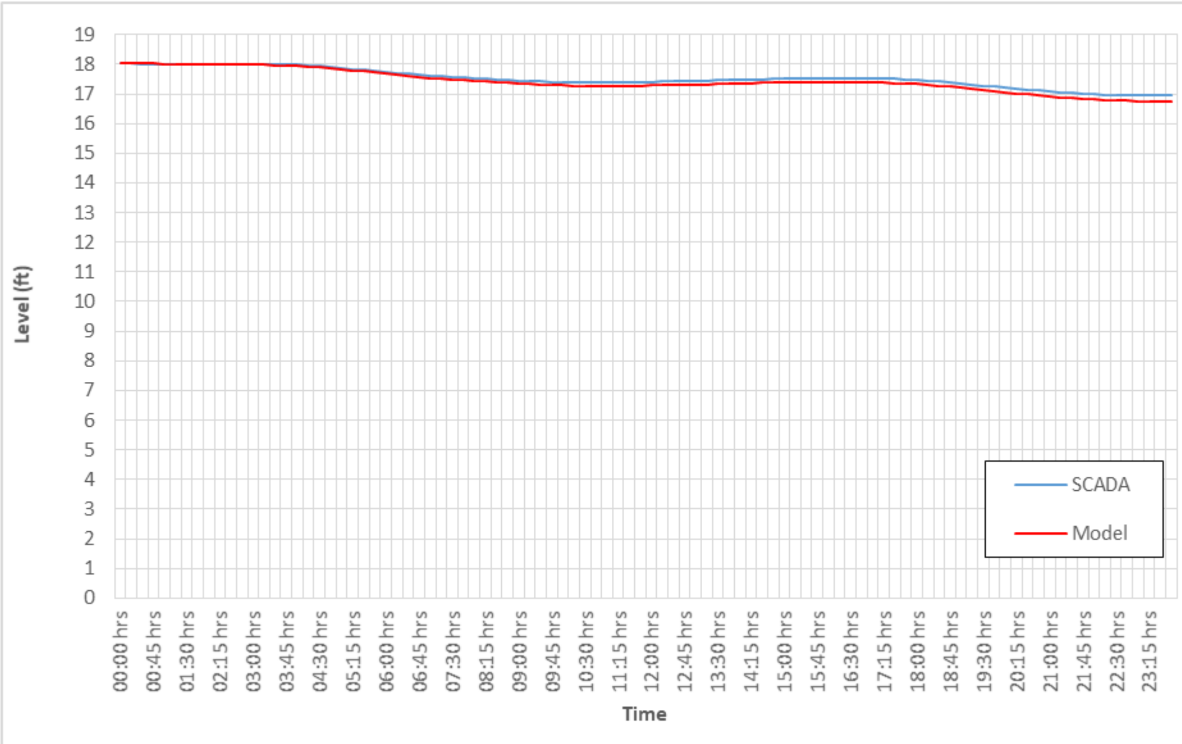


Figure 9-9

Reservoirs 1348-1A, 1B, and 1C Equivalent Tank Level Comparison



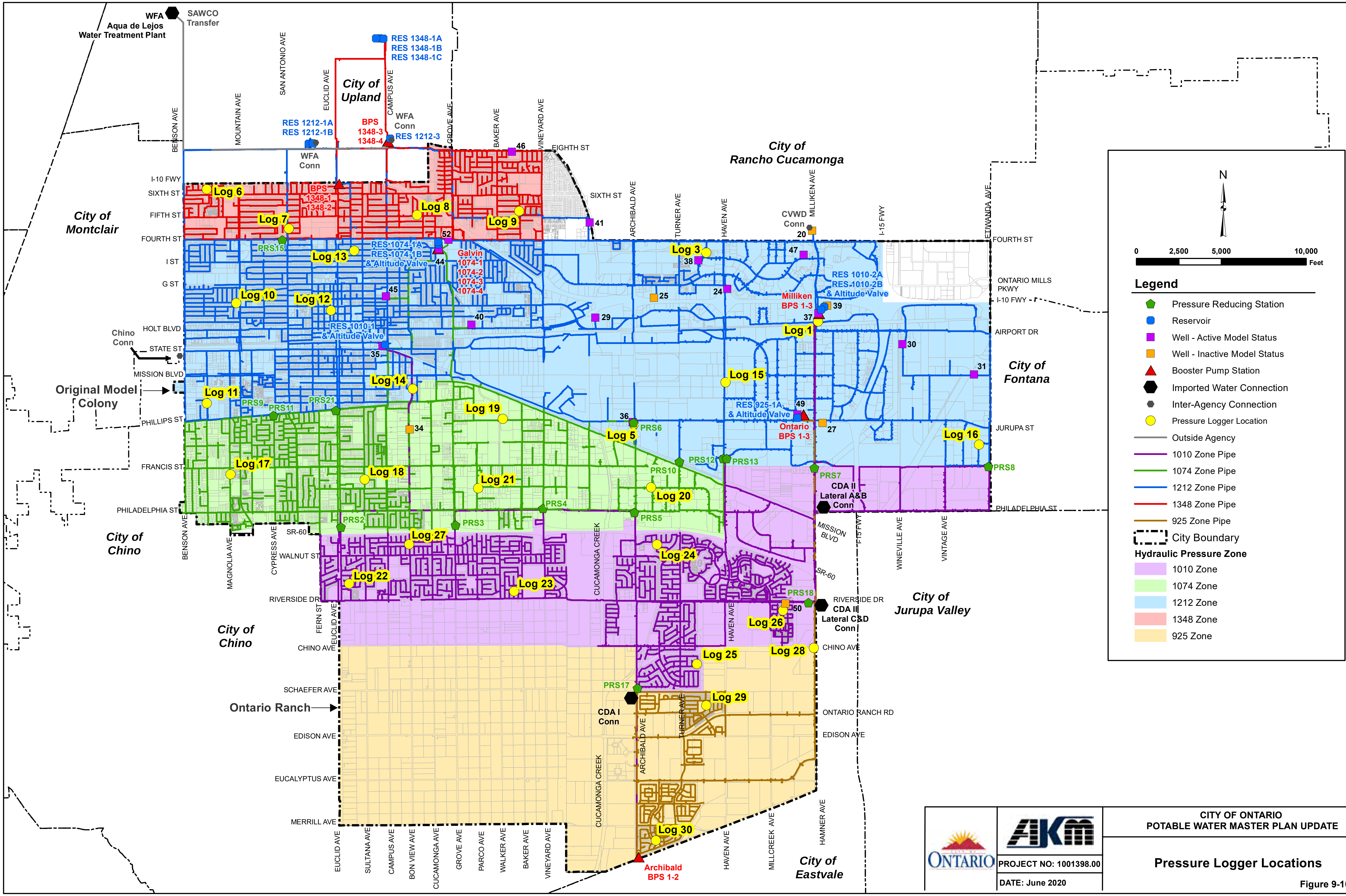
9-5 Pressure Data Comparison

In addition to the pressure data available on the SCADA system, pressure data was collected by installing portable pressure data loggers on twenty-eight (28) fire hydrants throughout the system. The locations selected were primarily in the large open zones of the system, scattered throughout in order to obtain representative pressure measurements in all areas of the system. The locations were specifically placed away from main facilities such as reservoirs, pump stations, and turnouts where pressures are not expected to vary as much and/or where pressure information is already available in the existing SCADA system. The pressure data logger locations are listed in Table 9-7 and shown on Figure 9-10.

The model calculated pressures at Cedar and Business (logger location ID 20 or model node O19FIT173) do not match the field recorded pressures on calibration day. The model calculated pressures that are about 8 psi less than the pressures recorded in the field. It is likely that the pressure difference is due to a discrepancies with actual hydrant elevation or with the pressure data logger equipment.

Table 9-7
Pressure Data Loggers Calibration Summary Table

Logger Location ID	Model Junction ID	Hydrant ID	Location	Zone ID	Size (in)	Ground El. (ft)	Model Pressures Minimum (psi)	Model Pressures Average (psi)	Model Pressures Maximum (psi)	Field Pressures Minimum (psi)	Field Pressures Average (psi)	Field Pressures Maximum (psi)	Average Pressure Difference (psi)	Comments
6	F10FIT147	F10FH101	Gardenia Ct. and Deodar	1348	6	1152	78.2	82.0	84.4	81.3	84.5	88.2	-2.5	
7	WMP2019_FIT00482	G12FH180	Princeton and San Antonio	1348	6	1106	96.6	100.3	102.6	96.3	101.4	104.9	-1.0	
8	G15FIT233	G15FH140	Orchard and Fifth	1348	6	1115	98.2	101.6	103.7	98.6	102.6	106.8	-1.0	
9	G17FIT109	G17FH133	Bonnie Brae and Corona	1348	6	1070	112.3	116.2	118.7	111.2	116.3	121.4	0.0	
13	H13FIT174	H13FH160	J e.o. Columbia	1212	6	1078	54.1	55.4	55.9	51.8	54.0	55.5	1.4	
3	H20FIT204	H20FH147	Center, north of Concours	1212	10	1018	81.4	84.6	89.0	77.6	82.6	88.2	2.0	
10	J11FIT217	J11FH114	E and Azalea	1212	6	1023	77.0	78.7	79.4	72.9	77.7	81.8	1.0	
12	WMP2019_FIT00749	J13FH401	n.o. Laurel and C	1212	6	1018	78.8	80.4	81.1	73.9	78.6	83.3	1.8	
1	J22FIT168	J22FH111	Guasti, east of Milliken	1212	12	980	98.8	101.6	105.3	93.1	98.9	104.6	2.7	
15	L21FIT178	L21FH126	Haven n.o. La Salle	1212	6	943	120.0	122.6	126.1	116.2	121.6	126.0	1.0	
14	L14FIT121	L14FH157	Maitland and Bon View	1212	6	937	113.3	115.2	115.9	106.6	112.7	117.7	2.5	
11	M10FIT165	M10FH113	Oaks and Clair	1212	6	923	120.6	122.6	123.5	113.9	123.6	129.3	-1.0	
19	M16FIT118	M16FH109	Acacia and Walker	1074	6	904	54.5	61.0	69.9	60.2	63.4	71.6	-2.4	
5	M19FIT159	M19FH141	Archibald, south of Jurupa (Near PRS #6)	1074	12	893	55.8	63.3	87.0	60.3	65.4	82.2	-2.2	
16	N26FIT126	N26FH113	Clark and Chablis	1212	6	893	136.0	138.7	142.8	120.0	134.6	149.9	4.1	
17	O11FIT119	O11FH105	Magnolia s.o. Francis	1074	6	867	65.4	72.9	81.2	70.2	76.8	84.1	-3.9	
18	O13FIT137	O13FH130	Manzanita and Sultana	1074	6	870	64.3	71.2	79.6	69.2	73.3	81.1	-2.1	
21	O16FIT102	O16FH155	Cedar and Parco	1074	6	852	74.1	81.0	90.3	78.5	82.3	89.2	-1.3	
20	O19FIT173	O19FH149	Cedar and Business	1074	6	840	78.7	85.8	97.1	85.7	93.9	106.3	-8.1	Likely issue with actual hydrant elevation or with pressure logger equipment.
27	Q14FIT115	Q14FH139	s.o. Bon View and Oak Hill	1010	6	826	67.9	73.4	77.3	62.0	70.3	76.1	3.1	
24	Q19FIT176	Q19FH125	Seagull and Oakhill	1010	6	805	78.2	82.2	85.3	69.0	79.2	83.9	2.9	
22	R13FIT145	R13FH142	Plum, n.o. Merion	1010	6	799	78.0	83.4	87.3	70.7	81.8	86.9	1.6	
23	R16FIT116	R16FH172	Meadowbrook and Merion	1010	6	784	85.5	90.9	94.8	76.7	88.2	93.3	2.7	
26	WMP2019_FIT00332	S22FH182	Callaway and Edenglen	1010	6	793	90.1	91.8	93.6	83.2	89.6	94.2	2.1	
25	T20FIT210	T20FH173	Clover and Chaparral	1010	6	766	100.4	104.5	107.7	91.6	100.0	104.8	4.5	
28	WMP2019_FIT02667	T22FH113	Hamner and Chino	925	6	776	62.2	62.4	62.6	57.2	60.2	62.0	2.2	
29	WMP2019_FIT00697	U20FH153	Oakville and Trinitas	925	6	737	78.0	78.6	78.9	67.5	77.0	81.5	1.6	
30	WMP2019_FIT00966	Y19FH131	McCleve and Salisbury	925	6	658	111.8	112.5	112.8	105.2	111.1	115.3	1.4	


City of Upland
City of Rancho Cucamonga
City of Montclair
City of Fontana
City of Chino
City of Jurupa Valley
City of Eastvale
Original Model Colony
Ontario Ranch
WFA Aqua de Lejos Water Treatment Plant
SAWCO Transfer
RES 1348-1A
RES 1348-1B
RES 1348-1C
RES 1212-1A
RES 1212-1B
BPS 1348-3 1348-4
WFA Conn
RES 1212-3
BPS 1348-1 1348-2
RES 1074-1A
RES 1074-1B
& Altitude Valve
Galvin 1074-1 1074-2 1074-3 1074-4
RES 1010-1 & Altitude Valve
RES 1010-2A
RES 1010-2B
& Altitude Valve
Milliken BPS 1-3
CVWD Conn
RES 925-1A & Altitude Valve
Ontario BPS 1-3
CDA II Lateral A&B Conn
CDA II Lateral C&D Conn
CDA I Conn
Archibald BPS 1-2
Chino Conn
Log 1
Log 3
Log 5
Log 6
Log 7
Log 8
Log 9
Log 10
Log 11
Log 12
Log 13
Log 14
Log 15
Log 16
Log 17
Log 18
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Log 23
Log 24
Log 25
Log 26
Log 27
Log 28
Log 29
Log 30
N
0 2,500 5,000 10,000 Feet
Legend
Pressure Reducing Station
Reservoir
Well - Active Model Status
Well - Inactive Model Status
Booster Pump Station
Imported Water Connection
Inter-Agency Connection
Pressure Logger Location
Outside Agency
1010 Zone Pipe
1074 Zone Pipe
1212 Zone Pipe
1348 Zone Pipe
925 Zone Pipe
City Boundary
Hydraulic Pressure Zone
1010 Zone
1074 Zone
1212 Zone
1348 Zone
925 Zone
ONTARIO
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DATE: June 2020
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
Pressure Logger Locations
Figure 9-10

SECTION 10

EXISTING SYSTEM ANALYSIS

10-1 Introduction

The established system criteria and calibrated system computer model were utilized in analyzing the existing system, and evaluating its adequacy. As discussed in Section 9, the system model was calibrated by simulating actual system conditions and making adjustments to the model. The model was then utilized to analyze the existing system under average day, maximum day, and peak hour conditions.

Existing system deficiencies were identified and mitigation projects were formulated based upon the results of the model runs and input from City staff. Proposed projects were added in the hydraulic model to test the operation of the system after their implementation.

A capital improvement program was developed as a result of these analyses. Recommended projects and cost estimates are discussed in Section 13 of this Master Plan Report.

10-2 Existing Source of Supply

Any water system must be capable of meeting all demands imposed upon the system. The City's existing water demands are summarized in Table 10-1.

This can be achieved through multiple supply sources, storage, or a combination of both. It is prudent to secure water supplies from multiple sources so that demands can be met at reasonable levels when one or more water sources are not available.

Table 10-1
Existing System Demand

Demand Description	Total System Demand (gpm)	(mgd)	(AFY)
Average Day	19,280	27.76	31,098
Max Day	29,790	42.90	48,051
Peak Hour[1]	36,934	53.19	59,575

[1] *Estimated from Existing System Model*

10-2.1 Existing Average Day Demand

The criterion established requires a source of supply equal to one average day demand (ADD) (19,280 gpm) from local sources.

The City's existing source of supply is detailed in Table 10-2. The City's local water source include direct access to groundwater from the Chino Basin, which is managed by the Chino Basin Watermaster. The City's existing seventeen (17) active wells have a capacity of 38,604 gpm, which is about double the existing ADD.

Table 10-2
Existing Source of Supply

Source	Capacity gpm	mgd	AFY
Existing Wells	38,604	55.6	62,269
WFA	10,700	15.4	17,259
CDA	5,290	7.6	8,533
Total	**54,594**	**78.6**	**88,061**

10-2.2 Existing Maximum Day Demand

California Code of Regulations Related to Drinking Water requires a minimum source of supply of one maximum day demand (MDD) of the service area. Under this criterion, reservoirs are typically needed to regulate hourly fluctuations in demand, provide fire flow and supplement supply during an outage of a source for an extended duration.

As detailed in Table 10-2, the total existing source of supply is equivalent to 54,594 gpm. This is about 183% of the City's existing MDD (29,790 gpm). With 38,604 gpm from groundwater sources alone, the City is capable of providing the full MDD.

The available existing imported water from the Chino Desalter Authority (CDA) and Water Facility Authority (WFA) total 15,990 gpm (54% of the existing MDD). If some wells are out of service, the City would need 13,800 gpm (29,790 gpm – 15,990 gpm) from groundwater sources to supply the remaining MDD. This is about 36% of the existing system well capacity.

10-2.3 Existing Peak Hour Demand

California Code of Regulations Related to Drinking Water, Chapter 16, Section 64554 requires that if a system has more than 1,000 service connections, it must be capable of providing four (4) hours of peak hourly demand (PHD) through a combination of source capacity, storage capacity, and/or emergency source connections.

As detailed in Table 4-5, the City's existing peak hour demand is 36,934 gpm. The City's existing total supply is 54,594 gpm with 38,604 gpm from groundwater sources, which is capable of providing the peak hour demand for four (4) hours. Storage capacity is not necessary to meet the peak hour demand supply criteria.

10-3 Storage

10-3.1 Storage Criteria Summary

Operational Storage

For the City of Ontario's system, operational storage criterion is based on 30 percent of the maximum day demand for OR, and 25 percent of maximum day demand for OMC due to the diversity of demands in OMC.

Emergency Storage

The City's emergency storage criterion is set at one average day demand. For a system that depends mostly on groundwater supplies, this amount of emergency storage is adequate and is primarily for response in operations due to a loss of a major source of supply.

Fire Suppression Storage

Fire suppression storage is the volume required to supply the service area with the required fire flows, which range from 1,500 to 4,000 gpm for a duration of two (2) to four (4) hours.

The fire flow suppression storage and operational storage is increased by 15 percent so that a portion of the reservoir volume is available for variations in elevation, and to provide submergence over the reservoir outlet pipes. In an emergency, the emergency storage volume, as well as the operational storage volume and the fire suppression storage volume would all be available for use.

10-3.2 Existing Storage Analysis

Table 10-3 shows the existing storage capacity in each zone, and the reservoir capacity needed.

Table 10-3

Existing Storage Analysis

Zone	1348	1212	1074	1010	925	Total System
Average Day Demand (mgd)	2.96	12.88	5.53	5.98	0.41	27.76
Maximum Day Demand (mgd)	4.71	19.75	8.55	9.27	0.61	42.90
[1]Fire Flow Demand (gpm)	3,500	4,000	4,000	4,000	4,000	-
Fire Flow Duration (hrs)	4	4	4	4	4	-
[2]Fire Suppression Storage (MG)	0.84	0.96	0.96	0.96	0.96	-
[3]Operational Storage (MG)	1.18	4.94	2.14	2.32	0.18	10.75
[4]Emergency Storage (MG)	2.96	12.88	5.53	5.98	0.41	27.76
[5]Total Storage Required (MG)	5.29	19.67	9.09	9.75	1.72	45.51
[6]Existing Available Storage (MG)	8.75	32.00	4.75	23.50	6.00	75.00
Zone Surplus / Deficit (MG)	3.46	12.33	-4.34	13.75	4.28	29.49

[1] *Highest fire flow required in zone*

[2] *Fire flow multiplied by duration*

[3] *30% of maximum day demand for NMC, 25% of maximum day demand for OMC*

[4] *One average day demand*

[5] *(1.15 x (fire suppression+operational storage))+emergency*

A deficit of 4.34 MG is calculated in the 1074 Zone. The storage surplus in the 1212 Zone could be transferred to the 1074 Zone through altitude valve 1074A at the Reservoir 1074-1 site, as well as through PRS 6, 10, 11, 12 and 21 to make up for this deficit.

10-4 Existing System Hydraulic Model Analysis

The existing system model was calibrated to simulate actual field conditions, as detailed in Section 9. Once calibrated, the hydraulic model was run to analyze the existing system. The pressures during the ADD scenario were above the City's dynamic pressure criteria (40 psi) throughout the service area. The existing system was also evaluated under the MDD scenario, which include the peak hour demand, and all pressures met the City's criteria. The 24-hour average pressure contours for the existing system are illustrated on Figure 10-1.

The maximum velocity criteria of 7 ft/s or less under maximum day and peak hour demands is generally met throughout the City's existing system. The maximum velocities are detailed on Figure 10-2.

10-5 Existing Facility Condition Assessment

All facilities have useful lives for which relatively trouble-free service can be expected. Once exceeded, these facilities become less reliable, expensive to maintain and are subject to failure. Therefore, facility age is considered in the assessment of all water systems and in formulating future replacement projects.

Planning criteria included in Table 7-2 were used to identify facilities that have reached or are nearing the end of their useful lives.

10-5.1 Wells

Operations staff is limited in its operating capabilities due to water quality issues which include but are not limited to perchlorate, 1,2,3 Trichloropropane (TCP), and a bacterial plume. In addition, the City is preparing for new state and federal regulations for perfuorooctane sulfonate (PFOS) and polyfluoroalkyl (PFOA). The City is anticipating that all existing wells will require improvements to provide the necessary treatment capabilities for the various water quality issues with the groundwater source. Capital improvement projects are recommended for water quality treatment near Reservoir 925-2A, near future Reservoirs 925-1A and 925-1B, and for wells in the OMC.

The City plans to rehabilitate and reactivate Well 37, 39, and 50 in the 1010 Zone. It should be noted that Well 37 currently supplies the 1212 Zone, but will be reconfigured to supply the 1010 Zone, when the well is upgraded.

The wells sites are being rehabilitated to improve the existing roofs to ensure all mechanical equipment is protected. The roof improvement projects are expected to be completed in the 2021 Fiscal Year. The wells are also being equipped with chlorine generators, which will be completed by the 2024 Fiscal Year.

The estimated useful life of well casings is 60 years. The oldest active well is Well 24, which was constructed in 1969. Well 30 was constructed in 1978, and Wells 29 and 31 were constructed in 1979. Depending upon the condition of the casings, these wells may need to be replaced in the next 10 to 20 years. Before designing treatment upgrades at Well 24, 29, 30, and 31, it is recommended that the City evaluate the condition of the casing to determine if additional improvements or replacement is necessary.

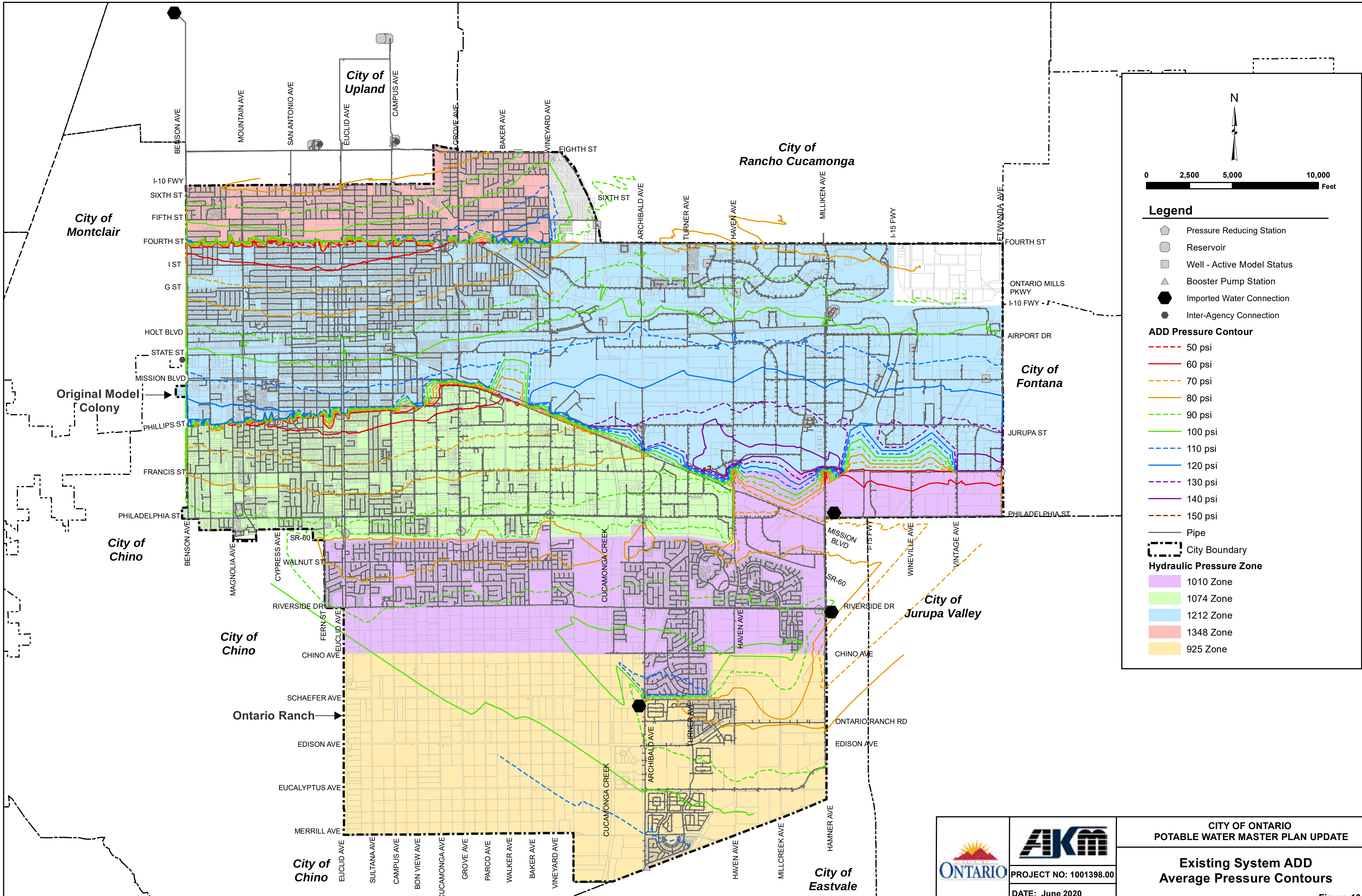
The future system hydraulic model analysis, includes use of all existing wells and rehabilitated Wells 37, 39, and 50.

10-5.2 Reservoirs

A "Reservoir Seismic Vulnerability Evaluation" was conducted in 2008 by Tetra Tech, which was summarized by the City's Utilities Engineering Division in the "Seismic Risk of City's Potable Water Reservoirs" technical memorandum, dated 2012. The memorandum recommended seismic upgrades at Reservoir 1074-1A, 1074-1B, 1212-1A, 1212-3, 1348-1A, 1348-1B, and 1348-1C.

Per the established criteria for concrete reservoirs, six of the City's existing reservoirs have outlived their useful life of 50 years: Reservoirs 1074-1B (1957), 1212-1A (1959), 1212-1B (1958), 1212-3 (1926), 1348-1B (1955) and 1348-1C (1958). These reservoirs should be re-inspected and their condition should be assessed every three (3) years, at minimum, to determine the need for rehabilitation/replacement projects.

The future system hydraulic model analysis, includes use of all these reservoirs.


City of Upland
City of Rancho Cucamonga
City of Montclair
Original Model Colony
City of Fontana
City of Chino
City of Chino
City of Jurupa Valley
Ontario Ranch
City of Chino
City of Eastvale
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
EIGHTH ST
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
MAGNOLIA AVE
CYPRESS AVE
FERN ST
CUCAMONGA CREEK
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
MISSION BLVD
WINEVILLE AVE
VINTAGE AVE
ONTARIO RANCH RD
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
MILLCREEK AVE
HAMNER AVE
N
0
2,500
5,000
10,000
Feet
Legend
Pressure Reducing Station
Reservoir
Well - Active Model Status
Booster Pump Station
Imported Water Connection
Inter-Agency Connection
ADD Pressure Contour
50 psi
60 psi
70 psi
80 psi
90 psi
100 psi
110 psi
120 psi
130 psi
140 psi
150 psi
Pipe
City Boundary
Hydraulic Pressure Zone
1010 Zone
1074 Zone
1212 Zone
1348 Zone
925 Zone
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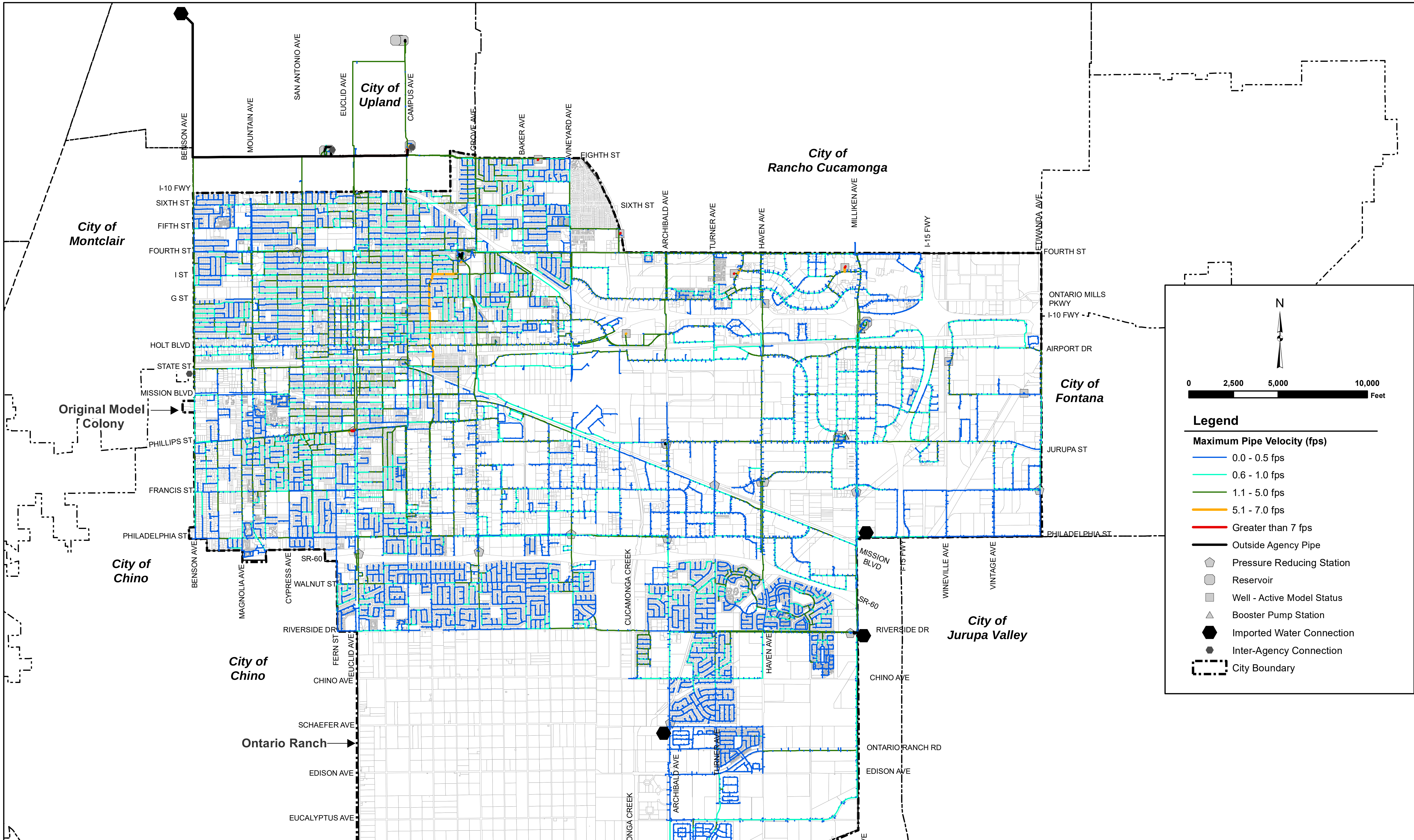
PROJECT NO: 1001398.00
DATE: June 2020
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
Existing System ADD
Average Pressure Contours
Figure 10-1



CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE

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Existing System
Maximum Pipe Velocities

Figure 10-2

Reservoir 1212-3

Based on review of the 2012 technical memorandum, the tank inspection (completed September 10, 2010), and discussions with City staff, there are plans for the Reservoir 1212-3 be repaired, which will extend its useful life possibly by 10 to 15 years. A thorough inspection and condition assessment is recommended every 3 years, at minimum. Due to its age (currently 84 years old), Reservoir 1212-3 is expected to eventually be taken out of service.

When Reservoir 1212-3 is taken out of service, two additional 8 MG reservoirs (Reservoirs 1212-4A and 1212-4B) are recommended for the 1212 Zone to replace Reservoir 1212-3. The City has acquired a site for these reservoirs near the intersection of Foothill Boulevard and Rochester Avenue in the City of Rancho Cucamonga. The reservoir site has an approximate ground elevation of 1,189 feet amsl. The City plans to tie into the 24-inch pipe (1212 Zone) on 4th Street at Buffalo Avenue. A 30-inch pipe will extend north on Buffalo Avenue east on San Marino Street, and north on Rochester Avenue to Reservoir 1212-4A and 1212-4B.

10-5.3 Booster Pump Stations

Per the established criteria for booster pump stations, three stations have outlived their useful life of 50 years. Booster pumps 1348-3 and 1348-4 are located at the pump station near Reservoir 1212-3. This pump station was constructed in 1959, and has reached the end of its useful life. Concurrent to this master planning effort, the City is conducting a condition assessment of this pump station, which will include recommendations to rehabilitate this facility.

The Galvin Pump Station includes three pumps (Galvin 1074-1, Galvin 1074-2, and Galvin 1074-3) that pump to the 1212 Zone and one pump (Galvin 1074-4) that pumps to the 1348 Zone. Built in 1960, this booster pump station has reached the end of its useful life. Likewise, the booster pump station that houses pumps 1348-1 and 1348-2 was constructed in 1960, and has reached the end of its useful life. It is recommended that a condition assessment of these pump stations be conducted to identify all necessary improvement projects.

10-5.4 Pipeline

The City has a pipeline replacement program that is intended to target the replacement of pipes that have exceeded their useful lives and/or have diameters that are less than the minimum 8-inch in diameter criteria. The City currently prioritizes the pipe replacement projects based on operational information such as historical pipe leaks, historical breaks, or maintenance issues.

Small Diameter Pipe

It is recommended that all small diameter pipe (less than 8-inches) be replaced with a minimum of 8-inch diameter pipe. Pipe improvements greater than the minimum 8-inch diameter criteria, may be required in areas where the system in unable to meet the minimum peak hour pressures and/or fire flow pressure criteria.

In addition, it is recommended that all small diameter fire hydrant laterals (less than 6-inches) be replaced with a minimum of 6-inch diameter pipe. The City Standard Drawing Number 4111 require the hydrant lateral to be 6-diameter PVC pipe. Older metal hydrant laterals were also recommended to be replaced with PVC pipe to reduce headless through the hydrant lateral in a fire flow event.

The geometry for the future system model scenario was adjusted such that the minimum pipe diameter is 8-inches, and the minimum fire hydrant lateral diameter is 6-inches.

Pipes Exceeding Useful Lives

The existing distribution system pipes were installed between 1916 and 2018. The system pipe length by decade of construction is shown in Figure 6-5. The majority of the distribution system was constructed after 1970. The year of installation is unknown for about 28 miles or 4.8 percent of the existing pipes.

As detailed in Table 7-2, the pipe useful life for DIP, ACP, and PVC pipe is 50 years, which means pipes constructed before 1970 have exceeded their useful lives. Pipe replacements due to age are planned for all pipes constructed on or before 1970. This excludes small diameter pipe improvements.

The total length of pipe replacements due to size and age, is estimated as 1,105,000 feet (209 miles). A summary of the recommended existing water system pipeline improvements is shown in Table 10-4. Locations of fire flow, small diameter, and age improvements are shown on Figure 10-3.

Table 10-4

Summary of Existing Water System Improvements

	Pipe Length (ft)						
Row Labels	**925 Zone**	**1010 Zone**	**1074 Zone**	**1212 Zone**	**1348 Zone**	**Verify Pipe Age**	**Total**
4" and less small diameter deficiency and exceeding useful life.		86	4,061	14,621	14,037	72,271	105,077
6" diameter deficiency and exceeding useful life.		5,413	27,536	152,411	132,152	23,392	340,904
4" and less small diameter deficiency	406	289	8,912	12,078	2,051		23,736
6" diameter deficiency	38	131,173	125,811	69,485	48,976		375,483
Exceeding Useful Life (8")			7,548	35,553	11,486	11,268	65,855
Exceeding Useful Life (10")		7,948	2,465	1,616	18,936	7,330	38,295
Exceeding Useful Life (12")		53	866	28,753	12,251	9,062	50,985
Exceeding Useful Life (14")				4,927	201	344	5,472
Exceeding Useful Life (16")				7,217	5,235	2,009	14,460
Exceeding Useful Life (16.5")						52	52
Exceeding Useful Life (18")			12,990	34,668	702	1,798	50,159
Exceeding Useful Life (19")				2,073		0	2,073
Exceeding Useful Life (20")				2,159		11	2,170
Exceeding Useful Life (24")				6,493		1,782	8,275
Exceeding Useful Life (42")						289	289
Total	**444**	**144,961**	**190,189**	**372,055**	**246,027**	**129,608**	**1,083,284**

10-5.5 Pressure Reducing Stations

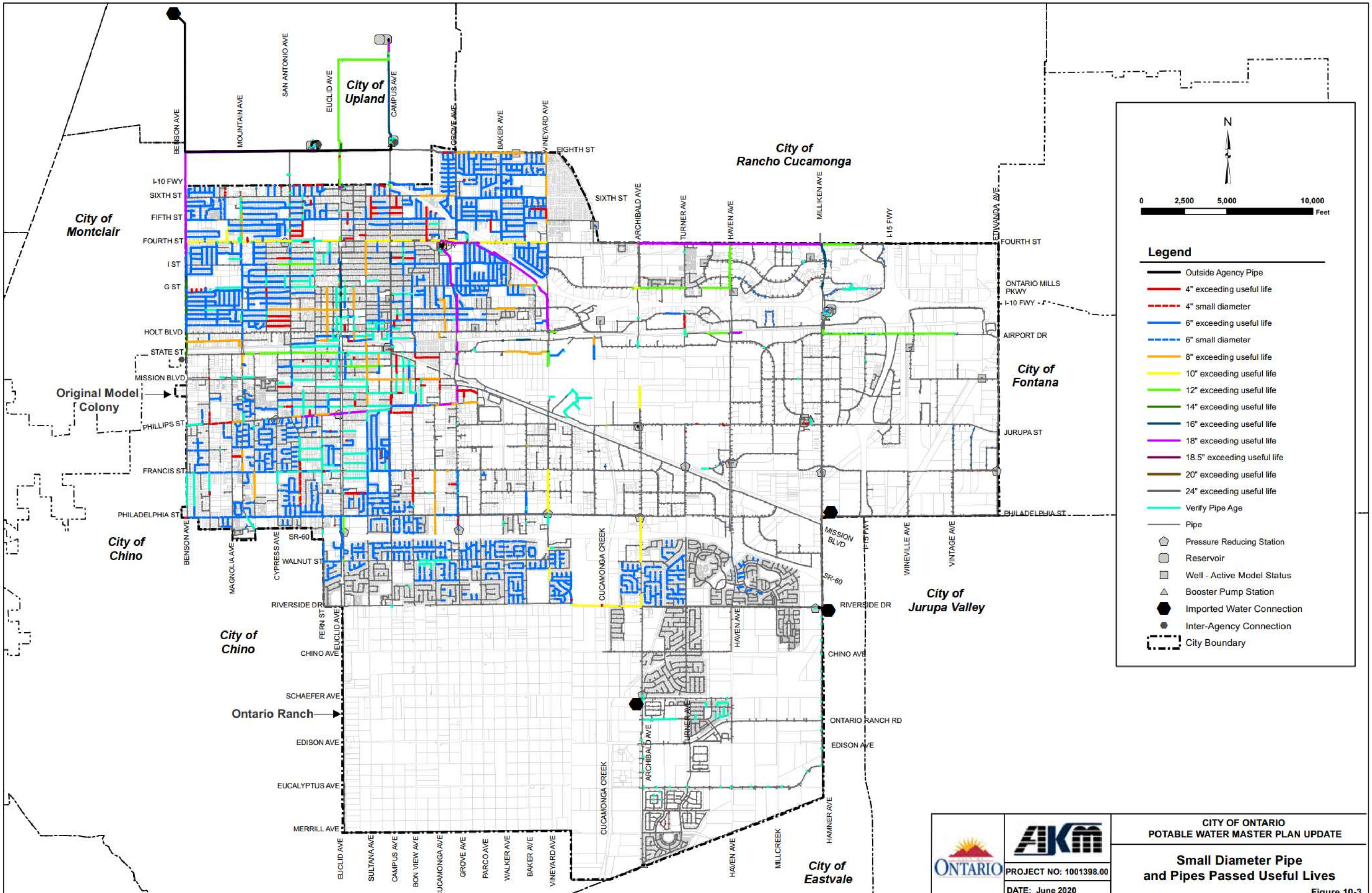
The City is in the process of rehabilitating all pressure reducing stations. New valves and vaults will be provided at all stations. The SCADA will also be updated to provide upstream pressure, downstream pressure, and flowrate.

10-5.6 Facility Back-up Power

The system has to be able to provide service during commercial power outages. Currently, the wells with standby power are Well 40 (1074 Zone), 41 (1212 Zone), 46 (1348 Zone), 47 (1212 Zone), and 49 (925 Zone).

All future pump stations and wells should be constructed with standby power so that at least one average day demand can be conveyed to each zone from the wells. If well capacity is not sufficient, water can be transferred via pressure reducing stations and/or booster pump stations with backup power.

Most wells are equipped with automatic transfer switches, which may be connected to a portable generator. The City plans to rehabilitate Well 31 and Well 39 with automatic transfer switches. The City currently has three (3) 850 KW and one (1) 530 KW portable generators. The City plans to purchase an additional 850 KW portable generator.



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Small Diameter Pipe and Pipes Passed Useful Lives

Figure 10-3

10-5.7 Water Service Meters

The existing system consists of approximately 36,750 water service meters. The City has an aggressive meter replacement program in place. In the 2021 Fiscal Year, approximately 4,000 meters are scheduled to be replaced. This equates to about a 12 year replacement schedule.

In addition to the meter replacements, approximately 1,600 meters are scheduled to be installed for new development areas in the 2021 Fiscal Year.

10-5.8 Communication Upgrades

The City is adding an additional wireless Ethernet radio system to their SCADA network. The older spread spectrum 900 mhz system will remain as a backbone. The new radio network will have much more bandwidth and provide more capabilities such as video from remote sites. Not all RTU are set up for Ethernet, and some hardware will need to be upgraded.

10-5.9 RTU/PLC Upgrades

SLC PLC systems make up approximately 95% of the City's system. Over the past 20 years, these have been the backbone of many water systems. Currently, the industry is moving toward faster PLC systems. Since the City's radio system is being upgraded, many of the PLC's will also need to be upgraded. The City is evaluate the necessary upgrades and schedule on a site-by-site basis. All new facilities will be installed with equipment that is compatible with the new Ethernet radio system.

10-5.10 Site Security

Once the SCADA upgrades are completed, the City will incorporated site security upgrades. The City will install security cameras and secure gate motors at all sites.

SECTION 11
FUTURE SYSTEM

11-1 Introduction

The future potable water system will consist of five pressure zones as shown on Figure 11-1. As Ontario Ranch is developed, the 1010 Zone will be expanded further south to Chino Avenue. The remaining Ontario Ranch area will be a part of the 925 Zone. A hydraulic schematic of the future potable water system is shown on Figure 11-2.

11-2 Developer Impact Fee Projects

The City has developed projects for the future system expansion. Developer Impact Fee (DIF) projects were provided by the City and incorporated into the future system model and capital improvement program. The DIF projects primarily include reservoirs, wells, pump stations, pipelines, water quality treatment facilities, and pressure reducing stations that will serve the Ontario Ranch (OR) developments in the 925 Zone and the 1010 Zone. It also includes transmission pipeline projects in the Original Model Colony (OMC) that will improve the overall system operations, including new development in OR and redevelopment in the OMC.

11-3 Future Facilities

As detailed in Section 8, the future system scenarios were developed in the hydraulic model to include all future facilities, which include all recommendations included from the existing system analysis.

11-3.1 Future Wells

The summary of all active wells that are included in the future model are detailed in Table 11-1.

11-3.2 Future Reservoirs

The summary of all active reservoirs that are included in the future model are detailed in Table 11-2.

11-3.3 Future Booster Pump Stations

The summary of all active booster pump stations that are included in the future model are detailed in Table 11-3.

11-3.3 Future Pressure Reducing Stations

The summary of all active pressure reducing stations that are included in the future model are detailed in Table 11-4.

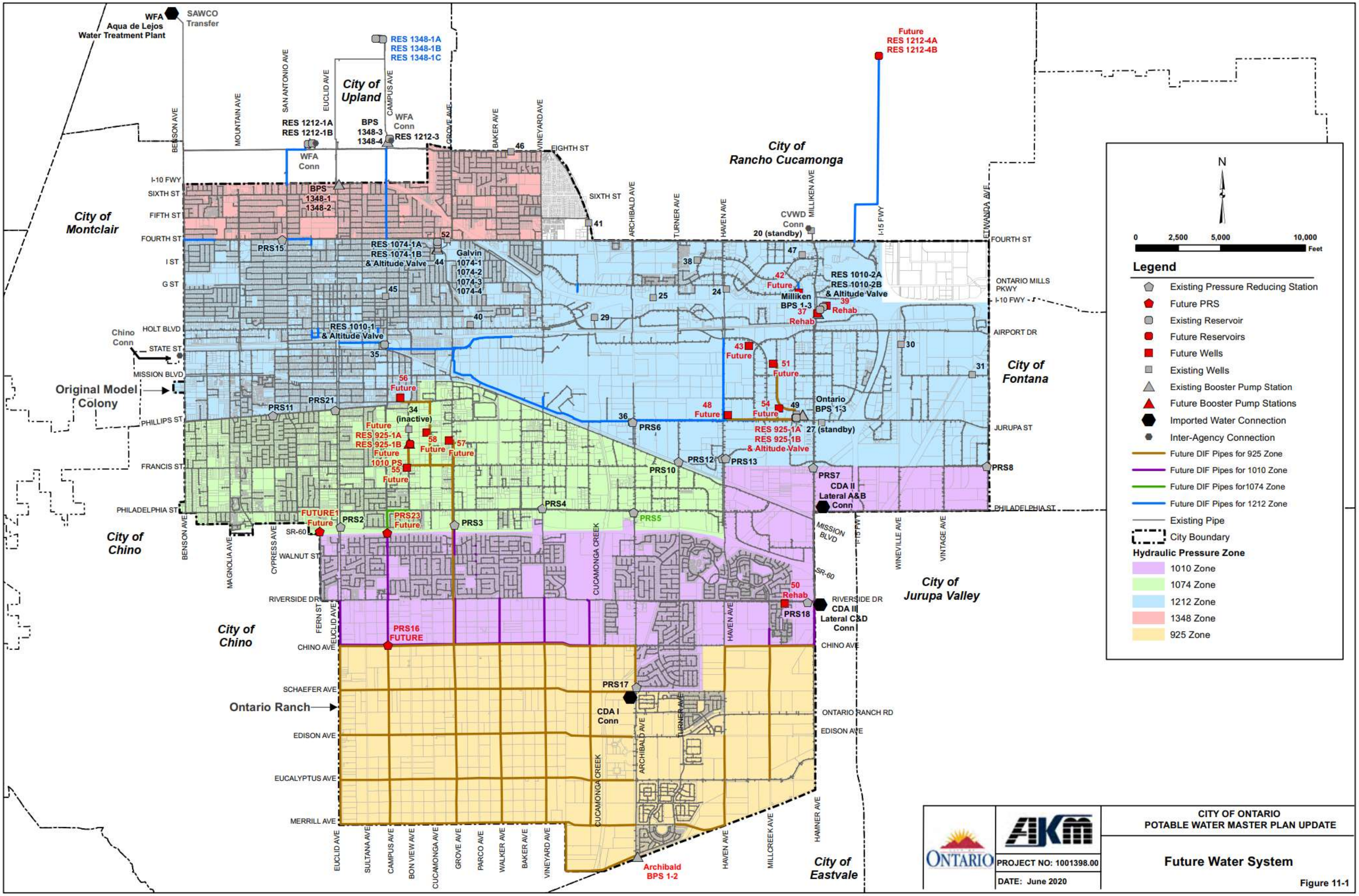
11-4 Future 925 Zone Facilities

The future 925 Zone will provide water service to the majority of Ontario Ranch. This zone is generally bounded by Chino Avenue to the north, Euclid Avenue to the west, the City boundary to the south, and Milliken Avenue to the east. Table 11-5 summarizes the existing 925 Zone facilities and the recommended facilities that are yet to be constructed. The facility locations are shown on Figure 11-1.

One additional 6 MG reservoir and two 9 MG reservoirs are recommended for the 925 Zone which will ultimately provide service to most of the OR service area. The proposed 6 MG reservoir will be located adjacent the existing 6 MG reservoir (Dupont Ave and Jurupa St). The two 9 MG reservoirs are planned to be located between Bon View Avenue and Cucamoga Avenue, north of Francis Street. Treatment facilities will be provided at both reservoir sites to treat groundwater before entering the distribution system.

Seven new wells are planned in the 925 Zone to provide an additional 17,000 gpm capacity for the future growth in this area.

PRS 16 will reduce pressures from the 1010 Zone to the 925 Zone, near Chino Avenue and Campus Avenue.



Future Water System

Figure 11-1

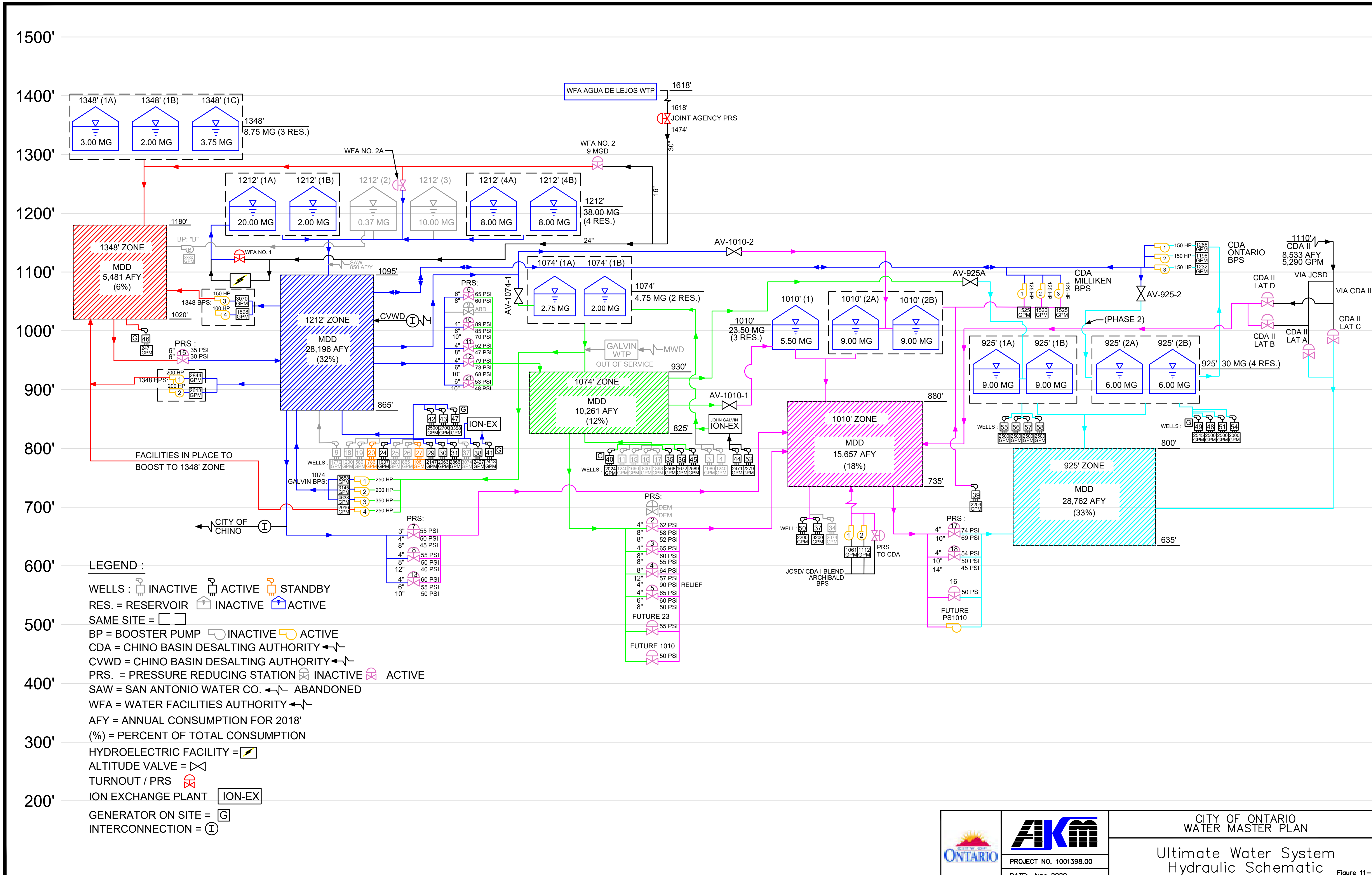

1500'
1400'
1300'
1200'
1100'
1000'
900'
800'
700'
600'
500'
400'
300'
200'
1348' (1A)
1348' (1B)
1348' (1C)
3.00 MG
2.00 MG
3.75 MG
1348'
8.75 MG (3 RES.)
WFA AGUA DE LEJOS WTP
1618'
JOINT AGENCY PRS
1474'
WFA NO. 2A
WFA NO. 2
9 MGD
1212' (1A)
1212' (1B)
1212' (2)
1212' (3)
1212' (4A)
1212' (4B)
20.00 MG
2.00 MG
0.37 MG
10.00 MG
8.00 MG
8.00 MG
1212'
38.00 MG
(4 RES.)
1348' ZONE
MDD
5,481 AFY
(6%)
1212' ZONE
MDD
28,196 AFY
(32%)
1074' (1A)
1074' (1B)
2.75 MG
2.00 MG
1074'
4.75 MG (2 RES.)
1074' ZONE
MDD
10,261 AFY
(12%)
GALVIN WTP
OUT OF SERVICE
MWD
CVWD
AV-1010-2
AV-1074-1
AV-1010-1
AV-925A
AV-925-2
1010' (1)
1010' (2A)
1010' (2B)
5.50 MG
9.00 MG
9.00 MG
1010'
23.50 MG
(3 RES.)
1010' ZONE
MDD
15,657 AFY
(18%)
925' (1A)
925' (1B)
925' (2A)
925' (2B)
9.00 MG
9.00 MG
6.00 MG
6.00 MG
925' 30 MG (4 RES.)
925' ZONE
MDD
28,762 AFY
(33%)
CDA ONTARIO BPS
CDA MILLIKEN BPS
CDA II
8,533 AFY
5,290 GPM
VIA JCSD
VIA CDA II
CDA II LAT A
CDA II LAT B
CDA II LAT C
CDA II LAT D
(PHASE 2)
1348 BPS
1074 GALVIN BPS
ION-EX
JOHN GALVIN ION-EX
JCSD/ CDA I BLEND ARCHIBALD BPS
PRS TO CDA
FUTURE PS1010
FUTURE 23
FUTURE 1010
CITY OF CHINO
FACILITIES IN PLACE TO BOOST TO 1348' ZONE
LEGEND :
WELLS : INACTIVE ACTIVE STANDBY
RES. = RESERVOIR INACTIVE ACTIVE
SAME SITE =
BP = BOOSTER PUMP INACTIVE ACTIVE
CDA = CHINO BASIN DESALTING AUTHORITY
CVWD = CHINO BASIN DESALTING AUTHORITY
PRS. = PRESSURE REDUCING STATION INACTIVE ACTIVE
SAW = SAN ANTONIO WATER CO. ABANDONED
WFA = WATER FACILITIES AUTHORITY
AFY = ANNUAL CONSUMPTION FOR 2018'
(%) = PERCENT OF TOTAL CONSUMPTION
HYDROELECTRIC FACILITY =
ALTITUDE VALVE =
TURNOUT / PRS
ION EXCHANGE PLANT ION-EX
GENERATOR ON SITE = G
INTERCONNECTION = I
ONTARIO
PROJECT NO. 1001398.00
DATE: June 2020
CITY OF ONTARIO
WATER MASTER PLAN
Ultimate Water System
Hydraulic Schematic
Figure 11-2

Table 11-1

Future System Wells Summary Table

Well Data										Efficiency Test					Motor Specifications							
Well Number	Location	Existing Model Status	Future Model Status	Year Drilled	Pressure Zone	Pump Model	Pump Mfg	No of Stages	Pump RPM	Capacity (gpm)	TDH (ft)	Static GWL (ft)	Draw-down (ft)[1]	Test Date	Motor Mfgr	HP	Motor RPM	Backup Power (Y/N)	WQ Issues	Remaining Useful Life[1] (Years)	Model ID	Comments
49	1495 S. Dupont Ave.	Active	Active	Unknown	925	14MD	Peerless	5	1780	2,545	341	292	23	9/9/16	US	350	Unknown	Y	Yes	N.A.	M22WE101_WELL_49	
48	3595 W. Jurupa St.	N.A.	Active	Future	925		N.A.			2,500	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	WMP2019_FUTWE00003_WELL_48	Future Well
51	600 N. Doubleday Ave.	N.A.	Active	Future	925		N.A.			2,500	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	WMP2019_FUTWE00005_WELL_51	Future Well
54	Jurupa and Dupont	N.A.	Active	Future	925		N.A.			2,000	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	WMP2019_FUTWE00004_WELL_54	Future Well
55	Francis and Bon View	N.A.	Active	Future	925		N.A.			2,500	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	WMP2019_FUTWE00009_WELL_55	Future Well
56	Belmont, east of Campus	N.A.	Active	Future	925		N.A.			2,500	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	WMP2019_FUTWE00007_WELL_56	Future Well
57	Grove and Locust	N.A.	Active	Future	925		N.A.			2,500	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	WMP2019_FUTWE00011_WELL_57	Future Well
58	Cucamonga, between Belmont and Francis	N.A.	Active	Future	925		N.A.			2,500	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	WMP2019_FUTWE00010_WELL_58	Future Well
									Zone 925 Capacity	19,545												
34	1425 S. Bon View Ave.	Inactive	Inactive	1983	1010	15EHM	Ingersoll Dresser	12	1175	2,074	-	-	-	-	GE	500	1180	N	Yes		M14WE101_WELL_34	Well could be equipped and place back in service, but unlikely.
37	4327 E. Guasti	Active	Active	Future	1010		N.A.			3,200	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	J22WE100_WELL_37	Currently connected to 1212' zone but will be moved to 1010' zone
39	4397 Guasti Ave.	Inactive	Active	Future	1010		N.A.			2,200	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	J23WE100_WELL_39	Needs treatment; directly connected to reservoir at 1010 reservoirs. Place back into service for future model, as treatment will be provided.
50	3900 W. Riverside Dr.	Inactive	Active	Future	1010		N.A.			2,200	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	R22WE100_WELL_50	Perchlorate issues". Inactive during existing model, but will be placed back into service for the future model.
									Zone 1010 Capacity	7,600												
35	652 E. Main St.	Active	Active	1983	1074	17 MQH	Byron Jackson	11	1170	2,568	548	351	65	3/18/18	US	500	1180	N	Yes	23	K14WE100_WELL_35	The City indicated that there are water quality issues and the water, quality is not reliable. This well is currently in service.
36	1400 S. Archibald Ave.	Active	Active	1986	1074		Unknown			1,672	532	268	62	3/18/18	US	350	1770	N		26	M19WE100_WELL_36	
40	1335 East Holt Bl.	Active	Active	2003	1074	14R	L&B Verti-line	6	1785	2,024	503	360	39	3/18/18	US	600	1785	Y		43	J16WE100_WELL_40	Not sequenced to start and stop. Typically only used in summer months. High operation and energy costs.
44	964 Cucamonga Ave.	Active	Active	2003	1074	15ETMH	Flowserve	7	1770	2,471	644	421	80	4/18/18	USEM	600	1800	N	Yes	43	H15WE106_WELL_44	Ion Exchange Plant. at 1074 Reservoirs. Water quality makes this plant unreliable. Clearwell is planned for future.
45	665 N .Campus Ave.	Active	Active	2006	1074	17MQL	Flowserve	5	1775	2,589	516	395	40	8/10/18	Unknown	500	Unknown	N		46	I14WE100_WELL_45	
52	1230 E. 4th St,	Active	Active	Unknown	1074	15ETMH	Flowserve	7	1770	2,279	672	420	114	4/18/18	USEM	600	1800	N	Yes	N.A.	H15WE107_WELL_52	Ion Exchange Plant. at 1074 Reservoirs. Water quality makes this plant unreliable. Clearwell is planned for future.
									Zone 1074 Capacity	13,603												
20	9600 S. Milliken Ave.	Inactive	Inactive	1977	1212	-	-	-	-	-	-	-	-	-	-	-	-	N				Not physically connected to system
27	4300 E. Jurupa St.	Inactive	Inactive	1971	1212	-	-	-	-	-	-	-	-	-	-	-	-	N				Not physically connected to system
24	700 N. Haven Ave.	Active	Active	1969	1212	14KHM	Aurora	11	1770	1,907	599	351	21	2/18/18	US	450	1780	N		9	I21WE100_WELL_24	
29	2400 E. Airport Dr.	Active	Active	1979	1212		Unknown			2,147	657	318	71	9/16/16	GE	500	Unknown	N		19	J18WE100_WELL_29	Not sequenced to start and stop. Typically only used in summer months. High operation and energy costs.
30	220 S. Wineville Ave.	Active	Active	1978	1212	14M160	Ingersoll Dresser	7	1775	2,063	597	314	31	4/18/18	Westing-house	600	1800	N		18	K24WE100_WELL_30	
31	5719 E. Santa Ana St,	Active	Active	1979	1212	16KHL	Verti-Line	8	1770	2,866	606	283	36	4/18/18	US	600	Unknown	N	Yes	19	L25WE100_WELL_31	There are water quality issues. It is used as an emergency backup well.
38	837 N. Center	Active	Active	1997	1212	15MQH	Byron Jackson	7	1770	2,427	663	369	44	3/18/18	US	500	1775	N		37	H20WE100_WELL_38	
41	1252 North Hellman Ave.	Active	Active	2003	1212		Unknown			2,143	703	391	46	4/18/18	US	600	Unknown	Y		43	G18WE100_WELL_41	Treatment was added to well.
47	4255 E. Concours St.	Active	Active	Unknown	1212		17MQH			3,358	632	373	57	3/18/18	Unknown	800	Unknown	Y		N.A.	H22WE100_WELL_47	
42	4100 E. Inland Empire Blvd.	N.A.	Active	Future	1212		N.A.			2,500	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	WMP2019_FUTWE00001_WELL_42	Future Well
43	3650 E. Airport Drive	N.A.	Active	Future	1212		N.A.			2,700	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	WMP2019_FUTWE00002_WELL_43	Future Well
									Zone 1212 Capacity	22,111												
46	1670 W. 8th St.	Active	Active	2006	1348	17MQL	Flowserve	8	1775	2,471	847	486	82	3/18/18	Unknown	800	Unknown	Y			E16WE100_WELL_46	
									Zone 1348 Capacity	2,471												
									Total Capacity	65,330												

[1] *Useful life of pump casing is 60 years*

Table 11-2

Future System Storage Reservoir Summary Table

Pressure Zone	Reservoir ID	Status	Reservoir Name	Old Reservoir Name	Location	Shape[1]	Volume (MG)	Bottom Elevation (ft)	High Water Elevation (ft)	Height (ft)	Width x Length[1] (ft)	Dia (ft)	Material	Year of Const.	Passed Useful Life?	Model ID	Comment
925	1A	Future	Reservoir 925-1A	N.A.	Bon View between Belmont and Francis	Cylindrical	9.00	905	925	20.0	-	N.A.	N.A.	N.A.		WMP2019_FUTTA00004_RES_925_1A_1B	Model Equivalent Diamter 391'
925	1B	Future	Reservoir 925-1B	N.A.		Cylindrical	9.00	905	925	20.0	-	N.A.	N.A.	N.A.			
925	2A	Existing	Reservoir 925-2A	N.A.	Northeast corner of Dupont Ave and Jurupa St	Cylindrical	6.00	893	925	32.0	-	188	Concrete	2003		WMP2019_FUTTA00001_RES_925_2A_2B	Model Equivalent Diamter 253'
925	2B	Future	Reservoir 925-2B	N.A.		Cylindrical	6.00	893	925	32.0	-	N.A.	N.A.	N.A.			
						Total Zone 925 Volume	**30.00**										
1010	1	Existing	Reservoir 1010-1	Reservoir 10	Southwest corner of Campus Ave and Main St	Cylindrical	5.50	979.3	1,009.3	30.0	-	178	Steel	1982		K14RS101_1010_1	
1010	2A	Existing	Reservoir 1010-2A	Reservoir 11	Southeast corner of Miliken Ave and San Bernardino Freeway	Cylindrical	9.00	980	1,010	30.0	-	226	Concrete	2001		J23RS101_1010_2A	
1010	2B	Existing	Reservoir 1010-2B	Reservoir 10		Cylindrical	9.00	980	1,010	30.0	-	226	Concrete	2007		J22RS101_1010_2B	
						Total Zone 1010 Volume	**23.50**										
1074	1A	Existing	Reservoir 1074-1A	Reservoir 8	Southeast corner of Cucamonga Ave and Fourth St	Rectangular	2.75	1,054.4	1,074	19.6	140 x 140	-	Concrete	1978		H15RS103_1074_EQUIV_TANK	Seismic upgrades planned
1074	1B	Existing	Reservoir 1074-1B	Reservoir 9	Southeast corner of Cucamonga Ave and Fourth St	Rectangular	2.00	1,058.8	1,074	15.2	118 x 158	-	Concrete	1957	Yes		Seismic upgrades planned
						Total Zone 1074 Volume	**4.75**										
1212	1A	Existing	Reservoir 1212-1A	Reservoir 4	Southwest corner of Fern Ave and Euclid Pl	Rectangular	20.00	1,188	1,214	26.0	278 x 458	-	Concrete	1959	Yes	E12RS102_1212_1A	Elevations were verified from surveying data. Seismic upgrades planned.
1212	1B	Existing	Reservoir 1212-1B	Reservoir 5	Southwest corner of Fern Ave and Euclid Pl	Rectangular	2.00	1,202	1,214	11.5	166 x 180	-	Concrete	1958	Yes	E12RS101_1212_1B	Plans show depth 12' - 1.1.5'.
1212	3	To Be Abandoned	Reservoir 1212-3	Reservoir 7	East side of Campus Ave, north of 8th Street	Irregular	10.00	1,189	1,213	24.3	218 x 398	-	Concrete	1926	Yes	E14RS101_1212_3	Elevations were verified from surveying data. Seismic upgrades planned.
1212	4A	Future	Reservoir 1212-4A	N.A.	North of Rochester Ave and Foothill Blvd	Cylindrical	8.00	1,188	1,212	24.0	-	N.A.	N.A.	N.A.		WMP2019_FUTTA00001_RES_1212_4A_B	Model Equivalent Diamter 337'
1212	4B	Future	Reservoir 1212-4B	N.A.		Cylindrical	8.00	1,188	1,212	24.0	-	N.A.	N.A.	N.A.			
						Total Zone 1212 Volume	**38.00**										
1348	1A	Existing	Reservoir 1348-1A	Reservoir 1	Southwest corner of Campus Ave and 13th St	Rectangular	3.00	1,328.4	1,347.7	19.3	125.5 x 162.5	-	Concrete	1972		B14RS104_EQUIV_TANK_1348	Seismic upgrades planned
1348	1B	Existing	Reservoir 1348-1B	Reservoir 2		Rectangular	2.00	1,327.6	1,348.0	20.5	107 x 125.5	-	Concrete	1955	Yes		Seismic upgrades
1348	1C	Existing	Reservoir 1348-1C	Reservoir 3		Rectangular	3.75	1,328.9	1,349.5	20.6	125.5 x 199.5	-	Concrete	1958	Yes		Seismic upgrades
						Total Zone 1348 Volume	**8.75**										
						Total System Volume	**105.00**										

[1] *Reservoirs with hopper bottoms and sloped walls are considered regular shapes (rectangular/cylindrical) as these irregularities in the shape account for insignificant impact on volume.*

Table 11-3

Future System Booster Pump Station Summary Table

			Pump Data									Efficiency Test						
Location of Booster Pump Station	**Status**	**Date of Construction**	**Name**	**Old Name**	**Suction Zone**	**Discharge Zone**	**Pump Model**	**Pump Mfg**	**Stages**	**Pump Type**	**RPM**	**Capacity (gpm)**	**TDH (ft)**	**Test Date**	**Horse Power**	**Model ID**	**Model Pump Curve ID**	**Comment**
John Galvin Pump Station 960 N Cucamonga Ontario, CA 91764	Existing	1960	Galvin 1074-1	Galvin Booster 1A	1074	1212	14FHC	Goulds	3	VT	1800	3,658	152	4/18/18	250	H15BP102_GALVIN_1212_1	GALVIN_BPS_P1_1A	
			Galvin 1074-2	Galvin Booster 1B	1074	1212	16ENL	Flowserve	2	VT	1780	3,145	147	7/1/13	200	H15BP103_GALVIN_1212_2	GALVIN_BPS_P2_1B	
			Galvin 1074-3	Galvin Booster 1C	1074	1212	Unknown		2	VT	1770	4,638	164	4/18/18	350	H15BP104_GALVIN_1212_3		Modeled pump with design point
			Galvin 1074-4	Booster 2	1074	1348	14HMC	Goulds	4	VT	1800	2,016	334	4/18/18	250	H15BP101_GALVIN_1348_4	GALVIN_BPS_P4_2	
1212 Reservoir (10MG) 140 s. Campus, Upland, CA 91786	Existing	1959	Booster 1348-3	Booster 3	1212	1348	8A-16	Peerless	-	HSC	1770	3,070	157	4/18/18	150	E14BP101_BOOSTER_1348_3		Modeled pump with design point
			Booster 1348-4	Booster 4	1212	1348	6AE16	Peerless	-	HSC	1760	1,898	161	4/18/18	100	E14BP102_BOOSTER_1348_4	BOOSTER_1348_4	
1559 N. Columbia Ave, Ontario, CA 91764	Existing	1960	Booster 1348-1	Booster 9A	1212	1348	411-BF	Aurora	-	HSC	1775	2,844	214	4/18/18	200	F13BP101A_BOOSTER_1348_1		Modeled pump with design point
			Booster 1348-2	Booster 9B	1212	1348	411-BF	Aurora	-	HSC	1778	2,613	226	8/10/18	200	F13BP101B_BOOSTER_1348_2		Modeled pump with design point
4251 East Jurupa Ave, east of Dupont Ave	Existing	2008	CDA Ontario Booster Pump 1	N.A.	925	1212	Unknown					1,286	302	4/18/18	150	M22BP100_ONTARIO_1212_1	ONTARIO_BPS_P1	
			CDA Ontario Booster Pump 2	N.A.	925	1212	Unknown					1,198	295	4/18/18	150	M22BP101_ONTARIO_1212_3	ONTARIO_BPS_P2	
			CDA Ontario Booster Pump 3	N.A.	925	1212	Unknown					1,232	295	4/18/2018	150	M22BP102_ONTARIO_1212_2	ONTARIO_BPS_P3	
4301 E Guasti Rd, east of Milliken Ave	Existing	N.A.	CDA Milliken Booster 1	N.A.	1010	1212	12ENL	Flowserve	5	VT	1770	1,525	203	12/18/2014	125	WMP2019_BP00001_MILLIKAN_1212_1	MILLIKEN_BPS_P1	
			CDA Milliken Booster 2	N.A.	1010	1212	12ENL	Flowserve	5	VT	1770	1,520	202	12/18/2014	125	WMP2019_BP00002_MILLIKAN_1212_2	MILLIKEN_BPS_P2	
			CDA Milliken Booster 3	N.A.	1010	1212	12ENL	Flowserve	5	VT	1770	1,525	204	12/18/2014	125	WMP2019_BP00003_MILLIKAN_1212_3	MILLIKEN_BPS_P3	
Archibald Ave, north of Cloverfield Rd. (Owned by CDA)	Existing	N.A.	Archibald -1	N.A.	CDA	1010		Fairbanks Morse				1061	166	4/18/2018	75	WMP2019_BP00004_ARCHIBALD_1010_1		Modeled pump with design point
			Archibald -2	N.A.	CDA	1010		Fairbanks MOrse				1,112	164	4/18/2018	75	WMP2019_BP00005_ARCHIBALD_1010_2		Modeled pump with design point
Bon View between Belmont and Francis	Future	FUTURE	Future 925-1010 Pump Station	N.A.	925	1010	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	400	WMP2019_PS1010		Modeled pump with design point

Table 11-4
Future System Pressure Reducing Stations Summary Table

Station No.	Status	From Zone	To Zone	Location	Diameter (inch)	Pressure Setting (psi)	Ground Elevation (feet)	Model ID
2	Existing	1074’	1010’	Euclid Ave, south of Philadelphia St (east side of street)	4	62	840	P13PR102_PRV_2
					8	58		
					8	52		
3	Existing	1074’	1010’	Grove Ave, south of Philadelphia St	4	65	834	P15PR101_PRV_3
					8	60		
					8	55		
4	Existing	1074’	1010’	Philadelphia St at Vineyard Ave	6	64	838	P17PR103_PRV_4
					12	57		
				Pressure Relief	6	90		
5	Existing	1074’	1010’	Archibald Ave at Philadelphia St	4	65	830	P19PR101_PRV_5
					6	60		
					8	50		
6	Existing	1212’	1074’	Archibald Ave at Jurupa St (adjacent Well 36)	6	65	893	M19PR101_PRV_6
					8	60		
7	Existing	1212’	1010’	Milliken Ave south of Francis St	3	55	876	N22PR101_PRV_7
					4	50		
					8	45		
8	Existing	1212’	1010’	Francis St at Etiwanda Ave	4	55	878	N26PR101_PRV_8
					8	50		
					12	40		
10	Existing	1212’	1074’	Mission Blvd at Turner Ave	4	80	856	N20PR101_PRV_10
					8	75		
					10	70		
11	Existing	1212’	1074’	Phillips Street at Cypress Ave	4	52	918	M12PR101_PRV_11
					8	47		
12	Existing	1212’	1074’	Haven Ave at Francis St (west side of street)	4	79	866	N21PR102_PRV_12
					6	73		
					10	68		
				Pressure Relief		-		
13	Existing	1212’	1010’	Haven Ave at Francis St (east side of street)	4	60	866	N21PR101_PRV_13
					6	55		
					10	50		
				Pressure Relief		-		
15	Existing	1348’	1212’	Fourth St at San Antonio Ave	6	35	1,094	H12PR100_PRV_15
					6	30		
16	Future	1010	925	Chino Ave and Campus Ave	N.A.	55	761.1	WMP2019_FUTVL00002_PRS_16
17	Existing	1010'	925'	Archibald Ave at Schaefer Ave	4	74	728	U19PR100_PRV_17
					10	69		
18	Existing	1010'	925'	Riverside Dr, west of Milliken Ave	4	54	788	R22PR100_PRV_18
					10	50		
					14	45		
21	Existing	1212'	1074'	Euclid St at Phillips St	6	53	930	M13PR100_PRV_21
					10	48		
23	Future	1074	1010	Campus Ave and SR-60	N.A.	55	834	WMP2019_FUTVL00001_PRS_23
Future 1010	Future	1074	1010	Fern Ave and SR-60	N.A.	50	845	WMP2019_VL00001_FUTURE1

Table 11-5
Existing and Future 925 Zone Facilities

<table>
<tr><th>Facility Type</th><th colspan="2">Existing Facility Description</th><th colspan="2">Ultimate Facility Description</th></tr>
<tr><td rowspan="3">Reservoirs</td><td rowspan="3">Reservoir 925-2A</td><td rowspan="3">6 MG</td><td>Reservoir 925-2B</td><td>6 MG</td></tr>
<tr><td>Reservoir 925-1A</td><td>9 MG</td></tr>
<tr><td>Reservoir 925-1B</td><td>9 MG</td></tr>
<tr><td rowspan="7">Wells</td><td rowspan="7">Well 49 - 2,545 gpm</td><td rowspan="7">Pumps to Reservoir 925-2A</td><td>Well 48 - 2,500 gpm</td><td rowspan="3">Pumps to Reservoir 925-2A & 925-2B</td></tr>
<tr><td>Well 51 - 2,500 gpm</td></tr>
<tr><td>Well 54 - 2,000 gpm</td></tr>
<tr><td>Well 55 - 2,500 gpm</td><td rowspan="4">Pumps to Reservoir 925-1A & 925-1B</td></tr>
<tr><td>Well 56 - 2,500 gpm</td></tr>
<tr><td>Well 57 - 2,500 gpm</td></tr>
<tr><td>Well 58 - 2,500 gpm</td></tr>
<tr><td rowspan="2">Treatment</td><td colspan="2" rowspan="2">N.A.</td><td colspan="2">Treatment at Reservoirs 925-1A and 1B</td></tr>
<tr><td colspan="2">Treatment at Reservoirs 925-2A and 2B</td></tr>
<tr><td rowspan="2">Pressure Reducing Stations</td><td colspan="2">PRS17 - Capable of providing water from 1010 Zone to future 925 Zone at Archibald Ave and Schaeffer Ave</td><td colspan="2" rowspan="2">PRS16 - Capable of providing water from 1010 Zone to future 925 Zone at Chino Ave and Campus Ave</td></tr>
<tr><td colspan="2">PRS18 - Capable of providing water from 1010 Zone to future 925 Zone at Riverside Dr and Milliken Ave</td></tr>
<tr><td>Altitude Valves</td><td colspan="2">AV-925A at Reservoir 925-2A.</td><td colspan="2">AV-925B - Capable of providing water from 1074 Zone to future Reservoir 925-1A and 925-1B</td></tr>
</table>

11-5 Future 1010 Zone Facilities

The southerly boundary of the existing 1010 Zone will ultimately be expanded south to Chino Avenue from Euclid Avenue to Milliken Avenue. Currently, mainline pipes are planned in major streets as shown on Figure 11-3. The future pipes will tie into existing 1010 Zone pipes in Riverside Drive.

The following additional facilities are recommended to improve the redundancy of supply into the 1010 Zone:

- Well 39 and Well 50 upgrades will be made to provide water quality treatment, such that the pumps may be reactivated.
- Well 37 will be retrofitted to pump from the 1212 Zone to the 1010 Zone. Currently this well pumps to the 1212 Zone.
- New PRS 23 will reduce pressures from 1074 Zone to 1010 Zone, near Campus and the SR60 Freeway.
- New PRS FUTURE1. Will reduced pressures from the 1074 Zone to the 1010 Zone, near Euclid Avenue and the SR60 Freeway.
- A new booster pump station from 925 Zone to 1010 Zone is recommended to provide water to 1010 Zone in emergencies or when storage reserves are low. The location of this future pump station is near the future Reservoirs 925-1A and 925-1B.

11-6 Future 1074 Zone Facilities

The following improvements are necessary for facilities that have reached the end of their useful lives or require system upgrades.

- All existing wells in the 1010 Zone (Well 35, 36, 40, 44, 45, and 52) are currently operational; however, due to existing and upcoming water quality issues, treatment and/or other facility improvements maybe required.
- Improvements are necessary for Reservoirs 1074-1A and 1074-1B, based on the City's recommendations included in the 2012 Seismic Risk of City's Potable Water Reservoirs technical memorandum. While Reservoir 1074-1B (2 MG) was constructed in 1957 and has reached the end of its useful life, it is expected that the reservoir may continue operating once the recommended rehabilitation project has been implemented. This reservoir should be re-inspected and condition assessed every three (3) years, at minimum, to determine the additional rehabilitation/replacement project needs.
- The John Galvin Pump Station was constructed in 1960 and has reached the end of its useful life. It is recommended that a condition assessment of this pump station be conducted to identify all necessary improvement projects.

11-7 Future 1212 Zone Facilities

The following additional facilities are recommended to improve the redundancy of supply into the 1212 Zone:

- It is recommended that the future 1212 Zone include two additional 8 MG reservoirs (1212-4A and 1212-4B) to replace the existing Reservoir 1212-3 and to meet the storage criteria.
- Under future conditions, the City has access of up to 25 mgd capacity from the WFA connections in the 1212 Zone and 1348 Zone. Currently, the City's operations staff have experienced a maximum of 15.4 mgd from these turnouts.
- The City will construct Well 42 and Well 43 to provide an additional 5200 gpm capacity to the 1212 Zone. Well 43 has been drilled, but needs to be equipped before being placed into service.

The following improvements are necessary for facilities that have reached the end of their useful lives or require system upgrades.

- Well 38, 41, and 47 are currently operational; however, due to existing and upcoming water quality issues, treatment and/or other facility improvements may be required.
- Wells 24, 29, 30, and 31 will also require facility upgrades to meet water quality requirements. These wells are also expected to reach the end of their useful lives in the next 10 to 20 years. It is recommended that the City evaluate the condition of these wells to determine if additional improvements or replacement is necessary.
- Reservoir 1074-1A (20 MG) and Reservoir 1074-1B (2 MG) were constructed in 1959 and 1958, respectively. Per the criteria for concrete reservoirs, these facilities have reached the end of its useful life. These reservoirs should be re-inspected and condition assessed every three (3) years, at minimum, to determine the rehabilitation/replacement project needs.
- Booster pumps 1348-3 and 1348-4 are located at the pump station near Reservoir 1212-3. This pump station was constructed in 1959, and has reached the end of its useful life. Concurrent to this master planning effort, the City is conducting a condition assessment of this pump station, which will include recommendations to rehabilitate this facility.
- The booster pump station that house pumps 1348-1 and 1348-2 was constructed in 1960, and has reached the end of its useful life. It is recommended that a condition assessment of these pump stations be conducted to identify all necessary improvement projects.

11-8 Future 1348 Zone Facilities

The following improvements are necessary for facilities that have reached the end of their useful lives or require system upgrades.

- Well 46 is currently operational; however, due to existing and upcoming water quality issues, treatment and/or other facility improvements will be required.
- Reservoir 1348-1B (2 MG) and Reservoir 1074-1C (3.75 MG) were constructed in 1955 and 1958, respectively. Per the criteria for concrete reservoirs, these facilities have reached the end of its useful life. These reservoirs should be re-inspected and condition assessed every three (3) years, at minimum, to determine the rehabilitation/replacement project needs.

SECTION 12

FUTURE SYSTEM ANALYSIS

12-1 General

The established system criteria and calibrated system computer model were utilized in analyzing the system, and evaluating its adequacy. As discussed in Section 10, the model was utilized to perform the existing system analyses. The hydraulic model was updated to include the existing system improvement projects that were identified in Section 10 and the known future system facility expansion projects detailed in Section 11.

The hydraulic model was used to identify existing deficiencies and develop mitigation projects based on the future system analyses under average day, maximum day, and peak hour and maximum day plus fire flow conditions.

A capital improvement program was developed as a result of these analyses. Recommended projects and cost estimates are discussed in Section 13 of this Master Plan Report.

12-2 Future Source of Supply

It is prudent to secure water supplies from multiple sources so that demands can be met at reasonable levels when one or more water sources are not available. The City's future water demands are summarized in Table 12-1.

For planning purposes, the City's future sources of supply must be able to meet the minimum City and state supply requirements.

Table 12-1

Future System Demand

Demand Description	Total System Demand (gpm)	(mgd)	(AFY)
Average Day	35,716	51.43	57,610
Max Day	54,778	78.88	88,357
Peak Hour[1]	73,132	105.31	117,963

[1] Estimated from Future System Model

12-2.1 Future Average Day Demand

The criterion established requires a source of supply equal to one average day demand (ADD) (35,716 gpm) from local sources.

The City's future source of supply is detailed in Table 12-2. The City's local water source include direct access to groundwater from the Chino Basin, which is managed by the Chino Basin Watermaster. The City's existing and future wells have a capacity of 65,330 gpm, which is about 183% the future ADD.

Table 12-2

Future Source of Supply

Source	Capacity gpm	mgd	AFY
Existing Wells[1]	35,530	51.2	57,310
Future Wells[1]	29,800	42.9	48,068
WFA	10,700	15.4	17,259
CDA	5,290	7.6	8,533
Total	**81,320**	**117.1**	**131,170**

[1] Well 37 will be retrofitted to pump to Zone 1010.

12-2.2 Future Maximum Day Demand

California Code of Regulations Related to Drinking Water requires a minimum source of supply of one maximum day demand (MDD) of the service area. Under this criterion, reservoirs are typically needed to regulate hourly fluctuations in demand, provide fire flow and supplement supply during an outage of a source for an extended duration.

As detailed in Table 12-2, the total future source of supply is equivalent to 81,320 gpm. This is about 149% of the City's future MDD (54,778 gpm). With 65,330 gpm from existing and future groundwater sources alone, the City is capable of providing the full projected MDD.

The available future imported water from the Chino Desalter Authority (CDA) and Water Facility Authority (WFA) total 15,990 gpm (29% of the future MDD). If some wells are out of service, the City would need 38,788 gpm (54,778 gpm – 15,990 gpm) from groundwater sources to supply the remaining MDD. This is about 59% of the future system well capacity.

12-2.3 Future Peak Hour Demand

California Code of Regulations Related to Drinking Water, Chapter 16, Section 64554 requires that if a system has more than 1,000 service connections, it must be capable of providing four (4) hours of peak hourly demand (PHD) through a combination of source capacity, storage capacity, and/or emergency source connections.

The estimated future peak hour demand from the hydraulic model is 73,132 gpm. The City's future total supply (81,320 gpm) is greater than the peak hour demand. Storage capacity is not necessary to meet the future peak hour demand supply criteria.

12-3 Storage

12-3.1 Storage Criteria Summary

Operational Storage

For the City of Ontario's system, operational storage criterion is based on 30 percent of the maximum day demand for OR, and 25 percent of maximum day demand for OMC due to the diversity of demands in OMC.

Emergency Storage

The City's emergency storage criterion is set at one average day demand. For a system that depends mostly on groundwater supplies, this amount of emergency storage is adequate and is primarily for response in operations due to a loss of a major source of supply.

Fire Suppression Storage

Fire suppression storage is the volume required to supply the service area with the required fire flows, which range from 1,500 to 4,000 gpm for a duration of two (2) to four (4) hours.

The fire flow suppression storage and operational storage is increased by 15 percent so that a portion of the reservoir volume is available for variations in elevation, and to provide submergence over the reservoir outlet pipes. In an emergency, the emergency storage volume, as well as the operational storage volume and the fire suppression storage volume would all be available for use.

12-3.2 Future Storage Analysis

With anticipated development in the OR service area, the City is planning for additional storage in the 925 Zone 925 and the 1212 Zone. Table 12-3 shows the future storage capacity in each zone, and the reservoir capacity.

Table 12-3

Future Storage Analysis

Zone	1348	1212	1074	1010	925	Total System
Average Day Demand (mgd)	3.08	16.27	5.91	9.06	17.12	51.43
Maximum Day Demand (mgd)	4.89	25.17	9.16	13.98	25.68	78.88
[1]Fire Flow Demand (gpm)	3,500	4,000	4,000	4,000	4,000	-
Fire Flow Duration (hrs)	4	4	4	4	4	-
[2]Fire Suppression Storage (MG)	0.84	0.96	0.96	0.96	0.96	-
[3]Operational Storage (MG)	1.22	6.29	2.29	3.49	7.70	21.00
[4]Emergency Storage (MG)	3.08	16.27	5.91	9.06	17.12	51.43
[5]Total Storage Required (MG)	5.45	24.61	9.65	14.18	27.08	80.97
[6]Existing Available Storage (MG)	8.75	38.00	4.75	23.50	30.00	105.00
Zone Surplus / Deficit (MG)	3.30	13.39	-4.90	9.32	2.92	24.03

[1] Highest fire flow required in zone

[2] Fire flow multiplied by duration

[3] 30% of maximum day demand for NMC, 25% of maximum day demand for OMC

[4] One average day demand

[5] (1.15 x (fire suppression+operational storage))+emergency

A deficit of 4.90 MG is calculated in the 1074 Zone. The construction of additional storage in the 1074 Zone is not recommended due to cost of construction and locating an appropriate site. There is 13.39 MG of surplus storage within the 1212 Zone that could be transferred to the 1074 Zone through altitude valve 1074A at the Reservoir 1074-1 site, as well as through PRS 6, 10, 11, 12 and 21 to make up for this deficit.

12-4 Pipeline Replacement Program

As detailed in Section 10-3.4, the City has a pipeline replacement program that is intended to target the replacement of pipes that have exceeded their useful lives and/or have diameters that are less than the minimum 8-inch in diameter criteria. The City currently prioritizes the pipe replacement projects based on operational information such as historical pipe leaks, historical breaks, or maintenance issues.

Approximately 1,105,000 feet of pipe will need to be replaced due to size and or age.

12-5 Future System Hydraulic Model Analysis

The future system model scenarios include the known future facilities, the future development demands, the future supplies, and planned future operations. As detailed in Section 10-5-4, pipe replacements are recommended for all pipes less than 8-inches in diameter and for all pipes that were constructed after 1970. Likewise, fire hydrant lateral replacements were recommended for hydrant laterals with diameters less than 6-inch, as well as older metal pipes that experience higher friction losses. The geometry for the future system model scenario was adjusted such that the minimum pipe diameter is 8-inches and minimum hydrant lateral diameter is 6-inch minimum.

12-5.1 Future Average Day Demand and Maximum Day Demand Scenarios

The pressures during the future ADD scenario were above the City's dynamic pressure criteria (40 psi) throughout the service area. The future system was also evaluated under the MDD scenario, which include the peak hour demand. All system pressures meet the City's minimum pressure requirements. The future system analysis resulted in the 24-hour average pressure contours shown on Figure 12-1.

For the future system model scenarios, the pipe diameters were increased to meet the City's maximum velocity criteria of 7 ft/s or less. The maximum velocities are detailed on Figure 12-2. The 12-inch pipe on Archibald Avenue south of Riverside Drive has a maximum velocity of 7.1 feet per second, which is due to water moving between the 1010 Zone and 925 Zone, through PRS17. If these velocities affect the pipe condition, the valve setting may be adjusted to restrict the flowrate from the upstream piping.

12-5.2 Future Maximum Day plus Fire Flow Scenario

The future fire flow system analysis was conducted with known future facilities and demands under maximum day plus fire flow conditions.

Fire flow demands, as listed in Table 7-1, were applied at all model fire hydrant locations. If a fire node was located near multiple land use types, the highest fire flow demand was utilized. The fire flow criterion requires a residual pressure of 20 psi at the fire hydrant outlet. The system evaluation is therefore based on providing 20 psi at the model hydrant.

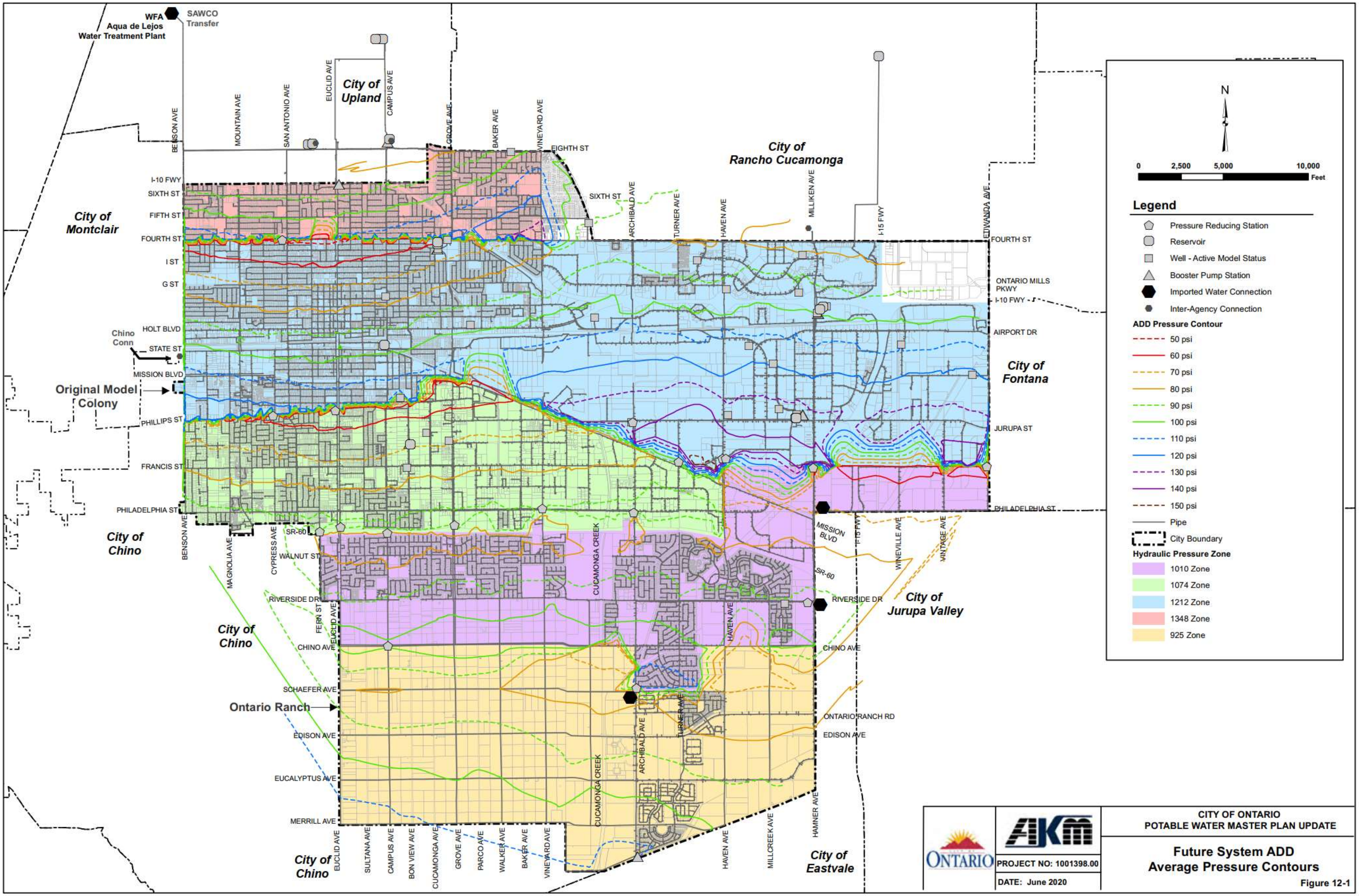
When the fire flow analysis was initially run, there were areas within the system that could not meet the fire flow requirement. These areas were generally industrial and high density residential land use types, where the fire flow requirement is 4,000 gpm and 3,500 gpm, respectively. The fire flow deficiencies were due to small pipe sizes or dead end mainlines. The City currently requires a minimum pipe size of 12-inch diameter in commercial and industrial areas. The initial fire flow deficiencies were often remedied by increasing the existing pipe diameter to 12-inches. In some cases, pipe looping was also necessary. The available fire flow contours at 20 psi for the future system are illustrated on Figure 12-3.

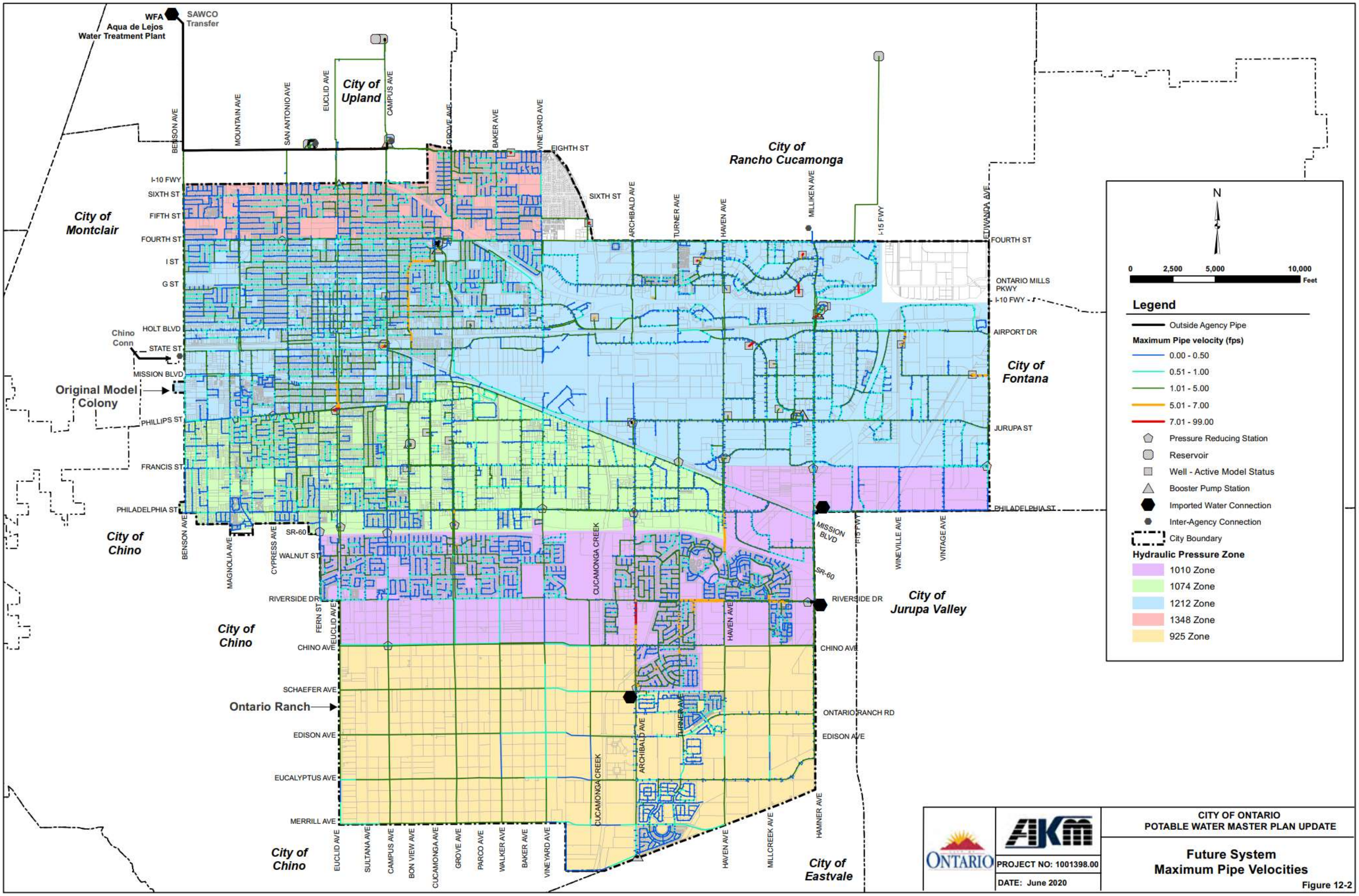
Hydrants that are unable to meet the fire flow requirement are also detailed on Figure 12-3 and summarized in Appendix 12-1. These hydrants are located on private property and require improvements to the private system. No recommendations were made to private pipes and laterals, and no private system improvements are included in the capital improvement program.

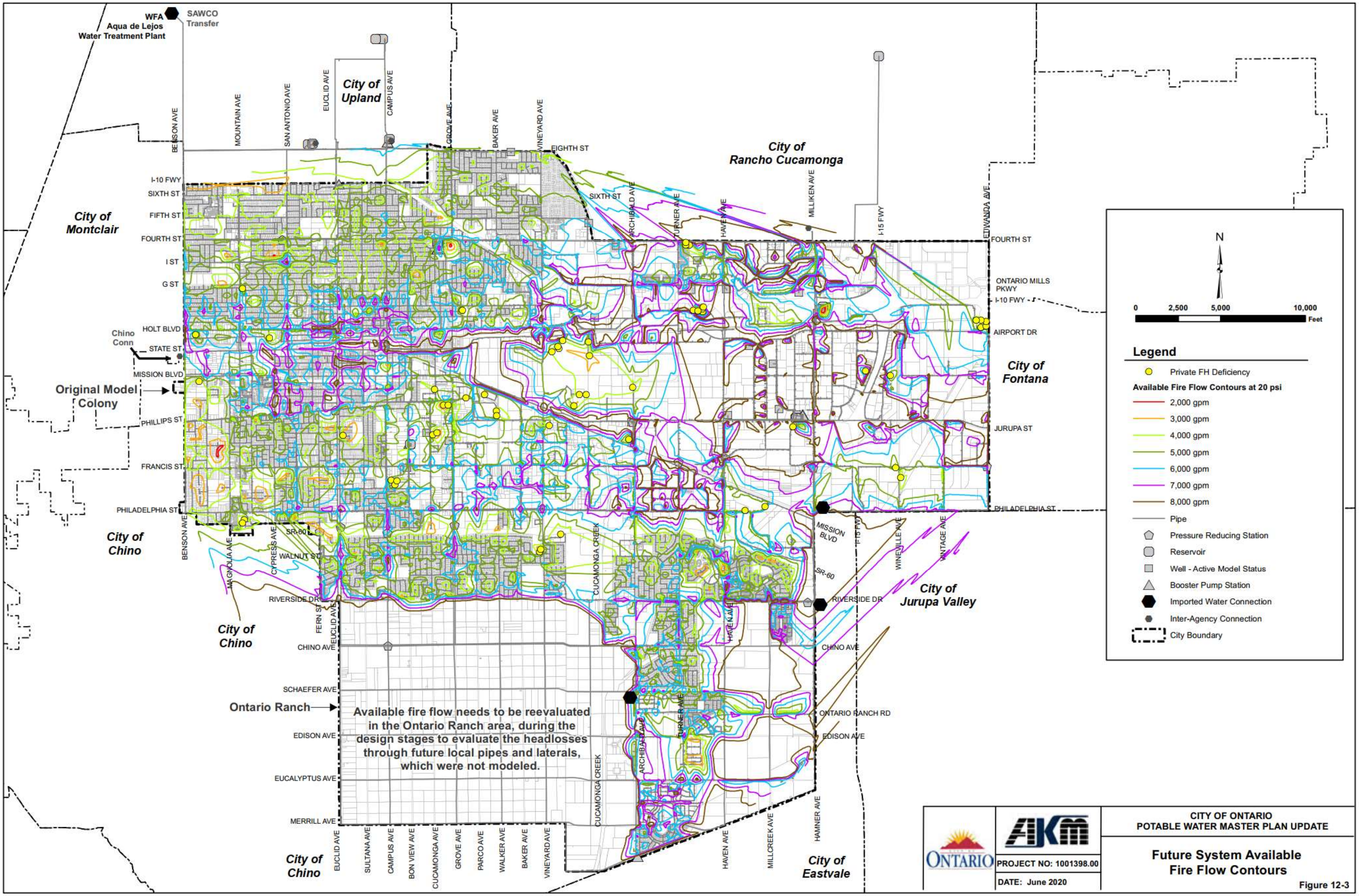
The recommended fire flow improvements are illustrated on Figure 12-4 and detailed in Table 12-4.

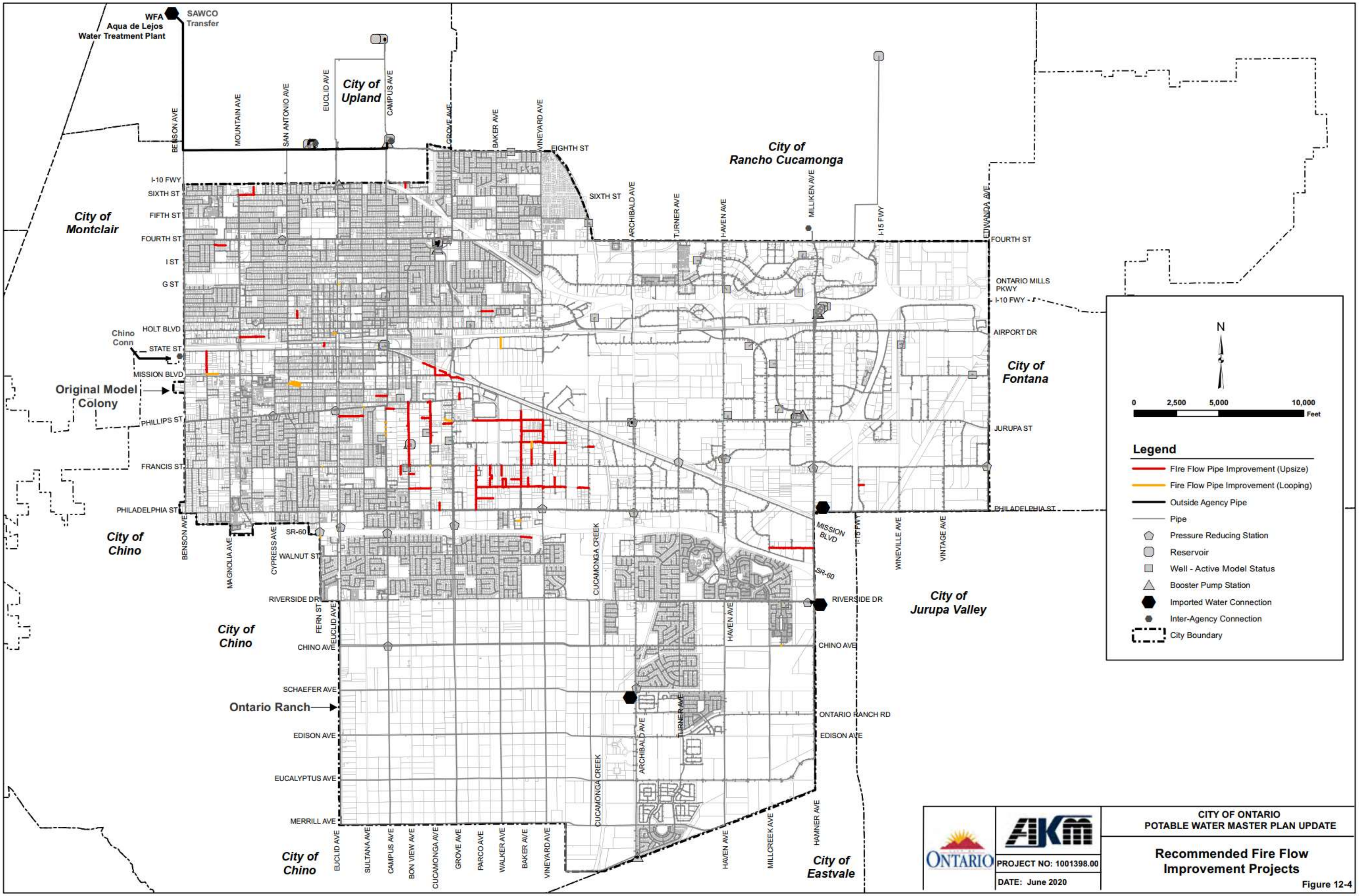
Table 12-4
Recommended Fire Flow Improvements

Zone	Fire Flow Deficiency Upsize	Fire Flow Deficiency Looping				Total Footage
	Future Size 12" (ft)	Future Size 6" (ft)	Future Size 8" (ft)	Future Size 12" (ft)	Future Size 16" (ft)	
925						0
1010	3,657		31			3,688
1074	51,115	127	79	1,130		52,451
1212	2,735	235	2,196	156	955	6,277
1348	1,658					1,658
Total	**59,165**	**362**	**2,305**	**1,287**	**955**	**64,074**


WFA
Aqua de Lejos
Water Treatment Plant
SAWCO
Transfer
City of Upland
City of Montclair
City of Rancho Cucamonga
City of Fontana
City of Chino
City of Jurupa Valley
City of Eastvale
Original Model Colony
Ontario Ranch
Chino Conn
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
EIGHTH ST
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
SR-60
WALNUT ST
MAGNOLIA AVE
CYPRESS AVE
CUCAMONGA CREEK
RIVERSIDE DR
FERN ST
CHINO AVE
WINEVILLE AVE
VINTAGE AVE
SCHAEFER AVE
ONTARIO RANCH RD
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
MILLCREEK AVE
HAMNER AVE
N
0 2,500 5,000 10,000 Feet
Legend
Pressure Reducing Station
Reservoir
Well - Active Model Status
Booster Pump Station
Imported Water Connection
Inter-Agency Connection
ADD Pressure Contour
50 psi
60 psi
70 psi
80 psi
90 psi
100 psi
110 psi
120 psi
130 psi
140 psi
150 psi
Pipe
City Boundary
Hydraulic Pressure Zone
1010 Zone
1074 Zone
1212 Zone
1348 Zone
925 Zone
ONTARIO
AKM
PROJECT NO: 1001398.00
DATE: June 2020
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
Future System ADD
Average Pressure Contours
Figure 12-1


WFA
Aqua de Lejos
Water Treatment Plant
SAWCO
Transfer
City of Upland
City of Rancho Cucamonga
City of Montclair
City of Fontana
City of Chino
City of Jurupa Valley
City of Eastvale
Original Model Colony
Ontario Ranch
Chino Conn
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
EIGHTH ST
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
I-10 FWY
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
ONTARIO RANCH RD
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
MAGNOLIA AVE
CYPRESS AVE
FERN ST
CUCAMONGA CREEK
WINEVILLE AVE
VINTAGE AVE
HAMNER AVE
MILLCREEK AVE
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
N
0 2,500 5,000 10,000 Feet
Legend
Outside Agency Pipe
Maximum Pipe velocity (fps)
0.00 - 0.50
0.51 - 1.00
1.01 - 5.00
5.01 - 7.00
7.01 - 99.00
Pressure Reducing Station
Reservoir
Well - Active Model Status
Booster Pump Station
Imported Water Connection
Inter-Agency Connection
City Boundary
Hydraulic Pressure Zone
1010 Zone
1074 Zone
1212 Zone
1348 Zone
925 Zone
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
AKM
ONTARIO
PROJECT NO: 1001398.00
DATE: June 2020
Future System
Maximum Pipe Velocities
Figure 12-2


WFA Aqua de Lejos Water Treatment Plant
SAWCO Transfer
City of Upland
City of Montclair
City of Rancho Cucamonga
City of Fontana
City of Jurupa Valley
City of Chino
City of Eastvale
Original Model Colony
Chino Conn
Ontario Ranch
Available fire flow needs to be reevaluated in the Ontario Ranch area, during the design stages to evaluate the headlosses through future local pipes and laterals, which were not modeled.
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
EIGHTH ST
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
MAGNOLIA AVE
CYPRESS AVE
SR-60
WALNUT ST
RIVERSIDE DR
FERN ST
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
ONTARIO RANCH RD
CUCAMONGA CREEK
WINEVILLE AVE
VINTAGE AVE
HAMNER AVE
MILLCREEK AVE
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
N
0 2,500 5,000 10,000 Feet
Legend
Private FH Deficiency
Available Fire Flow Contours at 20 psi
2,000 gpm
3,000 gpm
4,000 gpm
5,000 gpm
6,000 gpm
7,000 gpm
8,000 gpm
Pipe
Pressure Reducing Station
Reservoir
Well - Active Model Status
Booster Pump Station
Imported Water Connection
Inter-Agency Connection
City Boundary
ONTARIO
AKM
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
PROJECT NO: 1001398.00
DATE: June 2020
Future System Available Fire Flow Contours
Figure 12-3



WFA
Aqua de Lejos
Water Treatment Plant
SAWCO
Transfer
City of Upland
City of Rancho Cucamonga
City of Montclair
City of Fontana
City of Chino
City of Jurupa Valley
City of Eastvale
Chino Conn
Original Model Colony
Ontario Ranch
BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
EIGHTH ST
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
MAGNOLIA AVE
CYPRESS AVE
FERN ST
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
CUCAMONGA CREEK
WINEVILLE AVE
VINTAGE AVE
ONTARIO RANCH RD
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
MILLCREEK AVE
HAMNER AVE
N
0
2,500
5,000
10,000
Feet
Legend
Fire Flow Pipe Improvement (Upsize)
Fire Flow Pipe Improvement (Looping)
Outside Agency Pipe
Pipe
Pressure Reducing Station
Reservoir
Well - Active Model Status
Booster Pump Station
Imported Water Connection
Inter-Agency Connection
City Boundary
ONTARIO
AKM
PROJECT NO: 1001398.00
DATE: June 2020
CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE
Recommended Fire Flow Improvement Projects
Figure 12-4

SECTION 13

CAPITAL IMPROVEMENT PROGRAM

13-1 Introduction

The primary goal of the Capacity Improvement Program (CIP) is to provide the City of Ontario with a long-range planning tool for implementing its water system improvements in an orderly manner and a basis for financing of these improvements. The CIP consists of projects that will enhance the system to meet the established criteria, properly maintain the system's assets, and replace the facilities that have reached the end of their useful lives.

13-2 Project Descriptions

Proposed facility improvement projects and costs are planning level estimates. Specific alignments and refined cost estimates should be developed as a part of the preliminary design phase for each recommended pipeline project.

It should be noted that some of the improvements recommended herein are conceptual in nature based on existing available planning information. Therefore, they should not be considered as absolute for final design. Further analysis and refinement will be necessary prior to commencing work on the final plans, specifications and estimates package for each project. Detailed preliminary design studies should be prepared to select the final design projects.

Improvement projects are categorized as Existing System Improvement Projects, Annual Improvement Projects, Condition Projects – Mainline Replacement Program, Condition Projects – Facility Improvement Program, or Future System Development Projects.

Existing System Improvement Projects include:

- Improvements identified from the hydraulic model analysis, such as velocity and fire flow deficiencies.
- Projects identified from the City's operations and engineering staff, to improve the condition of the main facilities such as reservoirs.
- Projects included on the City's existing DIF maps in the OMC area

Annual Improvement Projects are projects that need to be regularly updated and include:

- Reservoir recoating/repainting/ and repair improvements
- Meter replacement

Condition Projects – Mainline Replacement Program include:

- Small diameter pipes
- Pipes exceeding useful lives

Condition Projects – Facility Improvement Program include:

- Improvements to existing fire hydrant lateral size and/or material
- Wells exceeding useful lives
- Pump stations exceeding useful lives
- Reservoirs exceeding useful lives

Future System Development Projects include:

- DIF projects in the OR area

13-3 Project Cost Estimate

The capital improvement projects are developed based upon the results of the existing system analysis and future system analysis, which are described in detail in Section 10 and Section 12, respectively.

The cost estimates are based upon recent information for similar projects in the City of Ontario, and include contingencies for this planning level study. The cost estimates are based on the unit construction costs, detailed in Table 13-1. Pipeline costs take into consideration the size of the pipe as well as whether the construction will be within the OMC or OR areas. OMC is largely developed and there are many existing utilities to consider; therefore, the costs of replacing water pipes will be generally higher than the new construction costs in undeveloped areas such as OR.

Pipe improvements recommendations in the OMC are based on the replacement of the existing pipes. Replacement costs are generally more conservative and will therefore allow the City more flexibility for each project. Preliminary design studies should be conducted, utilizing detailed utility information to identify and evaluate project alternatives such as parallel pipes.

The estimated unit costs for wells include permanent back-up power.

Table 13-1
Unit Cost Summary

Type		Units	OMC	OR
Pipe	6-inch [1]	$/LF	$108.36	$72.00
Pipe	8-inch	$/LF	$144.48	$96.00
Pipe	12-inch	$/LF	$216.72	$144.00
Pipe	16-inch	$/LF	$288.96	$192.00
Pipe	18-inch	$/LF	$325.08	$260.06
Pipe	24-inch	$/LF	$433.44	$331.56
Pipe	30-inch	$/LF	$541.80	$403.05
Pipe	36-inch	$/LF	$650.16	$486.31
Pipe	42-inch	$/LF	$758.52	$557.81
Well		$/LS	$4,000,000.00	
Reservoir		$/MG	$1,444,800.00	
Pump Station		$/HP	$6,000.00	
PRS		$/LS	$680,260.00	
Treatment Plant		$/Well	$6,324,111.00	

[1] *6-inch recommendation for laterals only*

Cost estimates for currently planned improvement projects in the near future were provided by the City.

The total costs include construction, contingency, engineering, design, and construction management costs. The individual cost components are calculated as follows:

1. Base Cost = Unit Cost x Recommended Units
2. Contingency Cost for Original Model Colony Projects = 10% of the Base Cost
3. Construction Cost = Base Cost + Contingency Cost
4. Engineering and Design Cost = 10% of the Construction Cost
5. Construction Management Cost = 5% of the Construction Cost
6. Total Cost = Construction Cost + Engineering and Design Cost + Construction Management Cost

Construction costs can be expected to fluctuate as changes occur in the economy. These costs should therefore be reevaluated and updated annually based upon Engineering News Record (ENR) Index for the Los Angeles area (ENRLA), with the base ENRLA Index of 12,144.49 for January 2020.

The recommended CIP is detailed in Table 13-2. Project locations are shown on Plate-1. A summary of the total costs are as follows:

Existing System Improvement Projects:	$237,900,000
Condition Projects – Mainline Replacement Program:	$226,200,000
Condition Projects – Facility Improvement Program:	$89,600,000
Future System Development Projects:	$225,600,000
Total CIP cost:	**$779,300,000**
Annual Improvement Projects:	$3,600,000/Year

13-4 Project Priorities

The primary consideration in establishing project priorities for the capital improvement program list must always be given to the health, safety and welfare of the public and the customers. In general, the projects necessary to improve the existing system are scheduled earlier in the order of supply, pumping and storage.

With these guidelines, the projects recommended in this report and their estimated costs were examined and sorted. Each project is shown with its total estimated project cost. The City should review this schedule and adjust it annually to respond to changed conditions and to take advantage of concurrent construction such as street paving projects or adjacent infrastructure work.

Projects in Ontario Ranch or related to service to Ontario Ranch will be dependent upon the progression of development, which is continually changing. Therefore, the Ontario Ranch projects are not prioritized in Table 13-2.

Table 13-2

Capital Improvement Program

Existing System Capital Improvement Projects																
Project No.	**OMC/ OR**	**Ex/ Fut**	**Facility Type**	**DIF#**	**Description**	**Replacement Pipe Size (in)**	**Number**	**Unit**	**Unit Cost ($)**	**Unit**	**Base Cost ($)**	**10% Contingency ($)**	**Construction Cost ($)**	**10% Engineering & Admin. ($)**	**5% Construction Mgmt. ($)**	**Total Cost ($)**
O01[1]	OMC	Ex	Other	WT-026	1348 Zone Reservoirs Structural Retrofits	N.A.	1	Reservoir	$5,800,000.00	LS	$5,800,000	$580,000	$6,380,000	$638,000	$319,000	$7,337,000
O02	OMC	Ex	Other	WT-026	Reservoir 1010-1A Piping Seismic Retrofits	Completed										
S01[1]	OMC	Ex	Supply	WT-002	CIP Well #43 in the 1212 Zone Equipping of Well drilled in 2008	N.A.	1	Well	$1,600,000.00	$/Well	$1,600,000	$160,000	$1,760,000	$176,000	$88,000	$2,024,000
S02	OMC	Ex	Supply	WT-002	CIP Well #42 in the 1212 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S03	OMC	Ex	Supply	WT-032	Treatment for OMC Wells	N.A.	12	Well	$6,324,111	$/Well	$75,889,328	$7,588,933	$83,478,261	$8,347,826	$4,173,913	$96,000,000
S04[2]	OMC	Ex	Supply	WT-002	18-inch Well #42 Collector Line (1212 Zone)	18	600	ft	$325.08	$/ft	$195,048	$19,505	$214,553	$21,455	$10,728	$246,736
S05	OMC	Ex	Supply	WT-009	18-Inch to PRS23 P-14 (1074 Zone)	18	2,620	ft	$325.08	$/ft	$851,710	$85,171	$936,881	$93,688	$46,844	$1,077,413
Skipped	OMC		Supply	WT-032	Skipped	Skipped										
S07	OMC	Ex	Supply	WT-023	Well #11 Abandon due to continuing sanding problem (1074 Zone)	Completed										
R01	OMC	Ex	Reliability	WT-017	Backup Power for Well 39 (500 KW) - 1010 Zone	Completed										
ST01[1]	OMC	Ex	Storage	WT-026	Reservoir 1212-3, seismic rehabiliation (Improvements included in 2012 Tech Memo)	N.A.	73,100	sq ft	$10.00	$/sq ft	$4,017,694	$401,769	$4,419,463	$441,946	$220,973	$5,082,383
ST02	OMC		Storage	WT-009	Booster Pump Station from 1010 Zone to 1074 Zone - Location to be determined	Removed										
O03	OMC		Other	WT-035	Airport Metering and Backflow Prevention - Planning	Removed										
O04	OMC		Other	WT-035	Airport Metering and Backflow Prevention - Construction	Removed										
R02[1]	OMC	Ex	Reliability	WT-017	Portable Generator Connection and Manual Transfer Switchs at Well 31 and Well 39.	N.A.	1	Well	$300,000.00	Lump Sum	$300,000	$30,000	$330,000	$33,000	$16,500	$379,500
R03[1]	OMC	Ex	Reliability	WT-017	Portable Generators-850 KW	N.A.	1	EA	$670,000.00	$/Genset	$670,000	$67,000	$737,000	$73,700	$36,850	$847,550

Table 13-2 (Continued)

Capital Improvement Program

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
Existing System Capital Improvement Projects																
S08	OMC	Ex	Supply	WT-023	Abandon Existing OMC Well #3	Completed										
S09	OMC	Ex	Supply	WT-023	Abandon Existing OMC Well #4	Completed										
S10	OMC	Ex	Supply	WT-023	Abandon Existing OMC Well #16	Completed										
S11	OMC		Supply	WT-023	Skipped	Skipped										
S12	OMC		Supply	WT-025	Abandon John Galvin Facility	2012 Water Master Plan project that is no longer required										
P01[2]	OMC	Ex	DIF 1212 Zone	WT-004	24-inch pipeline in Campus Ave from Eighth St to Fourth St (1212 Zone)	24	5,400	ft	$433.44	$/ft	$2,340,576	$234,058	$2,574,634	$257,463	$128,732	$2,960,829
P02	OMC	Ex	DIF 1212 Zone	WT-004	30-inch pipeline in Eighth St from Reservoir 1212-1A and 1212-1B to San Antonio Ave (1212 Zone)	30	1,650	ft	$541.80	$/ft	$893,970	$89,397	$983,367	$98,337	$49,168	$1,130,872
P03	OMC	Ex	DIF 1212 Zone	WT-004	30-inch pipeline in San Antonio Ave from Eighth St to Fourth St (1212 Zone)	30	2,100	ft	$541.80	$/ft	$1,137,780	$113,778	$1,251,558	$125,156	$62,578	$1,439,292
P04	OMC	Ex	DIF 1212 Zone	WT-004	18-inch pipeline in Fourth St from Elderberry Ave to Benson Ave (1212 Zone)	18	1,800	ft	$325.08	$/ft	$585,144	$58,514	$643,658	$64,366	$32,183	$740,207
P05[2]	OMC	Ex	DIF 1212 Zone	WT-004	18-inch pipeline in Fourth St from San Antonio Ave to Vine Ave (1212 Zone)	18	1,800	ft	$325.08	$/ft	$585,144	$58,514	$643,658	$64,366	$32,183	$740,207
P06[2]	OMC	Ex	DIF 1212 Zone	WT-004	18-inch pipeline in Vine Ave from Fouth St to J St (1212 Zone)	18	700	ft	$325.08	$/ft	$227,556	$22,756	$250,312	$25,031	$12,516	$287,858
P07	OMC	Ex	Pressure	WT-004	18-inch pipeline in J St from Vine Ave to Euclid Ave (1212 Zone)	Completed										
P08	OMC	Ex	Pressure	WT-004	24-inch pipeline in J St east side of Euclid Ave (1212 Zone)	Completed										
P19[2]	OMC	Fut	DIF 1212 Zone	WT-004	16-inch Ontario International Airport Loop (1212 Zone)	16	3,850	ft	$288.96	$/ft	$1,112,496	$111,250	$1,223,746	$122,375	$61,187	$1,407,307
P20[2]	OMC	Fut	DIF 1212 Zone	WT-004	18-inch Ontario International Airport Loop (1212 Zone)	18	33,200	ft	$325.08	$/ft	$10,792,656	$1,079,266	$11,871,922	$1,187,192	$593,596	$13,652,710

Table 13-2 (Continued)

Capital Improvement Program

Existing System Capital Improvement Projects																
Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
P09	OMC	Fut	Pressure	WT-036	PRS 21 at Euclid Ave and Phillips St (from 1212 Zone to 1074 Zone)	Completed										
P10	OMC	Fut	Pressure	WT-036	PRS 22 at Vineyard Ave and Mission Blvd (from 1212 Zone to 1074 Zone)	Completed										
P11	OMC	Fut	Pressure	WT-036	12-inch & 18-inch pipeline in Grove Ave from Philips St to Francis St (1074 Zone)	Completed										
P12	OMC	Fut	Pressure	WT-009	12-inch pipeline in Euclid Ave from PRS 2 at SR-60 to Walnut St (1010 Zone)	Completed										
P13[2]	OMC	Fut	DIF 1010 Zone	WT-009	16-inch pipeline in Grove Ave from PRS 3 at SR-60 to Walnut St (1010 Zone)	16	1,850	ft	$288.96	$/ft	$534,576	$53,458	$588,034	$58,803	$29,402	$676,239
P14	OMC	Fut	DIF 1074 Zone	WT-009	PRS 23 at SR-60 and Campus Ave (from 1074 Zone to 1010 Zone)	N.A.	4 and 8	inch	$680,260.00	$/station	$680,260	$68,026	$748,286	$74,829	$37,414	$860,529
P15[2]	OMC	Fut	DIF 1010 Zone	WT-009	8-inch pipeline in Banyan St, west of Parco Ave (1010 Zone)	8	300	ft	$144.48	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
P16[2]	OMC	Fut	DIF 1010 Zone	WT-009	12-inch pipeline in Walnut St, west of Parco Ave (1010 Zone)	12	200	ft	$216.72	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
P17[2]	OMC	Fut	DIF 1010 Zone	WT-009	8-inch pipeline in Maidstone St, west of Parco Ave (1010 Zone)	8	300	ft	$144.48	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
P18[2]	OMC	Fut	DIF 1010 Zone	WT-009	8-inch pipeline in St. Andrews St, west of Parco Ave (1010 Zone)	8	300	ft	$144.48	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
P21	OMC	Fut	DIF 1212 Zone	WT-022	8-inch Miscellaneous Up-Sized Projects (1212 Zone)	8	2700	ft	$144.48	$/ft	$264,218	$26,422	$290,640	$29,064	$14,532	$334,236
P21	OMC	Fut	DIF 1212 Zone	WT-022	12-inch Miscellaneous Up-Sized Projects (1212 Zone)	12	2300	ft	$216.72	$/ft	$421,367	$42,137	$463,504	$46,350	$23,175	$533,030
ST03	OMC	Fut	Storage	WT-006	Reservoir 1212-4A	N.A.	8	MG	$1,444,800.00	$/MG	$11,558,400	$1,155,840	$12,714,240	$1,271,424	$635,712	$14,621,376
ST04	OMC	Fut	Storage	WT-006	Reservoir 1212-4B	N.A.	8	MG	$1,444,800.00	$/MG	$11,558,400	$1,155,840	$12,714,240	$1,271,424	$635,712	$14,621,376
ST05[2]	OMC	Fut	Storage	WT-004	30-inch transmission line from Reservoir 1212-4A and 1212-4B	30	13,750	ft	$541.80	$/ft	$7,449,750	$744,975	$8,194,725	$819,473	$409,736	$9,423,934

Table 13-2 (Continued)

Capital Improvement Program

Existing System Capital Improvement Projects																
Project No.	**OMC/ OR**	**Ex/ Fut**	**Facility Type**	**DIF#**	**Description**	**Replacement Pipe Size (in)**	**Number**	**Unit**	**Unit Cost ($)**	**Unit**	**Base Cost ($)**	**10% Contingency ($)**	**Construction Cost ($)**	**10% Engineering & Admin. ($)**	**5% Construction Mgmt. ($)**	**Total Cost ($)**
ST06[1]	OMC	Ex	Storage	WT-025	Abandon Reservoir 1212-3 (condition/age)	N.A.	10	MG	$148,500.00	$/CY	$1,485,000	$148,500	$1,633,500	$163,350	$81,675	$1,878,525
P22	OMC	Fut	DIF 925 Zone		Future 1010 to 925 PRS at Fern asn SR-60	N.A.	4 and 8	inch	$680,260.00	$/station	$680,260	$68,026	$748,286	$74,829	$37,414	$860,529
P23	OMC	Fut	DIF 925 Zone		Piping of Future 1010 to 925 PRS at Fern and SR-60	12	550	ft	$216.72	$/ft	$119,196	$11,920	$131,116	$13,112	$6,556	$150,783
S48[1]	OMC	Ex	Supply		Well 37 Rehabilitation	N.A.	1	Well		$/Well	$5,811,350	$1,015,000	$6,826,350		$341,318	$7,167,668
S49[1]	OMC	Ex	Supply		Well 39 Rehabilitation	N.A.	1	Well		$/Well	$5,811,350	$1,015,000	$6,826,350		$341,318	$7,167,668
R11	OMC		Reliability	WT-035	Future Emergency Connection (MVWD-1)	2012 Water Master Plan project that is no longer required										
R12	OMC		Reliability	WT-035	Future Emergency Connection (Chino-2)	2012 Water Master Plan project that is no longer required										
R13	OMC		Reliability	WT-035	Future Emergency Connection (FWC-1)	2012 Water Master Plan project that is no longer required										
R14	OMC		Reliability	WT-035	Future Emergency Connection (Upland-2)	2012 Water Master Plan project that is no longer required										
FF1	OMC	Fut	Fire		Fire Flow Improvement: New Looped 6-inch pipe	6	400	ft	$108.36	$/ft	$43,344	$4,334	$47,678	$4,768	$2,384	$54,830
FF1	OMC	Fut	Fire		Fire Flow Improvement: New Looped 8-inch pipe	8	2,350	ft	$144.48	$/ft	$339,528	$33,953	$373,481	$37,348	$18,674	$429,503
FF1	OMC	Fut	Fire		Fire Flow Improvement: New Looped 12-inch pipe	12	1,300	ft	$216.72	$/ft	$281,736	$28,174	$309,910	$30,991	$15,495	$356,396
FF1	OMC	Fut	Fire		Fire Flow Improvement: New Looped 16-inch pipe	16	1,000	ft	$216.72	$/ft	$216,720	$21,672	$238,392	$23,839	$11,920	$274,151
FF2	OMC	Ex	Fire		Fire Flow Improvement: Upsize to 12-inch pipe	12	59,200	ft	$216.72	$/ft	$12,829,824	$1,282,982	$14,112,806	$1,411,281	$705,640	$16,229,727
V1	OMC	Ex	Velocity		Pipe Velocity Improvement: Replace with 12-inch	12	350	ft	$216.72	$/ft	$75,852	$7,585	$83,437	$8,344	$4,172	$95,953
V2	OMC	Ex	Velocity		Pipe Velocity Improvement: Replace with 16-inch	16	4,750	ft	$288.96	$/ft	$1,372,560	$137,256	$1,509,816	$150,982	$75,491	$1,736,288
V3	OMC	Ex	Velocity		Pipe Velocity Improvement: Replace with 24-inch	24	400	ft	$433.44	$/ft	$173,376	$17,338	$190,714	$19,071	$9,536	$219,321
ST11[1]	OMC	Ex	Storage		Seismic Upgrades of Reservoirs 1074-1A, 1074-1B, 1212-1A				$9,200,000.00	LS	$9,200,000	$920,000	$10,120,000	$1,012,000	$506,000	$11,638,000
O05[1]	OMC	Ex	Other	Rate	Facility Security Improvements				$370,000.00	LS	$370,000	$37,000	$407,000	$40,700	$20,350	$468,050

Table 13-2 (Continued)

Capital Improvement Program

Existing System Capital Improvement Projects																
Project No.	**OMC/ OR**	**Ex/ Fut**	**Facility Type**	**DIF#**	**Description**	**Replacement Pipe Size (in)**	**Number**	**Unit**	**Unit Cost ($)**	**Unit**	**Base Cost ($)**	**10% Contingency ($)**	**Construction Cost ($)**	**10% Engineering & Admin. ($)**	**5% Construction Mgmt. ($)**	**Total Cost ($)**
O10[1]	OMC	Ex	Other		Wellhouse Roof Upgrades				$325,000.00	LS	$325,000	$32,500	$357,500	$35,750	$17,875	$411,125
O07[1]	OMC	Ex	Other		On-site Chlorine Generators				$3,027,000.00	LS	$3,027,000	$302,700	$3,329,700	$332,970	$166,485	$3,829,155
O08[1]	OMC	Ex	Other		Upgrade of existing PRS (New valves, new vaults, and SCADA upgrades)				$2,100,000.00	LS	$2,100,000	$210,000	$2,310,000	$231,000	$115,500	$2,656,500
O09[1]	OMC	Ex	Other		SCADA System Upgrade. Connection to new Ethernet System				$450,000.00	LS	$450,000	$45,000	$495,000	$49,500	$24,750	$569,250
									Total		**$188,351,545**					**$237,897,324**

Annual Improvement Projects																
Project No.	**OMC/ OR**	**Ex/ Fut**	**Facility Type**	**DIF#**	**Description**	**Replacement Pipe Size (in)**	**Number**	**Unit**	**Unit Cost ($)**	**Unit**	**Base Cost ($)**	**10% Contingency ($)**	**Construction Cost ($)**	**10% Engineering & Admin. ($)**	**5% Construction Mgmt. ($)**	**Total Cost ($)**
ST07[1]	OMC	Ex	Storage	Rate	Reservoir recoating/repainting/repair				$150,000.00	$/year	$150,000	$15,000	$165,000	$16,500	$8,250	$189,750
O07[1]	OMC	Ex	Other	Rate	Water Meter Replacements				$2,000,000.00	$/year	$2,000,000	$200,000	$2,200,000	$220,000	$110,000	$2,530,000
O06[1]	OMC	Ex	Other	Rate	New Meter Installations				$700,000.00	$/year	$700,000	$70,000	$770,000	$77,000	$38,500	$885,500
									Total		**$2,850,000**					**$3,605,250**

Table 13-2 (Continued)

Capital Improvement Program

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
Condition Improvement Projects - Mainline Replacement Program																
D01	OMC	Ex	Size	WT-021	4" and Due to Pipe Age - Replace Small Diameter Pipes with 8-inch Pipe	8	32,850	ft	$144.48	$/ft	$4,746,168	$474,617	$5,220,785	$522,078	$261,039	$6,003,903
D01	OMC	Ex	Size	WT-021	6" and Due to Pipe Age - Replace Small Diameter Pipes with 8-inch Pipe	8	317,550	ft	$144.48	$/ft	$45,879,624	$4,587,962	$50,467,586	$5,046,759	$2,523,379	$58,037,724
D01	OMC	Ex	Size	WT-021	4" & Less. (Verify Pipe Age) Replace Small Diameter Pipes with 8-inch Pipe	8	72,300	ft	$144.48	$/ft	$10,445,904	$1,044,590	$11,490,494	$1,149,049	$574,525	$13,214,069
D01	OMC	Ex	Size	WT-021	6" (Verify Pipe Age)- Replace Small Diameter Pipes with 8-inch Pipe	8	23,400	ft	$144.48	$/ft	$3,380,832	$338,083	$3,718,915	$371,892	$185,946	$4,276,752
D01	OMC	Ex	Size	WT-021	4" & Less- Replace Small Diameter Pipes with 8-inch Pipe	8	23,750	ft	$144.48	$/ft	$3,431,400	$343,140	$3,774,540	$377,454	$188,727	$4,340,721
D01	OMC	Ex	Size	WT-021	6" -Replace Small Diameter pipes with 8-inch Pipe	8	375,500	ft	$144.48	$/ft	$54,252,240	$5,425,224	$59,677,464	$5,967,746	$2,983,873	$68,629,084
C01	OMC	Ex	Condition/ Age	WT-021	8" Improvements Due to Pipe Age (pipes constructed in or before 1970)- Replace with 8"	8	65,900	ft	$144.48	$/ft	$9,521,232	$952,123	$10,473,355	$1,047,336	$523,668	$12,044,358
C01	OMC	Ex	Condition/ Age	WT-021	10" to 12" Improvements Due to Pipe Age (pipes constructed in or before 1970)- Replace with 12"	12	89,300	ft	$216.72	$/ft	$19,353,096	$1,935,310	$21,288,406	$2,128,841	$1,064,420	$24,481,666
C01	OMC	Ex	Condition/ Age	WT-021	13" to 16"- Improvements Due to Pipe Age (pipes constructed in or before 1970) - Replace with 16"	16	19,950	ft	$288.96	$/ft	$5,764,752	$576,475	$6,341,227	$634,123	$317,061	$7,292,411
C01	OMC	Ex	Condition/ Age	WT-021	17" to 18"- Improvements Due to Pipe Age (pipes constructed in or before 1970) - Replace with 18"	18	50,250	ft	$325.08	$/ft	$16,335,270	$1,633,527	$17,968,797	$1,796,880	$898,440	$20,664,117
C01	OMC	Ex	Condition/ Age	WT-021	19" to 24"- Improvements Due to Pipe Age (pipes constructed in or before 1970) - Replace with 24"	24	12,550	ft	$433.44	$/ft	$5,439,672	$543,967	$5,983,639	$598,364	$299,182	$6,881,185
C01	OMC	Ex	Condition/ Age	WT-021	37" to 42"- Improvements Due to Pipe Age (pipes constructed in or before 1970) - Replace with 42"	42	300	ft	$758.52	$/ft	$227,556	$22,756	$250,312	$25,031	$12,516	$287,858
									Total		**$178,777,746**					**$226,153,849**

Table 13-2 (Continued)

Capital Improvement Program

Condition Improvement Projects - Facility Improvement Program

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
L1	OMC	Ex	Hydrant Lateral		4" & Less, Small Diameter Hydrant Lateral	6	4,050	ft	$108.36	$/ft	$438,858	$43,886	$482,744	$48,274	$24,137	$555,155
L2	OMC	Ex	Hydrant Lateral		Hydrant Lateral material improvements	6	11,400	ft	$108.36	$/ft	$1,235,304	$123,530	$1,358,834	$135,883	$67,942	$1,562,660
S50	OMC	Ex	Supply		1212 Zone Well 24 Replacement due to age.	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S51	OMC	Ex	Supply		1212 Zone Well 29 Replacement due to age.	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S52	OMC	Ex	Supply		1212 Zone Well 30 Replacement due to age.	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S53	OMC	Ex	Supply		1212 Zone Well 31 Replacement due to age.	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S54	OMC	Ex	Supply		Galvin Booster PS Replacement due to age.	N.A.	1,050	HP	$6,000.00	$/HP	$6,300,000	$630,000	$6,930,000	$693,000	$346,500	$7,969,500
S55	OMC	Ex	Supply		1348 Booster Pump 1 and 2 Replacement due to age.	N.A.	400	BPS	$6,000.00	$/HP	$2,400,000	$240,000	$2,640,000	$264,000	$132,000	$3,036,000
S56	OMC	Ex	Supply		1348 Booster Pump 3 and 4 Replacement due to age.	N.A.	250	BPS	$6,000.00	$/HP	$1,500,000	$150,000	$1,650,000	$165,000	$82,500	$1,897,500
ST12	OMC	Ex	Storage		Reservoir past useful Life 1074-1B	N.A.	2	MG	$1,444,800.00	$/MG	$2,889,600	$288,960	$3,178,560	$317,856	$158,928	$3,655,344
ST13	OMC	Ex	Storage		Reservoir past useful Life 1212-1A	N.A.	20	MG	$1,444,800.00	$/MG	$28,896,000	$2,889,600	$31,785,600	$3,178,560	$1,589,280	$36,553,440
ST14	OMC	Ex	Storage		Reservoir past useful Life 1212-1B	N.A.	2	MG	$1,444,800.00	$/MG	$2,889,600	$288,960	$3,178,560	$317,856	$158,928	$3,655,344
ST15	OMC	Ex	Storage		Reservoir past useful Life 1348-1B	N.A.	2	MG	$1,444,800.00	$/MG	$2,889,600	$288,960	$3,178,560	$317,856	$158,928	$3,655,344
ST16	OMC	Ex	Storage		Reservoir past useful Life 1348-1C	N.A.	3.75	MG	$1,444,800.00	$/MG	$5,418,000	$541,800	$5,959,800	$595,980	$297,990	$6,853,770
									Total		**$70,856,962**					**$89,634,057**

Table 13-2 (Continued)

Capital Improvement Program

Future System Development Projects

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
ST08	OR	Fut	Storage	WT-014	Reservoir 925-1A	N.A.	9.0	MG	$1,444,800.00	$/gallon	$13,003,200	$1,300,320	$14,303,520	$1,430,352	$715,176	$16,449,048
ST09	OR	Fut	Storage	WT-014	Reservoir 925-1B	N.A.	9.0	MG	$1,444,800.00	$/gallon	$13,003,200	$1,300,320	$14,303,520	$1,430,352	$715,176	$16,449,048
ST10	OR	Fut	Storage	WT-014	Reservoir 925-2B	N.A.	6.0	MG	$1,444,800.00	$/gallon	$8,668,800	$866,880	$9,535,680	$953,568	$476,784	$10,966,032
S13	OR	Fut	Supply	WT-012	Altitude Valve from 1074 Zone to 925 Zone at Reservoir 925-1A and 925-1B	N.A.	1	Valve	$680,260.00	$/LS	$680,260	$68,026	$748,286	$74,829	$37,414	$860,529
S14[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #48 in 925 Zone (Not in DIF)	N.A.	1	Well		$/site						
S15	OR	Fut	Supply	WT-007	NMC Well #48 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S16[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 48 and 54 to Reservoir 925-2A	18	3,250	ft	$325.08	$/ft	$1,056,510	$105,651	$1,162,161	$116,216	$58,108	$1,336,485
S17[2]	OR	Fut	Supply	WT-012	24-inch well collecting line for Well 48 and 54 to Reservoir 925-2A	24	1,000	ft	$433.44	$/ft	$433,440	$43,344	$476,784	$47,678	$23,839	$548,302
S18[2]	OR	Fut	Supply	WT-012	30-inch well collecting line for Well 48 to Reservoir 925-2A	30	600	ft	$541.80	$/ft	$325,080	$32,508	$357,588	$35,759	$17,879	$411,226
S19[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #51 in 925 Zone (Not in DIF)	N.A.	1	Well		$/site						
S20	OR	Fut	Supply	WT-007	NMC Well #51 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S21[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 51 to Reservoir 925-2A	18	4,300	ft	$325.08	$/ft	$1,397,844	$139,784	$1,537,628	$153,763	$76,881	$1,768,273
S22[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #54 in 925 Zone (Not in DIF)	N.A.	1	Well		$/site						
S23	OR	Fut	Supply	WT-007	NMC Well #54 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S24[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 54 to Reservoir 925-2A	18	700	ft	$325.08	$/ft	$227,556	$22,756	$250,312	$25,031	$12,516	$287,858
S25[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #55 in 925 Zone	N.A.	1	Well		$/site						$300,000
S26	OR	Fut	Supply	WT-007	NMC Well #55 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000

Table 13-2 (Continued)

Capital Improvement Program

Future System Development Projects																
Project No.	**OMC/ OR**	**Ex/ Fut**	**Facility Type**	**DIF#**	**Description**	**Replacement Pipe Size (in)**	**Number**	**Unit**	**Unit Cost ($)**	**Unit**	**Base Cost ($)**	**10% Contingency ($)**	**Construction Cost ($)**	**10% Engineering & Admin. ($)**	**5% Construction Mgmt. ($)**	**Total Cost ($)**
S27[2]	OR	Fut	Supply	WT-012	18-inch line from Well 55 to intersection of Bonview Ave and Francis St	18	800	ft	$325.08	$/ft	$260,064	$26,006	$286,070	$28,607	$14,304	$328,981
S28[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #56 in 925 Zone	N.A.	1	Well		$/site						$300,000
S29	OR	Fut	Supply	WT-007	NMC Well #56 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S30[2]	OR	Fut	Supply	WT-012	42-inch line from Well 56 to intersection of Bon View Ave and Francis St	42	1,250	ft	$758.52	$/ft	$948,150	$94,815	$1,042,965	$104,297	$52,148	$1,199,410
S31[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 48 to Reservoir 925-2A	18	400	ft	$325.08	$/ft	$130,032	$13,003	$143,035	$14,304	$7,152	$164,490
S32[2]	OR	Fut	Supply	WT-012	30-inch line in Francis St from Bon View Ave to Grove Ave	30	1,200	ft	$541.80	$/ft	$650,160	$65,016	$715,176	$71,518	$35,759	$822,452
S33[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #57 in 925 Zone	N.A.	1	Well		$/site						$300,000
S34	OR	Fut	Supply	WT-007	NMC Well #57 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S35[2]	OR	Fut	Supply	WT-012	18-inch well collecting line for Well 57 to Reservoir 925-1A	18	1,400	ft	$325.08	$/ft	$455,112	$45,511	$500,623	$50,062	$25,031	$575,717
S36[1]	OR	Fut	Supply	WT-007	Land Acquisition for Well #58 in 925 Zone	N.A.	1	Well		$/site						$300,000
S37	OR	Fut	Supply	WT-007	NMC Well #58 in the 925 Zone	N.A.	1	Well	$4,000,000.00	$/Well	$4,000,000	$400,000	$4,400,000	$440,000	$220,000	$5,060,000
S38[2]	OR	Fut	Supply	WT-012	18-inch well collecting line from Well 58 to intersection of Francis St and Cucamonga Ave	24	1,950	ft	$433.44	$/ft	$845,208	$84,521	$929,729	$92,973	$46,486	$1,069,188
S39	OR	Fut	Supply	WT-013	PRS 16 at Campus Ave and Chino Ave (from 1010 Zone to 925 Zone)	N.A.	8 and 12	inch	$680,260.00	$/station	$680,260	$68,026	$748,286	$74,829	$37,414	$860,529
S40	OR	Fut	Supply	WT-032	Water Quality Treatment Facility at the Jurupa 925-2 Reservoir Site	N.A.	4	Site	$6,324,111	$/Well	$25,296,443	$2,529,644	$27,826,087	$2,782,609	$1,391,304	$32,000,000
S46	OR	Fut	Supply	WT-032	Water Quality Treatment Facility at the at the Bon View 925-1 Reservoir Site	N.A.	4	Site	$6,324,111	$/Well	$25,296,443	$2,529,644	$27,826,087	$2,782,609	$1,391,304	$32,000,000
S47[1]	OR	Fut	Supply	WT-008	Water Quality Treatment Facility for Well #50	N.A.	1	Site	$3,100,000.00	$/site	$3,100,000	$310,000	$3,410,000	$341,000	$170,500	$3,921,500

Table 13-2 (Continued)
Capital Improvement Program

Future System Development Projects

Project No.	OMC/ OR	Ex/ Fut	Facility Type	DIF#	Description	Replacement Pipe Size (in)	Number	Unit	Unit Cost ($)	Unit	Base Cost ($)	10% Contingency ($)	Construction Cost ($)	10% Engineering & Admin. ($)	5% Construction Mgmt. ($)	Total Cost ($)
S41	OR		Supply	WT-007	Land Acquisition for Well #59 in 925 Zone	2012 Water Master Plan project that is no longer required										
S42	OR		Supply	WT-007	NMC Well #59 in the 925 Zone	2012 Water Master Plan project that is no longer required										
S43[2]	OR	Fut	Supply	WT-012	18-inch well collecting line from Well 56 in Belmont St and Cucamonga Ave	N.A.	1,950	ft	$325.08	$/ft	$633,906	$63,391	$697,297	$69,730	$34,865	$801,891
S44	OR		Supply	WT-012	18-inch well collecting line from Well 59 in Belmont St and Cucamonga Ave	2012 Water Master Plan project that is no longer required										
S45[2]	OR	Fut	Supply	WT-012	18-inch well collecting line from Well 56 in Belmont St and Cucamonga Ave	18	2,050	ft	$325.08	$/ft	$666,414	$66,641	$733,055	$73,306	$36,653	$843,014
S57	OR	Fut	Supply		New 925 to 1010 BPS	N.A.	400	BPS	$6,000.00	$/HP	$2,400,000	$240,000	$2,640,000	$264,000	$132,000	$3,036,000
T1[2]	OR	Fut	Transmission	WT-011	12-inch distribution lines (925 Zone) Completed Projects removed.	12	115,600	ft	$144.00	$/ft	$16,646,400	$1,664,640	$18,311,040	$1,831,104	$915,552	$21,057,696
T2[2]	OR	Fut	Transmission	WT-011	16-inch distribution lines (925 Zone)	16	44,450	ft	$192.00	$/ft	$8,534,400	$853,440	$9,387,840	$938,784	$469,392	$10,796,016
T3[2]	OR	Fut	Transmission	WT-011	18-inch distribution lines (925 Zone), Chino Ave	18	12,400	ft	$260.06	$/ft	$3,224,744	$322,474	$3,547,218	$354,722	$177,361	$4,079,301
T4[2]	OR	Fut	Transmission	WT-010	24-inch distribution lines (925 Zone), Milliken Ave, Eucalyptus Ave, Archibald Ave, Edison Ave	24	10,850	ft	$331.56	$/ft	$3,597,372	$359,737	$3,957,109	$395,711	$197,855	$4,550,675
T05	OR	Fut	Transmission	WT-010	42-inch distribution lines (925 Zone), Grove Ave btw Reservoir 925-1A and Edison Ave	42	22,700	ft	$557.81	$/ft	$12,662,174	$1,266,217	$13,928,391	$1,392,839	$696,420	$16,017,649
T06[2]	OR	Fut	Transmission	WT-009	12-inch distribution lines (1010 Zone)	12	19,200	ft	$144.00	$/ft	$2,764,800	$276,480	$3,041,280	$304,128	$152,064	$3,497,472
T07[2]	OR	Fut	Transmission	WT-009	18-inch distribution lines (1010 Zone) Campus Ave north of Riverside Ave	18	6,950	ft	$260.06	$/ft	$1,807,417	$180,742	$1,988,159	$198,816	$99,408	$2,286,383
									Total		**$177,395,388**					**$225,605,166**

[1] *Project cost specifically estimated based on more detailed information. The unit costs from Table 13-1 were not used.*
[2] *Project lengths based on existing planning estimates.*

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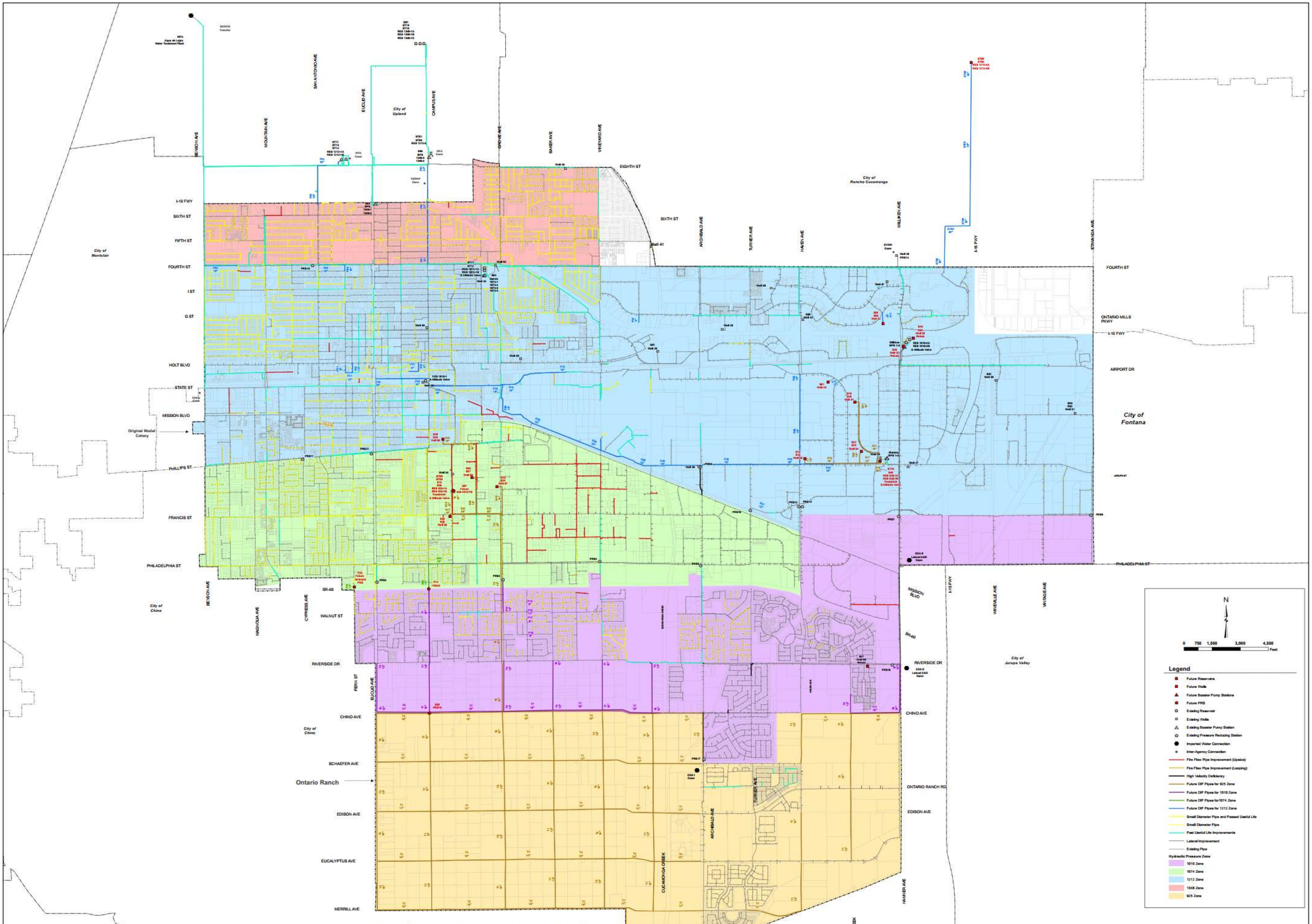
Existing System Capital Improvement Projects	$188,351,545	$237,897,324
Condition Projects - Mainline Replacement Program	$178,777,746	$226,153,849
Condition Projects - Facility Improvement Program	$70,856,962	$89,634,057
Future System Development Projects	$177,395,388	$225,605,166
Total	**$615,381,641**	**$779,290,395**
Annual Capital Improvement Costs		$3,605,250



CITY OF ONTARIO
POTABLE WATER MASTER PLAN UPDATE

PROJECT NO: 1001398.00

DATE: June 2020

Capital Improvement Program

Plate 1

CITY OF
ONTARIO

City of Ontario - Water Master Plan Update

City of Ontario - Water Master Plan Update

City of Ontario - Water Master Plan Update

City of Ontario - Water Master Plan Update

APPENDIX C

2020 City of Ontario Recycled Water Master Plan Update

Stantec

RECYCLED WATER MASTER PLAN UPDATE

City of Ontario Municipal Water Utilities Company

FINAL

June 22, 2020

Prepared for:

City of Ontario, Municipal Utilities Company
1425 S. Bon View Avenue
Ontario, CA 91761

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Prepared by ______________________________

Jeff Dunn, PE

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Abbreviations

AF	Acre-Feet
AFM	Acre-Feet per Month
AFY	Acre-Feet per Year
AG	Agricultural
CCWRF	Carbon Canyon Waste Recycling Facility
CML&C	Cement Mortar Lined and Coated
CIP	Capital Improvement Plan
DIP	Ductile Iron Pipe
EPS	Extended Period Simulation
ft	feet
fps	feet per second
gpd	gallons per day
gpm	gallons per minute
GWR	Groundwater Recharge
HGL	Hydraulic Grade Line
Hp	Horsepower
HWL	High Water Level
IEUA	Inland Empire Utilities Agency
LF	Linear feet
LR	Local Runoff
MG	Million Gallons
MGD	Million Gallons per Day
NMC	New Model Colony (Now referred to as Ontario Ranch)
OMC	Original Model Colony
OR	Ontario Ranch
OMUC	Ontario Municipal Utilities Company
PRV	Pressure Reducing Valve
psi	pounds per square inch
PVC	Polyvinyl Chloride
RP	Regional Water Recycling Plant
RP-1	Regional Water Recycling Plant No. 1
RP-4	Reginal Water Recycling Plant No.4
RP-5	Reginal Water Recycling Plant No.5
RW	Recycled Water
RWC	Recycled Water Contribution
RWIP	Recycled Water Implementation Plan
RWMP	Recycled Water Master Plan
RWPS	Recycled Water Program Strategy
s.f.	square feet

Executive Summary

This Recycled Water Master Plan Update is to be used as a planning tool to guide future recycled water use and expansion of the existing recycled water system for the City of Ontario (City) over the course of the planning horizon. The planning horizon is identified to be the current General Plan.

The objective is to provide a cost-effective and fiscally responsible recycled water system CIP that will meet the needs of the future developments within the City, as well as the existing and future customers requirements for water delivery, system pressure, and reliability.

The future recycled water system has been developed for two major phases – Near-Term and Future. The Near-Term phase is assumed to be development in the Ontario Ranch and other recycled water conversion areas and connections to the recycled water system in the next 5-years, or approximately Year 2025. The Future phase is the remaining development of the Ontario Ranch to full build-out and other development areas and potential recycled water conversion areas as described herein in the Original Model Colony service areas.

Supply for the existing and future recycled water system demands is provided by Inland Empire Utilities Agency (IEUA). IEUA prepared a Recycled Water Program Strategy in 2015. This RWMP Update utilizes the hydraulic model used for that study. The IEUA Recycled Water Program Strategy developed a CIP with future improvements, including pumping and storage, to their 1158 and 1299 Zones to service the western portions of the 1158 and 1299 Zone service areas assuming all areas within the City are converted to recycled water. However, due to uncertainty in the timing of these facilities and reliance upon the recycled water improvements proposed by IEUA, this RWMP assumes the Future Phase as identified herein does not rely upon these improvements. Therefore, the Future Phase recycled water demands and potential conversion areas within the Original Model Colony are limited by IEUA's regional system's ability to provide the demands within the design criteria without these facilities.

RECYCLED WATER DEMANDS

Recycled water demands are estimated for the existing conditions, Near-Term, and Future phases. The Near-Term phase considers the following for estimating the projected recycled water demands:

- Current Developments in the Ontario Ranch service area – These developments are currently in the planning phase or design phase that are expected to begin in approximately 5-years.
- Creekside conversion project areas – These areas have already been previously studied and proposed for conversion to recycled water, and preliminary design plans have been prepared for many of the facilities to serve these areas.

- Some large irrigation meters/users that can be converted to recycled water – These parcels are assumed to be converted in the near future since they are in the vicinity of existing facilities or could be connected to a pipeline that is already proposed to be constructed.
- Parks and Schools that can be converted – These parcels have a high priority for the City where it is practical. These parcels are assumed to be converted in the near term since they are in the vicinity of existing facilities or could be connected to a pipeline that is already proposed to be constructed.
- Some agriculture land that can be converted to recycled water before it is ultimately developed – The agricultural use parcels that are adjacent to an existing pipeline or a pipeline that is to be constructed within the Near-Term planning horizon are assumed to be converted to the recycled water system.

The Future phase consists of the full build-out of the Ontario Ranch developments and all potential conversion areas within the Original Model Colony as identified in this study. The Euclid Avenue conversion areas are also considered to be Future phase improvements

The table below provides a summary of the projected recycled water demands. A slight increase in demands for the Original Model Colony area for the next 5 years can be expected due to the reduction in agricultural uses as development areas are constructed. As shown in the table, overall, the Near-Term phase has only a moderate increase of approximately 20 percent while the future demands increase by nearly 70 percent.

ES-1 Summary of Projected Recycled Water Demands

Service Area	Existing Recycled Water Demands (AFY)	Near Term Recycled Water Demands (AFY)	Future Recycled Water Demands (AFY)
Ontario Ranch	4,465	6,740	8,158
Original Model Colony	5,190	5,428	7,901
Total	**9,655**	**12,168**	**16,059**

RECYCLED WATER DISTRIBUTION SYSTEM

Hydraulic model analyses were conducted for a 24-hour EPS of the maximum day demands for existing, Near-Term, and Future phases of development of the recycled water system. No significant deficiencies to the distribution piping system were identified for existing conditions.

The Near-Term analysis sized the proposed pipelines so that the system meets design pressure and velocity criteria. In addition, to supplement the 930 Zone the two City PRV stations in Chino Avenue are assumed to be constructed. Each of these PRV stations reduces pressure from the 1050 Zone to the 930

Zone. These PRV stations will only open during peak demand periods. Approximately 12.2 miles of pipeline is proposed for the Near-Term, ranging from 8-inch to 30-inch diameter.

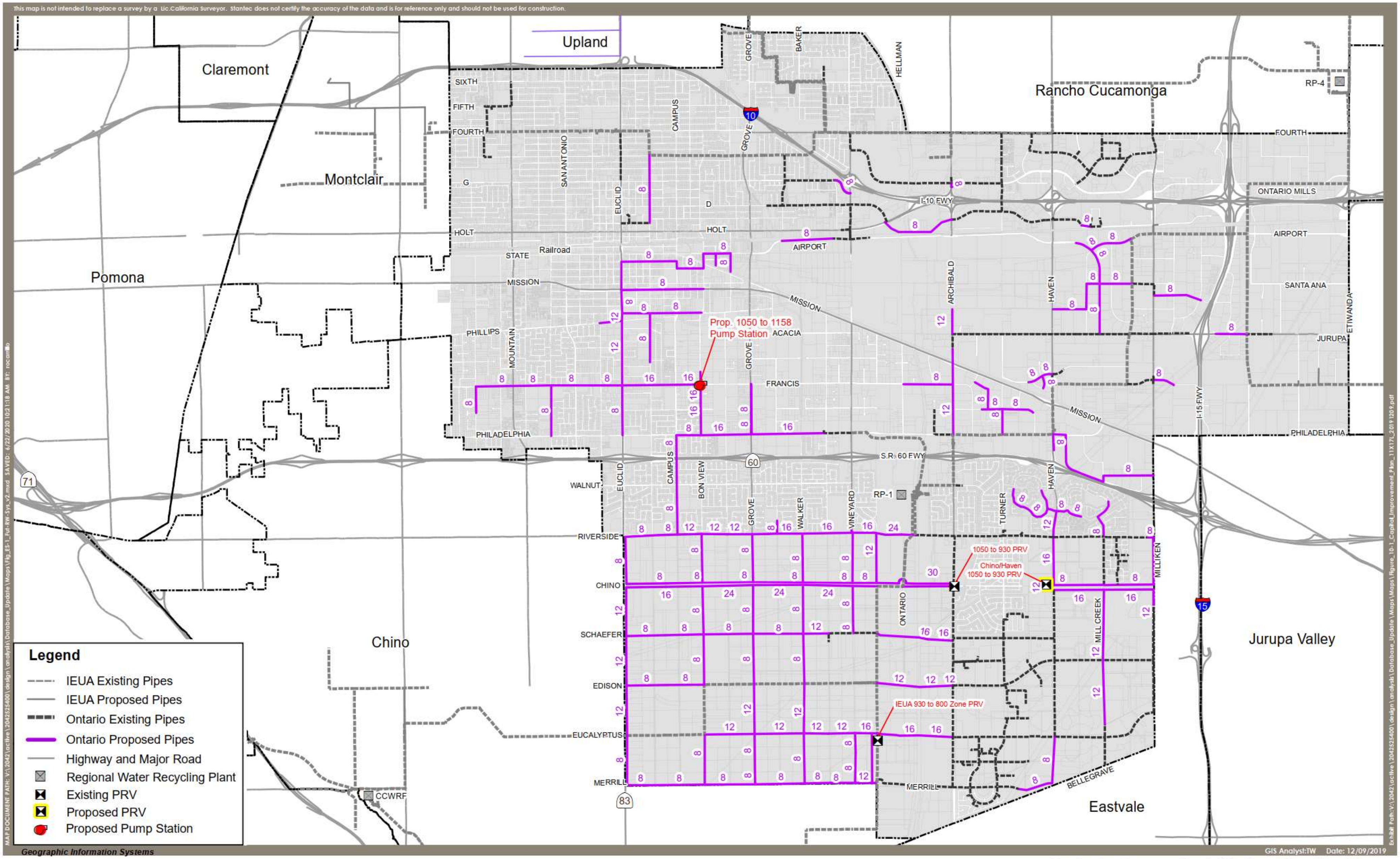
The Future system analysis shows that with the proposed piping system and booster pump station, the system meets all design criteria. In addition to approximately 51.9 miles of proposed pipelines ranging from 8-inch to 20-inch diameter, a 1050 to 1158 Zone Pump Station is proposed to supply the potential conversion areas in the western portion of the 1158 Zone. This pump station is anticipated to have a peak design capacity of 1,323 gpm, and be equipped with three pumps, each with 50-horsepower motors with variable frequency drives.

CAPITAL IMPROVEMENT PLAN

The CIP is divided into the two major phases of development as described herein, the Near-Term and Future phases. The Near-Term phase consists of the recycled water demands and expansion needs for the next 5-years, to approximately Year 2025. The Future phase consists of the full build-out of Ontario Ranch and other development and conversion areas within the Original Model Colony based on the City's General Plan.

ES-2 Summary of CIP Costs

Phase	Pressure Zone	Total Project CIP Costs
Near-Term	930	$5,843,879
	1050	$3,180,019
	1158	$399,848
	1299	$838,901
	PRV	$810,000
	Subtotal Near-Term	**$11,072,647**
Future	930	$21,170,803
	1050	$13,665,456
	1158	$21,119,491
	1299	$1,856,760
	Pump Station	$2,025,000
	Subtotal Future	**$59,837,510**
	Total CIP	**$70,910,157**



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Ontario Recycled Water Master Plan
Figure ES-1 Future Recycled Water System

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this document is to update the Recycled Water Master Plan (RWMP) prepared in 2012, with an updated Capital Improvement Plan (CIP). The 2012 RWMP was prepared by the Ontario Municipal Water Utilities Company (OMUC) staff and utilized the 2006 Water and Recycled Water Master Plan, Section 10 Recycled Water System as the basis for the update. OMUC recognizes the need to provide its customers with the most economically feasible source of water supply. With the decreasing supply and escalating costs of imported water, recycled water provides an alternate source of water supply for irrigation and some industrial processes.

The intent of this RWMP Update is to develop a document that can be used as a planning tool to guide future recycled water use and expansion of the existing recycled water system for the City of Ontario (City) over the course the planning horizon. The planning horizon is identified to be the current General Plan with anticipated buildout in year 2040.

The objective is to provide a cost-effective and fiscally responsible recycled water system CIP that will meet the needs of the future developments within the City, as well as the existing and future customers requirements for water delivery, system pressure, and reliability.

The scope for this RWMP Update includes achieving the following goals.

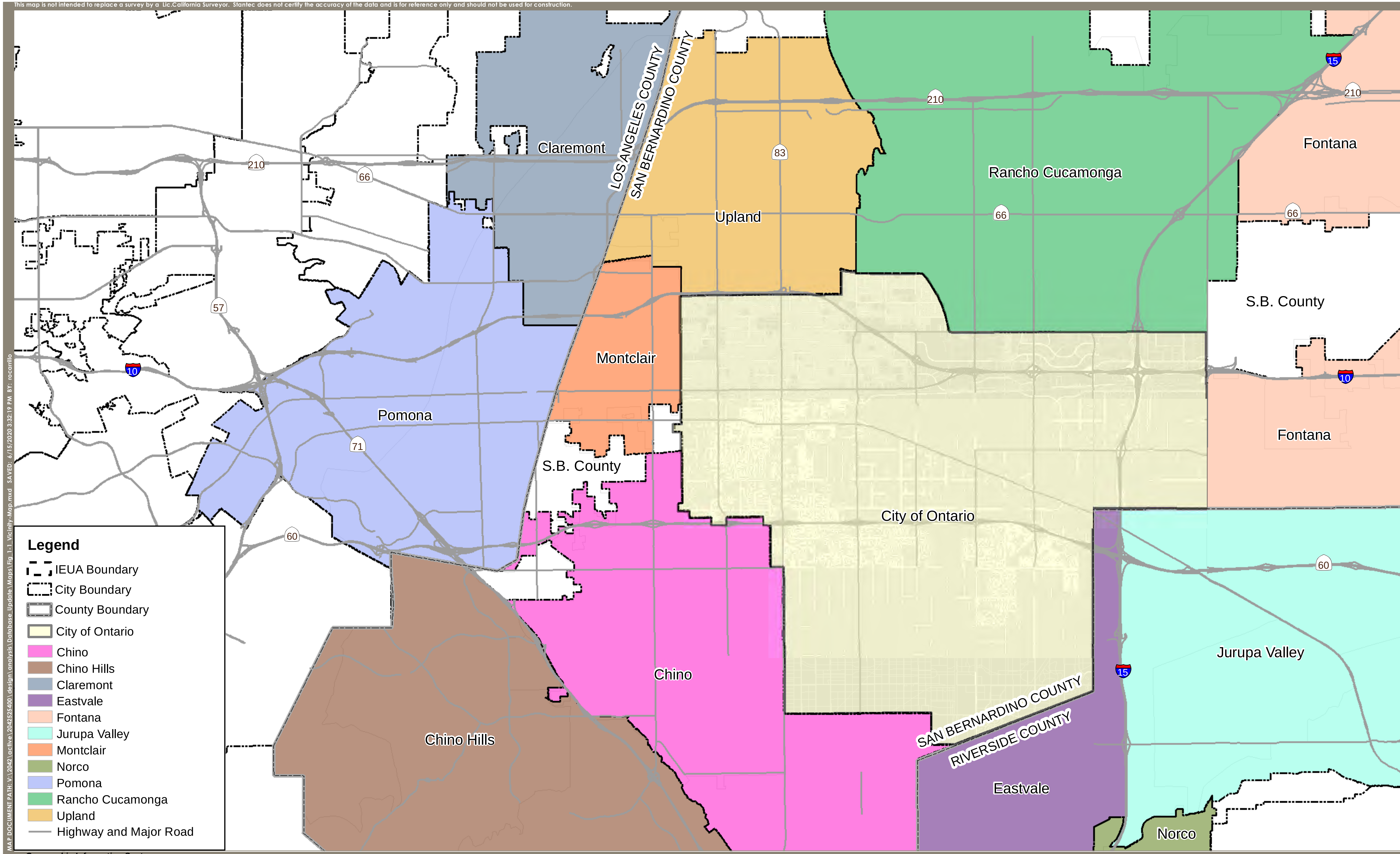
- Update the current Recycled Water Master Plan prepared in 2012;
- Create an updated hydraulic model in InfoWater modeling software that includes the IEUA supply facilities;
- Update existing, interim, and ultimate projected recycled water demands, based on the recent demand factor study prepared for the Urban Water Management Plan 2016 Update;
- Analyze and determine recommendations for recycled water system improvements and system expansion needs to meet ultimate recycled water demands; and,
- Develop a long-range Capital Improvement Plan.

1.2 STUDY AREA

The OMUC's service area comprises the City of Ontario and encompasses approximately 49.79 square miles. As shown in Figure 1-1, the service area is generally bordered by Cities of Rancho Cucamonga and Upland to the north, Cities of Fontana and Jurupa Valley to the east, City of Eastvale to the southeast and south, City of Chino to the southwest and south, and City of Montclair to the west. OMUC’s service area will be referred to as the Study Area from hereon.

The Study Area is divided into two main areas divided by Riverside Drive, the Original Model Colony (OMC) and the Ontario Ranch (OR), which was previously called the New Model Colony (NMC). OMC, located north of Riverside Drive, covers an area of approximately 37.00 square miles. OMC consists of existing residential, commercial, and industrial developments. Ontario Ranch (or NMC), located south of Riverside Drive, covers an area of approximately 12.79 square miles. Ontario Ranch mainly consists of agricultural land and vacant land; however, this area is a large growth area with many development projects planned for a mixture of residential, commercial, industrial, and public uses.

The City’s recycled water (RW) system has several pipelines that are connected to the Inland Empire Utilities Agency (IEUA) recycled water mains. However, the City operates and maintains its own recycled water system that delivers recycled water to its customers.



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0 0.75 1.5 3 Miles

Ontario Recycled Water Master Plan
Figure 1-1 City of Ontario Vicinity Map

1.3 DATA SOURCE AND MODEL

Previous studies for the recycled water system are:

- Ontario Recycled Water Pipeline Project: *Pipeline Sizing Memo* by Michael Baker, July 2016
- Ultimate City-Wide Water Demand Estimate Memo by AKM, May 2016
- Inland Empire Utilities Agency (IEUA) Recycled Water Program Strategy (RWPS), October 2015
- Study of Recycled Water Pressure Zone 930 (Elimination of pipe in Chino Ave) by AKM, April 2014
- City of Ontario Recycled Water Master Plan, April 2012

Reference documents for this report are as follows.

- The Ontario Plan (General Plan), February 2010
- California Code of Regulations Title 14 and Title 17

InfoWater 12.4 is used to conduct the analysis. Data sources are shown below.

- Existing Recycled Water Customer Billing Data from 2009 to 2018.
- Demand Factors and Demand Pattern from Ultimate City Wide Water Demand Estimate Memo (AKM, May 2016) and IEUA Recycled Water Program Strategy, October 2015.
- GIS data provided by the City of Ontario:
    - Land use data received on October 31, 2018.
    - Recycled water system data received on October 31st, 2018, which included recycled water mains, laterals, system valves, hydrants, meters, active recycled water meters with customer data, geocode points locations of active meters, parcel data, and street centerlines.
    - Recycled water meter locations, received on November 1, 2018.

2.0 EXISTING AND FUTURE LAND USES

2.1 EXISTING LAND USE

The existing land use and general land use categories are shown in Table 2-1 and illustrated on Figure 2-1. The existing land uses are identified using the City's GIS Existing Land Use database layer, aerial map overlay, and the land uses shown in the 2016 Ultimate Citywide Water Demand Estimate Technical Memorandum.

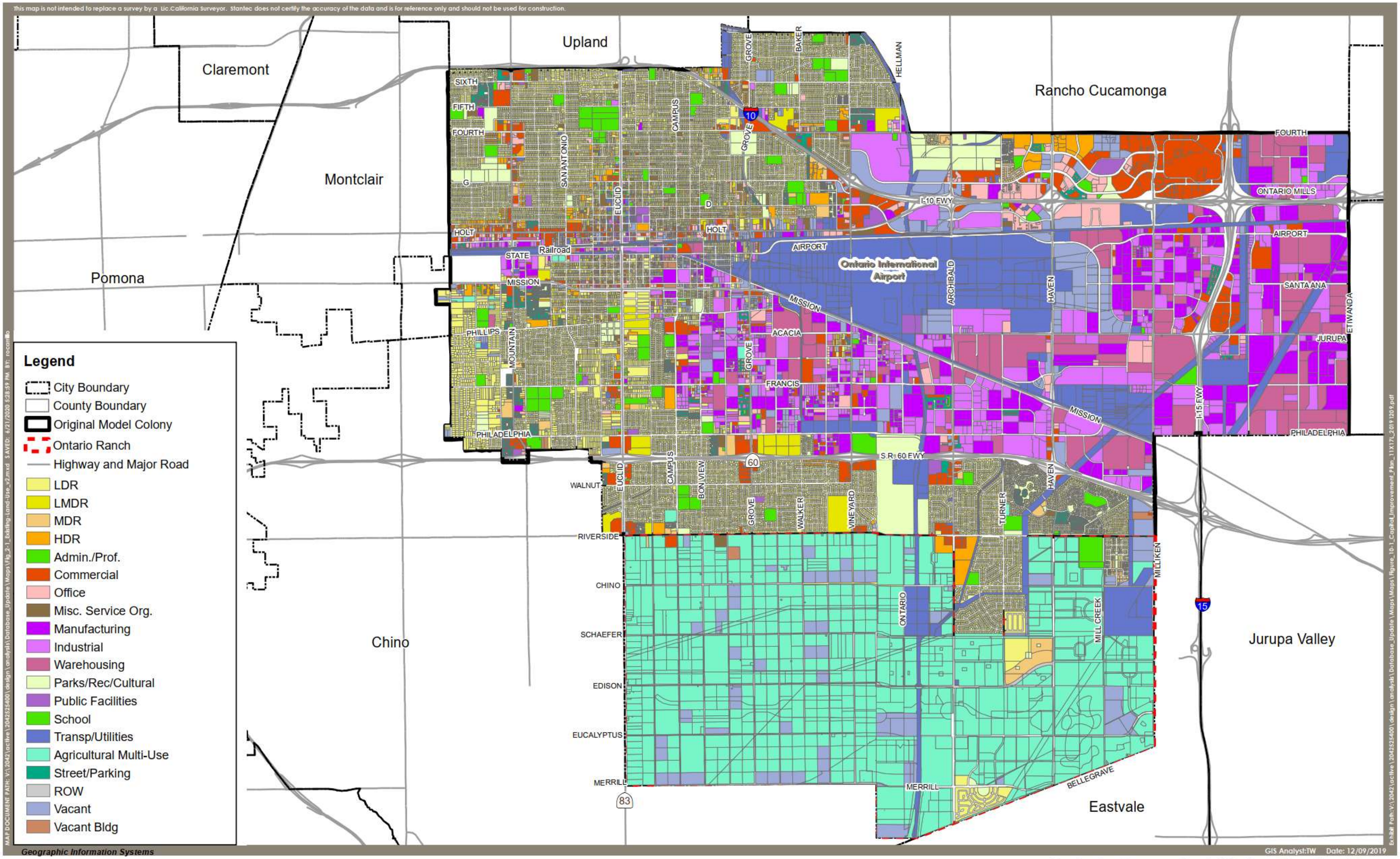
Table 2-1 Existing Land Use

General Land Use Category	Existing Land Use Designation	Acres
Residential	LDR	5,134
	LMDR	357
	MDR	328
	HDR	454
Commercial	Admin./Prof.	143
	Commercial	1,245
	Office Commercial	514
	Misc. Service Org.	116
Industrial	Manufacturing	1,716
	Industrial	2,116
	Warehousing	1,807
Parks/Rec/Cultural	Parks/Rec/Cultural	772
Public Facilities	Public Facilities	165
School	School	497
Transportation/Utilities	Transp/Utilities	3,242
Agricultural	Ag. Multi-Use	6,470
Right of Way	Street/Parking	264
	ROW	323
Vacant	Vacant	1,608
	Vacant Bldg	87
	Total	**27,359**

[1] Vacant, vacant building and agriculture land use that have been identified through aerial map as developed land are assigned land use based on general plan. Area of mix use land use is counted to commercial category.

[2] The table does not include area of ROW in OMC.

As shown in Figure 2-1, the OMC area (north of Riverside Drive) is mostly built-out. The OMC consists predominantly of Industrial, Commercial, and Single-Family Residential uses. The Ontario Ranch service area (south of Riverside Drive) is predominantly undeveloped or Agricultural land.



Ontario Recycled Water Master Plan
Figure 2-1 Existing Land Use

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2.2 FUTURE LAND USE DESIGNATIONS

The future land use categories and designations are shown in Table 2-2. These land uses are based on the City's current General Plan, as amended in March 2017.

Table 2-2 General Plan Land Use Designations

General Category	Land Use Designations	Abbr.	Density/ Intensity	Intention
Residential	Rural Density Residential	RR	< 2 du/ac	Single-family detached, typically an estate setting.
	Low Density Residential	LDR	>2 -5 du/ac	Single-family detached residences
	Low Medium Density Residential	LMDR	5 -11 du/ac	Includes small lot subdivisions, townhouses, mobile home parks.
	Medium Density Residential	MDR	11-25 du/ac	Single/multi-family attached and detached residences including townhouses.
	High Density	HDR	25-45 du/ac	Multi-Family residences
Commercial	Neighborhood Commercial	NC	0.4 FAR	Local serving predominantly residential neighborhood.
	General Commercial	GC	0.4 FAR	Local and regional serving retail, personal service, entertainment, dining, office, tourist-serving, and related commercial uses.
	Office Commercial	OC	0.75 FAR	Includes professional offices in a neighborhood setting
	Business Park	BP	0.6 FAR	Includes corporate offices, technology centers, research and development, "clean" industry, light manufacturing, and supporting retail.
	Hospitality	HOS	1.0 FAR	Regional including convention centers, hotels/motels, and entertainment.
Industrial	Industrial	IND	0.55 FAR	Variety of light industrial uses, including warehousing/distribution, assembly, and light manufacturing.
Open Space	Open Space- Non-Recreation	OS-OR	N/A	
	Open Space – Recreational	OS-R	N/A	
	Open Space – Water	OS-W	N/A	Accommodates recreational uses such as boating and fishing.
Public	Public Facilities	PF	N/A	Includes transportation facilities and museums.
	Public School	PS	N/A	Public schools (K-12) and universities.
	Airport	ARPT	N/A	Ontario Airport
	Right of Way	ROW		

[1] Designations listed above only included those shown and provided within the GIS Database. For additional designations, please refer to General Plan LU-02.

[2] FAR: Floor Area Ratio

2.3 FUTURE LAND USES

The future land uses are based on the current General Plan and the land use designations as shown in Table 2-2. For the OMC area, since most of the area has been built out, the land use types will largely remain the same, with the exception of the Mixed-Use areas. The Mixed-Use areas are predominantly high density residential and commercial uses. The eastern OMC consists mainly of industrial uses, whereas the western OMC is mostly residential uses. Table 2-3 provides a summary of the future land uses and acreages.

Table 2-3 Future Land Use

Service Area	General Land Use Category	Land Use	Abbr.	Acres
Original Model Colony (OMC)	Residential	Rural Density Residential	RR	529
		Low Density Residential	LDR	4,321
		Low Medium Density Residential	LMDR	448
		Medium Density Residential	MDR	873
		High Density	HDR	185
	Commercial	Neighborhood Commercial	NC	194
		General Commercial	GC	380
		Office Commercial	OC	349
		Business Park	BP	665
		Hospitality	HOS	141
	Industrial	Industrial	IND	6,456
	Open Space	Open Space- Non-Recreation	OS-NR	799
		Open Space – Recreational	OS-R	533
		Open Space – Water	OS-W	8
	Public	Public Facilities	PF	90
		Public School	PS	429
		Airport	ARPT	1,422
		Railroad	Rail	247
		Right of Way	ROW	8
		Landfill	LF	137
	Mixed Use	Mixed Use	MU	1,107
			Subtotal OMC	**19,322**

Table 2-3 Future Land Use

Service Area	General Land Use Category	Land Use	Abbr.	Acres
Ontario Ranch	Residential	Rural Density Residential	RR	-
		Low Density Residential	LDR	3,234
		Low Medium Density Residential	LMDR	505
		Medium Density Residential	MDR	1,069
		High Density	HDR	-
	Commercial	Neighborhood Commercial	NC	88
		General Commercial	GC	146
		Office Commercial	OC	113
		Business Park	BP	827
		Hospitality	HOS	-
	Industrial	Industrial	IND	288
	Open Space	Open Space- Non-Recreation	OS-NR	434
		Open Space – Recreational	OS-R	461
		Open Space – Water	OS-W	51
	Public	Public Facilities	PF	2
		Public School	PS	198
		Airport	ARPT	-
		Railroad	Rail	-
		Right of Way	ROW	204
		Landfill	LF	-
	Mixed Use	Mixed Use	MU	579
	Subtotal Ontario Ranch			**8,199**
Total City of Ontario				**27,521**

[1] The table does not include street ROW that are shown in Figure 2-2 in OMC. However, OR does include areas to become become future street ROW.

2.3.1 Growth Areas

2.3.1.1 Mixed Use Areas

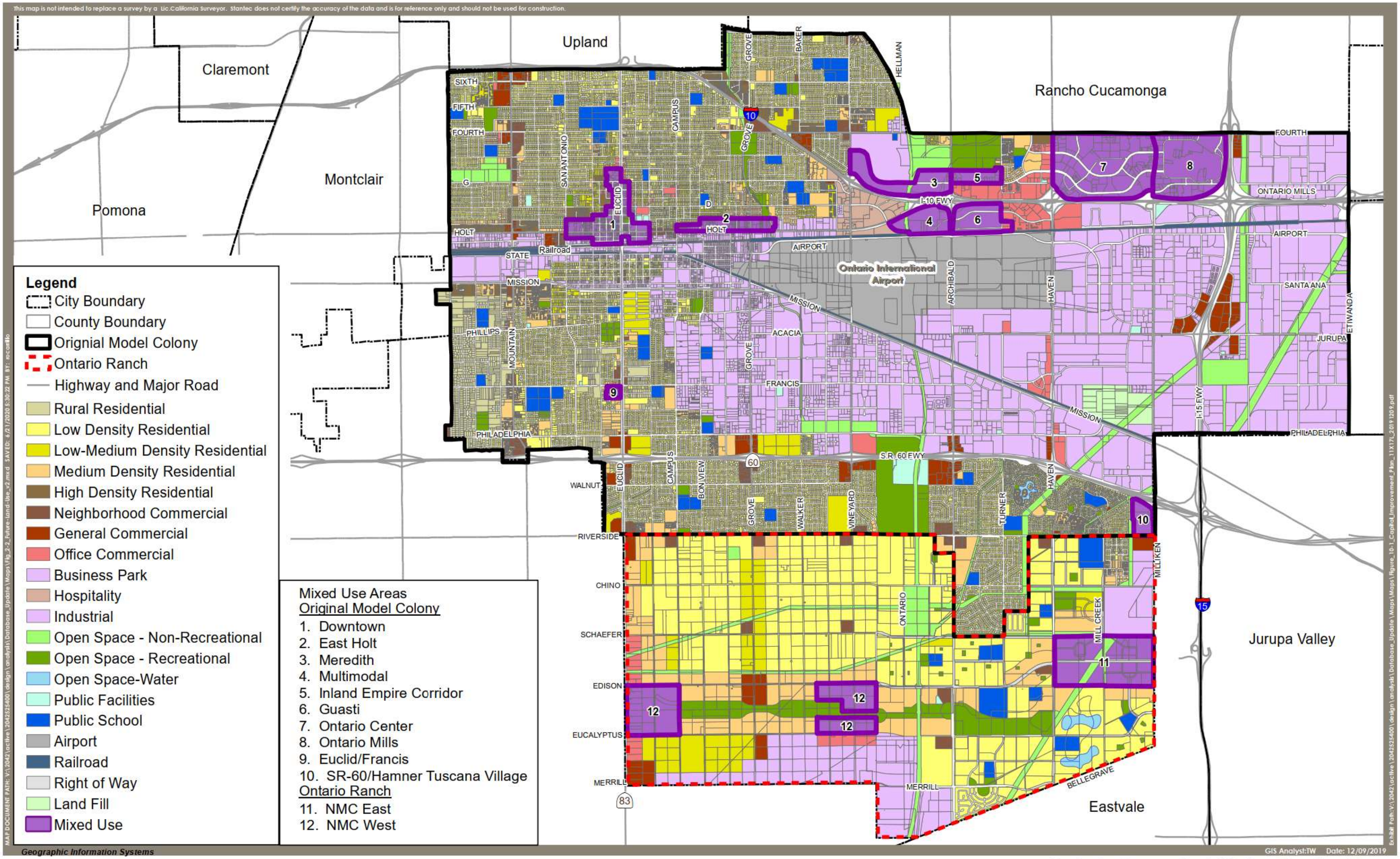
Based on the General Plan, the areas with anticipated growth are primarily identified within the Mixed-Use areas and within the Ontario Ranch area south of Riverside Drive. There are twelve Mixed-Use areas, with ten of these areas located in the OMC area. Each Mixed-Use area accommodates primarily commercial and residential uses. Densities and intensities vary by area and are designated by Area or Specific Plans.

Table 2-4 Growth Areas – Mixed Use Areas

Mixed Use Area		Residential Density & Non-residential Intensity	Acres
Original Model Colony			
1	Downtown	• >25.0 to 75.0 dwelling units per acre • 2.0 FAR for retail and office uses	178
2	East Holt	• >14.0 to 40.0 dwelling units per acre • 2.0 FAR for office uses • 1.0 FAR for retail uses	70
3	Meredith	• >14.0 to 125.0 dwelling units per acre • 3.0 FAR for office and retail uses	275
4	Multimodal	>20.0 to 80.0 dwelling units per acre • 1.0 FAR for office and retail uses	83
5	Inland Empire Corridor	>14.0 to 30.0 dwelling units per acre • 2.0 FAR for office uses • 1.0 FAR for retail uses	41
6	Guasti	• >25.0 to 65.0 dwelling units per acre • 1.0 FAR for office and retail uses	94
7	Ontario Center	• >20.0 to 125.0 dwelling units per acre • 2.0 FAR for office uses • 1.0 FAR for retail uses	410
8	Ontario Mills	>25.0 to 85.0 dwelling units per acre • 1.5 FAR for office uses • 1.0 FAR for retail uses	278
9	Euclid/Francis	• >14.0 to 25.0 dwelling units per acre • 1.0 FAR for retail uses	10
10	60/Hammer	20.0 – 30.0 dwelling units per acre • 1.0 FAR for retail and office uses	42
Ontario Ranch			
11	NMC East	• >14.0 to 50.0 dwelling units per acre • 0.7 FAR for office and retail uses	314
12	NMC West	• >14.0 to 65.0 dwelling units per acre • 1.5 FAR for office uses • 1.0 FAR for retail uses	315

[1] The acres include right of way within mix use areas.

Figure 2-2 illustrates the future land uses in accordance with the General Plan land uses. The Mixed-Use areas are also depicted to show the areas of anticipated growth and development.



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Ontario Recycled Water Master Plan
Figure 2-2 Future Land Use

2.3.1.2 Ontario Ranch

Ontario Ranch will consist of the largest development area within the City. Most of the existing area is either vacant or used for Agricultural purposes. According to the General Plan, in addition to the Mixed-Use areas described in the previous section, the majority of the Ontario Ranch area will be developed for Low Density Residential and Industrial uses. There are several development projects within Ontario Ranch already being developed or in the planning stages. These projects area shown in Figure 2-3.

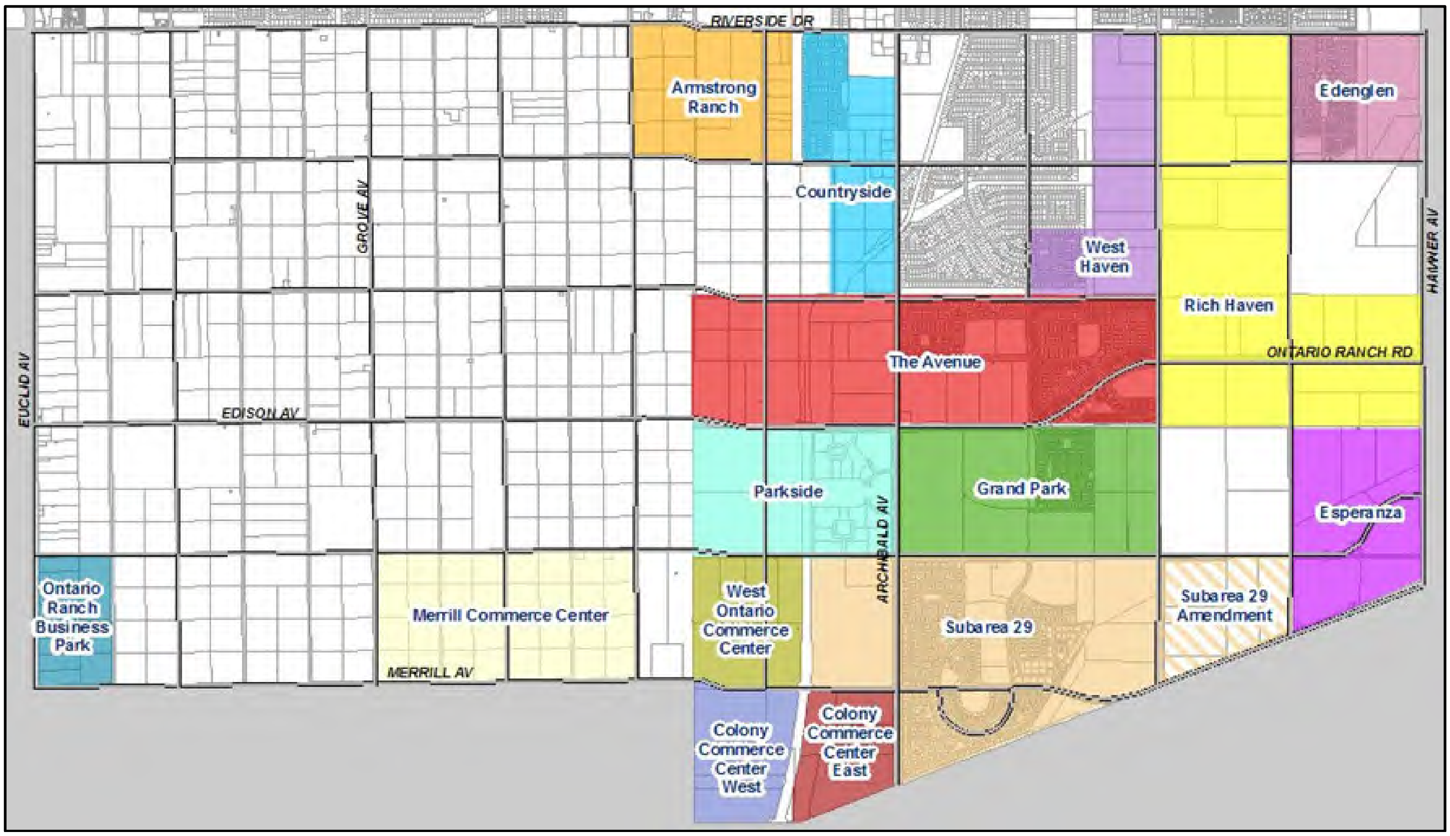


Figure 2-3 Ontario Ranch Current Projects

Table 2-5 provides a summary of the acreages and proposed land uses within each of the current projects shown in Figure 2-3.

Table 2-5 Current Ontario Projects

Current Project	Total Area	Land Uses Proposed
Grand Park (Approved)	320 acres	• 740 single family units • 587 multi-family units
The Avenue (Approved)	568 acres	• 2,313 single family units • 562 multi-family units • 130,000 s.f. commercial
Subarea 29 (Approved	539 acres	• 2,392 single family units • 87,000 s.f. commercial
Rich Haven	584 acres	• 1,833 single family units • 5361 multi-family units • 1.13 million s.f. commercial
Parkside (Approved)	250 acres	• 437 single family units • 1,510 multi-family units • 115,000 s.f. commercial
Esperanza (Approved)	233 acres	• 914 single family units • 496 multi-family units
West Haven (Approved)	199 acres	• 753 single family units • 87,000 s.f. commercial
Edenglen (Approved)	160 acres	• 310 single family units • 274 multi-family units • 217,520 s.f. commercial • 550,000 s.f. business park
Countryside (Approved)	178 acres	• 819 single family units
Armstrong Ranch (Approved)	199 acres	• 994 single family units
Colony Commerce Center West (Approved)	123 acres	• 2.95 million s.f. industrial
West Ontario Commerce Center (Approved)	125 acres	• 1.79 million s.f. industrial • 555,000 s.f. business park
Colony Commerce Center East (Approved	95 acres	• 2.2 million s.f. industrial
Subarea 29 Amendment	125 acres	• 574 single family units
Merrill Commerce Center	308 acres	• 5.8 million s.f. industrial • 1.2 million s.f. business park
Ontario Ranch Business Park	84 acres	• 410,000 s.f. business park • 1.38 million s.f. industrial

3.0 REGIONAL RECYCLED WATER SUPPLY

3.1 INLAND EMPIRE UTILITIES AGENCY (IEUA)

As one of the Member Agencies of IEUA, OMUC receives recycled water supply from IEUA. The recycled water supply is delivered via direct pipeline connections from the IEUA transmission system. The connections to IEUA are not separately metered or controlled.

The IEUA's recycled water supply is produced from wastewater collected and treated at tertiary wastewater treatment plants, mainly from Regional Water Recycling Plant No. 1 (RP-1), Regional Water Recycling Plant No. 4 (RP-4), Regional Water Recycling Plant No. 5 (RP-5), and Carbon Canyon Waste Recycling Facility (CCWRF). The treated wastewater effluent supplies IEUA member agencies through IEUA's distribution system via 35 miles of pipelines, three booster pump stations, three storage reservoirs, and four pressure regulating stations.

3.1.1 IEUA Recycling Plants

RP-1 is located in the City of Ontario near the intersection of State Highway 60 and Archibald Avenue. This facility was originally commissioned in 1948 and has undergone several expansions to increase the design wastewater treatment capacity to the current 44.0 MGD and biosolids treatment capacity equivalent to a wastewater flow rate of 60.0 MGD. The water pumped into the RW distribution system meets the requirement of California Title 22 bacteriological water quality regulations. As a source of supply to the RW system, RP-1 supplies three pressure zones, namely the 930, 1050, and 1158 Pressure Zones, through three (3) effluent pump stations.

RP-4 is located in the City of Rancho Cucamonga, which has been in operation and producing RW since 1997. RP-4 treats an average flow of 10 MGD. The RP-4 facility has been expanded to a capacity of 14 MGD. The plant provides recycled water that meets the State of California Title 22 Regulations. When the demand in the RW system is less than the amount of water being produced, the excess recycled water is discharged to the plant storage pond and the filter backwash water is sent to RP-1.

RP-5, located immediately east of the IEUA's Administrative Headquarters on Kimball Avenue in the City of Chino, began operation in March 2004. The first phase of RP-5 was designed to treat 15 MGD. Ultimately, RP-5 will treat 60 MGD and process 68 MGD of solids combined from RP-5 and CCWRF. The effluent waters meet the State of California Title 22 Regulations. The water produced from this plant is pumped to the 800 Pressure Zone.

CCWRF is located in the City of Chino and has been in operation since May 1992. This facility serves the cities of Chino, Chino Hills, Montclair, and Upland. Liquids are treated at CCWRF, while the solids removed from the waste flow are treated at RP-2, located on Prado Road in the City of Chino. CCWRF treats an annual average flow of 9.5 MGD. CCWRF includes several treatment processes that contribute to providing quality recycled water pursuant to the State of California Title 22 regulations. The water is pumped into the RW distribution system 930 Pressure Zone.

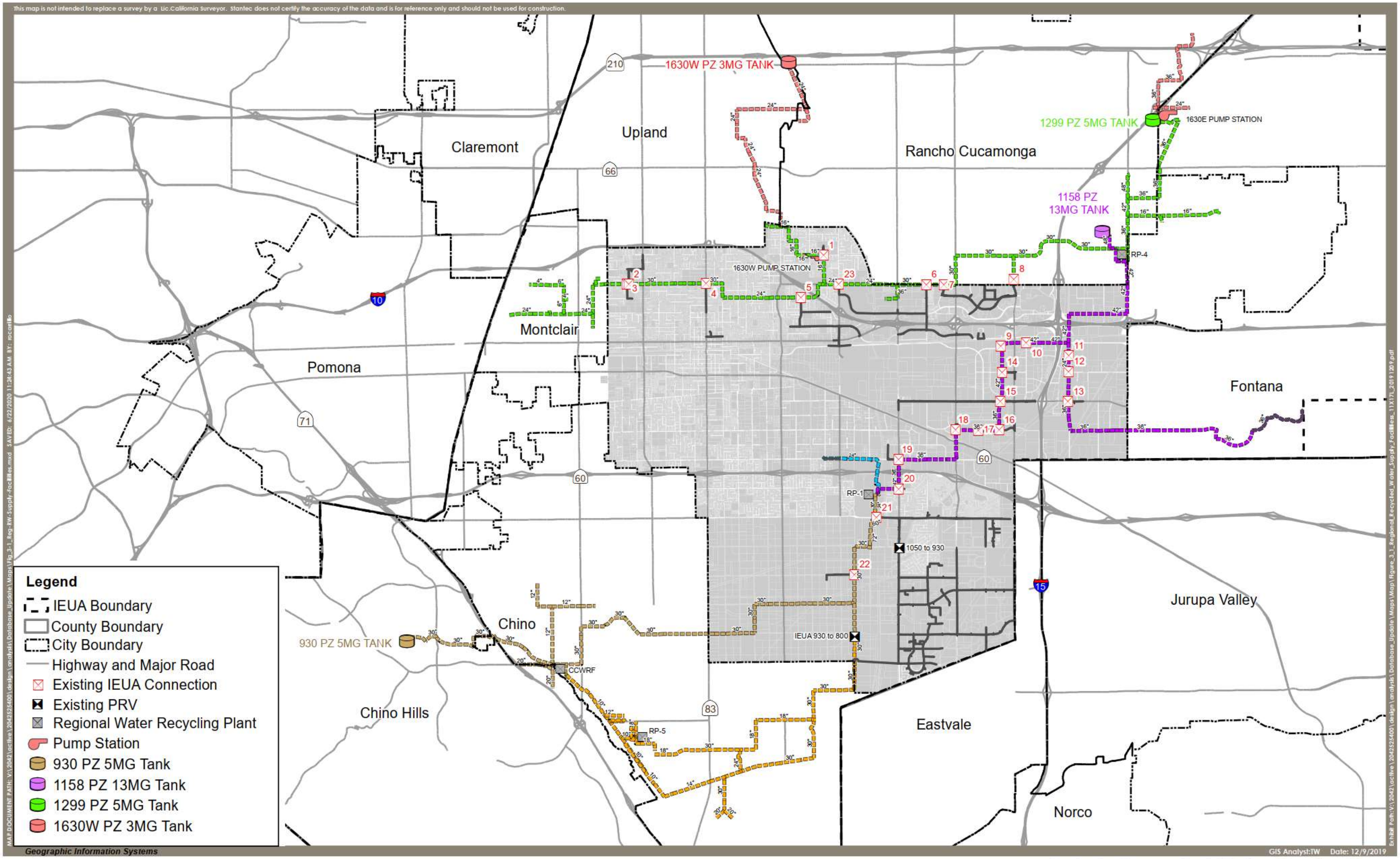
3.2 EXISTING SUPPLY CONNECTIONS

Table 3-1 provides a summary of OMUC's existing recycled water supply connections to the IEUA recycled water system. Each connection is a direct pipeline connection and is not metered or controlled separately.

Table 3-1 OMUC Supply Points of Connections

No.	Location of POC	Pipe Connection Size	Pressure Zone
1	E 6th St / N Corona Ave	IEUA 30"/ Ontario 8"	1630
2	W 4th St / N Elderberry Ave	IEUA 30"/ Ontario 8"	1299
3	W 4th St / Anthony Munoz Hall of Fame Park	IEUA 30"/ Ontario 8"	1299
4	W 4th St / N Euclid Ave	IEUA 30"/ Ontario 8"	1299
5	E 1st St / N Imperial Ave	IEUA 24"/ Ontario12"	1299
6	E 4th St / N Turner Ave	IEUA 30"/ Ontario12"	1299
7	E 4th St / N Center Ave	IEUA 30"/ Ontario12"	1299
8	E 4th St / N Milliken Ave	IEUA 18"/ Ontario12"	1299
9	E Airport Dr / S Dupont Ave	IEUA 42"/ Ontario 8"	1158
10	E Airport Dr / S Rockefeller Ave	IEUA 42"/ Ontario 8"	1158
11	Day Creek Channel / S Wineville Ave	IEUA 24"/ Ontario 8"	1158
12	Day Creek Channel / Santa Ana St	IEUA 24"/ Ontario 8"	1158
13	Day Creek Channel / Jurupa St	IEUA 20"/ Ontario 20"	1158
14	Santa Ana St / Dupont Ave	IEUA 42"/ Ontario 8"	1158
15	Dupont Ave / Jurupa St	IEUA 42"/ Ontario 8"	1158
16	Dupont Ave / E Francis St	IEUA 36"/ Ontario 8"	1158
17	E Francis St / between S Haven Ave and Dupont Ave	IEUA 36"/ Ontario 8"	1158
18	S Metro Way / S Haven Ave	IEUA 36"/ Ontario 8"	1158
19	S Archibald Ave / E Philadelphia St	IEUA 36"/ Ontario 8"	1158
20	S Archibald Ave / E Walnut St	IEUA 42"/ Ontario 8"	1050
21	E Riverside Dr / Southeast corner of Westwind Park	IEUA 42"/ Ontario 12"	1050
22	S Whispering Lakes Ln / Schaefer Ave	IEUA 30"/ Ontario12"	930

Figure 3-1 illustrates the IEUA regional recycled water supply facilities and OMUC supply points of connection listed in Table 3-1 above.



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0 0.75 1.5 3 Miles
1 inch = 1.5 miles

Ontario Recycled Water Master Plan
Figure 3-1 Regional Recycled Water Supply Facilities

4.0 EXISTING RECYCLED WATER SYSTEM INVENTORY

The existing recycled water system, including recycled water meters, in the Study Area are owned and maintained by OMUC. As of July 2018, there are 363 active recycled water meters, which consist of 343 meters for irrigation of landscaping and non-agricultural use, and 20 meters for agricultural or farmers' use.

4.1 PRESSURE ZONES

The preliminary pressure zone boundaries shown in Figure 4-1 are established based on surface elevation, pressure criteria, and IEUA's RWPS.

1630 Pressure Zone

IEUA's 1630 Zone is divided into separate service areas, the East and West 1630 Zones. As shown in Figure 4-1, the West 1630 Zone includes a small portion of OMUC's recycled water service area. This zone is supplied by the 1630 West Pump Station (which pumps recycled water from the 1299 Zone), and pumps to the 1630 West 3 MG storage tank. The 1630 pressure zone consists of a small portion of the City in the northern area and the whole area is north of the Freeway I-10 and East 6th Street and extends to the City's northern boundary.

1299 Pressure Zone

The 1299 Zone is supplied recycled water from the 1299 Zone Effluent Pump Station located at RP-4. This pump station can also pump recycled water from the lower 1158 Zone. The 1299 pressure zone is bounded on the north by the 1630 Zone and the northern City Boundary, and 1158 Zone to the south. It is bounded to the south by the 1158 Zone along the railroad, which is located to the north of Ontario International Airport, from the western city boundary to North Haven Ave, and then, to the north of Freeway I-10 to Freeway I-15; and then, along the city's northern boundary. The whole area above this boundary up to 1630 Pressure Zone is established as 1299 pressure zone.

1158 Pressure Zone

The 1158 Zone is supplied water from both the RP-1 and RP-4 facilities via 1158 Zone Effluent Pump Stations located at each. The 1158 pressure zone is bounded by the 1299 Zone to the north and 1050 pressure zone are divided along E. Francis St. from western city boundary to flood control channel next to Ontario Soccer Park, and then, along the channel southerly to California State Route 60 and then along the eastern city boundary to Route 60.

1050 Pressure Zone:

The 1050 pressure zone is bounded by the 1158 Zone to the north and the 930 Zone boundary to the south. The 1050/930 Zone boundary is along the Riverside Drive. The 1050 Zone is supplied directly from the 1050 Zone effluent pump station at RP-1. A 1158 to 1050 Zone PRV is also equipped at this facility to maintain system pressure and demands. No storage tank exists in this pressure zone. Connections to the OMUC pipelines are from the 24-inch to 42-inch IEUA transmission mains as shown in Figure 4-1.

930 Pressure Zone

The 930 Zone is bounded by the 1050 Zone along Riverside Drive to the north, and the southern boundary is along the City's southern boundary. The 930 Zone is supplied directly from two IEUA recycled water effluent pump stations at the CCWRF and RP-1. Most of the supply is from the RP-1 facility, in particular during the winter months. The 930 Zone contains a 5 MG storage tank located in the City of Chino Hills to the west. Supply and meter connections to the OMUC pipelines are from the 30-inch transmission main as shown in Figure 4-1.

Table 4-1 Pressure Zone Characteristics and Supply

Pressure Zone/HGL	Minimum Service Elevation in IEUA's RWPS	Maximum Service Elevation in IEUA's RWPS	IEUA Supply	Storage Tank
930	600-ft	778-ft	CCWRF, RP-1	5 MG
1050	746-ft	843-ft	RP-1	-
1158	813-ft	1,042-ft	RP-1, RP-4	13 MG (RP-4)
1299	971-ft	1,183-ft	RP-4	5 MG
1630	1,283-ft	1,465-ft	RP-4	3 MG (1630 West)

4.2 PRESSURE REDUCING STATIONS

The City owns and operates one existing pressure reducing station located at the intersection of Chino Avenue and Archibald Avenue. This PRV reduces pressure from the 1050 Zone to the 930 Zone. In addition, a second PRV station located at Chino Avenue and Haven Avenue is currently in the design phase and will also reduce pressure from the 1050 Zone to the 930 Zone.

4.3 PIPELINES

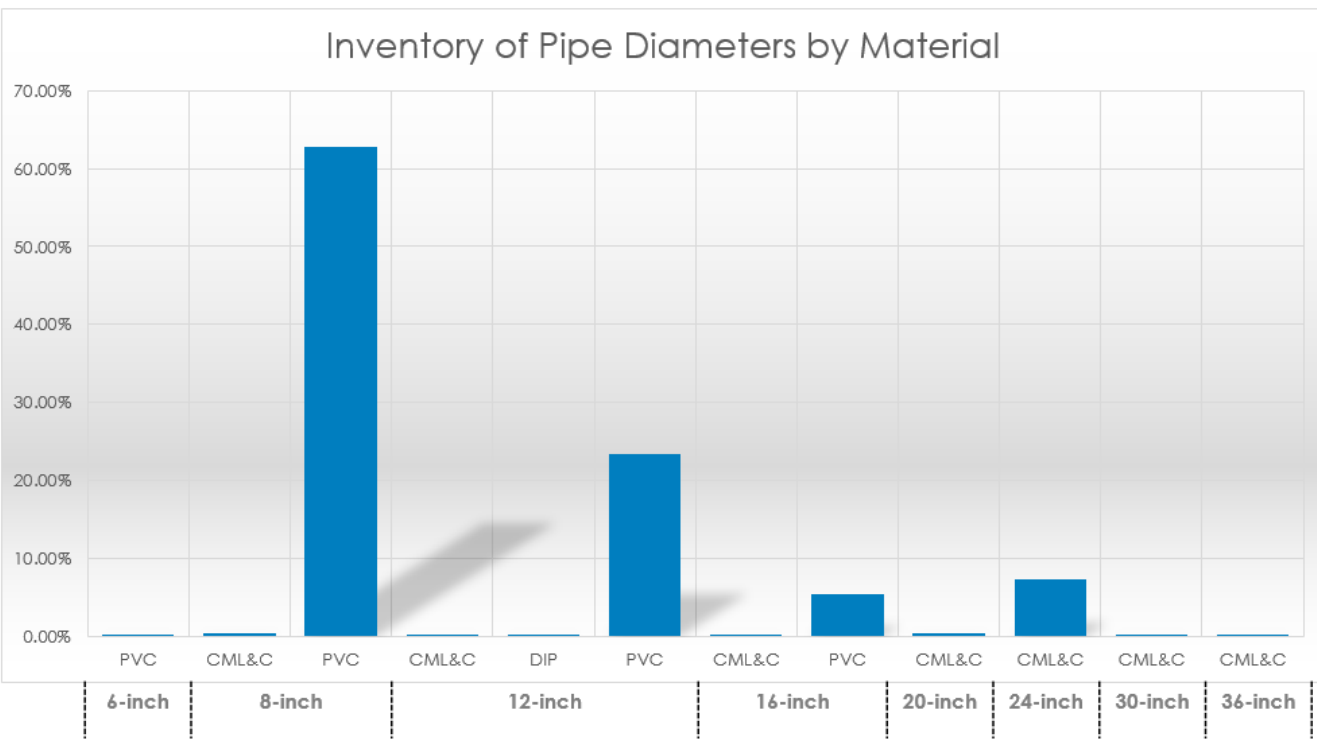
The pipelines operated and maintained by OMUC total approximately 172,684 LF. The pipelines range in size from 6-inch to 36-inch and consist primarily of PVC and CML&C materials. A summary of the length of pipe by diameter and material is shown in Table 4-2.

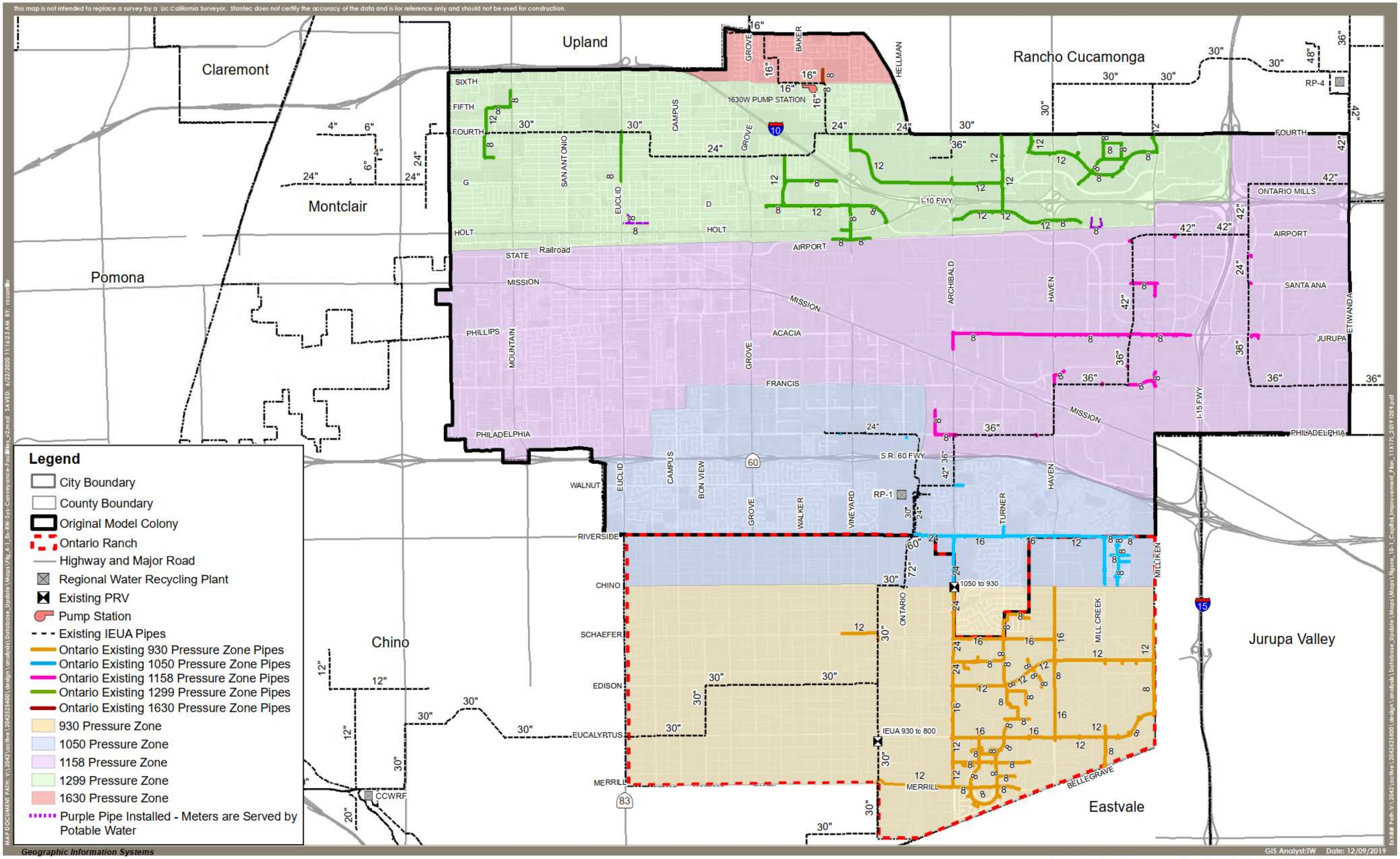
Table 4-2 Recycled Water Pipeline Inventory

Pipe Size	Pipe Material	Total Length of Pipe (lf)
6-inch	PVC	339
8-inch	CML&C[1]	531
	PVC	108,386
12-inch	CML&C	199
	DIP	225
	PVC	40,409
16-inch	CML&C	23
	PVC	9,120
20-inch	CML&C	474
24-inch	CML&C	12,619
30-inch	CML&C	155
36-inch	CML&C	204
	Total Length	**172,684**

[1] 8-inch CML&C also includes 327 LF of Cement Mortar Lined and Welded Steel pipe.

As illustrated in the chart below, approximately 63-percent of the OMUC pipelines are 8-inch PVC, and 23-percent are 12-inch PVC.





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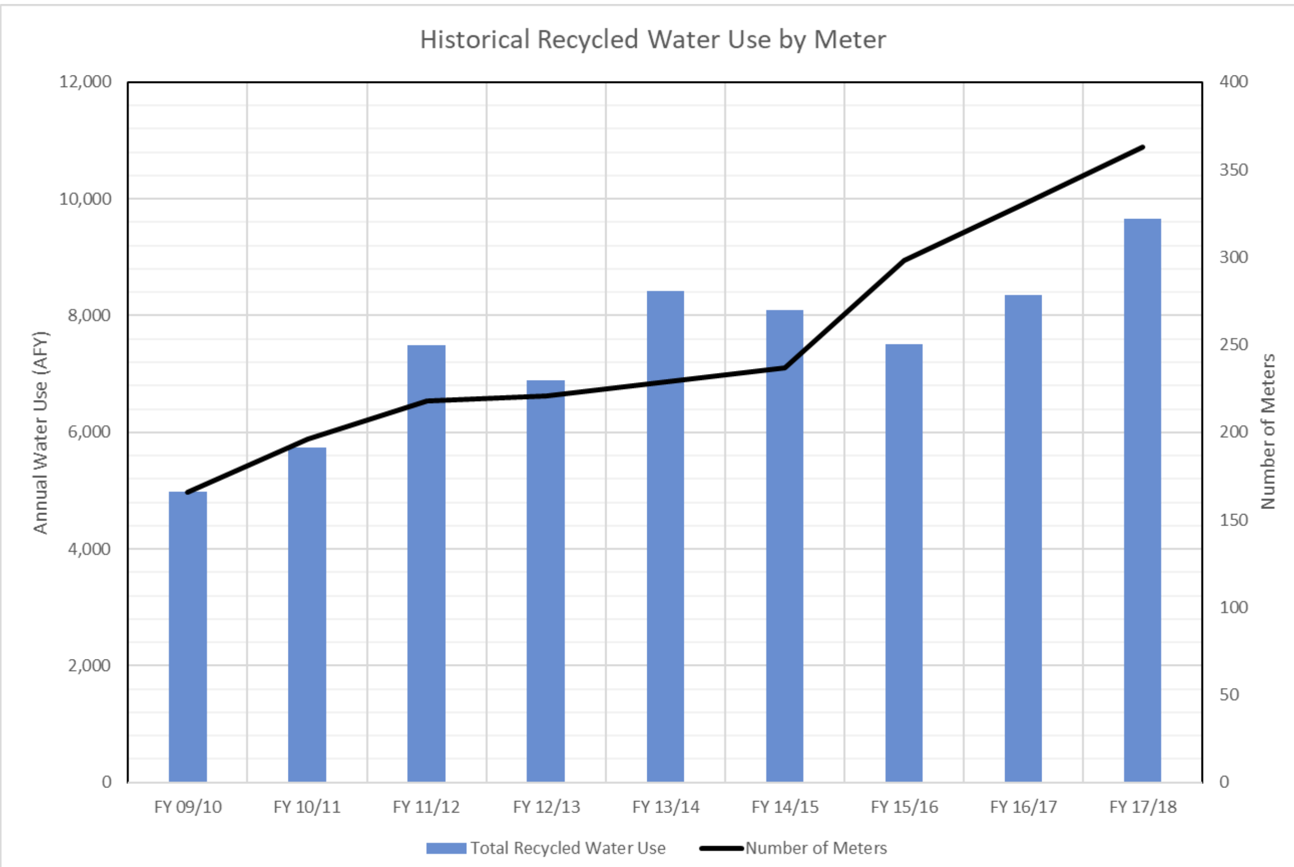
Ontario Recycled Water Master Plan

Figure 4-1 Existing Recycled Water System Conveyance Facilities

5.0 RECYCLED WATER DEMANDS

5.1 HISTORICAL RECYCLED WATER USE

The total amount of recycled water usage has been increasing since 2009 due to the increasing number of recycled water meters/users. In 2009, only 166 meters were active. As of 2018, there are 363 active recycled water meters. The chart below illustrates the growth in recycled water use and increase number of recycled water meters since 2009.



For this Master Plan and hydraulic analysis, the data from July 2017 through June 2018 will be utilized. The billing data from years 2009 through 2018 are summarized in Table 5-1.

Table 5-1 Historical Recycled Water Usage (AF)

Month	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18
July	-	944	845	884	931	1056	1021	1124	1198
August	1120	813	1145	871	965	1306	935	1186	1166
September	878	895	1228	982	1016	1127	928	1222	1392
October	837	569	786	706	755	786	540	943	878
November	409	238	446	560	698	677	647	564	752
December	289	269	253	337	519	429	410	475	490
January	117	148	364	194	513	211	380	164	595
February	49	270	385	235	573	260	232	107	409
March	67	192	321	346	362	472	433	198	481
April	229	297	314	405	453	551	493	695	426
May	440	424	520	636	774	624	703	731	935
June	546	685	887	739	868	602	788	942	932
Total	**4,981**	**5,744**	**7,493**	**6,894**	**8,427**	**8,099**	**7,511**	**8,351**	**9,653**
Number of Meters	166	196	218	221	229	237	298	330	363
AF/Meter	30.0	29.3	34.4	31.2	36.8	34.2	25.2	25.3	26.6

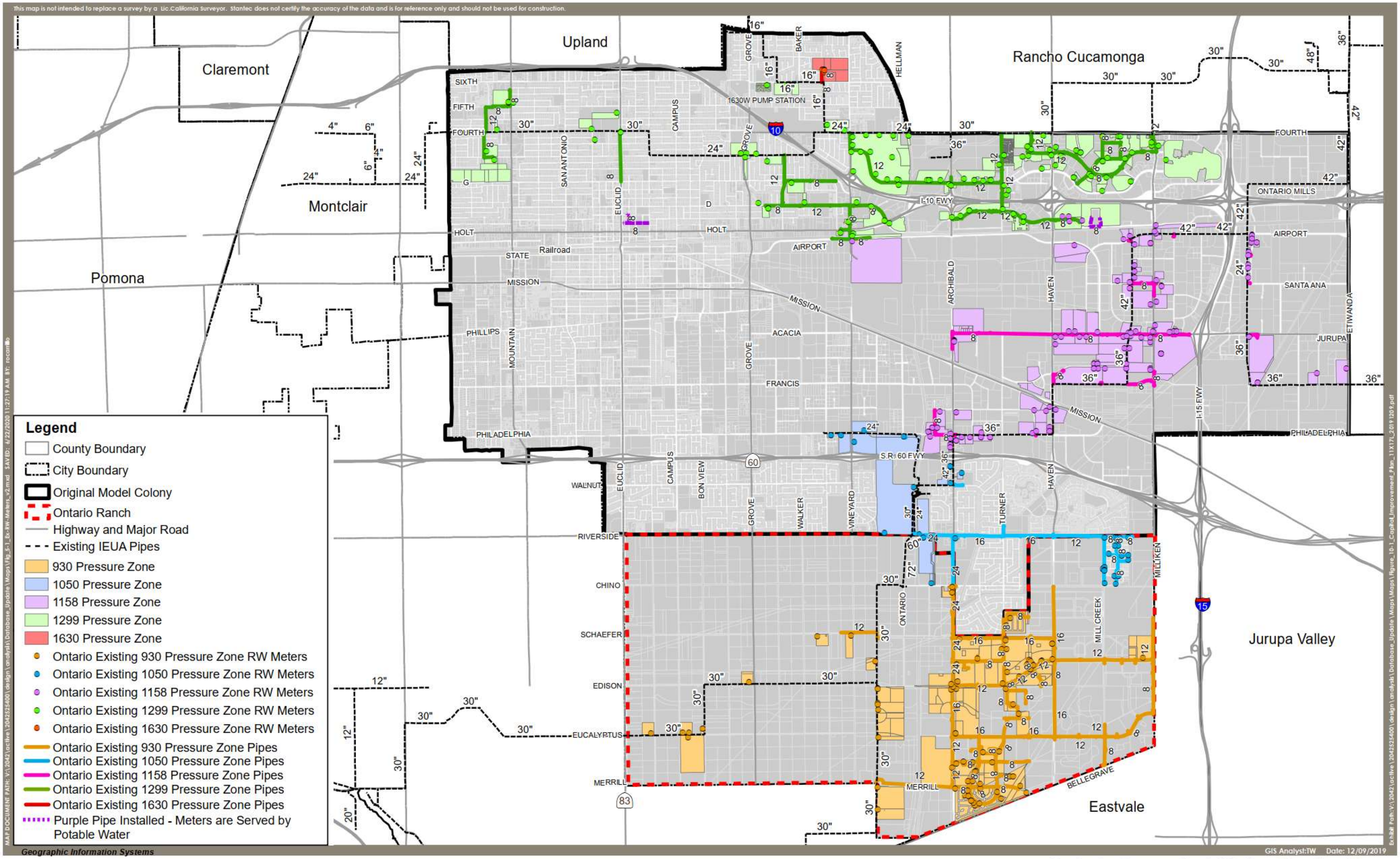
Based on 363 active RW water meters' billing data provided by the City, the total recycled water usage from July 2017 to June 2018 was 9,653 ac-ft.

The recycled water usage subtotaled by existing land use is shown in Table 5-2.

Table 5-2 Existing Recycled Water Usage by Existing Land Use

	General Land Use Category	Existing Land Use	FY 17/18 RW Usage (ac-ft)
Original Model Colony	Residential	LDR	1
		MDR	5
		HDR	72
	Commercial	Admin./Prof.	42
		Commercial	216
		Office Commercial	678
	Industrial	Manufacturing	971
		Industrial	411
		Warehousing	181
	Parks/Rec/Cultural	Parks/Rec/Cultural	1,361
	Public Facilities	Public Facilities	99
	School	School	277
	Transportation/Utilities	Transp/Utilities	57
	Agricultural	Ag. Multi-Use	14
	Right of Way	Street/Parking	0
		ROW	9
	Vacant	Vacant Bldg	1
	Temporary	Construction Meters	70
		Subtotal Original Model Colony	**4,465**
Ontario Ranch	Residential	LDR	106
		MDR	94
		HDR	0
	Commercial	Admin./Prof.	0
		Commercial	0
		Office Commercial	0
	Industrial	Manufacturing	0
		Industrial	0
		Warehousing	0
	Parks/Rec/Cultural	Parks/Rec/Cultural	33
	Public Facilities	Public Facilities	0
	School	School	0
	Transportation/Utilities	Transp/Utilities	9
	Agricultural	Ag. Multi-Use	4,940
	Right of Way	Street/Parking	0
		ROW	6
	Vacant	Vacant Bldg	0
	Temporary	Construction Meters	2
		Subtotal Ontario Ranch	**5,190**
		Total City of Ontario	**9,655**

Locations of the currently active recycled water meters are shown in Figure 5-1.



Ontario Recycled Water Master Plan
Figure 5-1 Existing Recycled Water Meters

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5.2 RECYCLED WATER DEMAND FACTORS

The recycled water demand factors are based on the recycled water meter billing data. In GIS the meters were assigned a parcel(s) based on the address and location information provided by the City. The meter data for each land use was then grouped and divided by the total area for each land use. This process also consisted of verifying that each land use and the service area of the meter (based on the land use from the GIS parcel base) is consistent with the actual land use (using aerial imagery).

The recycled water irrigation demand factors are shown in the following table.

Table 5-3 Recycled Water Irrigation Unit Demand Factors

General Land Use Category	Land Use	Abbr.	Demand Factors (Gal/AC/Day)
Residential	Rural Density Residential	RR	-
	Low Density Residential	LDR	600
	Low Medium Density Residential	LMDR	700
	Medium Density Residential	MDR	750
	High Density	HDR	800
Commercial	Neighborhood Commercial	NC	1,100
	General Commercial	GC	1,100
	Office Commercial	OC	1,500
	Business Park	BP	1,200
	Hospitality	HOS	1,000
Industrial	Industrial	IND	1,700
Open Space	Open Space- Non-Recreation	OS-NR	-
	Open Space – Recreational	OS-R	2,350
	Open Space – Water	OS-W	2,350
Public	Public Facilities	PF	2,100
	Public School	PS	2,250
	Airport	ARPT	100
	Railroad	Rail	250
	Right of Way	ROW	600
	Landfill	LF	-
Mixed Use	Mixed Use	MU	1,500

[1] Demand for LMDR is average of LDR and MDR.

5.3 RECYCLED WATER PEAKING FACTORS

In determining the peaking factors for this study, the monthly demands for FY 2017/2018 were used as shown below. Historically, the month of September represents the maximum monthly recycled water usage.

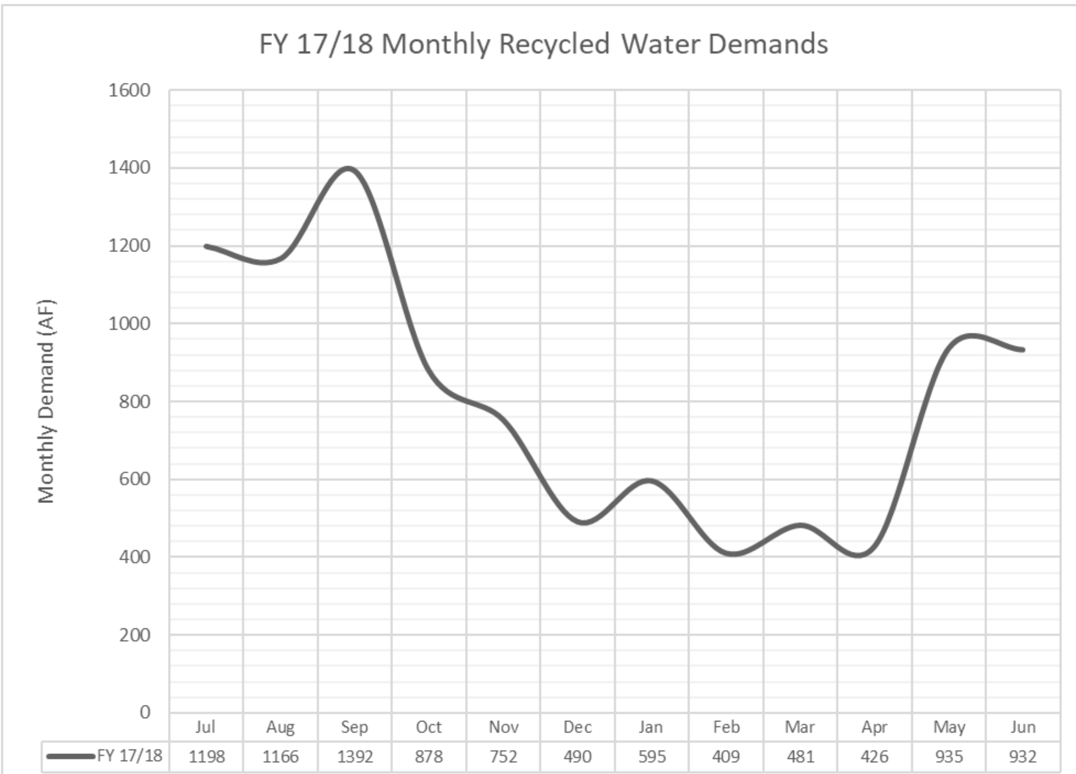


Table 5-4 has been prepared to summarize the water usage for FY 2017/2018.

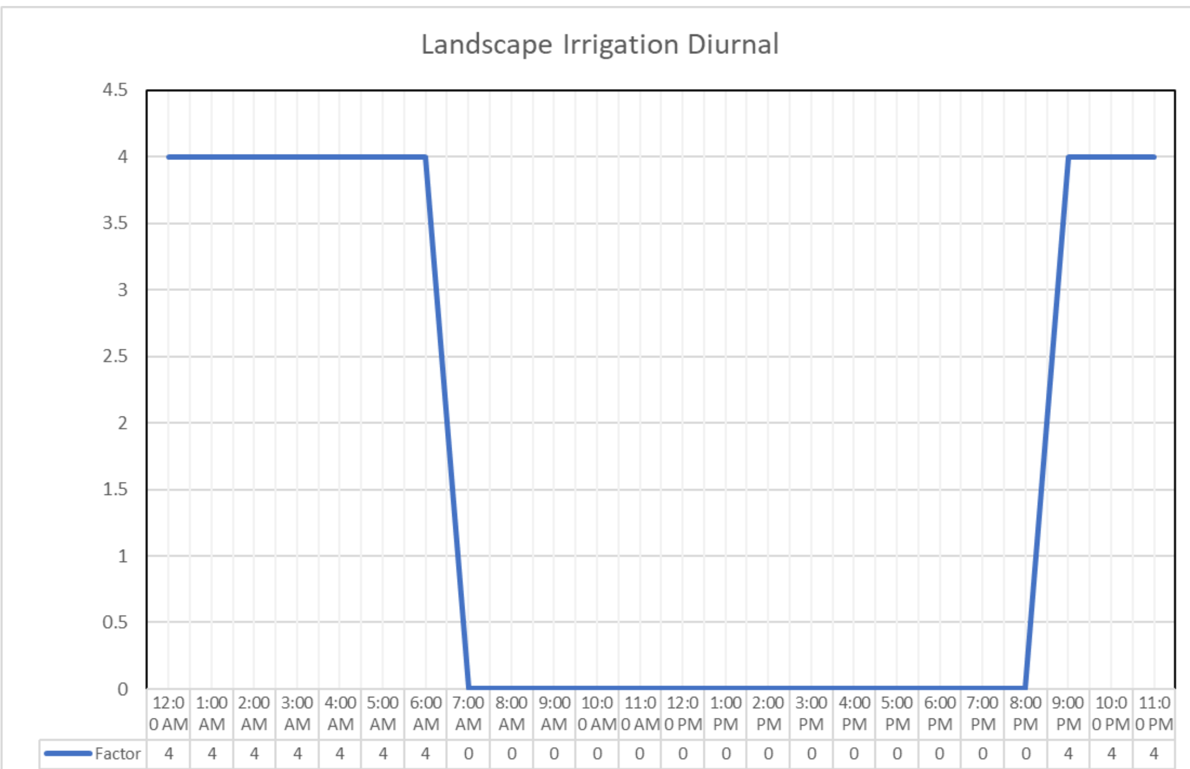
Table 5-4 Recycled Water Demand Factors

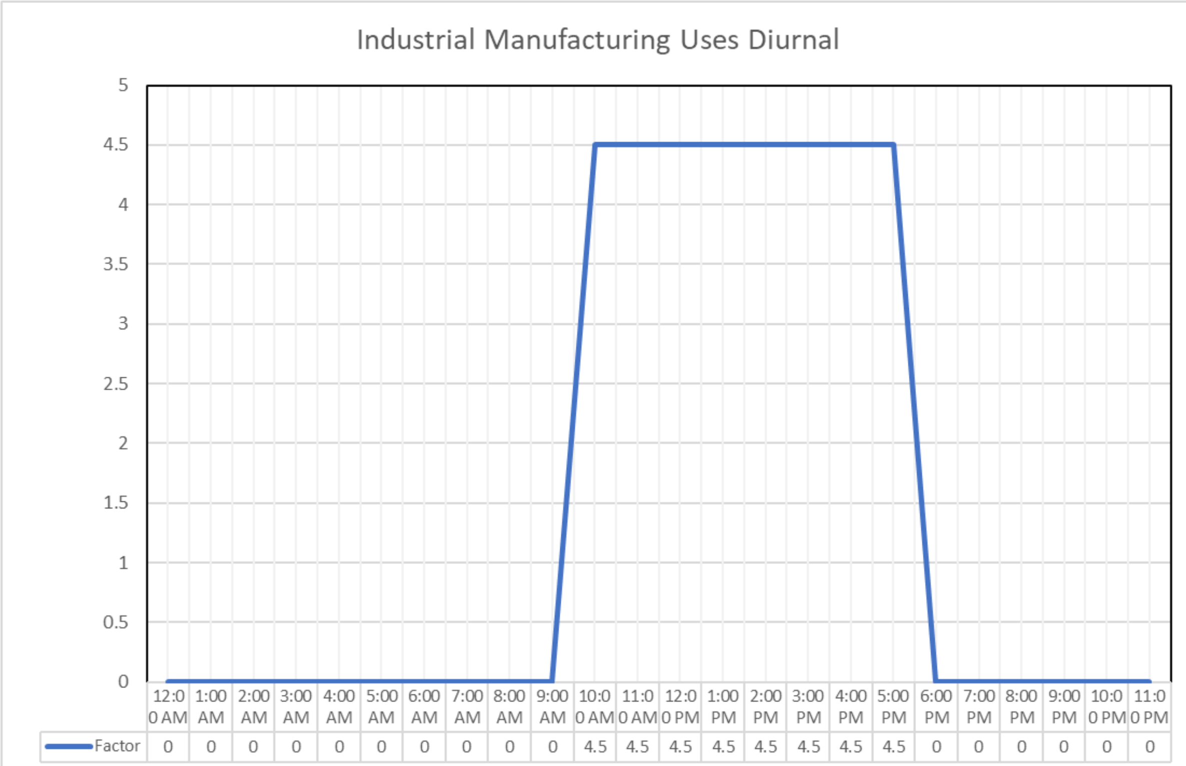
Demand Condition	Recycled Water Demand[1]	Demand Factor
Annual Average	9,653 AFY	-
Average Day (ADD)	8.46 mgd	-
Maximum Month	14.63 mgd	1.73 x ADD
Estimated Maximum Day (MDD)	16.82 mgd / 11,684 gpm	2.00 x ADD
Estimated Peak Hour (PH)	20,358 gpm	3.54 x ADD

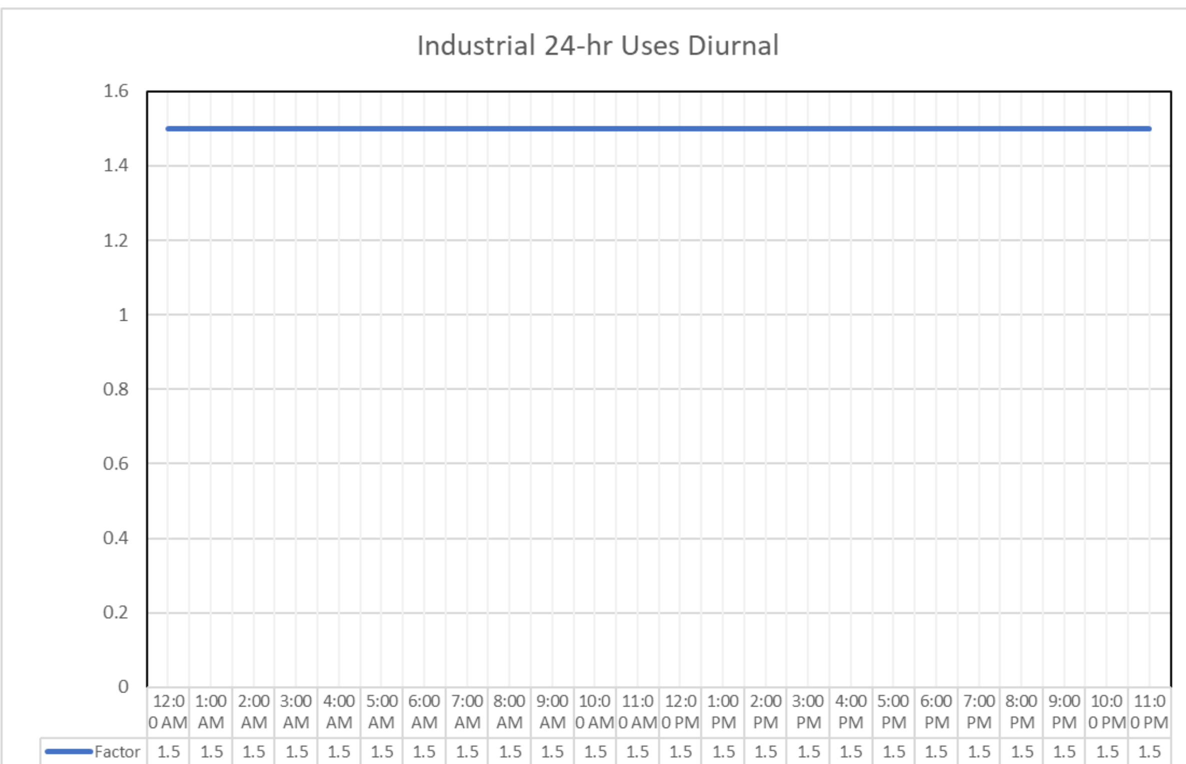
[1] Recycled Water Demand is based on the FY 17/18 data.

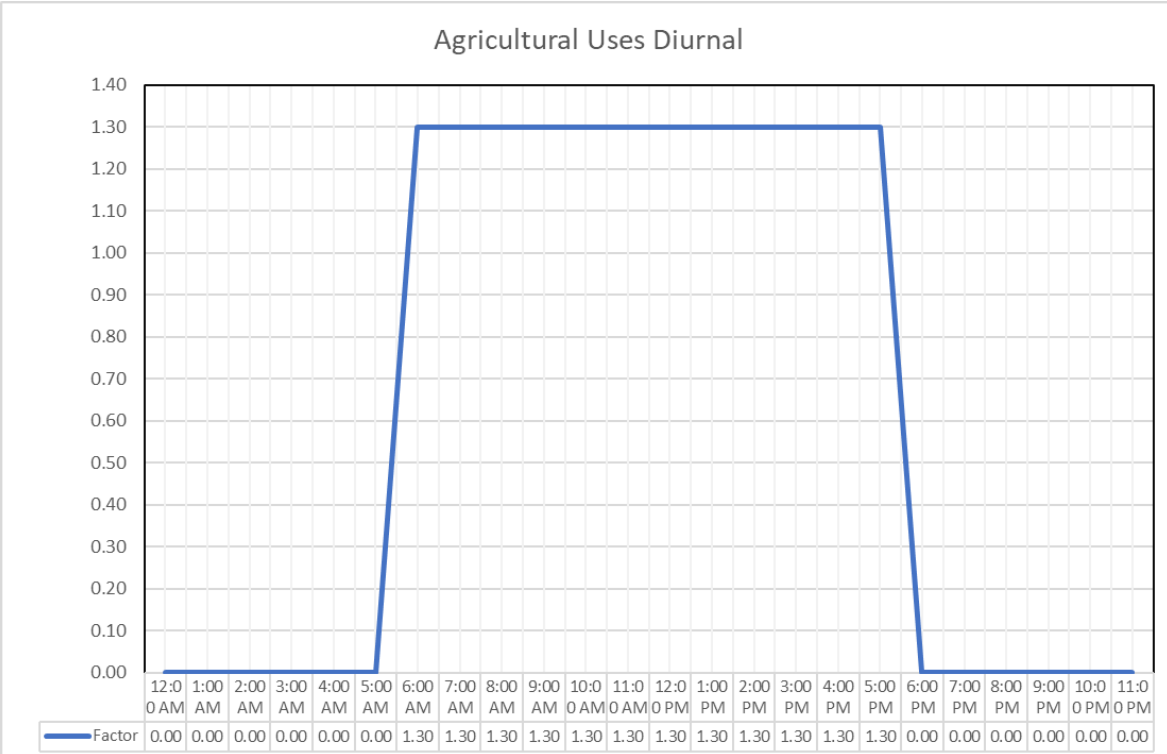
5.4 RECYCLED WATER DIURNAL DEMAND PATTERNS

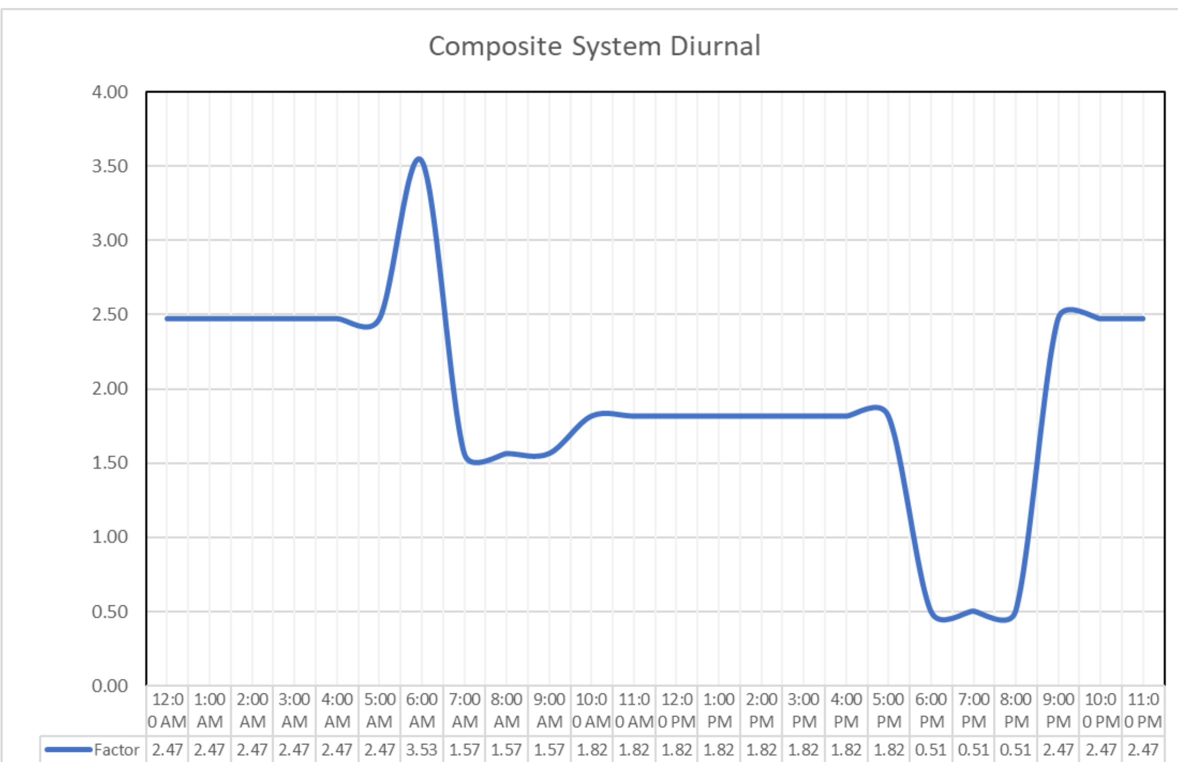
The demand patterns previously developed for the City's ultimate water demand estimate are used for this Master Plan Update. There are four primary diurnals used for the OMUC service meters including landscape irrigation, industrial, industrial manufacturing, and agricultural uses. Each of these diurnals are shown below. A composite diurnal has also been prepared that combines these four land use diurnals based on a weighted average of demand contribution to show a systematic diurnal and system peak hour factor.




Industrial Manufacturing Uses Diurnal
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
12:00 AM | 1:00 AM | 2:00 AM | 3:00 AM | 4:00 AM | 5:00 AM | 6:00 AM | 7:00 AM | 8:00 AM | 9:00 AM | 10:00 AM | 11:00 AM | 12:00 PM | 1:00 PM | 2:00 PM | 3:00 PM | 4:00 PM | 5:00 PM | 6:00 PM | 7:00 PM | 8:00 PM | 9:00 PM | 10:00 PM | 11:00 PM
Factor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 0 | 0 | 0 | 0 | 0 | 0


Industrial 24-hr Uses Diurnal
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
12:00 AM | 1:00 AM | 2:00 AM | 3:00 AM | 4:00 AM | 5:00 AM | 6:00 AM | 7:00 AM | 8:00 AM | 9:00 AM | 10:00 AM | 11:00 AM | 12:00 PM | 1:00 PM | 2:00 PM | 3:00 PM | 4:00 PM | 5:00 PM | 6:00 PM | 7:00 PM | 8:00 PM | 9:00 PM | 10:00 PM | 11:00 PM
Factor | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5


Agricultural Uses Diurnal
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
12:00 AM 1:00 AM 2:00 AM 3:00 AM 4:00 AM 5:00 AM 6:00 AM 7:00 AM 8:00 AM 9:00 AM 10:00 AM 11:00 AM 12:00 PM 1:00 PM 2:00 PM 3:00 PM 4:00 PM 5:00 PM 6:00 PM 7:00 PM 8:00 PM 9:00 PM 10:00 PM 11:00 PM
Factor 0.00 0.00 0.00 0.00 0.00 0.00 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30 0.00 0.00 0.00 0.00 0.00 0.00


Composite System Diurnal
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
12:00 AM 1:00 AM 2:00 AM 3:00 AM 4:00 AM 5:00 AM 6:00 AM 7:00 AM 8:00 AM 9:00 AM 10:00 AM 11:00 AM 12:00 PM 1:00 PM 2:00 PM 3:00 PM 4:00 PM 5:00 PM 6:00 PM 7:00 PM 8:00 PM 9:00 PM 10:00 PM 11:00 PM
Factor 2.47 2.47 2.47 2.47 2.47 2.47 3.53 1.57 1.57 1.57 1.82 1.82 1.82 1.82 1.82 1.82 1.82 1.82 0.51 0.51 0.51 2.47 2.47 2.47

6.0 DESIGN CRITERIA

6.1 SYSTEM ANALYSIS CRITERIA

The model will be established based on the following set of design and planning criteria:

- Minimum regional service pressure = 50 psi
- Maximum regional system pressure = 150 psi
- Maximum flow rate < 8 ft/s
- Minimum flow rate > 1 ft/s

6.2 FACILITY DESIGN CRITERIA

The design and construction of any RW facilities should follow the *Water & Sewer Construction Specification*, and the *Water & Sewer Design Guidelines and Specification* provided by the City. The beneficial uses of recycled water include but are not limited to, landscape irrigation systems, agricultural irrigation systems, and industrial process uses. Systems used for industrial processes, construction purposes, or recreational impoundment shall be reviewed by the City. The determination of whether the City supplies recycled water or potable water will be in accordance with the standards of treatment and water quality requirements set forth in Title 22, Chapter 4 of the California Administrative Code.

6.2.1 Pipe Sizing and Configuration

The tertiary treated recycled water lines shall be constructed in accordance with the color-coding and labeling requirements. All pipeline material used in the recycled water system shall be purple in color or installed with a purple polyethylene sleeve at the time of installation. Separation between water, sewer, and recycled water line installations shall be in accordance with Department of Public Health regulations, or City requirements, whichever is greater.

The standard recycled water mainline sizes allowed in the City are 8-inch, 12-inch, 16-inch, 20-inch, 24-inch, 30-inch, and 36-inch in diameter. For recycled water, the minimum pipeline size in arterial streets of a new development area is 8-inch diameter. Smaller diameter pipelines will be considered in collector streets on a case-by-case basis by the City. Recycled water facilities shall typically be located 8-feet from the curb face on the opposite side of the street as the potable water. Each line shall be valved so that any segment does not exceed 2000 feet. Dead end mains shall be provided with means of flushing with a blow-off. Pipelines 8-inches and smaller shall be installed with a minimum of 54-inches of cover between the top of the pipe and the finished grade. Pipelines 12-inches or greater shall be installed with a minimum of 60-inches from the top of the pipe to the finished grade. Recycled water pipes shall be installed at a depth greater than the potable waterlines.

6.2.2 Pressure Reducing Station Requirements

Where required by the City, pressure reducing stations shall be individually designed specifically for each installation, subject to City review and approval of design and materials. All services shall be constructed in accordance with the applicable City Standard Drawings. Services shall not be connected to 18-inch or larger mains unless specifically permitted by the City.

7.0 EXISTING SYSTEM HYDRAULIC MODEL ANALYSIS

7.1 HYDRAULIC MODEL

The hydraulic model used for this Master Plan is the IEUA hydraulic model used for IEUA's Recycled Water Program Strategy. This hydraulic model contains the IEUA supplies for existing and future conditions, including the other Member Agencies connections and recycled water demands purchased from IEUA. This hydraulic model is therefore considered to accurately reflect regional supply and hydraulic conditions that impact the City of Ontario's recycled water system.

The hydraulic model is created in InfoWater, with the InfoWater Suite 12.4 utilized for this Master Plan analysis. Since the hydraulic model included all IEUA supply facilities, pump stations, regional pipelines, and recycled water demands, including the groundwater recharge basin flows, updating the model was required only for the existing Ontario pipelines and demands. The model was then updated to create the Near-Term and Future demand scenarios required for this study.

The recycled water model was updated to include the most recent City of Ontario recycled water demands, as described in Chapter 5 based on the 2017/2018 billing data. Pipelines and demand locations that represent existing meter locations were updated into the model based on the latest GIS database information that was provided by the City.

The hydraulic model includes data sets and diurnal demand patterns to analyze the system for a 24-hour extended period simulation (EPS).

7.2 MAXIMUM DAY DEMAND HYDRAULIC ANALYSIS

An analysis for the existing maximum day demands was conducted as a baseline scenario for this master plan. The maximum day demands were input at each demand location in the model. The hourly diurnal pattern was then applied to the demands. The total maximum day demand for the existing recycled water system within the City is 16.83 MGD. The maximum day demand by pressure zone is shown in Table 7-1 below.

Table 7-1 Existing Maximum Day Demands by Pressure Zone

Pressure Zone	Maximum Daily Demand (MGD)	Maximum Day Flow Rate (gpm)
930	8.82	6,124
1050	1.36	942
1158	2.75	1,910
1299	3.90	2,708
Total	16.83	11,684

The hydraulic modeling results show that the existing IEUA regional system meets the design criteria for both pressure and pipeline velocities throughout the IEUA regional system. There are a few known low pressure areas, such as at the 7th/8th Street Basins in 1299 Zone and in the 42-inch transmission main of the 1158 Zone near RP-4.

There are a few demand nodes with pressures below the criteria in the western portion of the 1299 Zone within the City of Ontario's distribution system. These pressures are predicted by the model to be as low as between 35-48 psi between 5th Street and 6th Street from Elderberry Avenue to Mountain Avenue. The low pressures in this area are due to high ground elevations for the 1299 Zone. The pipeline velocities and supply sources for the pressure are within design criteria. The nodes with low pressures are indicated in red in the graphic below. To mitigate the low service pressures in this area, an irrigation pump at the meter is recommended.

All other demand locations within the City have pressures above 50 psi and pipeline velocities less than maximum criteria. There are no deficiencies for existing demand conditions based on the hydraulic model.

8.0 RECYCLED WATER USE PROJECTIONS

8.1 OVERVIEW OF DEMAND CATEGORIES

The projected future demands are determined for five main types of demand categories:

1) existing users (as described in Chapter 5),

2) vacant land areas to developed,

3) existing agricultural land to be developed,

4) existing agricultural land that can be converted in the interim before being developed, and

5) existing developed land with potable water irrigation meters that may be converted to the recycled water system, or potential conversion areas.

The land uses are determined by acreage for each land use type or category. The areas that are currently vacant or agricultural uses that are proposed to be developed are determined according to the City of Ontario's General Plan, and in conjunction with other planning studies such as the Mixed-Use Area Plans and developments for the Ontario Ranch area. The following sections described in more detail the demand categories evaluated, with the exception of the existing users since they are already discussed in Chapter 5 of this report.

8.2 VACANT LAND TO BE DEVELOPED

The vacant land use parcels in the existing land use database were evaluated by overlaying the parcel database on Google Earth aerial photogrammetry. By inspection, the vacant parcels were verified if there was an actual use or occupancy or if the parcel was indeed vacant. The remaining existing vacant land use parcels that were then overlaid with the General Plan land uses to determine which currently vacant land use parcels will be developed, with the General Plan land use designation. The results of this analysis are shown in Table 8-1. These parcels are also graphically illustrated in Figure 8-1. As shown, there are a significant number of parcels in the Original Model Colony and Ontario Ranch service areas.

Table 8-1 Vacant Parcels to Be Developed Recycled Water Use

Service Area	Future Land Use for the Existing Vacant Parcels	General Plan Land Use Designation	Total Gross Acreage (Acres)	Future Recycled Water Use (AFY)
Original Model Colony	Residential	RR	-	-
		LDR	0	0
		LMDR	-	-
		MDR	15	13
		HDR	-	-
	Commercial	NC	3	4
		GC	6	8
		OC	45	76
		BP	38	51
		HOS	5	5
	Industrial	IND	321	611
	Open Space	OS-NR	-	-
		OS-R	-	-
		OS-W	-	-
	Public	PF	-	-
		PS	-	-
		ARPT	10	1
		Rail	-	-
		ROW	1	1
		LF	1	-
	Mixed Use	MU	146	245
	Total Original Model Colony		591	1,014
Ontario Ranch	Residential	RR	-	-
		LDR	252	170
		LMDR	27	21
		MDR	78	66
		HDR	-	-
	Commercial	NC	-	-
		GC	18	23
		OC	-	-
		BP	120	162
		HOS	-	-
	Industrial	IND	51	97
	Open Space	OS-NR	24	-
		OS-R	21	56
		OS-W	-	-
	Public	PF	-	-
		PS	12	30
		ARPT	-	-
		Rail	-	-
		ROW	4	3
		LF	-	-
	Mixed Use	MU	-	-
	Total Ontario Ranch		609	627
Total City of Ontario			**1,199**	**1,641**

Note: Vacant parcels located within Euclid Area are categorized to Euclid Ave conversion areas shown in Table 8-3.

8.3 EXISTING AGRICULTURE LAND TO BE DEVELOPED

The agriculture land uses in the City are entirely within the Ontario Ranch service area. Based on the General Plan these parcels currently are identified as agricultural uses that will be developed, and largely become either residential, industrial or business park type of land use. Some of the agricultural area has already been developed, with large portions that are now projects in the design or late planning stages.

Table 8-2 provides a summary list of the projected recycled water demand for these agricultural development parcels within the Ontario Ranch service area.

Table 8-2 Agricultural Land to be Developed Recycled Water Use

Service Area	Future Land Use for the Existing Vacant Parcels	General Plan Land Use Designation	Total Gross Acreage (acres)	Future Recycled Water Use (AFY)
Ontario Ranch	Residential	RR	-	-
		LDR	2,301	1,546
		LMDR	389	305
		MDR	724	608
		HDR	-	-
	Commercial	NC	57	71
		GC	114	140
		OC	109	182
		BP	345	463
		HOS	-	-
	Industrial	IND	171	325
	Open Space	OS-NR	226	-
		OS-R	319	840
		OS-W	51	134
	Public	PF	-	-
		PS	101	254
		ARPT	-	-
		Rail	-	-
		ROW	110	74
		LF	-	-
	Mixed Use	MU	515	865
		Total City of Ontario	**5,531**	**5,807**

It should be noted that the current demand for these parcels is approximately 4,940 AFY. Despite the large acreage of development, the overall future recycled water use is not expected to increase greatly, at approximately 5,807 AFY.

Agricultural land that has a potential to be converted to recycled water in the interim before the land is developed is considered separately in Section 8.5.1 and shown in Table 8-4.

8.4 CONVERSION AREAS

Conversion areas are defined as parcels that are currently serviced by the potable water system to supply a separate irrigation meter to the parcel and that has a potential to be converted to the recycled water system. An analysis was conducted on the historical billing data for these potable irrigation meters based on the largest water users. The results of this analysis identified approximately 3,422 acres with a total current potable water irrigation demand of 4,906 AFY. Parcels considered most viable for conversion to the recycled water system are parks, schools, and parcels adjacent to or within close proximity to an existing or proposed recycled water pipeline. Therefore, not all parcels with potable irrigation meters are included with the conversion areas as a result. The parcels with a priority and proposed for conversion to the recycled water system are listed and subtotaled by land use.

In addition, there are two conversion areas that have been previously identified and studied, and which are included in this analysis. These areas are known as the Euclid Avenue and Creekside conversion areas. Planning studies and design drawings have been prepared for some facilities within these areas. Therefore, these two conversion areas are identified and subtotaled separately from the potable irrigation meters.

Table 8-3 Potential Conversion Areas for Recycled Water Use

Service Area	Future Land Use for the Existing Vacant Parcels	General Plan Land Use Designation	Total Gross Acreage (acres)	Future Recycled Water Use (AFY)
Original Model Colony (OMC)	Large Potable Irrigation Meters			
	Residential	RR	-	-
		LDR	156	105
		LMDR	33	26
		MDR	71	60
		HDR	-	-
	Commercial	NC	13	16
		GC	27	33
		OC	19	32
		BP	49	66
		HOS	10	12
	Industrial	IND	304	580
	Open Space	OS-NR	246	-
		OS-R	142	375
		OS-W	-	-
	Public	PF	1	1
		PS	153	385
		ARPT	34	4
		Rail	-	-
		ROW	15	10
		LF	-	-
	Mixed Use	MU	81	135
	Subtotal Large Potable Irrig. Meters		1,354	1,840

Table 8-3 Potential Conversion Areas for Recycled Water Use

Service Area	Future Land Use for the Existing Vacant Parcels	General Plan Land Use Designation	Total Gross Acreage (acres)	Future Recycled Water Use (AFY)
	Euclid Conversion Areas			
	Residential	RR	11	-
		LDR	46	31
		LMDR	24	19
		MDR	77	65
	Commercial	NC	4	4
		GC	18	22
		OC	6	10
		BP	24	33
	Industrial	IND	72	138
	Open Space	OS-R	127	335
	Public	PF	13	31
		PS	208	525
	Mix Use	MU	18	30
		Subtotal Euclid Area	648	1,243
	Creekside Conversion Areas			
	Residential	LDR	236	159
		MDR	41	34
	Commercial	GC	3	4
	Open Space	OS-NR	42	0
		OS-R	22	59
		OS-W	8	22
		PS	31	78
		ROW	5	3
		Subtotal Creekside Areas	388	359
		Subtotal OMC	**2,390**	**3,442**
Ontario Ranch	SCE Facility Conversion Area			
	Commercial	BP	150	202
		Subtotal SCE Facility Area	150	202
		Subtotal Ontario Ranch	**150**	**202**
		Total City of Ontario	**2,540**	**3,644**

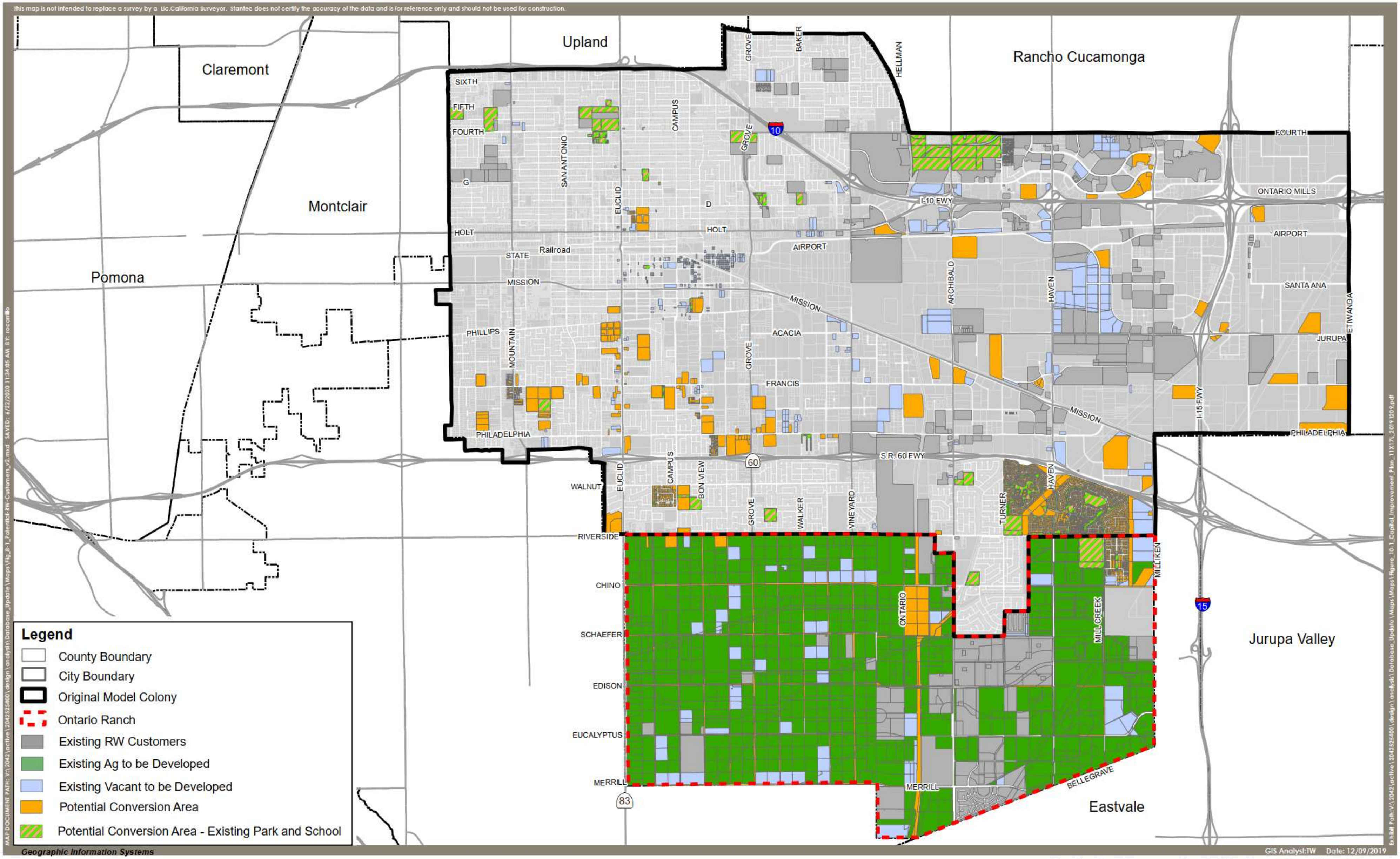


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Figure 8-1 Potential Recycled Water Customers

8.5 PHASING

For planning purposes for the recycled water system, there are two primary phases for the expansion of recycled water in the City of Ontario; a Near-Term phase, and the Future phase, as described in the following sections below.

8.5.1 Near-Term Phase

The Near-Term phase is assumed to include potential system requirements to support development for approximately the next 5-years. The Near-Term phase is assumed to consist of the following areas:

- Current Developments in the Ontario Ranch service area – These developments are currently in the planning phase or design phase that are expected to begin in approximately 5-years.
- Creekside conversion project areas – These areas have already been previously studied and proposed for conversion to recycled water, and design plans have been prepared many of the facilities to serve the areas.
- Some large irrigation meters/users that can be converted to recycled water – These parcels are assumed to be converted in the near future since they are in the vicinity of existing facilities or could be connected to a pipeline that is already proposed to be constructed.
- Parks and Schools that can be converted – These parcels have a high priority for the City where it is practical. These parcels are assumed to be converted in the near future since they are in the vicinity of existing facilities or could be connected to a pipeline that is already proposed to be constructed.
- Some agriculture land that can be converted to recycled water before it is ultimately developed – The temporary agricultural use parcels that are adjacent to an existing pipeline or a pipeline that is to be constructed within the Near-Term planning horizon are assumed to be converted to the recycled water system. For purposes of this study, the majority of these parcels are located along Haven Avenue and Eucalyptus Avenue in the East Ontario Ranch areas. Parcels are also assumed to be temporarily connected along the IEUA 30-inch pipeline in Edison Avenue.

Table 8-4 below provides the summary of the projected demands for this Near-Term Phase subtotaled by land use and service area. Table 8-4 summarizes the recycled water demands by type of area as listed above.

Table 8-4 Near-Term Phase Recycled Water Demands

Service Area	Near-Term Land Use for the Existing Vacant Parcels	General Plan Land Use Designation	Total Gross Acreage (Acres)	Near-Term Recycled Water Use (AFY)
Original Model Colony	Residential	RR	-	-
		LDR	245	164
		LMDR	-	-
		MDR	89	75
		HDR	11	10
	Commercial	NC	9	11
		GC	34	41
		OC	120	200
		BP	85	114
		HOS	36	40
	Industrial	IND	957	1,822
	Open Space	OS-NR	285	-
		OS-R	551	1,450
		OS-W	8	22
	Public	PF	8	19
		PS	288	725
		ARPT	141	16
		Rail	25	7
		ROW	5	3
		LF	-	-
	Mixed Use	MU	417	709
	SubTotal Original Model Colony		**3,314**	**5,428**
Ontario Ranch	Residential	RR	-	
		LDR	1,655	1,112
		LMDR	56	44
		MDR	344	288
		HDR	-	-
	Commercial	NC	32	39
		GC	111	136
		OC	48	82
		BP	537	721
		HOS	-	-
	Industrial	IND	469	894
	Open Space	OS-NR	52	-
		OS-R	153	403
		OS-W	29	76
	Public	PF	2	6
		PS	315	794
		ARPT	-	-
		Rail	-	-
		ROW	91	61
		LF	-	-
	Mixed Use	MU	287	380
	Temporary Agricultural		1,258	1,704
	SubTotal Ontario Ranch		**5,439**	**6,740**
Total City of Ontario			**8,753**	**12,168**

8.5.2 Future

The Future phase consists of all remaining areas proposed to be converted or connected to the recycled water system after the Near-Term phase areas are completed. Land uses are based on the current General Plan. The Future phase areas consists of the following areas:

- All Developments in the Ontario Ranch service area – This includes the Mixed-Use areas as described in the General Plan
- Euclid Avenue conversion project areas – These areas have already been previously studied and proposed for conversion to recycled water, and design plans have been prepared many of the facilities to serve the areas.
- Parks and Schools that can be converted
- All Agricultural land to be developed
- All large potable irrigation meters/users that can converted to recycled water

Table 8-5 provides a summary of the projected recycled water demands for the Future phase.

Figure 8-2 illustrates the near term and future potential customers by phase. Figure 8-3 shows a summary of all the potential recycled water customers by phase with potential piping needs.

Table 8-5 Future Phase Recycled Water Demands

Service Area	Future Land Use for the Existing Vacant Parcels	General Plan Land Use Designation	Total Gross Acreage (Acres)	Future Recycled Water Use (AFY)
Original Model Colony	Residential	RR	11	-
		LDR	290	195
		LMDR	24	19
		MDR	181	152
		HDR	11	10
	Commercial	NC	17	21
		GC	65	80
		OC	175	295
		BP	148	198
		HOS	48	54
	Industrial	IND	1,645	3,132
	Open Space	OS-NR	213	-
		OS-R	546	1,437
		OS-W	8	22
	Public	PF	18	43
		PS	469	1,181
		ARPT	185	21
		Rail	25	7
		ROW	6	4
		LF	1	-
	Mixed Use	MU	613	1,030
	Total Original Model Colony		**4,699**	**7,901**
Ontario Ranch	Residential	RR	-	-
		LDR	3,233	2,173
		LMDR	505	396
		MDR	1,064	894
		HDR	-	-
	Commercial	NC	88	108
		GC	146	180
		OC	113	190
		BP	525	706
		HOS	-	-
	Industrial	IND	288	548
	Open Space	OS-NR	434	-
		OS-R	461	1,214
		OS-W	51	134
	Public	PF	2	6
		PS	198	499
		ARPT	-	-
		Rail	-	-
		ROW	202	136
		LF	-	-
	Mixed Use	MU	579	974
	Total Ontario Ranch		**7,889**	**8,158**
Total City of Ontario			**12,590**	**16,059**

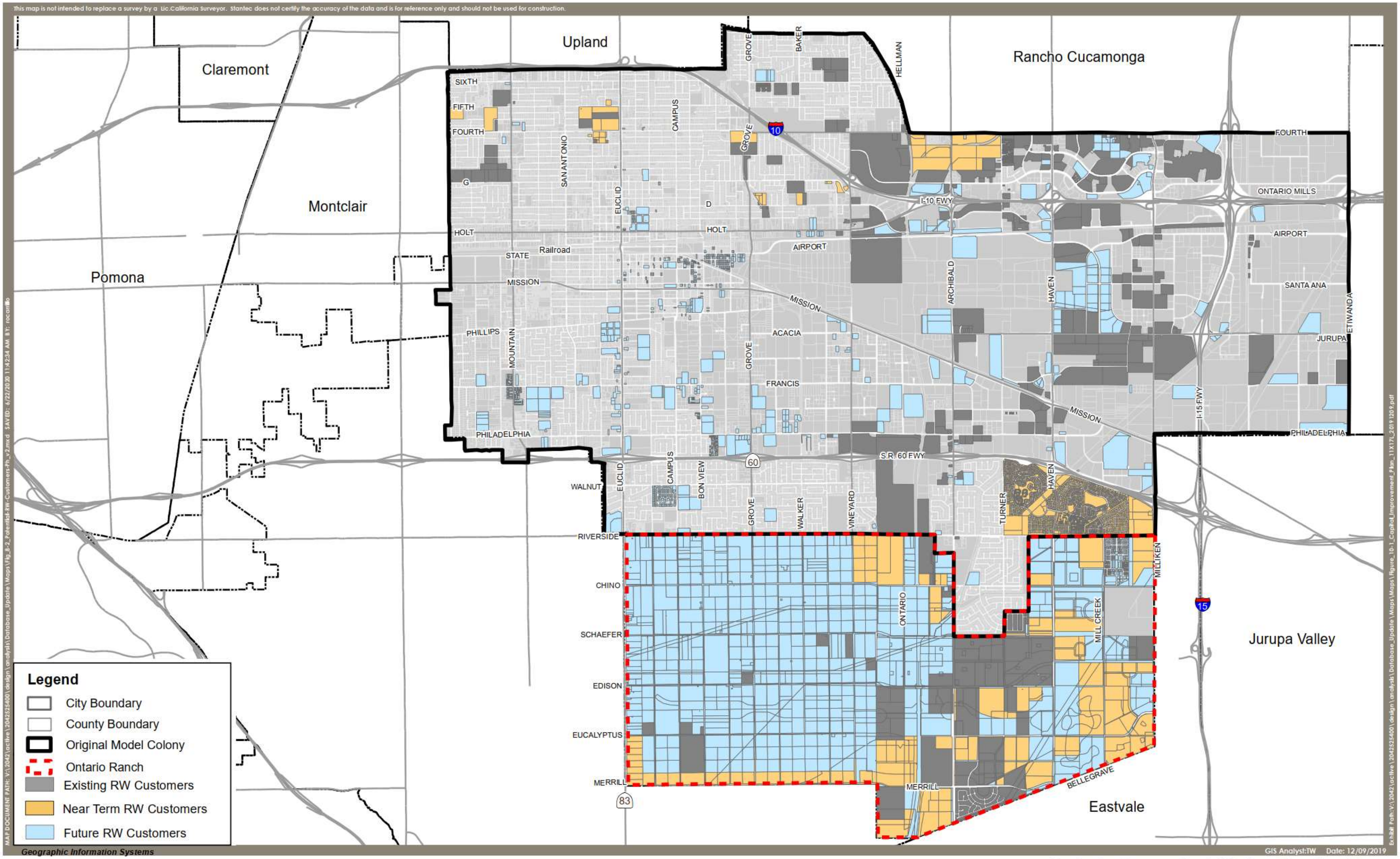

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Figure 8-2 Potential Recycled Water Customers by Phase

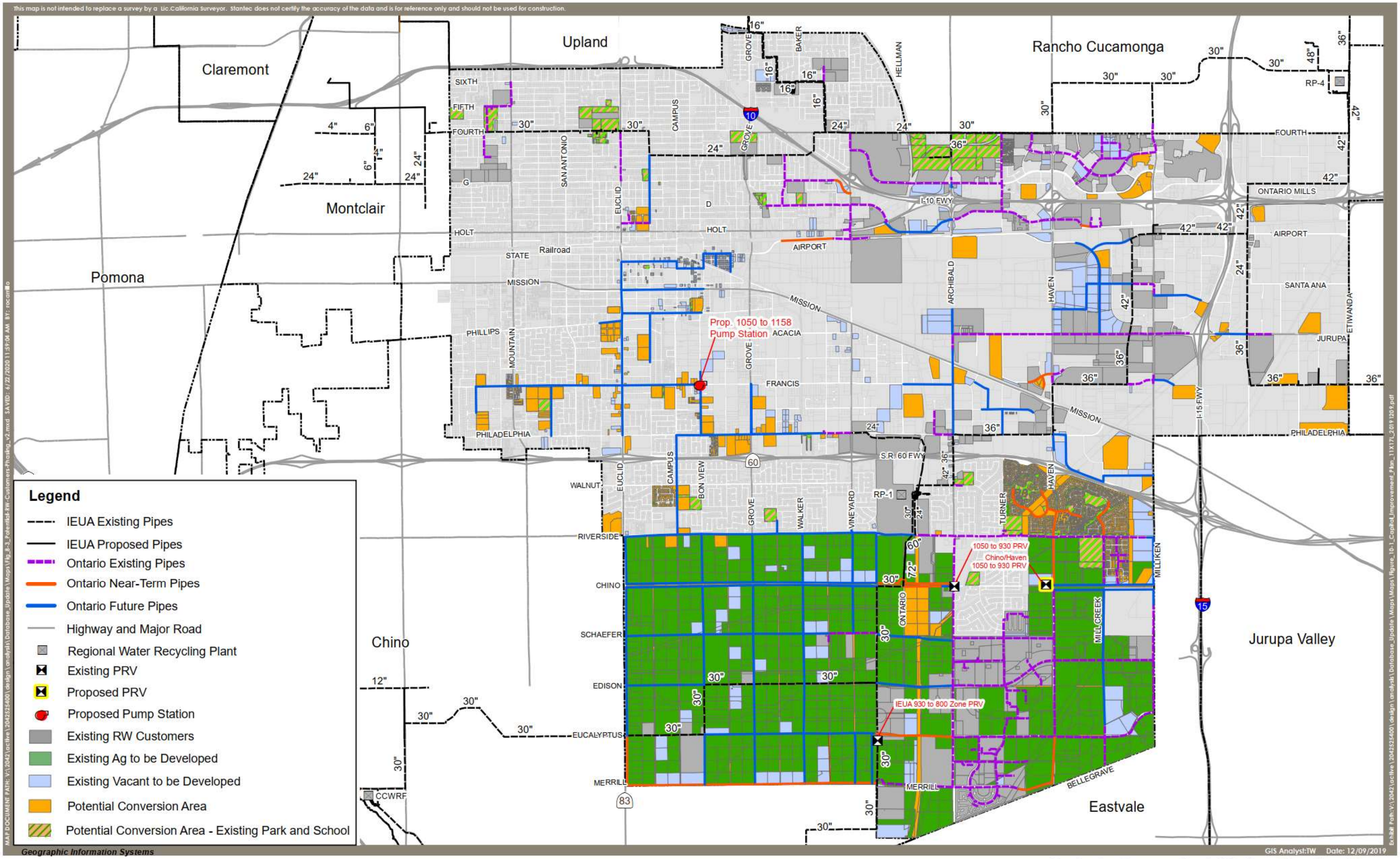

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Figure 8-3 Summary of Potential RW Customers & Phasing

9.0 FUTURE SYSTEM HYDRAULIC MODEL ANALYSIS

9.1 NEAR TERM HYDRAULIC MODEL ANALYSIS

The hydraulic model was updated to include the Near-Term Phase, which is assumed to occur within the next 5-years. This phase includes current developments in the Ontario Ranch service area, and portions of the previously planned Creekside conversion project areas. Some agriculture land adjacent to pipelines to be proposed that can be converted to recycled water before it is ultimately developed is also included in this phase for the Ontario Ranch area. Table 9-1 below provides a summary of the demands analyzed in the hydraulic model for each pressure zone.

Table 9-1 Near Term Phase Maximum Day Demands by Pressure Zone

Pressure Zone	Maximum Daily Demand (MGD)	Maximum Day Flow Rate (gpm)
930	9.67	6,715
1050	5.39	3,740
1158	2.64	1,910
1299	4.05	2,813
Total	21.75	15,178

The Near-Term phase is predominantly expansions within the 930 and 1050 Zones due to the Ontario Ranch developments and conversion of the existing Creekside area east of Turner Avenue. Additionally, there are some recycled water customers proposed to be converted to the 1299 Zone system that will require minimal piping construction. Most of the parcels to be converted in the 1299 Zone are near or adjacent to existing pipeline facilities.

930 Zone Pressure Reducing Stations

This zone is supplied primarily from the RP-1 and CCWRF treatment facilities and effluent pump stations from IEUA. To supplement the eastern portion of the 930 Zone, the City also has an existing pressure reducing station to feed the 930 Zone from the 1050 Zone located at Chino Avenue and Archibald Avenue. The City is also constructing a new pressure reducing station from the 1050 Zone to the 930 Zone at Chino Avenue and Haven Avenue. The following are the modeled pressure set points and resulting peak flow through the pressure reducing valve from the hydraulic model analysis.

Table 9-2 930 Zone Pressure Reducing Stations – Near Term

Pressure Reducing Station	Location	Modeled Downstream Setpoint	Modeled Peak Flow Rate
PR-1	Chino & Archibald	70	2,830 gpm
PR-2	Chino & Haven	55	802 gpm

The hydraulic modeling results show that the existing IEUA system meets the design criteria for both pressure and pipeline velocities throughout the IEUA regional system. There are a few known low pressure areas of the IEUA system, such as at the 7th/8th Street Basins in the 1299 Zone and in the northern area of the 42-inch transmission main of the 1158 Zone near RP-4.

The Near-Term model analysis shows that for the City's distribution system no additional locations with demands results pressures below the criteria than was seen for the Existing system analysis. The demand nodes with pressure below the criteria are located in the western portion of the 1299 Zone. These pressures are predicted by the model to be as low as between 35-48 psi between 5th Street and 6th Street from Elderberry Avenue to Mountain Avenue. The low pressures in this area are due to high ground elevations for the 1299 Zone. The pipeline velocities and supply sources for the pressure are within design criteria. The nodes with low pressures are indicated in red in the graphic below. Similar to the Existing system analysis, to mitigate the low service pressures an irrigation pump at the meter is recommended for this area.

All other demand locations within the City have pressures above 50 psi and pipeline velocities less than the maximum criteria.

Figure 9-1 and 9-2 illustrate the proposed Near-Term phase and proposed piping.

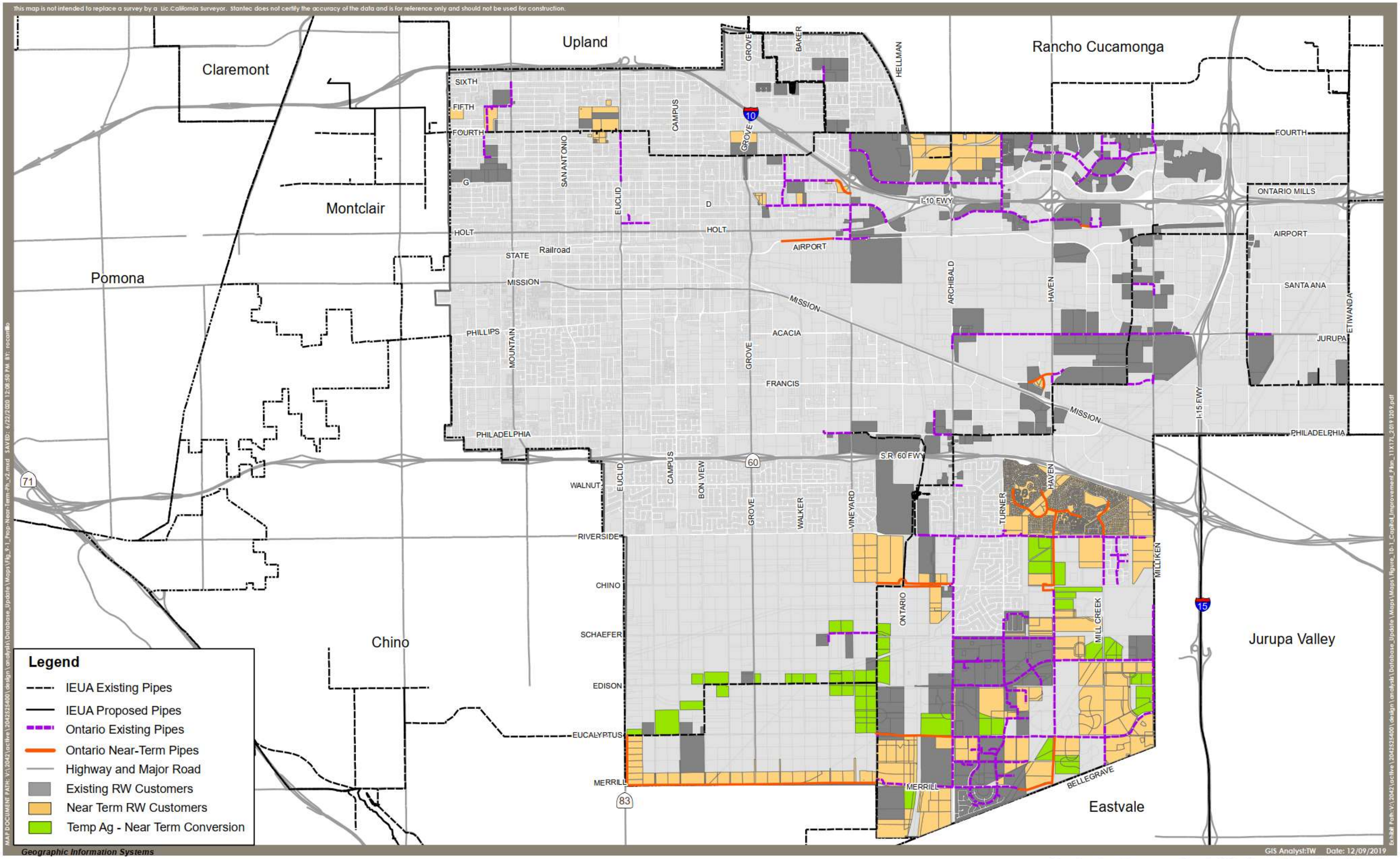

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Figure 9-1 Proposed Near Term Phase

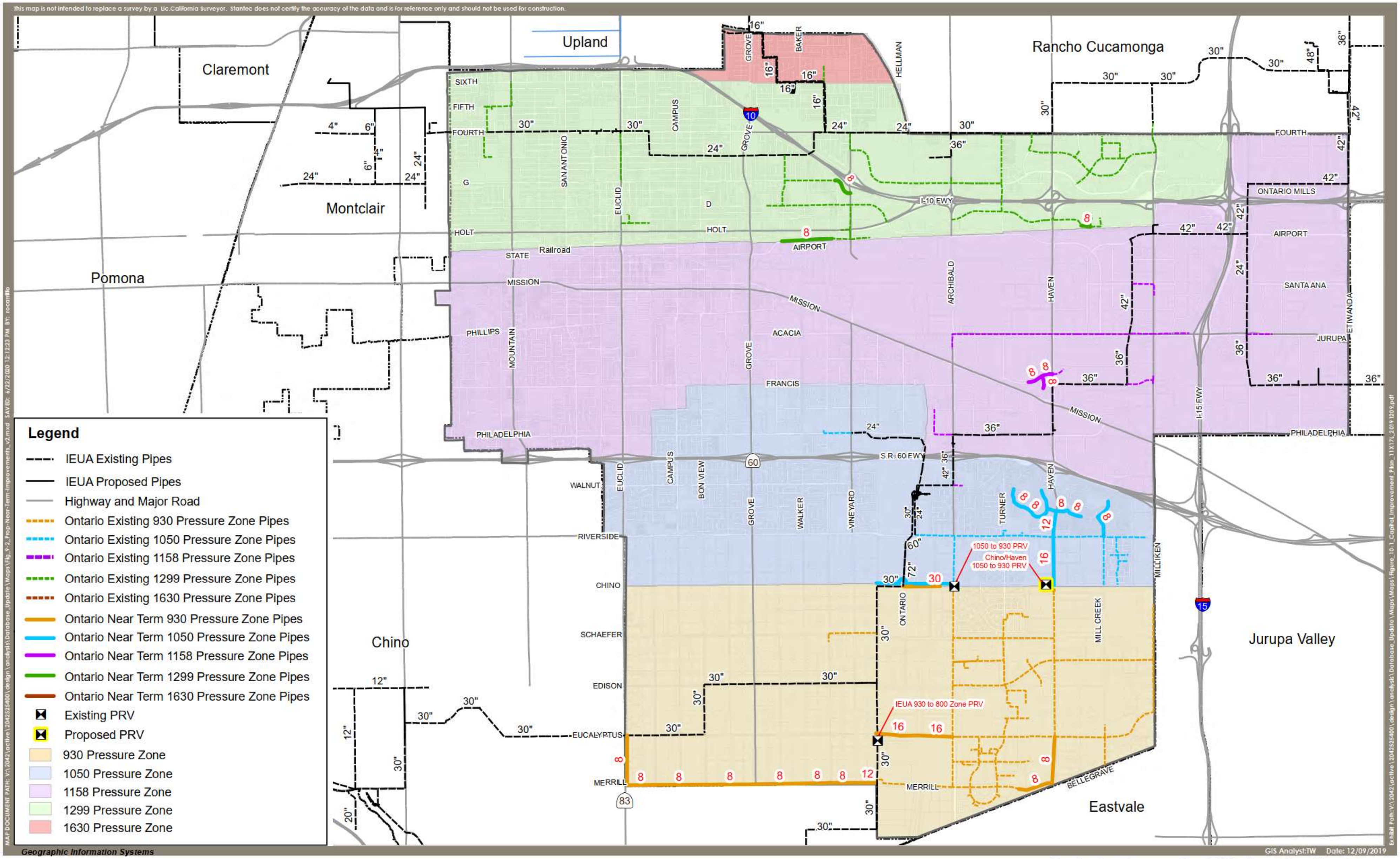

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Figure 9-2 Proposed Near Term Improvements

9.2 FUTURE HYDRAULIC MODEL ANALYSIS

The future phase areas consist of the following areas: all developments in the Ontario Ranch service area, parks and schools that can be converted, all agricultural land to be developed, and some large potable irrigation meters/users that can be converted to recycled water. Table 9-3 shows the maximum day demands for each pressure zone that were analyzed in the hydraulic model.

Table 9-3 Future Phase Maximum Day Demands by Pressure Zone

Pressure Zone	Maximum Daily Demand (MGD)	Maximum Day Flow Rate (gpm)
930	10.91	7,580
1050	3.02	2,202
1158	9.22	6,962
1299	4.55	3,156
Total	**27.70**	**19,900**

9.2.1 Future Regional 1158/1299 Zone IEUA Improvements

The Future phase for this study assumes that the proposed IEUA 1158/1299 Zone regional pipeline improvements, including the 1158 Zone storage tank and 1158 to 1299 Pump Station, as shown in the IEUA Recycled Water Program Strategy, are not constructed. The timing and reliance of these regional improvements are not certain, and therefore, the future planning horizon for this study assumes these IEUA regional facilities are not yet constructed.

9.2.2 Future 930 Zone Analysis

The 930 Zone Future phase assumes the Ontario Ranch development areas are built-out. The recycled water demands are primarily landscape irrigation with no agricultural uses. IEUA supply facilities from RP-1 and CCWRF are supplemented by the two City PRV stations located in Chino Avenue, as shown in Table 9-4 below.

Table 9-4 930 Zone Pressure Reducing Stations – Future

Pressure Reducing Station	Location	Modeled Downstream Setpoint	Modeled Peak Flow Rate
PR-1	Chino & Archibald	70	8,725 gpm
PR-2	Chino & Haven	55	885 gpm

9.2.3 Future 1050 Zone Analysis

The 1050 Zone Future expansion areas are west of South Vineyard Avenue, as shown in Figure 9-3. The demands for the 1050 Zone portion of the West Ontario Ranch will be met by new 8-inch, 12-inch, and

16-inch pipelines in Riverside Drive, and a new 8-inch pipeline in Chino Avenue. A new 16-inch diameter pipeline is proposed in Philadelphia and Bon View Avenue to support the proposed 1050 to 1158 Pump Station to serve the western portion of the 1158 Zone.

9.2.4 Future 1158 Zone Analysis

The Future 1158 Zone is proposed to be divided into two hydraulically separate pressure zones, the West 1158 Zone and the East 1158 Zone. The East 1158 Zone will be supplied by the IEUA RP-1 and RP-4 1158 Zone Effluent Pump Stations and 1158 Zone Storage Tank. The future pipeline expansion areas for the East 1158 Zone will be served by the existing IEUA 36-inch and 42-inch diameter pipelines, as shown in Figure 9-4.

The West 1158 Zone will be a closed-loop zone supplied by the proposed 1050 to 1158 Pump Station to be located at the southeast intersection of Bon View Avenue and Francis Street. A 16-inch diameter pipeline will then be routed from this pump station within Francis Street westerly to the intersection of Francis and Euclid Avenue. The proposed pump station is assumed to require VFD motors and equipped with three pumps: two-duty pumps and one-standby pump. The hydraulic parameters are described in Table 9-5 below.

Table 9-5 Future 1050 to West 1158 Zone Pump Station

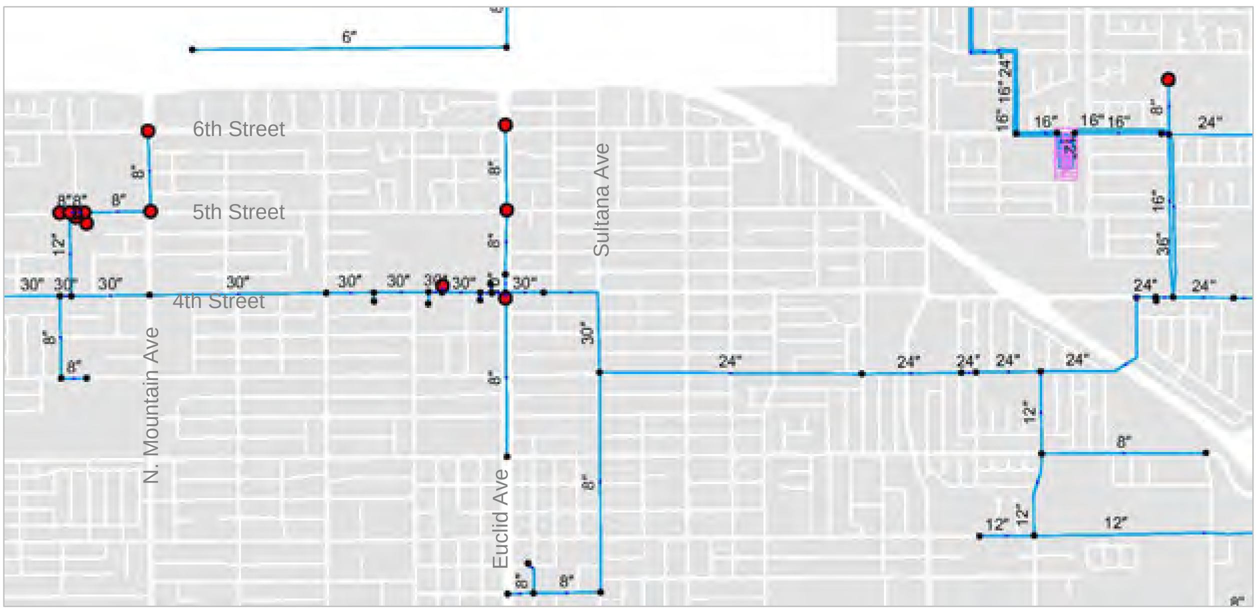
Description	Design Parameter
No. Pumps	2-Duty 1-Standby
Suction Pressure	70-75 psi
Discharge Pressure	118-126 psi
Peak Flowrate	1323 gpm
TDH (1)	115-ft
Approx. Motor HP-each	50 Hp

(1) TDH does not include internal pump station minor losses.

9.2.5 Future 1299 Zone Analysis

Within the City's distribution system, there are a few additional low-pressure demand locations in the western portion of the 1299 Zone than resulted from the Existing and Near-Term conditions analyses. These additional locations of pressures below the criteria are predicted by the model to be as low as between 35-48 psi north of 5th Street. Pressures that are only slightly below 50 psi along 4th Street are located on the City's laterals and are approximately 48-50 psi. The low pressures in this area are due to high ground elevations for the 1299 Zone. The pipeline velocities and supply sources for the pressure are within design criteria. The nodes with low pressures are indicated in red in the graphic below. To mitigate the low service pressures for these areas, an irrigation meter at the pump station is recommended.

Like the Existing and Near-Term analyses, demand nodes with pressure below the criteria are in the western portion of the 1299 Zone. These pressures are predicted by the model to be as low as between 35-48 psi between 5th Street and 6th Street from Elderberry Avenue to Mountain Avenue. The low pressures in this area are due to high ground elevations for the 1299 Zone. The pipeline velocities and supply sources for the pressure are within design criteria. The nodes with low pressures are indicated in red in the graphic below. Similar to the previous analyses, to mitigate the low service pressures an irrigation pump at the meter is recommended for this area.



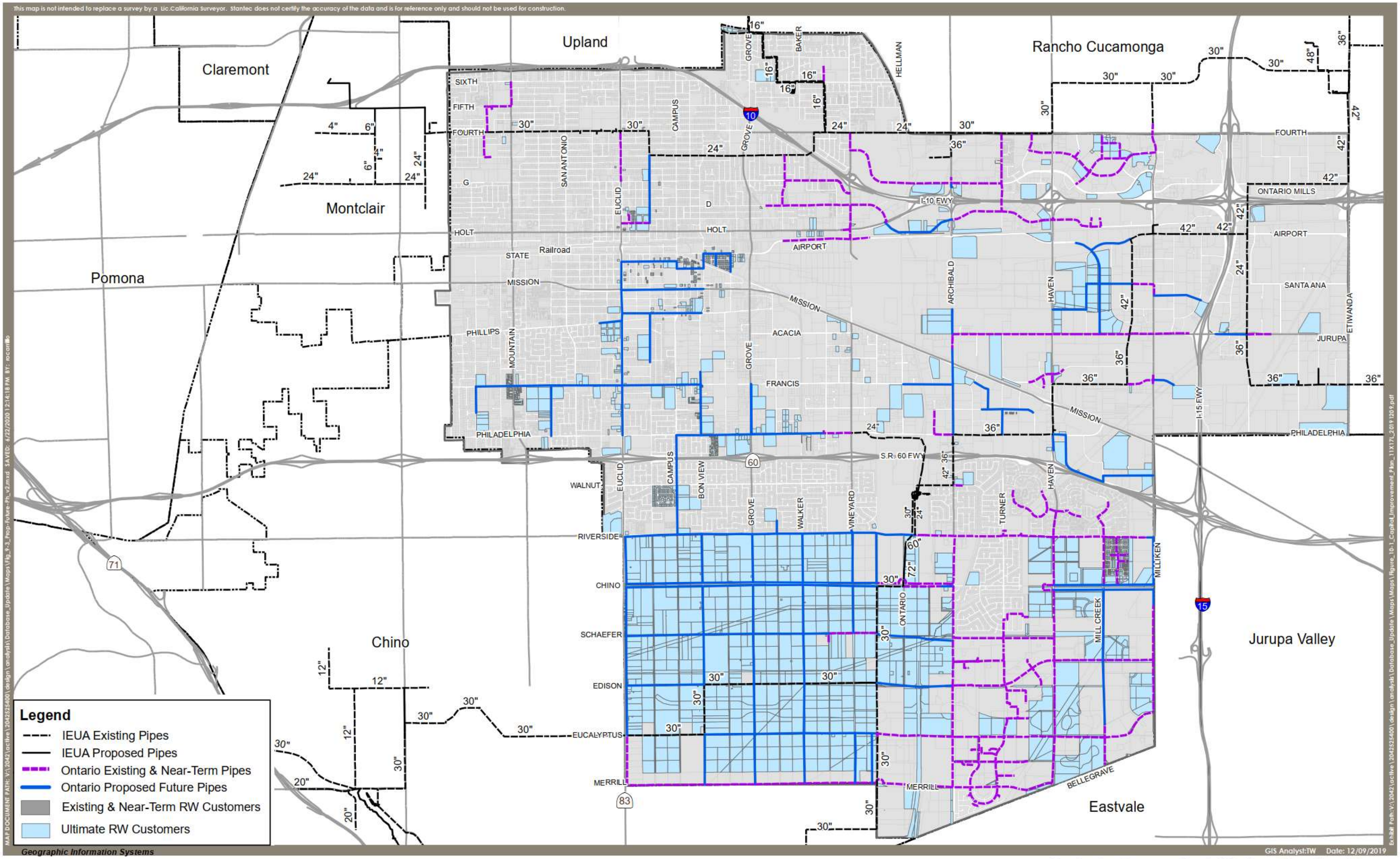


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Figure 9-3 Proposed Future Phase

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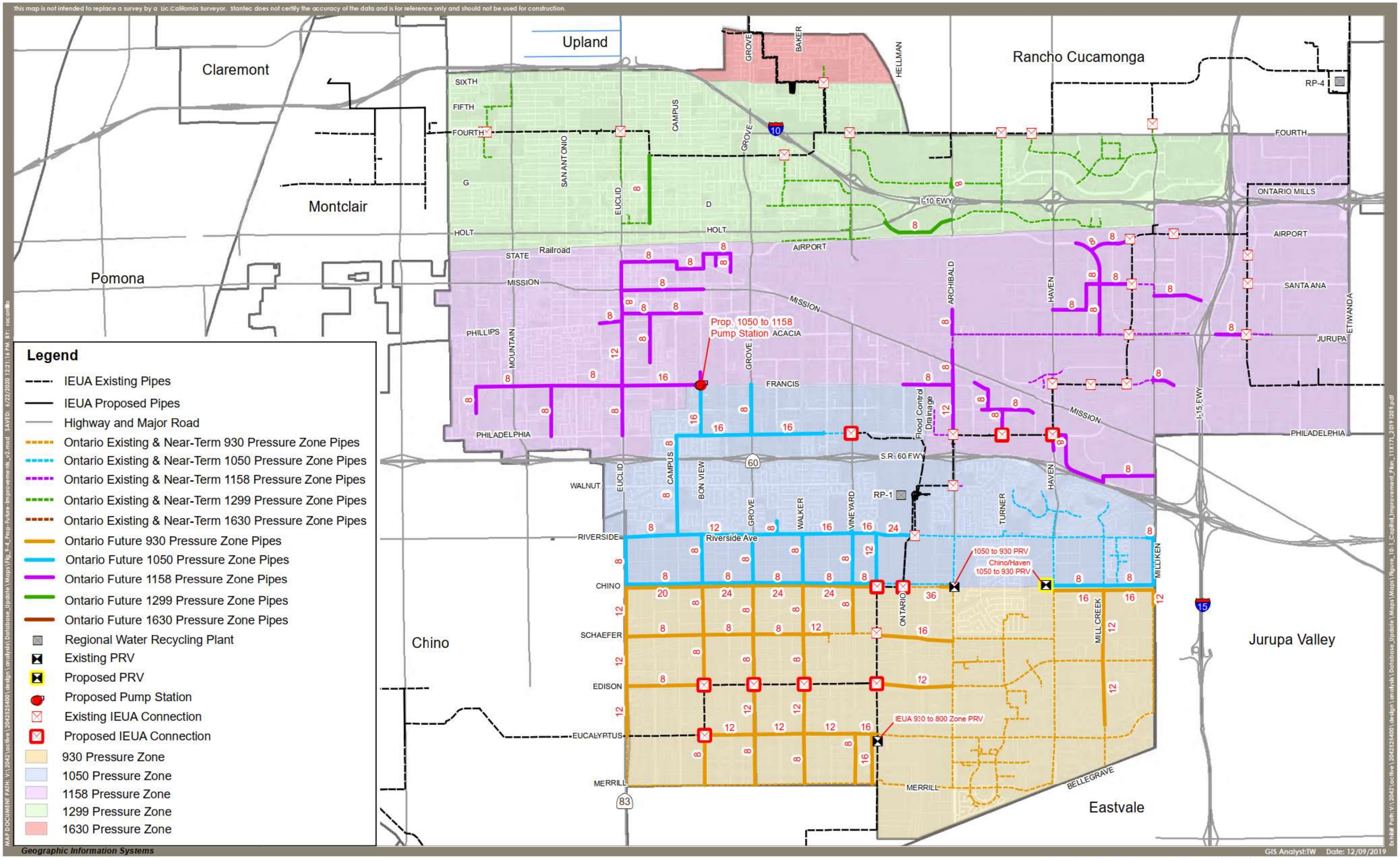

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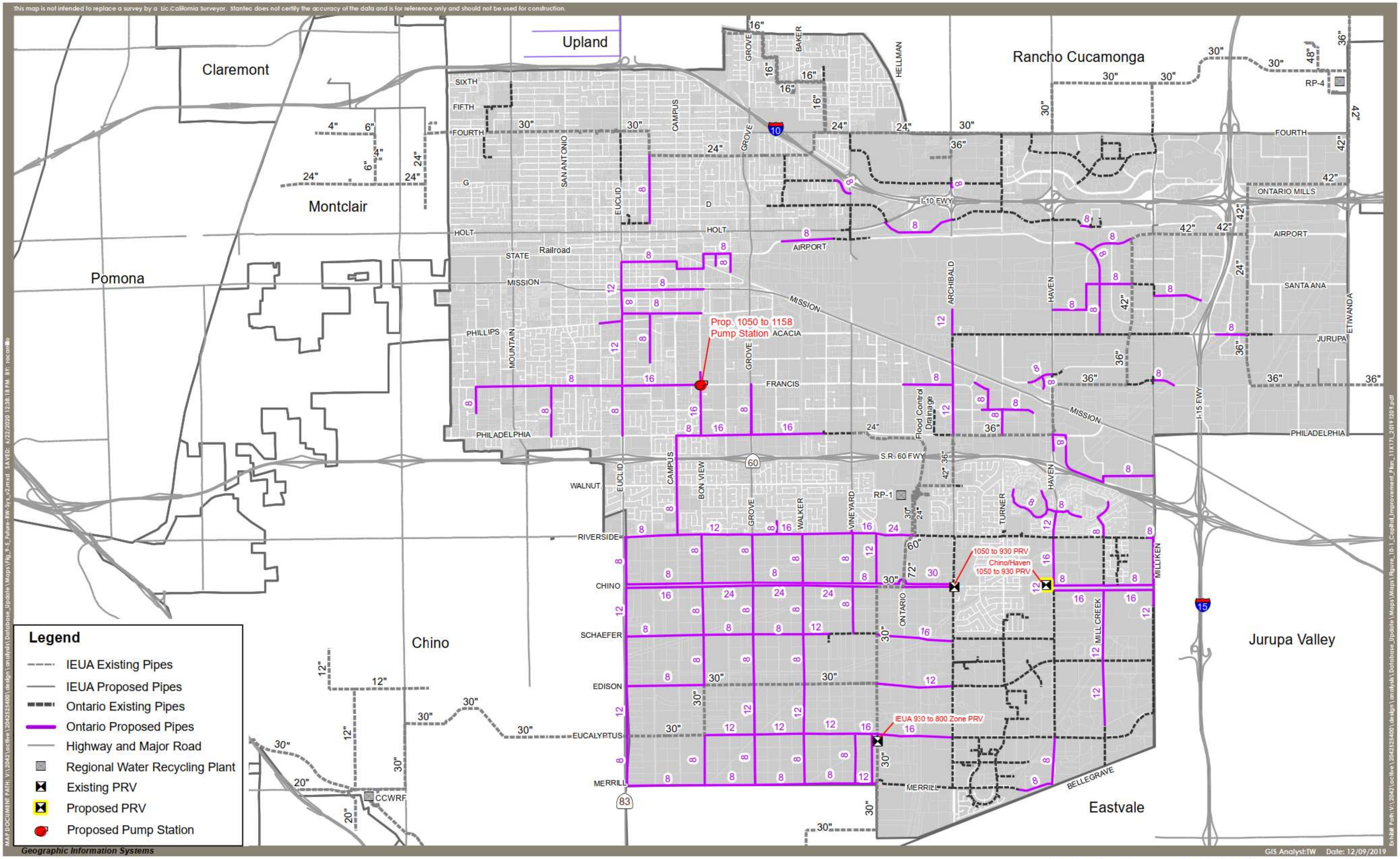
Figure 9-4 Future Recycled System Improvements



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Ontario Recycled Water Master Plan
Figure 9-5 Future Recycled Water System

9.3 STORAGE ANALYSIS

An investigation was performed to evaluate the potential need for future storage facilities to support the City's recycled water distribution system. Storage considerations were performed for only the Future system conditions and in addition to what is contained in the IEUA Recycled Water Program Strategy. Storage tanks are provided within IEUA's regional supply system that contain adequate storage for the direct recycled water use demands for each of the pressure zones. The hydraulic model analysis confirms that the future IEUA supply pumps and existing storage tanks have capacity for the projected maximum day demands proposed by this study.

The areas for any opportunity for storage would be the western portion of the 1299 and 1158 Zones. A storage tank in this area of the City may allow for increased demands in the system beyond what is projected by this Master Plan. A review of the potential for a storage tank to support the 1299 Zone shows that this would not be a feasible opportunity. The hydraulic model shows a storage tank located in the western portion of the 1299 Zone would not cycle appropriately and increase water quality concerns. In addition, a location would need to be located outside the City limits. Upon cursory review of the elevation contours required there is no suitable location for a new storage tank.

Storage tank locations for the 1158 and 1050 Zones would need to be far north from the existing and proposed pressure zone distribution systems requiring several miles of pipeline. Additionally, no suitable locations for storage tanks are available. The projected demands in these western areas have been planned so that the IEUA distribution system will be kept to a minimum of 50 psi without additional storage facilities.

9.4 COMPARISON TO 2012 RWMP

Some recommendations discussed in this report may differ from the 2012 RWMP. Table 9-6 compares the differences between the former and current RWMP and the reason for the updated recommendation.

Table 9-6 Comparison to 2012 RWMP

Description	Reasoning
Chino Ave between Archibald Ave and Haven Ave main removed for both Zone 930 and 1050	No RW demands along Chino Ave, Peak demand capacity to 930 Zone conveyed through PRV at Chino/Haven
Chino Ave between Haven Ave and Mill Creek Ave downsized to a 16-inch from a 20/24-inch main	Peak flow reduced due to less system demand and lower peaking factor
Chino Ave between Mill Creek Ave and Hamner Ave upsized to a 16-inch from a 12-inch main	To minimize headloss for system pressures above criteria
Merrill Ave between Baker Ave and Vineyard Ave downsized to an 8-inch from a 12-inch main	Peak flow reduced due to less system demand and lower peaking factor
Merrill Ave between Vineyard Ave and Carpenter Ave upsized to a 16-inch from a 12-inch main	Upsized to maintain pipe within velocity criteria due to peak flows in the area
Eucalyptus Ave between Baker Ave and Vineyard Ave upsized to a 12-inch from an 8-inch main	Upsized to maintain pipe within velocity criteria due to peak flows in the area
Euclid Ave OMC projects added	n/a

10.0 CAPITAL IMPROVEMENT PLAN

The proposed Capital Improvement Plan (CIP) assumes that the proposed improvements as described in Chapter 9, and shown in Figure 9-5, will be constructed in two primary phases: Near-Term and Future. The Near-Term phase assumes recycled water distribution system expansion through the next 5-years, to approximately Year 2025. The Future phase will be expansion projects to occur after Year 2025 and include the build-out of the Ontario Ranch developments and all potential conversion areas as described in this Recycled Water Master Plan.

10.1 NEAR-TERM

The Near-Term improvements and costs by pressure zone are shown in Table 10-1 below. For the Near-Term improvements, a total of 51,960 LF (9.84 miles) of pipeline is proposed ranging from 8-inch to 30-inch diameter pipe, including the proposed PRV station at Chino Avenue and Haven Avenue. The total Project CIP Costs include administrative, engineering and contingency costs at 35-percent of the construction cost estimates.

Table 10-1 Near-Term CIP Costs

CIP Project No.	Zone	Pipe Dia. (in)	Area	Ave Flow (gpm)	Peak Flow (gpm)	Length (LF)	Unit Cost ($/LF)	Project Const. Cost	Admin/ Eng/Conting Cost	Total CIP Costs
NT-100	930	8	Ontario Ranch	103	250	14,648	96.00	$1,406,208	$492,173	$1,898,381
NT-104	930	8	Ontario Ranch	70	201	4,274	96.00	$410,322	$143,613	$553,935
NT-105	930	12	Ontario Ranch	154	547	386	144.00	$55,540	$19,439	$74,980
NT-101	930	16	Ontario Ranch	335	936	3,979	192.00	$763,968	$267,389	$1,031,357
NT-103	930	16	Ontario Ranch	66	177	4,105	192.00	$788,160	$275,856	$1,064,016
NT-107	930	16	Ontario Ranch	154	547	564	192.00	$108,291	$37,902	$146,193
NT-114	930	30	Ontario Ranch	1859	4612	1,976	403.05	$796,309	$278,708	$1,075,017
Subtotal 930 Zone								$4,328,799	$1,515,080	$5,843,879
NT-110	1050	8	General City	83	246	2,967	144.48	$428,672	$150,035	$578,707
NT-111	1050	8	General City	83	246	1,033	144.48	$149,248	$52,237	$201,485
NT-112	1050	8	General City	65	192	1,408	144.48	$203,428	$71,200	$274,628
NT-113	1050	8	General City	82	241	2,194	144.48	$316,989	$110,946	$427,935
NT-116	1050	8	Ontario Ranch	98	291	4,280	96.00	$410,845	$143,796	$554,641
NT-108	1050	12	Ontario Ranch	154	547	527	144.00	$75,955	$26,584	$102,539
NT-109	1050	12	Ontario Ranch	312	901	2,572	144.00	$370,368	$129,629	$499,997
NT-109	1050	12	General City	312	901	1,846	216.72	$400,065	$140,023	$540,088
Subtotal 1050 Zone								$2,355,570	$824,449	$3,180,019
NT-119	1158	8	General City	19	55	1,379	144.48	$199,238	$69,733	$268,971
NT-120	1158	8	General City	12	37	671	144.48	$96,946	$33,931	$130,877
Subtotal 1158 Zone								$296,184	$103,664	$399,848
NT-121	1299	8	General City	5	16	2,654	144.48	$383,450	$134,207	$517,657
NT-124	1299	8	General City	23	67	497	144.48	$71,807	$25,132	$96,939
NT-125	1299	8	General City	9	27	1,150	144.48	$166,152	$58,153	$224,305
Subtotal 1299 Zone								$621,408	$217,493	$838,901
1050 to 930 Zone PRV at Chino & Haven								$600,000	$210,000	$810,000
Total Near-Term CIP Costs								**$8,201,961**	**$2,870,686**	**$11,072,648**

10.2 FUTURE PHASE

The Future phase improvements and costs by pressure zone are shown in Table 10-2. For the Future improvements, a total of 275,564 LF (52.19 miles) of pipeline is proposed ranging from 8-inch to 24-inch diameter pipe. The improvements listed for this phase are in addition to the improvement projects identified for the near-term phase improvements. Also, the proposed 1050 to 1158 Pump Station is included in the cost table. The total Project CIP Costs include administrative, engineering and contingency costs at 35-percent of the construction costs estimates.

Table 10-2 Future CIP Costs

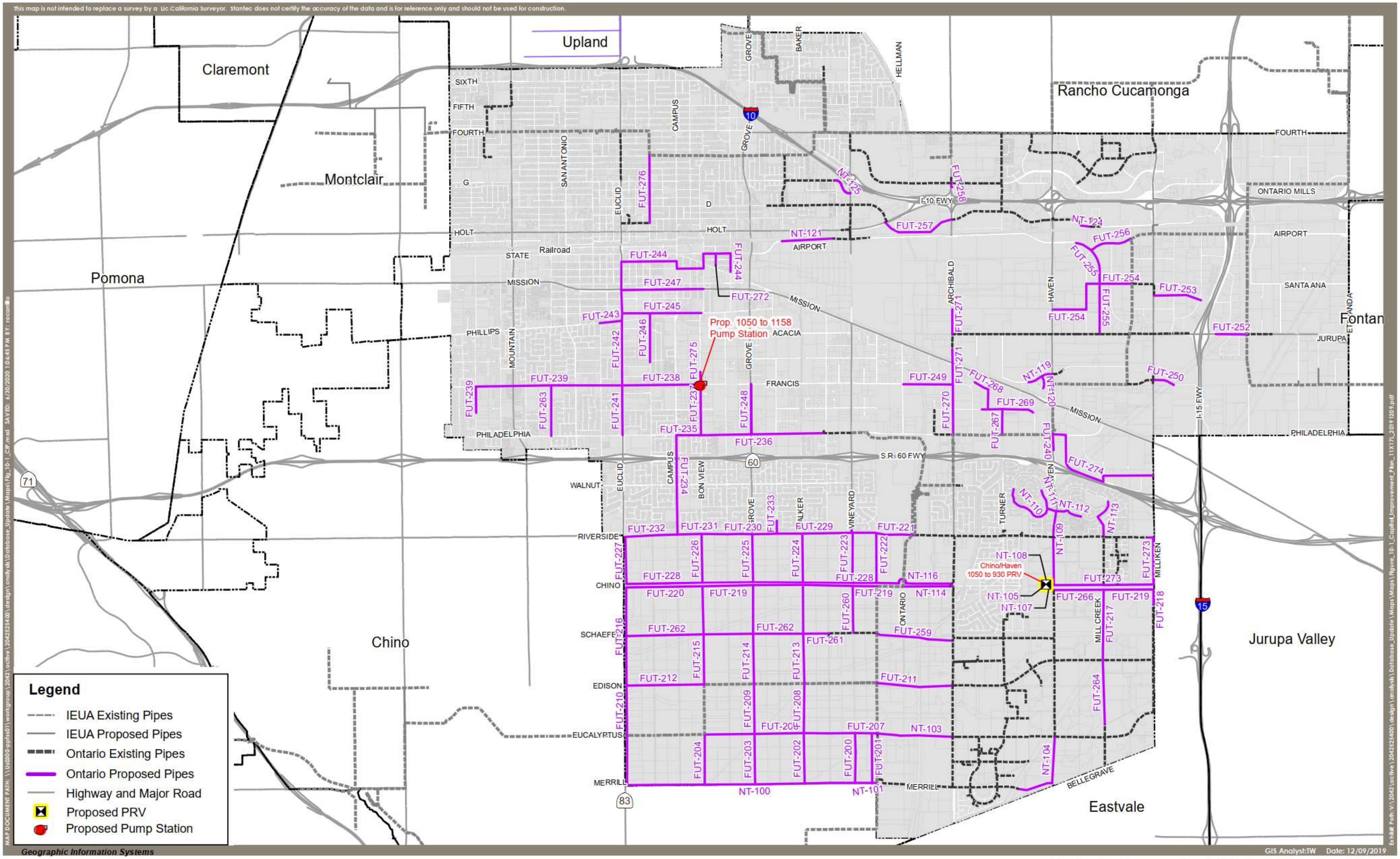
CIP Project No.	Zone	Pipe Dia. (in)	Area	Ave Flow (gpm)	Peak Flow (gpm)	Length (LF)	Unit Cost ($/LF)	Project Const. Cost	Admin/ Eng/Conting Cost	Total CIP Costs
FUT-200	930	8	Ontario Ranch	34	100	2,617	96.00	$251,232	$87,931	$339,163
FUT-202	930	8	Ontario Ranch	37	111	2,634	96.00	$252,864	$88,502	$341,366
FUT-203	930	8	Ontario Ranch	59	174	2,647	96.00	$254,112	$88,939	$343,051
FUT-204	930	8	Ontario Ranch	69	204	2,638	96.00	$253,248	$88,637	$341,885
FUT-212	930	8	Ontario Ranch	20	57	4,105	96.00	$394,080	$137,928	$532,008
FUT-213	930	8	Ontario Ranch	46	138	5,217	96.00	$500,792	$175,277	$676,070
FUT-214	930	8	Ontario Ranch	53	156	5,215	96.00	$500,607	$175,212	$675,819
FUT-215	930	8	Ontario Ranch	53	156	5,189	96.00	$498,169	$174,359	$672,528
FUT-260	930	8	Ontario Ranch	52	155	2,485	96.00	$238,541	$83,489	$322,030
FUT-262	930	8	Ontario Ranch	29	87	9,358	96.00	$898,368	$314,429	$1,212,797
FUT-206	930	12	Ontario Ranch	187	549	7,944	144.00	$1,143,936	$400,378	$1,544,314
FUT-208	930	12	Ontario Ranch	247	734	2,617	144.00	$376,848	$131,897	$508,745
FUT-209	930	12	Ontario Ranch	162	478	2,632	144.00	$379,008	$132,653	$511,661
FUT-210	930	12	Ontario Ranch	47	157	2,641	144.00	$380,304	$133,106	$513,410
FUT-211	930	12	Ontario Ranch	181	543	4,044	144.00	$582,336	$203,818	$786,154
FUT-216	930	12	Ontario Ranch	111	303	5,172	144.00	$744,840	$260,694	$1,005,533
FUT-217	930	12	Ontario Ranch	70	230	3,704	144.00	$533,324	$186,663	$719,987
FUT-218	930	12	Ontario Ranch	53	175	1,483	144.00	$213,552	$74,743	$288,295
FUT-261	930	12	Ontario Ranch	73	217	1,339	144.00	$192,816	$67,486	$260,302
FUT-264	930	12	Ontario Ranch	31	115	3,403	144.00	$490,032	$171,511	$661,543
FUT-201	930	16	Ontario Ranch	143	425	2,628	192.00	$504,576	$176,602	$681,178
FUT-207	930	16	Ontario Ranch	15	119	1,087	192.00	$208,792	$73,077	$281,869
FUT-220	930	16	Ontario Ranch	161	453	4,043	192.00	$776,256	$271,690	$1,047,946
FUT-259	930	16	Ontario Ranch	293	883	4,089	192.00	$785,088	$274,781	$1,059,869
FUT-266	930	16	Ontario Ranch	175	557	2,641	192.00	$507,147	$177,501	$684,648
FUT-219	930	24	Ontario Ranch	474	1379	11,820	331.56	$3,918,970	$1,371,639	$5,290,609
Subtotal 930 Zone								$15,779,837	$5,522,943	$21,302,780

CIP Project No.	Zone	Pipe Dia. (in)	Area	Ave Flow (gpm)	Peak Flow (gpm)	Length (LF)	Unit Cost ($/LF)	Project Const. Cost	Admin/ Eng/Conting Cost	Total CIP Costs
FUT-223	1050	8	Ontario Ranch	13	70	2,796	96.00	$268,450	$93,958	$362,408
FUT-224	1050	8	Ontario Ranch	13	50	2,575	96.00	$247,200	$86,520	$333,720
FUT-225	1050	8	Ontario Ranch	18	50	2,529	96.00	$242,784	$84,974	$327,758
FUT-226	1050	8	Ontario Ranch	14	44	2,567	96.00	$246,470	$86,264	$332,734
FUT-227	1050	8	Ontario Ranch	4	16	2,495	96.00	$239,543	$83,840	$323,383
FUT-228	1050	8	Ontario Ranch	28	76	13,210	96.00	$1,268,160	$443,856	$1,712,016
FUT-232	1050	8	Ontario Ranch	23	72	2,741	96.00	$263,136	$92,098	$355,234
FUT-273	1050	8	Ontario Ranch	31	95	8,078	96.00	$775,459	$271,411	$1,046,870
FUT-233	1050	8	General City	6	17	684	144.48	$98,824	$34,589	$133,413
FUT-234	1050	8	General City	39	172	5,239	144.48	$756,931	$264,926	$1,021,856
FUT-235	1050	8	General City	39	172	1,313	144.48	$189,702	$66,396	$256,098
FUT-222	1050	12	Ontario Ranch	48	262	2,630	144.00	$378,702	$132,546	$511,248
FUT-230	1050	12	Ontario Ranch	91	237	2,660	144.00	$382,990	$134,047	$517,037
FUT-231	1050	12	Ontario Ranch	69	168	1,295	144.00	$186,480	$65,268	$251,748
FUT-229	1050	16	Ontario Ranch	189	520	6,550	192.00	$1,257,623	$440,168	$1,697,791
FUT-236	1050	16	General City	272	836	6,492	288.96	$1,875,928	$656,575	$2,532,503
FUT-237	1050	16	General City	226	669	2,633	288.96	$760,832	$266,291	$1,027,123
FUT-221	1050	24	Ontario Ranch	238	762	2,061	331.56	$683,345	$239,171	$922,516
							Subtotal 1050 Zone	$10,122,560	$3,542,896	$13,665,456
FUT-239	1158	8	General City	30	283	9,103	144.48	$1,315,201	$460,321	$1,775,522
FUT-240	1158	8	General City	30	88	843	144.48	$121,797	$42,629	$164,425
FUT-241	1158	8	General City	4	13	2,638	144.48	$381,138	$133,398	$514,537
FUT-243	1158	8	General City	0	0	1,177	144.48	$170,053	$59,519	$229,571
FUT-244	1158	8	General City	24	71	10,636	144.48	$1,536,689	$537,841	$2,074,531
FUT-245	1158	8	General City	41	122	4,204	144.48	$607,394	$212,588	$819,982
FUT-246	1158	8	General City	23	68	2,593	144.48	$374,637	$131,123	$505,759
FUT-247	1158	8	General City	4	12	4,356	144.48	$629,355	$220,274	$849,629
FUT-249	1158	8	General City	93	276	2,635	144.48	$380,705	$133,247	$513,951
FUT-250	1158	8	General City	40	119	1,167	144.48	$168,608	$59,013	$227,621
FUT-252	1158	8	General City	0	0	1,641	144.48	$237,092	$82,982	$320,074
FUT-253	1158	8	General City	10	31	2,520	144.48	$364,090	$127,431	$491,521
FUT-254	1158	8	General City	347	618	5,533	144.48	$799,408	$279,793	$1,079,201
FUT-255	1158	8	General City	165	247	5,458	144.48	$788,572	$276,000	$1,064,572
FUT-256	1158	8	General City	132	477	2,221	144.48	$320,876	$112,306	$433,182
FUT-263	1158	8	General City	2	4	2,662	144.48	$384,606	$134,612	$519,218
FUT-267	1158	8	General City	33	96	2,426	144.48	$350,508	$122,678	$473,186

CIP Project No.	Zone	Pipe Dia. (in)	Area	Ave Flow (gpm)	Peak Flow (gpm)	Length (LF)	Unit Cost ($/LF)	Project Const. Cost	Admin/ Eng/Conting Cost	Total CIP Costs
FUT-268	1158	8	General City	31	92	1,866	144.48	$269,600	$94,360	$363,960
FUT-269	1158	8	General City	0	0	1,672	144.48	$241,571	$84,550	$326,120
FUT-272	1158	8	General City	0	0	625	144.48	$90,300	$31,605	$121,905
FUT-274	1158	8	General City	146	432	7,382	144.48	$1,066,551	$373,293	$1,439,844
FUT-242	1158	12	General City	90	268	3,788	216.72	$820,935	$287,327	$1,108,263
FUT-270	1158	12	General City	546	1328	2,641	216.72	$572,358	$200,325	$772,683
FUT-271	1158	12	General City	421	958	3,168	216.72	$686,569	$240,299	$926,868
FUT-238	1158	16	General City	211	623	4,152	288.96	$1,199,762	$419,917	$1,619,679
FUT-248	1158	16	General City	27	81	5,298	288.96	$1,530,770	$535,770	$2,066,540
FUT-275	1158	16	General City	223	661	813	288.96	$234,924	$82,224	$317,148
Subtotal 1158 Zone								$15,644,068	$5,475,424	$21,119,491
FUT-257	1299	8	General City	184	119	3,929	144.48	$567,662	$198,682	$766,344
FUT-276	1299	8	General City	11	34	5,063	144.48	$731,502	$256,026	$987,528
FUT-258	1299	16	General City	91	237	264	288.96	$76,213	$26,675	$102,888
Subtotal 1299 Zone								$1,375,377	$481,382	$1,856,760
1050 to West 1158 Pump Station								$1,500,000	$525,000	$2,025,000
Total Near-Term CIP Costs								**$44,324,082**	**$15,513,429**	**$59,837,510**

Table 10-3 Summary of CIP Costs

Phase	Pressure Zone	Total Project CIP Costs
Near-Term	930	$5,843,879
	1050	$3,180,019
	1158	$399,848
	1299	$838,901
	PRV	$810,000
	Subtotal Near-Term	**$11,072,647**
Future	930	$21,170,803
	1050	$13,665,456
	1158	$21,119,491
	1299	$1,856,760
	Pump Station	$2,025,000
	Subtotal Future	**$59,837,510**
Total CIP		**$70,910,157**



Stantec

38 Technology Drive, Irvine, CA 92618
Phone 949.923.6000 www.stantec.com

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Ontario Recycled Water Master Plan

Figure 10-1 Capital Improvement Plan

11.0 REFERENCES

Previous studies for the recycled water system are:

- Ontario Recycled Water Pipeline Project: *Pipeline Sizing Memo* by Michael Baker, July 2016
- Ultimate City-Wide Water Demand Estimate Memo by AKM, May 2016
- Inland Empire Utilities Agency (IEUA) Recycled Water Program Strategy (RWPS), October 2015
- Study of Recycled Water Pressure Zone 930 (Elimination of pipe in Chino Ave) by AKM, April 2014
- City of Ontario Recycled Water Master Plan, April 2012

Reference documents for this report are as follows.

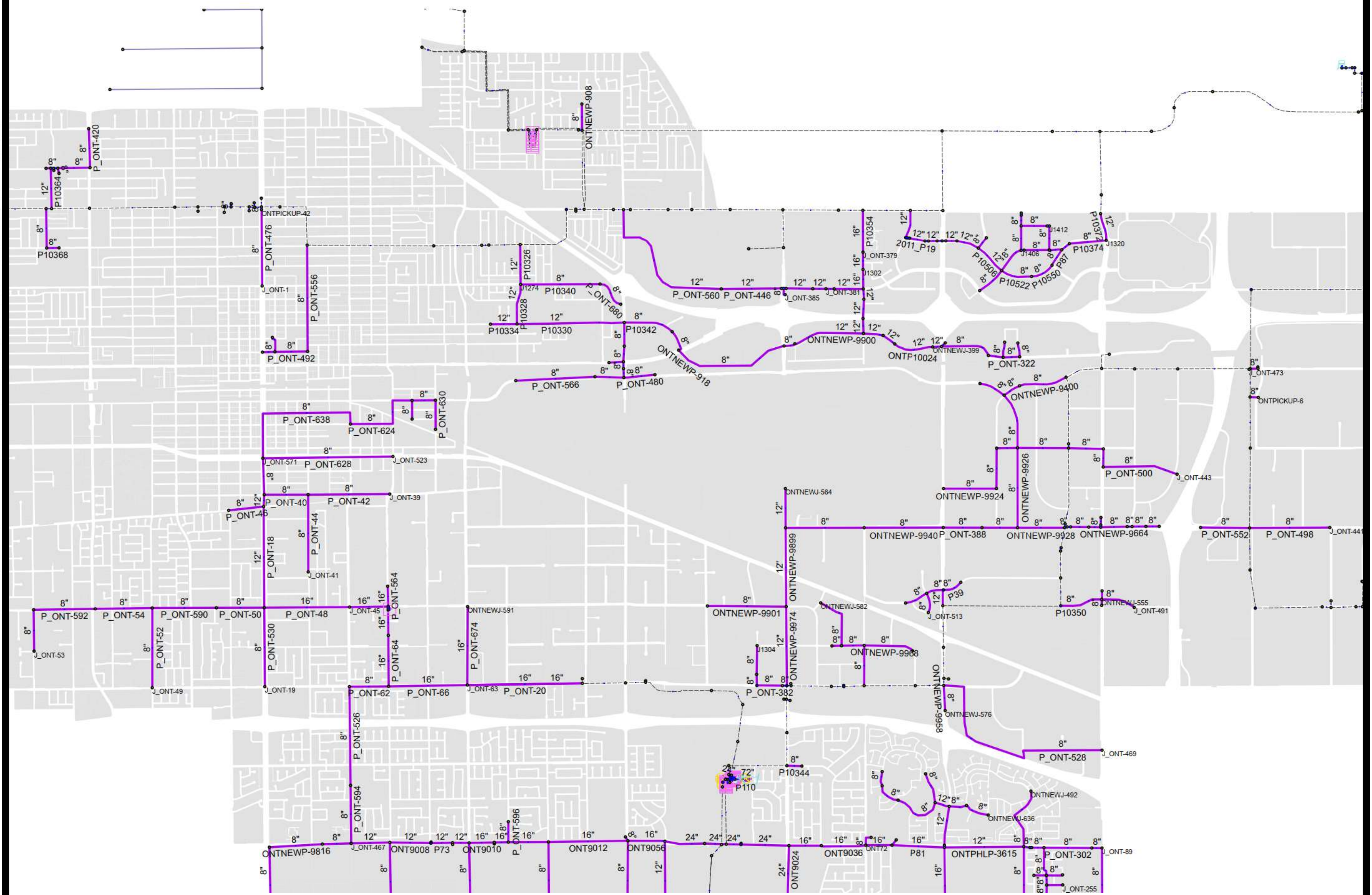
- The Ontario Plan (General Plan), February 2010
- California Code of Regulations Title 14 and Title 17

InfoWater 12.4 is used to conduct the analysis. Data sources are shown below.

- Existing Recycled Water Customer Billing Data from 2009 to 2018.
- Demand Factors and Demand Pattern from Ultimate City-Wide Water Demand Estimate Memo (AKM, May 2016) and IEUA Recycled Water Program Strategy, October 2015.
- GIS data provided by the City of Ontario:
    - Land use data received on October 31, 2018.
    - Recycled water system data received on October 31st, 2018, which included recycled water mains, laterals, system valves, hydrants, meters, active recycled water meters with customer data, geocode points locations of active meters, parcel data, and street centerlines.
    - Recycled water meter locations, received on November 1, 2018.

APPENDIX A

MODEL DATA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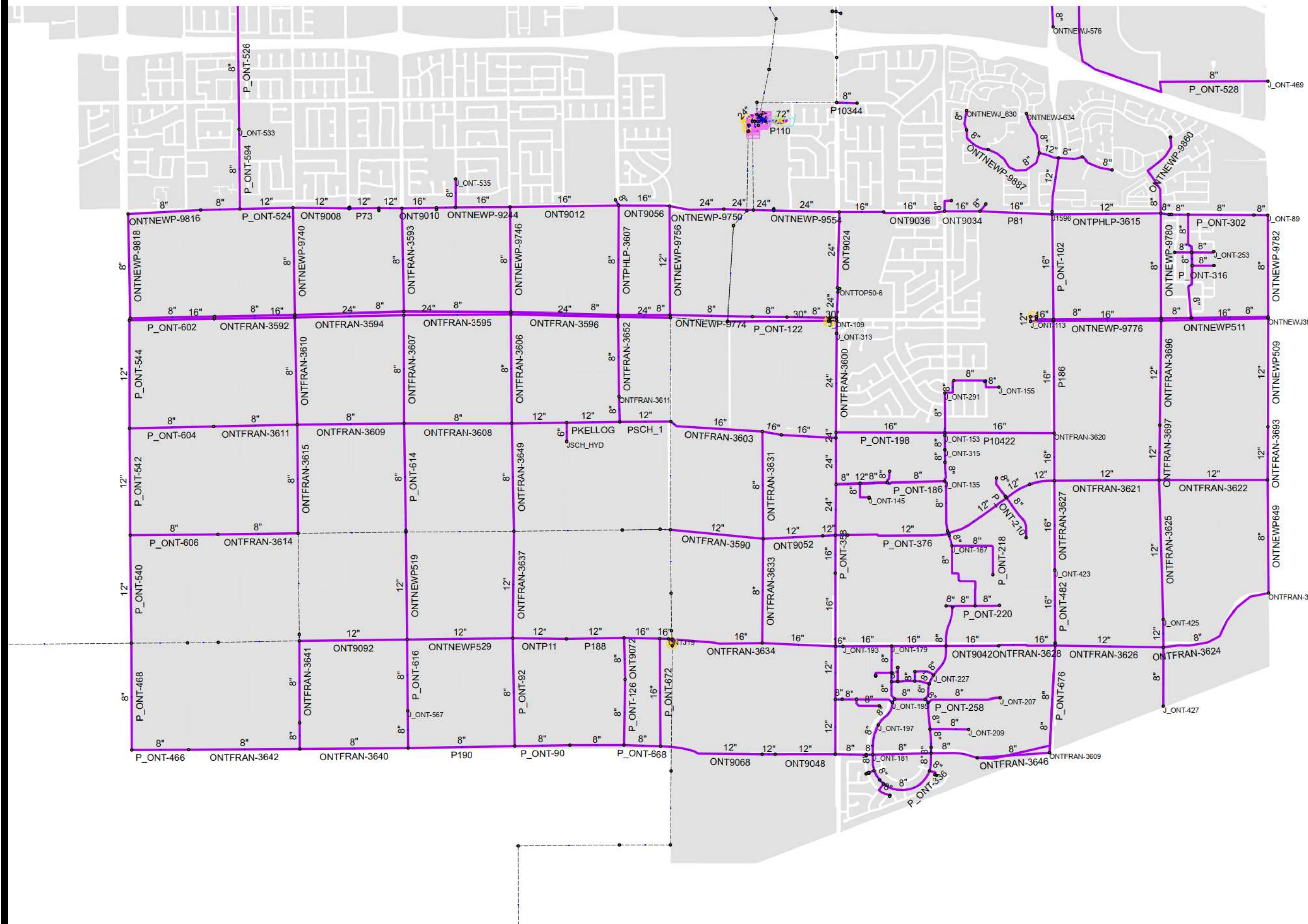
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Existing Model Scenario

Existing Scenario - City of Ontario - Junction Elevations and Zone

		ID (Char)	Zone (Char)	Elevation (ft)
1		J1272	1299	995.00
2		J1274	1299	1,015.00
3		J1276	1299	984.00
4		J1280	1299	997.00
5		J1288	1299	1,006.00
6		J1290	1299	967.00
7		J1292	1158	803.00
8		J1294	1158	873.00
9		J1296	1158	892.00
10		J1302	1299	1,005.00
11		J1304	1158	845.00
12		J1308	1299	1,010.00
13		J1314	1299	1,063.00
14		J1316	1299	1,063.00
15		J1320	1299	1,022.00
16		J1322	1299	998.50
17		J1324	1299	998.50
18		J1404	1299	1,005.00
19		J1406	1299	1,014.00
20		J1408	1299	1,029.00
21		J1410	1299	1,022.00
22		J1412	1299	1,022.00
23		J1414	1299	1,012.50
24		J1416	1299	994.50
25		J1586	1299	1,111.00
26		J1592	1299	970.00
27		J1596	1050	790.80
28		JKELLOG	930	722.50
29		JSCH_HYD	930	722.50
30		J_ONT-103	1050	752.33
31		J_ONT-105	930	752.33
32		J_ONT-107	1050	752.33
33		J_ONT-109	930	752.33
34		J_ONT-133	930	718.23
35		J_ONT-135	930	730.00
36		J_ONT-137	930	722.00
37		J_ONT-139	930	720.00
38		J_ONT-141	930	717.00
39		J_ONT-143	930	725.00
40		J_ONT-145	930	717.00
41		J_ONT-147	930	716.00
42		J_ONT-149	930	715.00
43		J_ONT-151	930	740.26
44		J_ONT-153	930	740.00
45		J_ONT-155	930	757.00
46		J_ONT-157	930	728.00
47		J_ONT-159	930	739.00
48		J_ONT-161	930	720.00
49		J_ONT-163	930	714.00
50		J_ONT-165	930	699.00
51		J_ONT-167	930	714.00

Existing Scenario - City of Ontario - Junction Elevations and Zone

		ID (Char)	Zone (Char)	Elevation (ft)
52	☐	J_ONT-169	930	710.00
53	☐	J_ONT-171	930	700.00
54	☐	J_ONT-173	930	696.00
55	☐	J_ONT-175	930	695.00
56	☐	J_ONT-177	930	690.26
57	☐	J_ONT-179	930	686.77
58	☐	J_ONT-181	930	662.11
59	☐	J_ONT-185	930	667.75
60	☐	J_ONT-187	930	662.97
61	☐	J_ONT-189	930	652.00
62	☐	J_ONT-191	930	652.00
63	☐	J_ONT-193	930	683.62
64	☐	J_ONT-195	930	670.00
65	☐	J_ONT-197	930	665.00
66	☐	J_ONT-199	930	668.00
67	☐	J_ONT-201	930	673.00
68	☐	J_ONT-203	930	676.00
69	☐	J_ONT-205	930	677.00
70	☐	J_ONT-207	930	683.00
71	☐	J_ONT-209	930	676.00
72	☐	J_ONT-211	930	671.02
73	☐	J_ONT-213	930	667.00
74	☐	J_ONT-215	930	669.00
75	☐	J_ONT-217	930	669.00
76	☐	J_ONT-219	930	670.00
77	☐	J_ONT-221	930	675.00
78	☐	J_ONT-223	930	679.00
79	☐	J_ONT-225	930	680.00
80	☐	J_ONT-227	930	685.00
81	☐	J_ONT-229	930	677.00
82	☐	J_ONT-231	930	677.00
83	☐	J_ONT-233	930	675.00
84	☐	J_ONT-235	930	678.00
85	☐	J_ONT-237	930	673.00
86	☐	J_ONT-239	1050	798.05
87	☐	J_ONT-243	1050	775.00
88	☐	J_ONT-247	1050	795.00
89	☐	J_ONT-249	1050	785.00
90	☐	J_ONT-251	1050	791.00
91	☐	J_ONT-253	1050	800.00
92	☐	J_ONT-255	1050	795.00
93	☐	J_ONT-265	930	662.00
94	☐	J_ONT-267	930	672.50
95	☐	J_ONT-271	930	662.00
96	☐	J_ONT-273	930	666.81
97	☐	J_ONT-275	930	663.85
98	☐	J_ONT-277	930	654.00
99	☐	J_ONT-279	930	654.00
100	☐	J_ONT-281	930	654.00
101	☐	J_ONT-283	930	658.00
102	☐	J_ONT-285	930	661.00

Existing Scenario - City of Ontario - Junction Elevations and Zone

		ID (Char)	Zone (Char)	Elevation (ft)
103		J_ONT-287	930	661.00
104		J_ONT-289	930	730.83
105		J_ONT-291	930	748.00
106		J_ONT-295	930	754.00
107		J_ONT-297	930	755.00
108		J_ONT-299	930	755.00
109		J_ONT-301	930	698.61
110		J_ONT-313	930	750.65
111		J_ONT-315	930	737.00
112		J_ONT-317	930	735.00
113		J_ONT-321	930	630.05
114		J_ONT-325	930	663.56
115		J_ONT-333	1158	898.39
116		J_ONT-341	1158	897.00
117		J_ONT-343	1158	897.00
118		J_ONT-351	1158	905.98
119		J_ONT-357	1158	907.23
120		J_ONT-359	1299	1,125.73
121		J_ONT-361	1299	1,022.00
122		J_ONT-363	1299	1,027.86
123		J_ONT-365	1299	1,013.84
124		J_ONT-367	1299	1,015.12
125		J_ONT-369	1299	1,020.00
126		J_ONT-371	1299	1,020.00
127		J_ONT-373	1299	1,012.03
128		J_ONT-377	1299	975.08
129		J_ONT-379	1299	1,012.28
130		J_ONT-381	1299	990.66
131		J_ONT-383	1299	988.07
132		J_ONT-387	1299	979.36
133		J_ONT-399	1299	967.15
134		J_ONT-401	1299	975.71
135		J_ONT-403	1299	972.20
136		J_ONT-407	1299	970.00
137		J_ONT-421	1299	962.00
138		J_ONT-423	930	717.61
139		J_ONT-425	930	699.76
140		J_ONT-427	930	699.76
141		J_ONT-473	1158	973.90
142		J_ONT-477	1299	983.86
143		J_ONT-507	1299	1,020.00
144		J_ONT-509	1299	1,010.42
145		J_ONT-511	1299	1,010.97
146		J_ONT-537	930	706.89
147		J_ONT-569	930	653.59
148		J_ONT-609	930	665.39
149		ONT66	1050	780.00
150		ONT68	1050	787.87
151		ONT72	1050	786.40
152		ONT76	930	694.43
153		ONTFRAN-3581	930	728.00

Existing Scenario - City of Ontario - Junction Elevations and Zone

		ID (Char)	Zone (Char)	Elevation (ft)
154		ONTFRAN-3583	930	723.56
155		ONTFRAN-3591	930	706.58
156		ONTFRAN-3592	930	725.00
157		ONTFRAN-3593	930	730.70
158		ONTFRAN-3594	930	731.73
159		ONTFRAN-3595	930	737.21
160		ONTFRAN-3596	930	706.61
161		ONTFRAN-3597	930	699.76
162		ONTFRAN-3598	930	706.52
163		ONTFRAN-3599	930	683.13
164		ONTFRAN-3608	930	658.46
165		ONTFRAN-3620	930	750.00
166		ONTFRAN-3622	930	750.00
167		ONTFRAN-3626	930	730.63
168		ONTJ114	1158	832.20
169		ONTNEWJ-198	1299	1,141.76
170		ONTNEWJ-212	1050	798.63
171		ONTNEWJ-214	1050	795.78
172		ONTNEWJ-224	1050	761.30
173		ONTNEWJ-262	1299	1,112.46
174		ONTNEWJ-278	1299	983.47
175		ONTNEWJ-322	1299	1,112.00
176		ONTNEWJ-340	1050	777.10
177		ONTNEWJ-354	1050	798.84
178		ONTNEWJ-356	1050	773.92
179		ONTNEWJ-378	1158	905.98
180		ONTNEWJ-398	1299	966.59
181		ONTNEWJ-399	1299	966.59
182		ONTNEWJ-432	1050	753.22
183		ONTNEWJ-438	1050	768.76
184		ONTNEWJ-470	1299	1,005.00
185		ONTNEWJ-478	1299	1,002.83
186		ONTNEWJ-482	1299	988.07
187		ONTNEWJ-500	1050	790.00
188		ONTNEWJ-510	1299	962.00
189		ONTNEWJ-516	1299	969.00
190		ONTNEWJ-520	1299	998.00
191		ONTNEWJ-522	1299	977.00
192		ONTNEWJ-526	1299	967.00
193		ONTNEWJ-528	1299	970.00
194		ONTNEWJ-550	1158	896.00
195		ONTNEWJ-554	1158	901.00
196		ONTNEWJ-555	1158	880.00
197		ONTNEWJ-556	1158	870.00
198		ONTNEWJ-560	1158	883.00
199		ONTNEWJ-562	1158	895.00
200		ONTNEWJ-568	1158	915.00
201		ONTNEWJ-598	1299	995.00
202		ONTNEWJ-622	1299	1,110.00
203		ONTNEWJ-640	1299	1,020.00
204		ONTNEWJ-646	1299	1,020.00

Existing Scenario - City of Ontario - Junction Elevations and Zone

		ID (Char)	Zone (Char)	Elevation (ft)
205		ONTNEWJ-908	1299	1,099.00
206		ONTNEWJ-910	1299	967.00
207		ONTNEWJ-914	1299	992.50
208		ONTNEWJ-934	1158	936.00
209		ONTNEWJ-936	1158	934.00
210		ONTNEWJ-950	1299	1,020.00
211		ONTNEWJ402	930	652.53
212		ONTPHLP-3606	930	753.22
213		ONTPHLP-3610	1050	799.50
214		ONTPICKUP-12	1050	760.27
215		ONTPICKUP-14	1050	777.77
216		ONTPICKUP-17	1050	790.00
217		ONTPICKUP-30	1158	835.00
218		ONTPICKUP-32	1158	925.00
219		ONTPICKUP-51	1299	1,110.62
220		ONTPICKUP-68	1299	968.54
221		ONTPICKUP-71	1158	907.45
222		ONTPICKUP-72	1299	1,094.10
223		ONTTOP50-15	1299	979.36
224		ONTTOP50-18	1299	988.07
225		ONTTOP50-22	1299	973.68
226		ONTTOP50-40	1299	1,109.15
227		ONTTOP50-48	1158	877.76
228		ONTTOP50-6	1050	761.11

Existing Scenario - City of Ontario - Junction Input Data

* EXISTING_MDD *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Demand 2	Pattern 2 (Char)	Demand 3 (gpm)	Pattern 3 (Char)	Demand 4
1		J1272	23.58	LANDSCAPE_IRR	0.00		0.00		0.00
2		J1274	52.34	LANDSCAPE_IRR	0.00		0.00		0.00
3		J1276	3.10	IND					
4		J1280	4.26		8.52	LANDSCAPE_IRR	24.92	LANDSCAPE_IRR	0.00
5		J1288	3.90	LANDSCAPE_IRR	0.00		0.00		0.00
6		J1290	5.98	LANDSCAPE_IRR			0.00		0.00
7		J1292	5.68	LANDSCAPE_IRR	0.00		0.00		0.00
8		J1294	12.50	LANDSCAPE_IRR	9.40	LANDSCAPE_IRR	2.72	LANDSCAPE_IRR	3.38
9		J1296	8.96	IND	6.92	IND	11.98	LANDSCAPE_IRR	16.24
10		J1302	8.76	LANDSCAPE_IRR			0.00		0.00
11		J1304	15.23	IND	10.94	IND	0.00		0.00
12		J1308	5.92	LANDSCAPE_IRR			0.00		0.00
13		J1314	20.44	LANDSCAPE_IRR	0.00		0.00		0.00
14		J1316	231.50	LANDSCAPE_IRR	0.00		0.00		0.00
15		J1320	9.32	LANDSCAPE_IRR	2.80	LANDSCAPE_IRR			0.00
16		J1322	10.48	LANDSCAPE_IRR	0.00		0.00		0.00
17		J1324	58.95	LANDSCAPE_IRR	8.34	LANDSCAPE_IRR	3.30	LANDSCAPE_IRR	3.30
18		J1404	21.29	LANDSCAPE_IRR	11.02	LANDSCAPE_IRR	5.34	LANDSCAPE_IRR	0.00
19		J1406	41.69	LANDSCAPE_IRR	50.38	LANDSCAPE_IRR	23.54	LANDSCAPE_IRR	
20		J1408	9.28	LANDSCAPE_IRR	3.56	LANDSCAPE_IRR	0.42	LANDSCAPE_IRR	12.82
21		J1410							
22		J1412	9.22	LANDSCAPE_IRR			0.00		0.00
23		J1414	0.00		0.00		0.00		0.00
24		J1416	61.65	LANDSCAPE_IRR	13.78	LANDSCAPE_IRR	0.00		0.00
25		J1586	0.00		0.00		0.00		0.00
26		J1592	3.21	LANDSCAPE_IRR	0.22	LANDSCAPE_IRR			
27		J1596	0.00		0.00		0.00		0.00
28		JKELLOG	0.02	AGRICULTURAL	0.00		0.00		0.00
29		JSCH_HYD	0.00		0.00		0.00		0.00
30		J_ONT-103	0.00		0.00		0.00		0.00
31		J_ONT-105	0.00		0.00		0.00		0.00
32		J_ONT-107	0.00		0.00		0.00		0.00
33		J_ONT-109	0.00		0.00		0.00		0.00
34		J_ONT-133	2.42	AGRICULTURAL	0.00		0.00		0.00
35		J_ONT-135	6.36	LANDSCAPE_IRR					0.00
36		J_ONT-137	0.00		0.00		0.00		0.00
37		J_ONT-139	0.00		0.00		0.00		0.00
38		J_ONT-141	0.00		0.00		0.00		0.00
39		J_ONT-143	43.42	AGRICULTURAL	0.00		0.00		0.00
40		J_ONT-145	0.00		0.00		0.00		0.00
41		J_ONT-147	11.40	LANDSCAPE_IRR			0.00		0.00
42		J_ONT-149	4.95	AGRICULTURAL	7.22	LANDSCAPE_IRR	0.00		0.00
43		J_ONT-151	3.41	LANDSCAPE_IRR	1.58	LANDSCAPE_IRR	0.00		0.00
44		J_ONT-153	0.00		0.00		0.00		0.00
45		J_ONT-155	0.00		0.00		0.00		0.00
46		J_ONT-157	3.21	LANDSCAPE_IRR	5.18	LANDSCAPE_IRR	1.76	LANDSCAPE_IRR	1.64
47		J_ONT-159	7.62	LANDSCAPE_IRR	4.86	LANDSCAPE_IRR	0.53	LANDSCAPE_IRR	3.25
48		J_ONT-161	0.00		0.00		0.00		0.00
49		J_ONT-163	0.00		0.00		0.00		0.00
50		J_ONT-165	0.26	AGRICULTURAL			0.00		0.00
51		J_ONT-167			0.00		0.00		0.00
52		J_ONT-169	0.20	AGRICULTURAL	0.00		0.00		0.00
53		J_ONT-171	0.00		0.00		0.00		0.00
54		J_ONT-173	0.00		0.00		0.00		0.00
55		J_ONT-175	0.00		0.00		0.00		0.00
56		J_ONT-177	0.00		0.00		0.00		0.00
57		J_ONT-179	0.00		0.00		0.00		0.00

Existing Scenario - City of Ontario - Junction Input Data

* EXISTING_MDD *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Demand 2	Pattern 2 (Char)	Demand 3 (gpm)	Pattern 3 (Char)	Demand 4
58		J_ONT-181	7.73	LANDSCAPE_IRR	7.90	LANDSCAPE_IRR	32.92	LANDSCAPE_IRR	14.34
59		J_ONT-185	0.00		0.00		0.00		0.00
60		J_ONT-187	0.00		0.00		0.00		0.00
61		J_ONT-189	0.00		0.00		0.00		0.00
62		J_ONT-191	9.38	LANDSCAPE_IRR	0.00		0.00		0.00
63		J_ONT-193	0.00		0.00		0.00		0.00
64		J_ONT-195	0.00		0.00		0.00		0.00
65		J_ONT-197	0.53	AGRICULTURAL	0.82	AGRICULTURAL	0.00		0.00
66		J_ONT-199	0.00		0.00		0.00		0.00
67		J_ONT-201	0.00		0.00		0.00		0.00
68		J_ONT-203	0.00		0.00		0.00		0.00
69		J_ONT-205	1.84	AGRICULTURAL	0.00		0.00		0.00
70		J_ONT-207	0.00		0.00		0.00		0.00
71		J_ONT-209	0.24	AGRICULTURAL	0.48	AGRICULTURAL	0.76	AGRICULTURAL	0.00
72		J_ONT-211	391.86	AGRICULTURAL	0.00		0.00		0.00
73		J_ONT-213	10.17	AGRICULTURAL	8.54	AGRICULTURAL	0.00		0.00
74		J_ONT-215	0.20	AGRICULTURAL	0.00		0.00		0.00
75		J_ONT-217	4.92	LANDSCAPE_IRR	0.00		0.00		0.00
76		J_ONT-219	0.00		0.00		0.00		0.00
77		J_ONT-221	0.00		0.00		0.00		0.00
78		J_ONT-223	0.00		0.00		0.00		0.00
79		J_ONT-225	0.00		0.00		0.00		0.00
80		J_ONT-227	0.02	AGRICULTURAL	0.00		0.00		0.00
81		J_ONT-229	0.00		0.00		0.00		0.00
82		J_ONT-231	0.00		0.00		0.00		0.00
83		J_ONT-233	4.92	AGRICULTURAL	0.00		0.00		0.00
84		J_ONT-235	0.00		0.00		0.00		0.00
85		J_ONT-237	0.00		0.00		0.00		0.00
86		J_ONT-239	0.00		0.00		0.00		0.00
87		J_ONT-243	0.00		0.00		0.00		0.00
88		J_ONT-247	0.00		0.00		0.00		0.00
89		J_ONT-249	0.00		0.00		0.00		0.00
90		J_ONT-251	0.00		0.00		0.00		0.00
91		J_ONT-253	0.00		0.00		0.00		0.00
92		J_ONT-255	0.00		0.00		0.00		0.00
93		J_ONT-265	6.70	LANDSCAPE_IRR	0.00		0.00		0.00
94		J_ONT-267	5.20	AGRICULTURAL	6.48	LANDSCAPE_IRR	0.00		0.00
95		J_ONT-271							
96		J_ONT-273	3.68	LANDSCAPE_IRR	0.00		0.00		0.00
97		J_ONT-275	13.52	LANDSCAPE_IRR	8.72	LANDSCAPE_IRR	0.00		0.00
98		J_ONT-277							
99		J_ONT-279	5.16	LANDSCAPE_IRR	10.28	LANDSCAPE_IRR	0.00		0.00
100		J_ONT-281	9.18	LANDSCAPE_IRR	0.00		0.00		0.00
101		J_ONT-283							
102		J_ONT-285							
103		J_ONT-287	0.10	LANDSCAPE_IRR	0.00		0.00		0.00
104		J_ONT-289	10.25	LANDSCAPE_IRR	4.66	LANDSCAPE_IRR	0.00		0.00
105		J_ONT-291	3.32	LANDSCAPE_IRR	0.00		0.00		0.00
106		J_ONT-295	8.44	LANDSCAPE_IRR	0.00		0.00		0.00
107		J_ONT-297	9.58	LANDSCAPE_IRR	0.00		0.00		0.00
108		J_ONT-299							
109		J_ONT-301	2.74	AGRICULTURAL	0.00		0.00		0.00
110		J_ONT-313	1.78	AGRICULTURAL					
111		J_ONT-315	6.64	LANDSCAPE_IRR					0.00
112		J_ONT-317	3.64	LANDSCAPE_IRR					0.00
113		J_ONT-321	9.52	LANDSCAPE_IRR	10.68	LANDSCAPE_IRR	0.00		0.00
114		J_ONT-325	4.06	LANDSCAPE_IRR			0.00		0.00

Existing Scenario - City of Ontario - Junction Input Data

* EXISTING_MDD *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Demand 2	Pattern 2 (Char)	Demand 3 (gpm)	Pattern 3 (Char)	Demand 4
115	☐	J_ONT-333	13.35	IND	3.22	IND	5.56	IND	2.36
116	☐	J_ONT-341	17.47	LANDSCAPE_IRR	15.42	LANDSCAPE_IRR			0.00
117	☐	J_ONT-343	13.32	IND					0.00
118	☐	J_ONT-351	1.82	IND					
119	☐	J_ONT-357	5.90	IND	0.00		0.00		0.00
120	☐	J_ONT-359	1.06	LANDSCAPE_IRR					0.00
121	☐	J_ONT-361	10.18	LANDSCAPE_IRR	0.00		0.00		0.00
122	☐	J_ONT-363	1.96	LANDSCAPE_IRR	1.36	LANDSCAPE_IRR	2.04	LANDSCAPE_IRR	0.00
123	☐	J_ONT-365	3.86	LANDSCAPE_IRR					
124	☐	J_ONT-367	13.52	LANDSCAPE_IRR	6.80	LANDSCAPE_IRR			
125	☐	J_ONT-369	14.12	LANDSCAPE_IRR					
126	☐	J_ONT-371	7.66	LANDSCAPE_IRR			0.00		0.00
127	☐	J_ONT-373	14.98	LANDSCAPE_IRR	5.92	LANDSCAPE_IRR			0.00
128	☐	J_ONT-377	34.53	LANDSCAPE_IRR	44.50	LANDSCAPE_IRR	0.00		0.00
129	☐	J_ONT-379	5.56	LANDSCAPE_IRR			0.00		0.00
130	☐	J_ONT-381	16.56	LANDSCAPE_IRR					
131	☐	J_ONT-383	12.12	IND					
132	☐	J_ONT-387	9.58	IND	2.60	IND	15.96	IND	0.08
133	☐	J_ONT-399	2.48	LANDSCAPE_IRR			0.00		0.00
134	☐	J_ONT-401	21.22	LANDSCAPE_IRR	10.52	LANDSCAPE_IRR	0.00		0.00
135	☐	J_ONT-403	10.11	LANDSCAPE_IRR	16.26	LANDSCAPE_IRR	0.00		0.00
136	☐	J_ONT-407			0.00		0.00		0.00
137	☐	J_ONT-421					0.00		0.00
138	☐	J_ONT-423	0.00		0.00		0.00		0.00
139	☐	J_ONT-425	0.00		0.00		0.00		0.00
140	☐	J_ONT-427	0.00		0.00		0.00		0.00
141	☐	J_ONT-473	1.89	LANDSCAPE_IRR	1.74	LANDSCAPE_IRR	0.48	LANDSCAPE_IRR	0.92
142	☐	J_ONT-477	149.10	LANDSCAPE_IRR	280.04	LANDSCAPE_IRR	6.16	LANDSCAPE_IRR	0.00
143	☐	J_ONT-507	16.36	LANDSCAPE_IRR			0.00		0.00
144	☐	J_ONT-509	14.18	LANDSCAPE_IRR	0.00		0.00		0.00
145	☐	J_ONT-511	23.26	LANDSCAPE_IRR	0.00		0.00		0.00
146	☐	J_ONT-537							
147	☐	J_ONT-569							
148	☐	J_ONT-609							
149	☐	ONT66	33.20	LANDSCAPE_IRR	0.00		0.00		0.00
150	☐	ONT68	0.00		0.00		0.00		0.00
151	☐	ONT72	0.00		0.00		0.00		0.00
152	☐	ONT76	0.00		0.00		0.00		0.00
153	☐	ONTFRAN-3581	0.00		0.00		0.00		0.00
154	☐	ONTFRAN-3583	847.26	AGRICULTURAL	0.00		0.00		0.00
155	☐	ONTFRAN-3591	7.40	LANDSCAPE_IRR	0.52	LANDSCAPE_IRR	1,411.68	AGRICULTURAL	0.00
156	☐	ONTFRAN-3592	4.63	LANDSCAPE_IRR	0.14	LANDSCAPE_IRR	25.36	LANDSCAPE_IRR	0.00
157	☐	ONTFRAN-3593	3.92	LANDSCAPE_IRR	0.00		0.00		0.00
158	☐	ONTFRAN-3594	0.00		0.00		0.00		0.00
159	☐	ONTFRAN-3595	3.22	AGRICULTURAL	0.00		0.00		0.00
160	☐	ONTFRAN-3596	1.88	AGRICULTURAL	0.00		0.00		0.00
161	☐	ONTFRAN-3597	0.00		0.00		0.00		0.00
162	☐	ONTFRAN-3598	0.00		0.00		0.00		0.00
163	☐	ONTFRAN-3599	9.78	AGRICULTURAL	10.04	AGRICULTURAL	0.00		0.00
164	☐	ONTFRAN-3608	18.60	LANDSCAPE_IRR			0.00		0.00
165	☐	ONTFRAN-3620	7.10	LANDSCAPE_IRR	7.44	LANDSCAPE_IRR	0.00		0.00
166	☐	ONTFRAN-3622	0.00		0.00		0.00		0.00
167	☐	ONTFRAN-3626	1.56	LANDSCAPE_IRR	0.00		0.00		0.00
168	☐	ONTJ114	11.35	IND	6.34	IND	0.32	IND	
169	☐	ONTNEWJ-198	24.87	LANDSCAPE_IRR	1.10	LANDSCAPE_IRR	2.08	LANDSCAPE_IRR	0.00
170	☐	ONTNEWJ-212	0.00		0.00		0.00		0.00
171	☐	ONTNEWJ-214	0.00		0.00		0.00		0.00

Existing Scenario - City of Ontario - Junction Input Data

* EXISTING_MDD *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Demand 2	Pattern 2 (Char)	Demand 3 (gpm)	Pattern 3 (Char)	Demand 4
172		ONTNEWJ-224	0.00		0.00		0.00		0.00
173		ONTNEWJ-262	0.00		0.00		0.00		0.00
174		ONTNEWJ-278	0.97	LANDSCAPE_IRR	0.62	LANDSCAPE_IRR	1.18	LANDSCAPE_IRR	1.18
175		ONTNEWJ-322	0.00		0.00		0.00		0.00
176		ONTNEWJ-340	1.61	AGRICULTURAL	3.22	AGRICULTURAL			0.00
177		ONTNEWJ-354	0.00		0.00		0.00		0.00
178		ONTNEWJ-356	0.00		0.00		0.00		0.00
179		ONTNEWJ-378	2.68	IND	0.76	LANDSCAPE_IRR	1.34	LANDSCAPE_IRR	3.34
180		ONTNEWJ-398	0.00		0.00		0.00		0.00
181		ONTNEWJ-399	0.00		0.00		0.00		0.00
182		ONTNEWJ-432	0.00		0.00		0.00		0.00
183		ONTNEWJ-438	0.00		0.00		0.00		0.00
184		ONTNEWJ-470	18.23	LANDSCAPE_IRR	13.06	LANDSCAPE_IRR	0.00		0.00
185		ONTNEWJ-478	7.20	LANDSCAPE_IRR	0.00		0.00		0.00
186		ONTNEWJ-482	16.00	LANDSCAPE_IRR	0.00		0.00		0.00
187		ONTNEWJ-500	0.00		0.00		0.00		0.00
188		ONTNEWJ-510	17.02	LANDSCAPE_IRR	10.92	LANDSCAPE_IRR	0.00		0.00
189		ONTNEWJ-516	0.00		0.00		0.00		0.00
190		ONTNEWJ-520	10.23	LANDSCAPE_IRR	9.74	LANDSCAPE_IRR			0.00
191		ONTNEWJ-522	4.16	LANDSCAPE_IRR	0.00		0.00		0.00
192		ONTNEWJ-526	13.54	LANDSCAPE_IRR	0.00		0.00		0.00
193		ONTNEWJ-528	16.66	LANDSCAPE_IRR	12.12	IND	0.00		0.00
194		ONTNEWJ-550	9.30	IND					
195		ONTNEWJ-554	15.84	IND	6.64	IND	3.92	IND	
196		ONTNEWJ-555	8.96	LANDSCAPE_IRR	6.92	LANDSCAPE_IRR	0.00		0.00
197		ONTNEWJ-556	0.00		0.00		0.00		0.00
198		ONTNEWJ-560	0.00		0.00		0.00		0.00
199		ONTNEWJ-562	0.00		0.00		0.00		0.00
200		ONTNEWJ-568	0.00		0.00		0.00		0.00
201		ONTNEWJ-598	14.21	LANDSCAPE_IRR	2.98	LANDSCAPE_IRR	0.00		0.00
202		ONTNEWJ-622	0.00		0.00		0.00		0.00
203		ONTNEWJ-640	7.90	LANDSCAPE_IRR					
204		ONTNEWJ-646	9.52	LANDSCAPE_IRR	6.68	LANDSCAPE_IRR	15.78	LANDSCAPE_IRR	
205		ONTNEWJ-908	17.48	LANDSCAPE_IRR					0.00
206		ONTNEWJ-910	9.71	LANDSCAPE_IRR	11.10	LANDSCAPE_IRR	15.16	LANDSCAPE_IRR	13.68
207		ONTNEWJ-914	20.76	LANDSCAPE_IRR	10.36	LANDSCAPE_IRR	0.00		0.00
208		ONTNEWJ-934	7.16	IND	6.80	IND	7.44	IND	0.00
209		ONTNEWJ-936	4.55	IND	4.42	IND	0.00		0.00
210		ONTNEWJ-950	0.00		0.00		0.00		0.00
211		ONTNEWJ402	0.00		0.00		0.00		0.00
212		ONTPHLP-3606	0.42	LANDSCAPE_IRR					
213		ONTPHLP-3610	0.00		0.00		0.00		0.00
214		ONTPICKUP-12	0.00		0.00		0.00		0.00
215		ONTPICKUP-14	88.88	LANDSCAPE_IRR	0.00		0.00		0.00
216		ONTPICKUP-17	0.00		0.00		0.00		0.00
217		ONTPICKUP-30	133.18	IND	4.84	IND	5.72	IND	5.84
218		ONTPICKUP-32	0.00		0.00		0.00		0.00
219		ONTPICKUP-51	0.00		0.00		0.00		0.00
220		ONTPICKUP-68	7.30	LANDSCAPE_IRR	4.24	LANDSCAPE_IRR	0.02	LANDSCAPE_IRR	0.00
221		ONTPICKUP-71	3.28	LANDSCAPE_IRR	3.08	LANDSCAPE_IRR	0.00		0.00
222		ONTPICKUP-72	0.00		0.00		0.00		0.00
223		ONTTOP50-15			0.00		0.00		0.00
224		ONTTOP50-18	20.27	LANDSCAPE_IRR	10.34	LANDSCAPE_IRR	0.00		0.00
225		ONTTOP50-22	48.66	LANDSCAPE_IRR	12.36	LANDSCAPE_IRR			
226		ONTTOP50-40	0.00		0.00		0.00		0.00
227		ONTTOP50-48	0.00		0.00		0.00		0.00
228		ONTTOP50-6	0.00		0.00		0.00		0.00

Existing Scenario - City of Ontario - Junction Input Data

* EXISTING_MDD *		ID (Char)	Pattern 4 (Char)
1		J1272	
2		J1274	
3		J1276	
4		J1280	
5		J1288	
6		J1290	
7		J1292	
8		J1294	LANDSCAPE_IRR
9		J1296	LANDSCAPE_IRR
10		J1302	
11		J1304	
12		J1308	
13		J1314	
14		J1316	
15		J1320	
16		J1322	
17		J1324	LANDSCAPE_IRR
18		J1404	
19		J1406	
20		J1408	LANDSCAPE_IRR
21		J1410	
22		J1412	
23		J1414	
24		J1416	
25		J1586	
26		J1592	
27		J1596	
28		JKELLOG	
29		JSCH_HYD	
30		J_ONT-103	
31		J_ONT-105	
32		J_ONT-107	
33		J_ONT-109	
34		J_ONT-133	
35		J_ONT-135	
36		J_ONT-137	
37		J_ONT-139	
38		J_ONT-141	
39		J_ONT-143	
40		J_ONT-145	
41		J_ONT-147	
42		J_ONT-149	
43		J_ONT-151	
44		J_ONT-153	
45		J_ONT-155	
46		J_ONT-157	LANDSCAPE_IRR
47		J_ONT-159	LANDSCAPE_IRR
48		J_ONT-161	
49		J_ONT-163	
50		J_ONT-165	
51		J_ONT-167	
52		J_ONT-169	
53		J_ONT-171	
54		J_ONT-173	
55		J_ONT-175	
56		J_ONT-177	
57		J_ONT-179	

Existing Scenario - City of Ontario - Junction Input Data

* EXISTING_MDD *		ID (Char)	Pattern 4 (Char)
58	☐	J_ONT-181	LANDSCAPE_IRR
59	☐	J_ONT-185	
60	☐	J_ONT-187	
61	☐	J_ONT-189	
62	☐	J_ONT-191	
63	☐	J_ONT-193	
64	☐	J_ONT-195	
65	☐	J_ONT-197	
66	☐	J_ONT-199	
67	☐	J_ONT-201	
68	☐	J_ONT-203	
69	☐	J_ONT-205	
70	☐	J_ONT-207	
71	☐	J_ONT-209	
72	☐	J_ONT-211	
73	☐	J_ONT-213	
74	☐	J_ONT-215	
75	☐	J_ONT-217	
76	☐	J_ONT-219	
77	☐	J_ONT-221	
78	☐	J_ONT-223	
79	☐	J_ONT-225	
80	☐	J_ONT-227	
81	☐	J_ONT-229	
82	☐	J_ONT-231	
83	☐	J_ONT-233	
84	☐	J_ONT-235	
85	☐	J_ONT-237	
86	☐	J_ONT-239	
87	☐	J_ONT-243	
88	☐	J_ONT-247	
89	☐	J_ONT-249	
90	☐	J_ONT-251	
91	☐	J_ONT-253	
92	☐	J_ONT-255	
93	☐	J_ONT-265	
94	☐	J_ONT-267	
95	☐	J_ONT-271	
96	☐	J_ONT-273	
97	☐	J_ONT-275	
98	☐	J_ONT-277	
99	☐	J_ONT-279	
100	☐	J_ONT-281	
101	☐	J_ONT-283	
102	☐	J_ONT-285	
103	☐	J_ONT-287	
104	☐	J_ONT-289	
105	☐	J_ONT-291	
106	☐	J_ONT-295	
107	☐	J_ONT-297	
108	☐	J_ONT-299	
109	☐	J_ONT-301	
110	☐	J_ONT-313	
111	☐	J_ONT-315	
112	☐	J_ONT-317	
113	☐	J_ONT-321	
114	☐	J_ONT-325	

Existing Scenario - City of Ontario - Junction Input Data

* EXISTING_MDD *		ID (Char)	Pattern 4 (Char)
115	☐	J_ONT-333	IND
116	☐	J_ONT-341	
117	☐	J_ONT-343	
118	☐	J_ONT-351	
119	☐	J_ONT-357	
120	☐	J_ONT-359	
121	☐	J_ONT-361	
122	☐	J_ONT-363	
123	☐	J_ONT-365	
124	☐	J_ONT-367	
125	☐	J_ONT-369	
126	☐	J_ONT-371	
127	☐	J_ONT-373	
128	☐	J_ONT-377	
129	☐	J_ONT-379	
130	☐	J_ONT-381	
131	☐	J_ONT-383	
132	☐	J_ONT-387	IND
133	☐	J_ONT-399	
134	☐	J_ONT-401	
135	☐	J_ONT-403	
136	☐	J_ONT-407	
137	☐	J_ONT-421	
138	☐	J_ONT-423	
139	☐	J_ONT-425	
140	☐	J_ONT-427	
141	☐	J_ONT-473	LANDSCAPE_IRR
142	☐	J_ONT-477	
143	☐	J_ONT-507	
144	☐	J_ONT-509	
145	☐	J_ONT-511	
146	☐	J_ONT-537	
147	☐	J_ONT-569	
148	☐	J_ONT-609	
149	☐	ONT66	
150	☐	ONT68	
151	☐	ONT72	
152	☐	ONT76	
153	☐	ONTFRAN-3581	
154	☐	ONTFRAN-3583	
155	☐	ONTFRAN-3591	
156	☐	ONTFRAN-3592	
157	☐	ONTFRAN-3593	
158	☐	ONTFRAN-3594	
159	☐	ONTFRAN-3595	
160	☐	ONTFRAN-3596	
161	☐	ONTFRAN-3597	
162	☐	ONTFRAN-3598	
163	☐	ONTFRAN-3599	
164	☐	ONTFRAN-3608	
165	☐	ONTFRAN-3620	
166	☐	ONTFRAN-3622	
167	☐	ONTFRAN-3626	
168	☐	ONTJ114	
169	☐	ONTNEWJ-198	
170	☐	ONTNEWJ-212	
171	☐	ONTNEWJ-214	

Existing Scenario - City of Ontario - Junction Input Data

* EXISTING_MDD *		ID (Char)	Pattern 4 (Char)
172	☐	ONTNEWJ-224	
173	☐	ONTNEWJ-262	
174	☐	ONTNEWJ-278	LANDSCAPE_IRR
175	☐	ONTNEWJ-322	
176	☐	ONTNEWJ-340	
177	☐	ONTNEWJ-354	
178	☐	ONTNEWJ-356	
179	☐	ONTNEWJ-378	LANDSCAPE_IRR
180	☐	ONTNEWJ-398	
181	☐	ONTNEWJ-399	
182	☐	ONTNEWJ-432	
183	☐	ONTNEWJ-438	
184	☐	ONTNEWJ-470	
185	☐	ONTNEWJ-478	
186	☐	ONTNEWJ-482	
187	☐	ONTNEWJ-500	
188	☐	ONTNEWJ-510	
189	☐	ONTNEWJ-516	
190	☐	ONTNEWJ-520	
191	☐	ONTNEWJ-522	
192	☐	ONTNEWJ-526	
193	☐	ONTNEWJ-528	
194	☐	ONTNEWJ-550	
195	☐	ONTNEWJ-554	
196	☐	ONTNEWJ-555	
197	☐	ONTNEWJ-556	
198	☐	ONTNEWJ-560	
199	☐	ONTNEWJ-562	
200	☐	ONTNEWJ-568	
201	☐	ONTNEWJ-598	
202	☐	ONTNEWJ-622	
203	☐	ONTNEWJ-640	
204	☐	ONTNEWJ-646	
205	☐	ONTNEWJ-908	
206	☐	ONTNEWJ-910	LANDSCAPE_IRR
207	☐	ONTNEWJ-914	
208	☐	ONTNEWJ-934	
209	☐	ONTNEWJ-936	
210	☐	ONTNEWJ-950	
211	☐	ONTNEWJ402	
212	☐	ONTPHLP-3606	
213	☐	ONTPHLP-3610	
214	☐	ONTPICKUP-12	
215	☐	ONTPICKUP-14	
216	☐	ONTPICKUP-17	
217	☐	ONTPICKUP-30	IND
218	☐	ONTPICKUP-32	
219	☐	ONTPICKUP-51	
220	☐	ONTPICKUP-68	
221	☐	ONTPICKUP-71	
222	☐	ONTPICKUP-72	
223	☐	ONTTOP50-15	
224	☐	ONTTOP50-18	
225	☐	ONTTOP50-22	
226	☐	ONTTOP50-40	
227	☐	ONTTOP50-48	
228	☐	ONTTOP50-6	

Existing Scenario - City of Ontario - Pipe Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
1	☐	2011_P14	373.88	8.00	130.00	0.00
2	☐	2011_P15	962.69	8.00	100.00	0.00
3	☐	2011_P17	325.69	8.00	130.00	0.00
4	☐	2011_P18	128.01	12.00	130.00	0.00
5	☐	2011_P19	536.66	12.00	130.00	0.00
6	☐	800ZONE_V1	98.84	16.00	150.00	0.00
7	☐	800ZONE_V2	61.66	16.00	150.00	0.00
8	☐	ONT283	45.13	42.00	130.00	0.00
9	☐	ONT9024	1,861.37	24.00	129.90	0.00
10	☐	ONT9034	878.87	16.00	130.00	0.00
11	☐	ONT9036	1,494.62	16.00	130.00	0.00
12	☐	ONT9042	1,301.52	16.00	130.00	0.00
13	☐	ONT9048	1,466.41	12.00	130.00	0.00
14	☐	ONT9068	2,509.56	12.00	130.00	0.00
15	☐	ONTFRAN-3600	2,415.15	24.00	130.00	0.00
16	☐	ONTFRAN-3617	1,125.95	24.00	130.00	0.00
17	☐	ONTFRAN-3618	302.48	12.00	130.00	0.00
18	☐	ONTFRAN-3620	616.50	12.00	130.00	0.00
19	☐	ONTFRAN-3621	2,561.70	12.00	130.00	0.00
20	☐	ONTFRAN-3622	2,654.69	12.00	130.00	0.00
21	☐	ONTFRAN-3624	3,119.97	8.00	130.00	0.00
22	☐	ONTFRAN-3626	2,648.24	12.00	130.00	0.00
23	☐	ONTFRAN-3627	2,180.56	16.00	130.00	0.00
24	☐	ONTFRAN-3628	1,393.06	16.00	130.00	0.00
25	☐	ONTFRAN-3629	1,795.09	16.00	130.00	0.00
26	☐	ONTFRAN-3645	1,341.66	12.00	130.00	0.00
27	☐	ONTFRAN-3693	1,301.23	12.00	130.00	0.00
28	☐	ONTFRAN-3694	1,162.41	16.00	130.00	0.00
29	☐	ONTFRAN-3706	139.34	24.00	130.00	0.00
30	☐	ONTNEWP-10016	157.83	8.00	130.00	0.00
31	☐	ONTNEWP-10017	96.03	8.00	130.00	0.00
32	☐	ONTNEWP-10044	201.93	8.00	130.00	0.00
33	☐	ONTNEWP-908	878.23	8.00	130.00	0.00
34	☐	ONTNEWP-910	380.88	8.00	130.00	0.00
35	☐	ONTNEWP-914	642.60	12.00	130.00	0.00
36	☐	ONTNEWP-9170	207.39	8.00	130.00	0.00
37	☐	ONTNEWP-9252	412.78	8.00	130.00	0.00
38	☐	ONTNEWP-9276	100.39	24.00	129.90	0.00
39	☐	ONTNEWP-9320	1,078.67	8.00	130.00	0.00
40	☐	ONTNEWP-9322	178.65	8.00	130.00	0.00
41	☐	ONTNEWP-934	606.33	8.00	130.00	0.00
42	☐	ONTNEWP-9384	83.35	12.00	130.00	0.00
43	☐	ONTNEWP-9434	58.47	8.00	130.00	0.00
44	☐	ONTNEWP-9494	108.24	8.00	130.00	0.00
45	☐	ONTNEWP-9512	142.43	8.00	130.00	0.00
46	☐	ONTNEWP-9514	73.92	8.00	130.00	0.00
47	☐	ONTNEWP-9554	1,604.77	24.00	130.00	0.00
48	☐	ONTNEWP-9556	40.59	8.00	130.00	0.00
49	☐	ONTNEWP-9590	55.67	8.00	130.00	0.00
50	☐	ONTNEWP-9596	1,084.77	16.00	130.00	0.00
51	☐	ONTNEWP-9600	425.19	8.00	130.00	0.00
52	☐	ONTNEWP-9602	628.83	24.00	129.90	0.00
53	☐	ONTNEWP-9664	888.03	8.00	130.00	0.00
54	☐	ONTNEWP-9668	465.68	8.00	130.00	0.00
55	☐	ONTNEWP-9712	297.60	12.00	130.00	0.00
56	☐	ONTNEWP-9714	170.69	8.00	130.00	0.00
57	☐	ONTNEWP-9780	2,567.84	8.00	130.00	0.00

Existing Scenario - City of Ontario - Pipe Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
58	☐	ONTNEWP-9810	493.88	24.00	130.00	0.00
59	☐	ONTNEWP-9846	649.71	16.00	130.00	0.00
60	☐	ONTNEWP-9854	225.67	8.00	130.00	0.00
61	☐	ONTNEWP-9861	444.03	8.00	130.00	0.00
62	☐	ONTNEWP-9870	152.28	24.00	130.00	0.00
63	☐	ONTNEWP-9884	483.65	8.00	130.00	0.00
64	☐	ONTNEWP-9886	966.94	8.00	130.00	0.00
65	☐	ONTNEWP-9890	343.61	12.00	130.00	0.00
66	☐	ONTNEWP-9892	972.35	12.00	130.00	0.00
67	☐	ONTNEWP-9894	500.54	12.00	130.00	0.00
68	☐	ONTNEWP-9896	662.68	12.00	130.00	0.00
69	☐	ONTNEWP-9900	2,385.20	12.00	130.00	0.00
70	☐	ONTNEWP-9902	1,713.42	8.00	130.00	0.00
71	☐	ONTNEWP-9912	1,165.49	8.00	130.00	0.00
72	☐	ONTNEWP-9913	1,000.33	8.00	130.00	0.00
73	☐	ONTNEWP-9928	1,570.82	8.00	130.00	0.00
74	☐	ONTNEWP-9932	1,189.23	8.00	130.00	0.00
75	☐	ONTNEWP-9940	2,657.09	8.00	130.00	0.00
76	☐	ONTNEWP-9942	2,628.90	8.00	130.00	0.00
77	☐	ONTNEWP-9946	444.01	8.00	130.00	0.00
78	☐	ONTNEWP649	2,763.21	8.00	130.00	0.00
79	☐	ONTP10024	1,339.83	12.00	130.00	0.00
80	☐	ONTPHLP-3615	2,658.69	12.00	130.00	0.00
81	☐	P10142	198.19	30.00	130.00	0.00
82	☐	P10326	1,331.58	12.00	130.00	0.00
83	☐	P10328	1,338.27	12.00	130.00	0.00
84	☐	P10330	3,591.48	12.00	130.00	0.00
85	☐	P10332	788.30	8.00	130.00	0.00
86	☐	P10334	885.54	12.00	100.00	0.00
87	☐	P10340	2,655.53	8.00	130.00	0.00
88	☐	P10342	1,686.44	8.00	130.00	0.00
89	☐	P10344	500.45	8.00	130.00	0.00
90	☐	P10346	1,214.04	12.00	130.00	0.00
91	☐	P10350	1,717.07	8.00	130.00	0.00
92	☐	P10354	1,409.44	16.00	130.00	0.00
93	☐	P10356	147.70	8.00	130.00	0.00
94	☐	P10360	937.27	12.00	130.00	0.00
95	☐	P10364	1,352.40	12.00	130.00	0.00
96	☐	P10366	1,324.73	8.00	130.00	0.00
97	☐	P10368	411.46	8.00	130.00	0.00
98	☐	P10372	923.19	12.00	130.00	0.00
99	☐	P10374	1,588.12	8.00	130.00	0.00
100	☐	P10376	420.57	8.00	100.00	0.00
101	☐	P10422	2,685.84	16.00	130.00	0.00
102	☐	P10506	1,088.71	12.00	130.00	0.00
103	☐	P10508	764.84	12.00	130.00	0.00
104	☐	P10510	966.88	8.00	130.00	0.00
105	☐	P10512	826.31	8.00	130.00	0.00
106	☐	P10514	358.14	8.00	130.00	0.00
107	☐	P10516	72.06	8.00	130.00	0.00
108	☐	P10518	840.93	8.00	130.00	0.00
109	☐	P10520	813.87	8.00	130.00	0.00
110	☐	P10522	1,047.91	8.00	130.00	0.00
111	☐	P10550	1,424.31	8.00	130.00	0.00
112	☐	P39	666.18	8.00	130.00	0.00
113	☐	P41	227.50	8.00	130.00	0.00
114	☐	P63	300.71	8.00	130.00	0.00

Existing Scenario - City of Ontario - Pipe Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
115	☐	P81	1,764.35	16.00	130.00	0.00
116	☐	P87	621.53	8.00	130.00	0.00
117	☐	PHYD_LAT	464.40	6.00	130.00	0.00
118	☐	PKELLOG	1,300.25	12.00	130.00	0.00
119	☐	PSCH_1	1,829.52	12.00	130.00	0.00
120	☐	P_ONT-154	83.00	24.00	130.00	0.00
121	☐	P_ONT-156	22.31	24.00	130.00	0.00
122	☐	P_ONT-158	19.05	24.00	130.00	0.00
123	☐	P_ONT-160	9.11	24.00	130.00	0.00
124	☐	P_ONT-176	1,242.53	24.00	130.00	0.00
125	☐	P_ONT-178	1,255.50	12.00	100.00	0.00
126	☐	P_ONT-180	587.21	8.00	130.00	0.00
127	☐	P_ONT-182	668.29	8.00	130.00	0.00
128	☐	P_ONT-184	564.54	8.00	130.00	0.00
129	☐	P_ONT-186	1,420.26	8.00	130.00	0.00
130	☐	P_ONT-188	26.06	4.00	130.00	0.00
131	☐	P_ONT-190	297.83	8.00	130.00	0.00
132	☐	P_ONT-192	1,225.11	8.00	130.00	0.00
133	☐	P_ONT-194	60.97	8.00	130.00	0.00
134	☐	P_ONT-196	1,680.54	12.00	130.00	0.00
135	☐	P_ONT-198	2,658.00	16.00	130.00	0.00
136	☐	P_ONT-200	471.02	8.00	130.00	0.00
137	☐	P_ONT-204	969.62	8.00	130.00	0.00
138	☐	P_ONT-206	47.18	8.00	130.00	0.00
139	☐	P_ONT-208	521.07	8.00	130.00	0.00
140	☐	P_ONT-210	1,123.08	8.00	130.00	0.00
141	☐	P_ONT-212	59.09	8.00	130.00	0.00
142	☐	P_ONT-214	272.70	8.00	130.00	0.00
143	☐	P_ONT-216	2,006.79	8.00	130.00	0.00
144	☐	P_ONT-218	1,692.61	8.00	130.00	0.00
145	☐	P_ONT-220	599.34	8.00	130.00	0.00
146	☐	P_ONT-222	570.91	8.00	130.00	0.00
147	☐	P_ONT-224	172.01	8.00	130.00	0.00
148	☐	P_ONT-226	1,324.95	16.00	130.00	0.00
149	☐	P_ONT-228	970.68	8.00	130.00	0.00
150	☐	P_ONT-230	1,192.23	16.00	130.00	0.00
151	☐	P_ONT-232	162.89	8.00	130.00	0.00
152	☐	P_ONT-234	1,424.05	8.00	130.00	0.00
153	☐	P_ONT-236	391.16	8.00	130.00	0.00
154	☐	P_ONT-238	270.79	8.00	130.00	0.00
155	☐	P_ONT-240	140.69	8.00	130.00	0.00
156	☐	P_ONT-242	22.56	2.00	130.00	0.00
157	☐	P_ONT-244	187.64	16.00	130.00	0.00
158	☐	P_ONT-246	746.58	8.00	130.00	0.00
159	☐	P_ONT-248	670.54	8.00	130.00	0.00
160	☐	P_ONT-250	143.89	8.00	130.00	0.00
161	☐	P_ONT-252	443.25	8.00	130.00	0.00
162	☐	P_ONT-254	648.48	8.00	130.00	0.00
163	☐	P_ONT-256	120.48	8.00	130.00	0.00
164	☐	P_ONT-258	1,808.44	8.00	130.00	0.00
165	☐	P_ONT-260	952.15	8.00	130.00	0.00
166	☐	P_ONT-262	1,292.82	12.00	130.00	0.00
167	☐	P_ONT-264	919.91	8.00	130.00	0.00
168	☐	P_ONT-266	346.22	8.00	130.00	0.00
169	☐	P_ONT-268	168.63	8.00	130.00	0.00
170	☐	P_ONT-270	686.73	8.00	130.00	0.00
171	☐	P_ONT-272	462.41	8.00	100.00	0.00

Existing Scenario - City of Ontario - Pipe Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
172	☐	P_ONT-274	107.99	8.00	130.00	0.00
173	☐	P_ONT-276	734.97	8.00	130.00	0.00
174	☐	P_ONT-278	210.60	8.00	130.00	0.00
175	☐	P_ONT-280	654.69	8.00	100.00	0.00
176	☐	P_ONT-282	458.27	8.00	130.00	0.00
177	☐	P_ONT-284	150.92	8.00	130.00	0.00
178	☐	P_ONT-286	338.69	8.00	130.00	0.00
179	☐	P_ONT-288	418.63	8.00	130.00	0.00
180	☐	P_ONT-290	226.11	8.00	130.00	0.00
181	☐	P_ONT-292	407.83	8.00	130.00	0.00
182	☐	P_ONT-294	359.41	8.00	130.00	0.00
183	☐	P_ONT-296	482.43	8.00	130.00	0.00
184	☐	P_ONT-298	238.49	8.00	130.00	0.00
185	☐	P_ONT-300	804.32	8.00	130.00	0.00
186	☐	P_ONT-302	1,603.88	8.00	130.00	0.00
187	☐	P_ONT-306	976.70	8.00	130.00	0.00
188	☐	P_ONT-308	328.33	8.00	130.00	0.00
189	☐	P_ONT-310	1,319.62	8.00	130.00	0.00
190	☐	P_ONT-312	418.46	8.00	130.00	0.00
191	☐	P_ONT-314	546.30	8.00	130.00	0.00
192	☐	P_ONT-316	533.90	8.00	130.00	0.00
193	☐	P_ONT-328	1,153.66	8.00	130.00	0.00
194	☐	P_ONT-330	433.22	8.00	130.00	0.00
195	☐	P_ONT-332	213.37	8.00	130.00	0.00
196	☐	P_ONT-334	48.14	2.00	130.00	0.00
197	☐	P_ONT-336	1,358.61	8.00	130.00	0.00
198	☐	P_ONT-338	499.45	8.00	130.00	0.00
199	☐	P_ONT-340	27.22	4.00	130.00	0.00
200	☐	P_ONT-342	67.98	8.00	130.00	0.00
201	☐	P_ONT-344	27.74	4.00	130.00	0.00
202	☐	P_ONT-346	31.87	2.00	130.00	0.00
203	☐	P_ONT-348	656.78	12.00	130.00	0.00
204	☐	P_ONT-350	524.15	8.00	130.00	0.00
205	☐	P_ONT-352	780.77	8.00	130.00	0.00
206	☐	P_ONT-354	480.54	8.00	130.00	0.00
207	☐	P_ONT-356	33.09	2.00	130.00	0.00
208	☐	P_ONT-358	923.64	16.00	130.00	0.00
209	☐	P_ONT-368	310.37	24.00	130.00	0.00
210	☐	P_ONT-370	344.46	8.00	130.00	0.00
211	☐	P_ONT-372	309.82	8.00	130.00	0.00
212	☐	P_ONT-376	2,490.34	12.00	130.00	0.00
213	☐	P_ONT-378	131.65	8.00	130.00	0.00
214	☐	P_ONT-382	855.29	8.00	130.00	0.00
215	☐	P_ONT-388	1,296.73	8.00	130.00	0.00
216	☐	P_ONT-406	92.92	8.00	130.00	0.00
217	☐	P_ONT-408	116.28	8.00	130.00	0.00
218	☐	P_ONT-410	608.38	8.00	130.00	0.00
219	☐	P_ONT-412	400.63	8.00	130.00	0.00
220	☐	P_ONT-418	159.12	8.00	130.00	0.00
221	☐	P_ONT-420	1,302.86	8.00	130.00	0.00
222	☐	P_ONT-422	874.68	8.00	130.00	0.00
223	☐	P_ONT-424	69.57	8.00	130.00	0.00
224	☐	P_ONT-426	102.02	8.00	130.00	0.00
225	☐	P_ONT-428	368.51	12.00	130.00	0.00
226	☐	P_ONT-430	167.29	12.00	130.00	0.00
227	☐	P_ONT-432	289.20	12.00	130.00	0.00
228	☐	P_ONT-434	71.34	12.00	130.00	0.00

Existing Scenario - City of Ontario - Pipe Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
229	☐	P_ONT-438	483.28	12.00	130.00	0.00
230	☐	P_ONT-440	578.60	16.00	130.00	0.00
231	☐	P_ONT-442	440.06	12.00	130.00	0.00
232	☐	P_ONT-444	69.36	12.00	130.00	0.00
233	☐	P_ONT-446	2,017.90	12.00	130.00	0.00
234	☐	P_ONT-456	301.25	8.00	130.00	0.00
235	☐	P_ONT-458	524.66	8.00	130.00	0.00
236	☐	P_ONT-460	743.53	8.00	130.00	0.00
237	☐	P_ONT-470	275.56	12.00	130.00	0.00
238	☐	P_ONT-480	1,044.89	8.00	130.00	0.00
239	☐	P_ONT-482	1,786.78	16.00	130.00	0.00
240	☐	P_ONT-484	684.16	12.00	130.00	0.00
241	☐	P_ONT-486	1,433.86	8.00	130.00	0.00
242	☐	P_ONT-534	889.56	12.00	130.00	0.00
243	☐	P_ONT-560	5,250.71	12.00	130.00	0.00
244	☐	P_ONT-570	116.47	12.00	130.00	0.00
245	☐	P_ONT-572	28.49	12.00	130.00	0.00
246	☐	P_ONT-574	36.83	12.00	130.00	0.00
247	☐	P_ONT-576	758.73	8.00	130.00	0.00
248	☐	P_ONT-598	61.31	16.00	130.00	0.00
249	☐	P_ONT-618	317.43	12.00	130.00	0.00
250	☐	P_ONT-666	68.58	8.00	130.00	0.00

Existing Scenario - City of Ontario - Junction Output Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
1	☐	JKELLOG	100.23	18:00	84.08	06:10	92.51	16.14
2	☐	JSCH_HYD	100.23	18:00	84.08	06:10	92.51	16.14
3	☐	J1272	141.88	20:00	98.60	00:30	117.20	43.28
4	☐	J1274	133.21	20:00	90.10	00:30	108.59	43.11
5	☐	J1276	146.64	20:00	103.17	00:30	121.90	43.47
6	☐	J1280	141.01	20:00	97.72	00:30	116.33	43.29
7	☐	J1288	137.11	20:00	94.00	00:30	112.49	43.11
8	☐	J1290	154.01	20:00	110.45	00:30	129.24	43.56
9	☐	J1292	176.67	11:40	142.80	01:50	159.37	33.87
10	☐	J1294	134.25	14:30	112.94	01:50	123.94	21.31
11	☐	J1296	122.75	14:30	104.60	01:50	114.22	18.15
12	☐	J1302	137.61	19:40	98.37	00:30	115.62	39.24
13	☐	J1304	151.60	19:50	123.39	09:40	137.51	28.20
14	☐	J1308	135.55	19:40	97.51	00:30	114.33	38.04
15	☐	J1314	112.41	20:00	65.43	00:30	85.57	46.99
16	☐	J1316	112.41	20:00	64.64	00:30	85.32	47.77
17	☐	J1320	130.81	19:40	97.52	00:30	112.77	33.29
18	☐	J1322	140.71	19:40	102.61	00:30	120.12	38.10
19	☐	J1324	140.61	19:40	101.85	00:30	119.42	38.76
20	☐	J1404	137.77	19:40	99.10	00:30	116.52	38.67
21	☐	J1406	133.94	19:40	95.10	00:30	112.91	38.84
22	☐	J1408	127.44	19:40	88.59	00:30	106.44	38.85
23	☐	J1410	130.48	19:40	91.64	00:30	109.48	38.83
24	☐	J1412	130.49	19:40	91.73	00:30	109.54	38.75
25	☐	J1414	134.61	19:40	96.00	00:30	113.73	38.61
26	☐	J1416	142.37	19:40	103.59	00:30	121.32	38.79
27	☐	ONT66	125.35	18:00	122.17	06:10	124.15	3.18
28	☐	ONTFRAN-3608	93.16	18:00	79.38	06:00	86.99	13.78
29	☐	ONTPHLP-3610	116.90	18:00	113.72	06:10	115.70	3.18
30	☐	ONTNEWJ-470	137.87	19:40	99.46	00:30	117.11	38.41
31	☐	ONTFRAN-3583	99.77	18:00	83.63	06:10	92.05	16.14
32	☐	ONTTOP50-40	92.41	20:00	48.36	00:30	66.54	44.05
33	☐	ONTNEWJ-262	90.98	20:00	46.93	00:30	65.10	44.05
34	☐	ONTPICKUP-51	91.78	20:00	47.73	00:30	65.90	44.05
35	☐	ONTNEWJ-322	91.18	20:00	47.13	00:30	65.30	44.05
36	☐	ONTNEWJ-198	78.28	20:00	34.14	00:30	52.38	44.15
37	☐	ONTNEWJ-516	153.14	20:00	109.48	00:30	128.34	43.67
38	☐	ONTNEWJ-510	156.17	20:00	112.51	00:30	131.37	43.67
39	☐	ONTNEWJ-908	96.81	20:00	54.56	00:30	72.70	42.26
40	☐	ONTNEWJ-278	146.87	19:40	105.35	00:30	123.86	41.52
41	☐	ONTTOP50-15	148.65	20:00	107.17	00:30	125.47	41.48
42	☐	ONTTOP50-18	144.90	19:40	103.96	00:30	122.17	40.95
43	☐	ONTNEWJ-520	140.64	19:40	101.04	00:30	118.51	39.60
44	☐	ONTNEWJ-526	154.07	19:40	113.95	00:30	131.77	40.12
45	☐	ONTNEWJ-910	154.07	19:40	113.95	00:30	131.77	40.12
46	☐	ONTNEWJ-522	149.74	19:40	109.67	00:30	127.46	40.06
47	☐	ONTNEWJ-914	143.02	19:40	103.29	00:30	120.85	39.73
48	☐	ONTTOP50-22	151.18	19:40	110.99	00:30	128.86	40.18
49	☐	ONTPICKUP-68	153.40	19:40	113.21	00:30	131.08	40.19
50	☐	ONTNEWJ-398	154.25	19:40	114.06	00:30	131.92	40.19
51	☐	ONTNEWJ-528	152.77	19:40	112.55	00:30	130.42	40.22
52	☐	ONTNEWJ-598	142.12	19:40	103.35	00:30	120.93	38.77
53	☐	ONTNEWJ-646	131.27	19:40	92.58	00:30	110.02	38.69
54	☐	ONTNEWJ-934	101.02	06:40	86.02	01:50	93.93	15.00
55	☐	ONTNEWJ-936	101.88	06:40	86.88	01:50	94.79	15.00
56	☐	ONTNEWJ-550	119.06	06:40	103.29	01:50	111.39	15.77
57	☐	ONTNEWJ-554	116.90	06:40	101.12	01:50	108.96	15.77

Existing Scenario - City of Ontario - Junction Output Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
58	☐	ONTNEWJ-560	124.70	06:40	108.92	01:50	116.76	15.77
59	☐	ONTNEWJ-562	119.50	06:40	103.72	01:50	111.56	15.77
60	☐	ONTNEWJ-556	135.55	14:30	114.27	01:50	125.25	21.29
61	☐	ONTNEWJ-378	114.74	14:30	98.91	01:50	107.39	15.83
62	☐	ONTTOP50-48	128.94	14:30	110.80	01:50	120.40	18.14
63	☐	ONTNEWJ-555	127.97	14:30	109.83	01:50	119.43	18.14
64	☐	ONTFRAN-3596	72.30	18:00	68.51	06:00	70.78	3.79
65	☐	ONTFRAN-3597	75.27	18:00	71.09	06:00	73.60	4.17
66	☐	ONTFRAN-3598	72.34	18:00	68.12	06:00	70.65	4.22
67	☐	ONTFRAN-3592	64.33	18:00	61.03	06:00	63.01	3.29
68	☐	ONTNEWJ-432	136.96	18:00	131.97	06:10	135.09	4.99
69	☐	ONTNEWJ-438	130.22	18:00	127.04	06:10	129.02	3.18
70	☐	ONTFRAN-3622	53.50	18:00	50.05	06:00	52.12	3.44
71	☐	ONTFRAN-3595	59.04	18:00	55.60	06:00	57.66	3.44
72	☐	ONTFRAN-3594	61.41	18:00	58.02	06:00	60.06	3.39
73	☐	ONTFRAN-3593	61.86	18:00	58.52	06:50	60.52	3.34
74	☐	ONTNEWJ-622	92.05	20:00	48.00	00:30	66.17	44.04
75	☐	ONTNEWJ-482	144.94	19:40	105.01	00:30	122.71	39.93
76	☐	ONTPICKUP-32	106.50	06:40	90.67	01:50	99.14	15.83
77	☐	ONTPICKUP-71	114.10	06:40	98.27	01:50	106.75	15.83
78	☐	ONTNEWJ-568	110.83	06:40	95.00	01:50	103.47	15.83
79	☐	ONTFRAN-3620	53.50	18:00	50.38	06:00	52.25	3.12
80	☐	ONT76	77.58	18:00	72.99	06:00	75.74	4.59
81	☐	ONTNEWJ402	95.73	18:00	72.42	06:00	84.87	23.31
82	☐	ONTPHLP-3606	52.10	18:00	52.04	06:00	52.08	0.07
83	☐	ONTFRAN-3591	72.31	18:00	69.21	06:00	71.21	3.10
84	☐	ONTNEWJ-224	133.45	18:00	128.97	06:10	131.78	4.48
85	☐	ONTTOP50-6	133.54	18:00	129.06	06:10	131.86	4.48
86	☐	ONTPICKUP-12	133.90	18:00	129.35	06:10	132.20	4.55
87	☐	ONTFRAN-3581	63.03	18:00	61.00	06:00	62.30	2.03
88	☐	ONTFRAN-3626	61.89	18:00	59.93	06:00	61.18	1.96
89	☐	ONTNEWJ-214	118.51	18:00	115.33	06:10	117.31	3.18
90	☐	ONTNEWJ-212	117.28	18:00	114.10	06:10	116.07	3.18
91	☐	ONTNEWJ-354	117.19	18:00	114.01	06:10	115.98	3.18
92	☐	ONT68	121.94	18:00	118.76	06:10	120.74	3.18
93	☐	ONT72	122.58	18:00	119.40	06:10	121.37	3.18
94	☐	ONTPICKUP-17	121.02	18:00	117.84	06:10	119.81	3.18
95	☐	ONTNEWJ-356	127.98	18:00	124.80	06:10	126.78	3.18
96	☐	ONTNEWJ-500	121.02	18:00	117.84	06:10	119.81	3.18
97	☐	ONTPICKUP-14	126.32	18:00	124.25	06:10	125.52	2.06
98	☐	ONTNEWJ-340	126.61	18:00	124.55	06:10	125.81	2.06
99	☐	ONTFRAN-3599	82.47	18:00	77.35	06:00	80.44	5.12
100	☐	ONTJ114	157.14	19:50	129.96	09:40	143.74	27.19
101	☐	ONTPICKUP-30	155.93	19:50	127.84	09:40	141.92	28.09
102	☐	ONTNEWJ-478	138.88	19:40	101.57	00:30	118.71	37.31
103	☐	ONTNEWJ-640	131.24	19:40	92.79	00:30	109.99	38.45
104	☐	ONTNEWJ-950	131.23	19:40	92.97	00:30	109.99	38.26
105	☐	ONTPICKUP-72	98.94	20:00	55.04	00:30	73.25	43.89
106	☐	ONTNEWJ-399	154.25	19:40	114.06	00:30	131.93	40.19
107	☐	J1586	91.61	20:00	47.57	00:30	65.74	44.04
108	☐	J1592	152.71	20:00	109.06	00:30	127.91	43.64
109	☐	J1596	120.67	18:00	117.49	06:10	119.47	3.18
110	☐	J_ONT-103	137.34	18:00	132.25	06:10	135.44	5.10
111	☐	J_ONT-105	52.49	18:00	52.47	06:00	52.48	0.02
112	☐	J_ONT-107	137.34	18:00	132.19	06:10	135.42	5.15
113	☐	J_ONT-109	52.49	18:00	52.47	06:00	52.48	0.01
114	☐	J_ONT-133	67.26	18:00	64.70	06:00	66.35	2.56

Existing Scenario - City of Ontario - Junction Output Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
115	☐	J_ONT-135	62.16	18:00	59.43	06:00	61.11	2.73
116	☐	J_ONT-137	65.63	18:00	63.04	06:00	64.70	2.59
117	☐	J_ONT-139	66.50	18:00	63.92	06:00	65.57	2.57
118	☐	J_ONT-141	67.80	18:00	65.22	06:00	66.87	2.57
119	☐	J_ONT-143	64.33	18:00	61.73	06:00	63.39	2.60
120	☐	J_ONT-145	67.80	18:00	65.22	06:00	66.87	2.57
121	☐	J_ONT-147	68.23	18:00	65.02	06:00	66.98	3.21
122	☐	J_ONT-149	68.66	18:00	65.43	06:00	67.41	3.23
123	☐	J_ONT-151	57.72	18:00	55.12	06:00	56.71	2.60
124	☐	J_ONT-153	57.83	18:00	55.22	06:00	56.82	2.61
125	☐	J_ONT-155	50.46	18:00	47.86	06:00	49.44	2.60
126	☐	J_ONT-157	63.03	18:00	59.73	06:00	61.71	3.29
127	☐	J_ONT-159	58.26	18:00	54.97	06:00	56.94	3.29
128	☐	J_ONT-161	66.50	18:00	63.20	06:00	65.17	3.29
129	☐	J_ONT-163	69.10	18:00	65.84	06:00	67.83	3.26
130	☐	J_ONT-165	75.60	18:00	71.34	06:00	73.91	4.26
131	☐	J_ONT-167	69.10	18:00	65.72	06:00	67.78	3.38
132	☐	J_ONT-169	70.83	18:00	67.45	06:50	69.51	3.38
133	☐	J_ONT-171	75.16	18:00	70.90	06:00	73.47	4.26
134	☐	J_ONT-173	76.89	18:00	72.39	06:00	75.10	4.51
135	☐	J_ONT-175	77.33	18:00	72.82	06:00	75.54	4.51
136	☐	J_ONT-177	79.38	18:00	74.45	06:00	77.41	4.93
137	☐	J_ONT-179	80.90	18:00	75.80	06:00	78.87	5.10
138	☐	J_ONT-181	91.58	18:00	81.27	06:00	86.77	10.31
139	☐	J_ONT-185	89.13	18:00	79.37	06:00	84.61	9.76
140	☐	J_ONT-187	91.21	18:00	80.98	06:00	86.41	10.23
141	☐	J_ONT-189	95.96	18:00	85.73	06:00	91.16	10.23
142	☐	J_ONT-191	95.96	18:00	85.73	06:00	91.13	10.23
143	☐	J_ONT-193	82.26	18:00	77.14	06:00	80.22	5.12
144	☐	J_ONT-195	88.16	18:00	79.31	06:00	84.35	8.85
145	☐	J_ONT-197	90.33	18:00	80.78	06:00	86.04	9.55
146	☐	J_ONT-199	89.03	18:00	79.42	06:00	84.61	9.61
147	☐	J_ONT-201	86.86	18:00	77.74	06:00	82.74	9.12
148	☐	J_ONT-203	85.56	18:00	77.16	06:00	81.89	8.40
149	☐	J_ONT-205	85.13	18:00	76.86	06:00	81.54	8.27
150	☐	J_ONT-207	82.53	18:00	74.13	06:00	78.85	8.40
151	☐	J_ONT-209	85.56	18:00	76.44	06:00	81.44	9.12
152	☐	J_ONT-211	87.72	18:00	77.79	06:00	83.66	9.93
153	☐	J_ONT-213	89.46	18:00	79.64	06:00	85.43	9.82
154	☐	J_ONT-215	88.59	18:00	79.04	06:00	84.62	9.55
155	☐	J_ONT-217	88.59	18:00	79.04	06:00	84.62	9.55
156	☐	J_ONT-219	88.16	18:00	79.66	06:00	84.50	8.50
157	☐	J_ONT-221	85.99	18:00	78.79	06:00	82.94	7.20
158	☐	J_ONT-223	84.26	18:00	77.41	06:00	81.38	6.85
159	☐	J_ONT-225	83.83	18:00	76.54	06:00	80.73	7.29
160	☐	J_ONT-227	81.66	18:00	74.68	06:00	78.71	6.99
161	☐	J_ONT-229	85.13	18:00	78.00	06:00	82.11	7.13
162	☐	J_ONT-231	85.13	18:00	77.93	06:00	82.07	7.20
163	☐	J_ONT-233	85.99	18:00	78.79	06:00	82.94	7.20
164	☐	J_ONT-235	84.69	18:00	77.49	06:00	81.64	7.20
165	☐	J_ONT-237	86.86	18:00	80.01	06:00	83.98	6.85
166	☐	J_ONT-239	117.53	18:00	114.35	06:10	116.32	3.18
167	☐	J_ONT-243	127.52	18:00	124.34	06:10	126.31	3.18
168	☐	J_ONT-247	118.85	18:00	115.67	06:10	117.65	3.18
169	☐	J_ONT-249	123.18	18:00	120.00	06:10	121.98	3.18
170	☐	J_ONT-251	120.58	18:00	117.40	06:10	119.38	3.18
171	☐	J_ONT-253	116.68	18:00	113.50	06:10	115.48	3.18

Existing Scenario - City of Ontario - Junction Output Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
172	☐	J_ONT-255	118.85	18:00	115.67	06:10	117.65	3.18
173	☐	J_ONT-265	91.63	18:00	81.77	06:00	87.00	9.86
174	☐	J_ONT-267	87.08	18:00	77.31	06:00	82.55	9.76
175	☐	J_ONT-271	91.63	18:00	81.77	06:00	87.04	9.86
176	☐	J_ONT-273	89.54	18:00	79.69	06:00	84.95	9.86
177	☐	J_ONT-275	90.83	18:00	80.68	06:00	86.06	10.14
178	☐	J_ONT-277	95.09	18:00	84.95	06:00	90.32	10.14
179	☐	J_ONT-279	95.09	18:00	84.95	06:00	90.32	10.14
180	☐	J_ONT-281	95.09	18:00	84.86	06:00	90.30	10.23
181	☐	J_ONT-283	93.36	18:00	83.13	06:00	88.56	10.23
182	☐	J_ONT-285	92.06	18:00	81.14	06:00	87.01	10.93
183	☐	J_ONT-287	92.06	18:00	81.14	06:00	87.01	10.93
184	☐	J_ONT-289	61.80	18:00	58.48	06:00	60.47	3.32
185	☐	J_ONT-291	54.36	18:00	51.76	06:00	53.35	2.60
186	☐	J_ONT-295	51.76	18:00	49.16	06:00	50.75	2.60
187	☐	J_ONT-297	51.33	18:00	48.73	06:00	50.26	2.60
188	☐	J_ONT-299	51.33	18:00	48.73	06:00	50.31	2.60
189	☐	J_ONT-301	75.76	18:00	71.98	06:00	74.35	3.79
190	☐	J_ONT-313	53.22	18:00	52.93	06:00	53.11	0.28
191	☐	J_ONT-315	59.13	18:00	56.48	06:00	58.11	2.65
192	☐	J_ONT-317	60.00	18:00	57.32	06:00	58.96	2.68
193	☐	J_ONT-321	105.47	18:00	102.36	06:00	104.35	3.11
194	☐	J_ONT-325	90.95	18:00	80.78	06:00	86.17	10.17
195	☐	J_ONT-333	118.03	06:40	102.25	01:50	110.15	15.77
196	☐	J_ONT-341	118.66	14:30	102.83	01:50	111.29	15.83
197	☐	J_ONT-343	118.66	14:30	102.84	01:50	111.30	15.82
198	☐	J_ONT-351	114.75	14:30	98.92	01:50	107.39	15.83
199	☐	J_ONT-357	114.20	06:40	98.37	01:50	106.84	15.83
200	☐	J_ONT-359	85.23	20:00	41.13	00:30	59.34	44.10
201	☐	J_ONT-361	130.48	19:40	91.72	00:30	109.53	38.76
202	☐	J_ONT-363	127.94	19:40	89.09	00:30	106.93	38.85
203	☐	J_ONT-365	134.01	19:40	95.20	00:30	113.00	38.81
204	☐	J_ONT-367	133.36	19:40	94.84	00:30	112.11	38.53
205	☐	J_ONT-369	131.24	19:40	92.82	00:30	109.99	38.42
206	☐	J_ONT-371	131.24	19:40	92.86	00:30	109.99	38.38
207	☐	J_ONT-373	134.67	19:40	96.58	00:30	113.45	38.10
208	☐	J_ONT-377	150.57	19:40	110.41	00:30	128.26	40.16
209	☐	J_ONT-379	134.46	19:40	95.54	00:30	112.59	38.92
210	☐	J_ONT-381	143.79	19:40	103.18	00:30	121.21	40.61
211	☐	J_ONT-383	144.92	19:40	104.53	00:30	122.43	40.39
212	☐	J_ONT-387	148.65	19:40	107.13	00:30	125.63	41.52
213	☐	J_ONT-399	153.94	20:00	110.29	00:30	129.14	43.65
214	☐	J_ONT-401	150.23	20:00	106.62	00:30	125.44	43.62
215	☐	J_ONT-403	151.75	20:00	108.20	00:30	126.98	43.55
216	☐	J_ONT-407	152.71	20:00	109.06	00:30	127.91	43.64
217	☐	J_ONT-421	156.17	20:00	112.51	00:30	131.37	43.67
218	☐	J_ONT-423	67.53	18:00	63.71	06:00	66.00	3.82
219	☐	J_ONT-425	75.27	18:00	71.09	06:00	73.60	4.17
220	☐	J_ONT-427	75.27	18:00	71.09	06:00	73.60	4.17
221	☐	J_ONT-473	78.12	06:40	69.92	03:10	74.05	8.21
222	☐	J_ONT-477	146.70	19:40	105.18	00:30	123.70	41.53
223	☐	J_ONT-507	131.23	19:40	92.93	00:30	109.99	38.30
224	☐	J_ONT-509	135.37	19:40	97.31	00:30	114.15	38.05
225	☐	J_ONT-511	135.13	19:40	97.06	00:30	113.91	38.07
226	☐	J_ONT-537	72.18	18:00	67.97	06:00	70.50	4.20
227	☐	J_ONT-569	95.27	18:00	73.66	06:00	85.25	21.61
228	☐	J_ONT-609	90.16	18:00	66.85	06:00	79.30	23.31

Existing Scenario - City of Ontario - Pipe Output Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
1	☐	800ZONE_V1	10,918.05	15:00	0.00	17:50	6,942.94	10,918.05
2	☐	800ZONE_V2	10,918.05	15:00	0.00	17:50	6,944.07	10,918.05
3	☐	PSCH_1	1,101.47	15:30	0.00	00:00	546.93	1,101.47
4	☐	PKELLOG	0.03	15:30	0.00	00:00	0.01	0.03
5	☐	PHYD_LAT	0.00	00:00	0.00	00:00	0.00	0.00
6	☐	P10142	4,842.93	06:50	0.11	18:20	2,655.48	4,842.82
7	☐	P10326	426.66	00:00	4.26	06:30	151.62	422.40
8	☐	P10328	314.18	00:00	4.26	06:30	113.61	309.92
9	☐	P10330	195.88	00:00	0.00	05:00	70.81	195.88
10	☐	P10332	131.18	00:00	0.00	05:00	44.33	131.18
11	☐	P10334	71.14	00:00	4.26	05:00	26.86	66.88
12	☐	P10340	7.80	00:00	0.00	05:00	2.64	7.80
13	☐	P10342	64.70	00:00	0.00	05:00	21.86	64.70
14	☐	P10344	11.36	00:00	0.00	05:00	3.84	11.36
15	☐	P10346	56.00	00:00	0.00	05:00	18.92	56.00
16	☐	P10350	122.32	22:30	0.00	05:00	64.99	122.32
17	☐	P10354	1,509.49	04:00	0.42	20:00	776.93	1,509.07
18	☐	P10356	871.92	10:00	0.00	05:00	294.14	871.92
19	☐	P10360	742.97	21:00	0.25	20:00	431.10	742.72
20	☐	P10364	58.22	22:50	0.00	05:00	19.67	58.22
21	☐	P10366	503.88	00:00	0.00	05:00	170.28	503.88
22	☐	P10368	463.00	00:00	0.00	05:00	156.46	463.00
23	☐	P10372	586.87	04:00	0.25	20:00	395.42	586.63
24	☐	P10374	562.63	04:00	0.25	20:00	387.22	562.39
25	☐	P10376	292.23	04:00	0.14	20:00	208.89	292.10
26	☐	P10422	834.42	06:50	0.03	19:00	499.53	834.39
27	☐	P10506	481.72	09:30	0.25	20:00	297.52	481.48
28	☐	P10508	481.73	21:00	0.25	20:00	343.61	481.48
29	☐	P10510	267.36	09:30	0.14	20:00	142.59	267.23
30	☐	P10512	98.13	09:30	0.05	20:00	50.05	98.08
31	☐	P10514	62.88	00:00	0.00	05:00	21.25	62.88
32	☐	P10516	112.46	04:00	0.05	20:00	78.18	112.41
33	☐	P10518	169.23	09:30	0.09	20:00	124.48	169.14
34	☐	P10520	130.90	04:00	0.05	20:00	84.41	130.85
35	☐	P10522	214.36	09:30	0.11	20:00	104.06	214.25
36	☐	P10550	214.36	09:30	0.11	20:00	145.24	214.25
37	☐	ONT9036	0.00	00:00	0.00	00:00	0.00	0.00
38	☐	ONTFRAN-3622	111.45	06:40	0.00	18:00	59.07	111.45
39	☐	ONT9042	991.45	06:00	0.03	18:30	527.24	991.42
40	☐	ONTNEWP-9322	0.00	00:00	0.00	00:00	0.00	0.00
41	☐	ONTNEWP-9512	58.22	23:40	0.00	05:00	19.67	58.22
42	☐	ONTNEWP-9514	0.00	00:00	0.00	00:00	0.00	0.00
43	☐	ONTNEWP-934	40.36	10:00	0.00	00:00	13.36	40.36
44	☐	ONTNEWP-10044	0.00	00:00	0.00	00:00	0.00	0.00
45	☐	ONTNEWP-9320	58.22	00:00	0.00	05:00	19.67	58.22
46	☐	ONTNEWP-10016	0.00	00:00	0.00	00:00	0.00	0.00
47	☐	ONTNEWP-9884	0.00	00:00	0.00	00:00	0.00	0.00
48	☐	ONTNEWP-9886	0.00	00:00	0.00	00:00	0.00	0.00
49	☐	ONTNEWP-9384	609.18	09:30	0.42	20:00	325.82	608.76
50	☐	ONTNEWP-9892	875.43	04:00	0.42	20:00	544.61	875.01
51	☐	ONTNEWP-9900	126.38	00:00	0.00	05:00	42.71	126.38
52	☐	ONTNEWP-910	27.08	00:00	0.00	05:00	9.15	27.08
53	☐	ONTNEWP-9896	336.54	00:00	0.00	05:00	131.78	336.54
54	☐	ONTNEWP-9712	56.44	00:00	0.00	05:00	37.13	56.44
55	☐	ONTNEWP-9902	54.54	10:00	0.00	05:00	29.31	54.54
56	☐	ONTNEWP-9890	565.48	00:00	0.00	05:00	209.15	565.48
57	☐	ONTNEWP-914	503.24	00:00	0.00	05:00	188.12	503.24

Existing Scenario - City of Ontario - Pipe Output Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
58	☐	ONTNEWP-9894	471.24	00:00	0.00	05:00	177.30	471.24
59	☐	ONTNEWP-9913	34.38	00:00	0.00	05:00	11.62	34.38
60	☐	ONTNEWP-9861	63.96	00:00	0.00	05:00	21.61	63.96
61	☐	ONTNEWP-9912	136.67	10:00	0.00	00:00	45.24	136.67
62	☐	ONTNEWP-9668	0.00	00:00	0.00	00:00	0.00	0.00
63	☐	ONTNEWP-9664	26.55	11:10	0.00	05:00	13.09	26.55
64	☐	ONTNEWP-9928	270.86	12:10	0.00	00:00	89.66	270.86
65	☐	ONTNEWP-9932	229.01	12:10	0.00	00:00	75.81	229.01
66	☐	ONTNEWP-9940	0.00	00:00	0.00	00:00	0.00	0.00
67	☐	ONTNEWP-9942	0.00	00:00	0.00	00:00	0.00	0.00
68	☐	ONTNEWP-908	34.96	00:00	0.00	05:00	11.81	34.96
69	☐	ONTNEWP-9846	1,480.85	04:00	0.42	20:00	767.25	1,480.43
70	☐	ONTFRAN-3693	0.00	00:00	0.00	00:00	0.00	0.00
71	☐	ONTFRAN-3621	111.45	06:40	0.00	18:00	59.07	111.45
72	☐	ONTNEWP649	107.26	06:50	0.00	18:00	56.99	107.26
73	☐	ONTFRAN-3624	104.82	06:50	0.00	18:00	55.77	104.82
74	☐	ONTFRAN-3626	104.81	07:00	0.00	18:00	55.77	104.81
75	☐	ONTNEWP-9780	0.00	00:00	0.00	00:00	0.00	0.00
76	☐	ONTFRAN-3694	834.42	06:50	0.03	19:00	489.71	834.39
77	☐	ONTFRAN-3620	192.16	05:00	0.00	18:00	106.68	192.16
78	☐	ONTFRAN-3628	991.45	06:00	0.03	18:30	527.24	991.42
79	☐	ONT9048	2,349.48	00:40	0.00	08:00	1,182.84	2,349.48
80	☐	ONT9068	0.00	00:00	0.00	00:00	0.00	0.00
81	☐	ONTNEWP-9870	4,842.93	07:00	0.10	18:00	2,655.50	4,842.82
82	☐	ONTFRAN-3645	1,830.77	00:40	0.04	18:30	928.84	1,830.72
83	☐	ONTFRAN-3627	886.64	06:50	0.03	18:50	471.47	886.61
84	☐	ONTFRAN-3618	392.19	21:30	0.00	18:00	211.37	392.19
85	☐	ONTFRAN-3629	1,727.60	06:00	0.06	18:20	941.76	1,727.54
86	☐	ONTFRAN-3617	3,905.44	06:50	0.08	18:20	2,080.59	3,905.36
87	☐	ONTFRAN-3600	4,840.61	06:50	0.11	18:20	2,654.05	4,840.51
88	☐	ONT9024	4,842.93	07:00	0.10	18:00	2,655.50	4,842.82
89	☐	ONTNEWP-9276	4,842.93	07:00	0.10	18:00	2,655.50	4,842.82
90	☐	ONTNEWP-9434	0.00	00:00	0.00	00:00	0.00	0.00
91	☐	ONTNEWP-9602	4,842.93	07:00	0.10	18:00	2,655.50	4,842.82
92	☐	ONTFRAN-3706	3,905.44	06:50	0.08	18:20	2,080.59	3,905.36
93	☐	ONTNEWP-9252	0.00	00:00	0.00	00:00	0.00	0.00
94	☐	ONTNEWP-9590	0.00	00:00	0.00	00:00	0.00	0.00
95	☐	ONTNEWP-9170	0.00	00:00	0.00	00:00	0.00	0.00
96	☐	ONTPHLP-3615	0.00	00:00	0.00	00:00	0.00	0.00
97	☐	ONT9034	0.00	00:00	0.00	00:00	0.00	0.00
98	☐	ONTNEWP-9600	0.00	00:00	0.00	00:00	0.00	0.00
99	☐	ONTNEWP-9854	0.00	00:00	0.00	00:00	0.00	0.00
100	☐	ONTNEWP-9556	177.76	00:00	0.00	05:00	60.07	177.76
101	☐	ONTNEWP-9554	4,842.93	06:10	0.11	18:00	2,677.94	4,842.83
102	☐	ONTNEWP-9810	4,849.21	06:10	0.11	18:00	2,741.13	4,849.11
103	☐	ONTNEWP-9596	0.00	00:00	0.00	00:00	0.00	0.00
104	☐	ONTNEWP-10017	58.22	22:40	0.00	05:00	19.67	58.22
105	☐	ONTNEWP-9946	0.00	00:00	0.00	00:00	0.00	0.00
106	☐	ONT283	10.06	00:20	0.00	05:00	3.40	10.06
107	☐	ONTNEWP-9714	23.12	00:00	0.00	05:00	7.81	23.12
108	☐	ONTNEWP-9494	0.00	00:00	0.00	00:00	0.00	0.00
109	☐	ONTP10024	56.44	00:00	0.00	05:00	37.13	56.44
110	☐	2011_P14	790.87	10:00	0.00	00:00	261.81	790.87
111	☐	2011_P15	117.77	10:00	0.00	00:00	38.98	117.77
112	☐	2011_P17	548.23	04:00	0.25	20:00	382.36	547.99
113	☐	2011_P18	538.17	21:00	0.25	20:00	362.36	537.92
114	☐	2011_P19	614.45	21:00	0.25	20:00	387.96	614.20

Existing Scenario - City of Ontario - Pipe Output Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
115		P39	56.00	00:00	0.00	05:00	18.92	56.00
116		P41	60.84	02:00	0.00	05:00	20.56	60.84
117		P63	90.56	00:00	0.00	05:00	54.26	90.56
118		P81	0.00	00:00	0.00	00:00	0.00	0.00
119		P87	235.04	04:00	0.11	20:00	166.39	234.93
120		P_ONT-154	4,842.93	07:00	0.10	18:00	2,655.50	4,842.82
121		P_ONT-156	4,842.93	07:00	0.10	18:00	2,655.50	4,842.82
122		P_ONT-158	4,842.93	06:50	0.10	18:10	2,655.48	4,842.82
123		P_ONT-160	4,842.93	06:50	0.11	18:20	2,655.48	4,842.82
124		P_ONT-176	3,750.95	06:50	0.08	18:20	1,982.03	3,750.88
125		P_ONT-178	104.56	06:50	0.00	18:00	67.01	104.56
126		P_ONT-180	46.79	06:50	0.00	18:00	29.99	46.79
127		P_ONT-182	46.79	06:30	0.00	18:00	29.99	46.79
128		P_ONT-184	0.00	00:00	0.00	00:00	0.00	0.00
129		P_ONT-186	138.74	21:50	0.00	18:00	68.97	138.74
130		P_ONT-188	0.00	00:00	0.00	00:00	0.00	0.00
131		P_ONT-190	56.45	06:00	0.00	00:00	28.03	56.45
132		P_ONT-192	195.65	06:50	0.00	18:00	112.80	195.65
133		P_ONT-194	195.65	06:50	0.00	18:00	105.10	195.65
134		P_ONT-196	283.64	02:40	0.00	18:00	156.08	283.64
135		P_ONT-198	935.17	06:50	0.03	18:20	572.41	935.14
136		P_ONT-200	100.75	07:00	0.00	18:00	48.13	100.75
137		P_ONT-204	42.68	00:20	0.00	05:00	14.42	42.68
138		P_ONT-206	56.10	00:00	0.00	05:00	18.96	56.10
139		P_ONT-208	32.52	00:00	0.00	05:00	10.99	32.52
140		P_ONT-210	0.00	00:00	0.00	00:00	0.00	0.00
141		P_ONT-212	210.15	06:50	0.00	18:00	112.37	210.15
142		P_ONT-214	210.15	06:50	0.00	18:00	112.37	210.15
143		P_ONT-216	209.89	06:10	0.00	18:00	112.24	209.89
144		P_ONT-218	0.26	06:00	0.00	00:00	0.13	0.26
145		P_ONT-220	0.00	00:00	0.00	00:00	0.00	0.00
146		P_ONT-222	209.55	06:00	0.00	18:00	112.08	209.55
147		P_ONT-224	0.00	00:00	0.00	00:00	0.00	0.00
148		P_ONT-226	658.25	07:00	0.00	18:00	335.46	658.25
149		P_ONT-228	209.55	06:00	0.00	18:00	112.08	209.55
150		P_ONT-230	229.45	07:00	0.00	18:00	94.77	229.45
151		P_ONT-232	669.19	07:00	0.04	18:10	326.43	669.15
152		P_ONT-234	207.95	23:40	0.00	18:00	111.20	207.95
153		P_ONT-236	141.74	06:40	0.00	18:00	46.62	141.74
154		P_ONT-238	141.74	06:00	0.00	18:00	59.16	141.74
155		P_ONT-240	37.12	00:00	0.00	05:00	12.54	37.12
156		P_ONT-242	18.76	00:00	0.00	05:00	6.34	18.76
157		P_ONT-244	229.45	07:00	0.00	18:00	94.77	229.45
158		P_ONT-246	424.16	00:40	0.03	19:00	211.21	424.12
159		P_ONT-248	424.16	00:40	0.03	19:00	212.08	424.12
160		P_ONT-250	412.16	23:40	0.03	19:00	213.33	412.13
161		P_ONT-252	412.16	23:40	0.03	19:00	213.33	412.13
162		P_ONT-254	412.16	23:20	0.03	18:30	214.29	412.13
163		P_ONT-256	412.16	00:40	0.03	18:20	214.29	412.13
164		P_ONT-258	0.00	00:00	0.00	00:00	0.00	0.00
165		P_ONT-260	1.92	06:00	0.00	00:00	0.96	1.92
166		P_ONT-262	1,931.29	06:00	0.06	18:30	1,023.73	1,931.23
167		P_ONT-264	283.01	06:40	0.00	18:00	113.80	283.01
168		P_ONT-266	282.75	06:30	0.00	18:00	110.35	282.75
169		P_ONT-268	258.42	06:30	0.00	18:00	98.27	258.42
170		P_ONT-270	9.84	00:00	0.00	05:00	3.33	9.84
171		P_ONT-272	439.97	06:00	0.00	18:00	243.29	439.97

Existing Scenario - City of Ontario - Pipe Output Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
172		P_ONT-274	616.72	06:00	0.00	18:00	325.89	616.72
173		P_ONT-276	176.75	07:00	0.00	18:00	82.59	176.75
174		P_ONT-278	428.80	07:00	0.00	18:00	240.69	428.80
175		P_ONT-280	428.80	06:00	0.00	18:00	240.69	428.80
176		P_ONT-282	0.00	00:00	0.00	00:00	0.00	0.00
177		P_ONT-284	11.17	06:00	0.00	18:00	3.08	11.17
178		P_ONT-286	0.00	00:00	0.00	00:00	0.00	0.00
179		P_ONT-288	17.57	06:40	0.00	18:00	6.26	17.57
180		P_ONT-290	171.13	06:40	0.00	18:00	94.83	171.13
181		P_ONT-292	535.02	00:40	0.03	18:30	298.06	534.99
182		P_ONT-294	165.15	23:00	0.00	18:00	89.05	165.15
183		P_ONT-296	171.13	06:40	0.00	18:00	94.83	171.13
184		P_ONT-298	371.60	06:00	0.00	18:00	209.01	371.60
185		P_ONT-300	542.75	06:00	0.03	18:30	303.86	542.73
186		P_ONT-302	0.00	00:00	0.00	00:00	0.00	0.00
187		P_ONT-306	0.00	00:00	0.00	00:00	0.00	0.00
188		P_ONT-308	0.00	00:00	0.00	00:00	0.00	0.00
189		P_ONT-310	0.00	00:00	0.00	00:00	0.00	0.00
190		P_ONT-312	0.00	00:00	0.00	00:00	0.00	0.00
191		P_ONT-314	0.00	00:00	0.00	00:00	0.00	0.00
192		P_ONT-316	0.00	00:00	0.00	00:00	0.00	0.00
193		P_ONT-328	12.96	00:00	0.00	05:00	7.74	12.96
194		P_ONT-330	191.25	23:40	0.00	18:00	94.39	191.25
195		P_ONT-332	13.40	00:00	0.00	05:00	4.53	13.40
196		P_ONT-334	13.40	00:00	0.00	05:00	4.53	13.40
197		P_ONT-336	170.49	23:40	0.00	18:00	87.37	170.49
198		P_ONT-338	30.88	00:00	0.00	05:00	10.44	30.88
199		P_ONT-340	30.88	00:00	0.00	05:00	10.44	30.88
200		P_ONT-342	18.76	00:00	0.00	05:00	6.34	18.76
201		P_ONT-344	18.36	00:00	0.00	05:00	6.20	18.36
202		P_ONT-346	0.20	00:00	0.00	05:00	0.07	0.20
203		P_ONT-348	192.16	05:00	0.00	18:00	116.76	192.16
204		P_ONT-350	36.04	00:20	0.00	05:00	12.18	36.04
205		P_ONT-352	19.16	00:20	0.00	05:00	6.47	19.16
206		P_ONT-354	0.00	00:00	0.00	00:00	0.00	0.00
207		P_ONT-356	19.16	00:00	0.00	05:00	6.47	19.16
208		P_ONT-358	1,731.16	06:00	0.06	18:20	943.53	1,731.10
209		P_ONT-368	4,842.93	06:50	0.11	18:20	2,655.20	4,842.82
210		P_ONT-370	100.75	07:00	0.00	18:00	55.08	100.75
211		P_ONT-372	100.75	07:00	0.00	18:00	50.59	100.75
212		P_ONT-376	351.79	21:30	0.00	18:00	197.71	351.79
213		P_ONT-378	141.74	06:00	0.00	18:00	61.91	141.74
214		P_ONT-382	871.92	10:00	0.00	00:00	288.64	871.92
215		P_ONT-388	118.80	12:10	0.00	00:00	39.33	118.80
216		P_ONT-406	109.30	21:10	0.00	05:00	72.27	109.30
217		P_ONT-408	109.30	21:10	0.00	05:00	52.43	109.30
218		P_ONT-410	46.80	11:10	0.00	05:00	30.20	46.80
219		P_ONT-412	43.52	21:10	0.00	05:00	27.49	43.52
220		P_ONT-418	12.72	21:10	0.00	05:00	4.30	12.72
221		P_ONT-420	56.10	00:00	0.00	05:00	18.96	56.10
222		P_ONT-422	98.13	09:30	0.05	20:00	71.30	98.08
223		P_ONT-424	52.16	00:00	0.00	05:00	17.63	52.16
224		P_ONT-426	169.23	09:30	0.09	20:00	121.87	169.14
225		P_ONT-428	522.37	21:00	0.25	20:00	357.07	522.12
226		P_ONT-430	566.41	21:00	0.25	20:00	371.84	566.16
227		P_ONT-432	581.73	21:00	0.25	20:00	376.98	581.48
228		P_ONT-434	656.25	21:00	0.25	20:00	401.99	656.00

Existing Scenario - City of Ontario - Pipe Output Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
229		P_ONT-438	178.48	00:00	0.00	05:00	78.37	178.48
230		P_ONT-440	1,498.37	04:00	0.42	20:00	773.17	1,497.95
231		P_ONT-442	842.31	04:00	0.42	20:00	515.36	841.89
232		P_ONT-444	609.18	09:30	0.42	20:00	328.28	608.76
233		P_ONT-446	559.40	08:40	0.42	20:00	286.25	558.98
234		P_ONT-456	55.88	02:00	0.00	05:00	18.88	55.88
235		P_ONT-458	67.70	00:00	0.00	05:00	22.88	67.70
236		P_ONT-460	11.96	00:00	0.00	05:00	4.04	11.96
237		P_ONT-470	875.43	04:00	0.42	20:00	526.55	875.01
238		P_ONT-480	0.00	00:00	0.00	00:00	0.00	0.00
239		P_ONT-482	886.64	06:50	0.03	18:50	471.47	886.61
240		P_ONT-484	0.00	00:00	0.00	00:00	0.00	0.00
241		P_ONT-486	0.00	00:00	0.00	00:00	0.00	0.00
242		P_ONT-534	781.09	04:00	0.42	20:00	494.67	780.67
243		P_ONT-560	559.40	08:40	0.42	20:00	286.25	558.98
244		P_ONT-570	614.45	21:00	0.25	20:00	387.96	614.20
245		P_ONT-572	731.13	21:00	0.25	20:00	427.12	730.88
246		P_ONT-574	702.77	21:00	0.25	20:00	417.61	702.52
247		P_ONT-576	669.19	06:40	0.04	19:00	326.36	669.15
248		P_ONT-598	886.64	06:50	0.03	18:50	471.47	886.61
249		P_ONT-618	2,349.48	00:40	0.00	08:00	1,182.84	2,349.48
250		P_ONT-666	100.75	07:00	0.00	18:00	55.08	100.75

Near Term Model Scenario

Near Term Scenario - City of Ontario - Junction Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
1		J1272	1299	995.00
2		J1274	1299	1,015.00
3		J1276	1299	984.00
4		J1280	1299	997.00
5		J1288	1299	1,006.00
6		J1290	1299	967.00
7		J1292	1158	803.00
8		J1294	1158	873.00
9		J1296	1158	892.00
10		J1302	1299	1,005.00
11		J1304	1158	845.00
12		J1308	1299	1,010.00
13		J1314	1299	1,063.00
14		J1316	1299	1,063.00
15		J1320	1299	1,022.00
16		J1322	1299	998.50
17		J1324	1299	998.50
18		J1404	1299	1,005.00
19		J1406	1299	1,014.00
20		J1408	1299	1,029.00
21		J1410	1299	1,022.00
22		J1412	1299	1,022.00
23		J1414	1299	1,012.50
24		J1416	1299	994.50
25		J1586	1299	1,111.00
26		J1592	1299	970.00
27		J1596	1050	790.80
28		JKELLOG	930	722.50
29		JSCH_HYD	930	722.50
30		J_ONT-1	1299	1,020.00
31		J_ONT-103	1050	752.33
32		J_ONT-105	930	752.33
33		J_ONT-107	1050	752.33
34		J_ONT-109	930	752.33
35		J_ONT-113	930	766.97
36		J_ONT-115	1050	766.95
37		J_ONT-117	930	766.95
38		J_ONT-119	1050	766.95
39		J_ONT-133	930	718.23
40		J_ONT-135	930	730.00
41		J_ONT-137	930	722.00
42		J_ONT-139	930	720.00
43		J_ONT-141	930	717.00
44		J_ONT-143	930	725.00
45		J_ONT-145	930	717.00
46		J_ONT-147	930	716.00
47		J_ONT-149	930	715.00
48		J_ONT-151	930	740.26
49		J_ONT-153	930	740.00
50		J_ONT-155	930	757.00
51		J_ONT-157	930	728.00

Near Term Scenario - City of Ontario - Junction Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
52		J_ONT-159	930	739.00
53		J_ONT-161	930	720.00
54		J_ONT-163	930	714.00
55		J_ONT-165	930	699.00
56		J_ONT-167	930	714.00
57		J_ONT-169	930	710.00
58		J_ONT-171	930	700.00
59		J_ONT-173	930	696.00
60		J_ONT-175	930	695.00
61		J_ONT-177	930	690.26
62		J_ONT-179	930	686.77
63		J_ONT-181	930	662.11
64		J_ONT-185	930	667.75
65		J_ONT-187	930	662.97
66		J_ONT-189	930	652.00
67		J_ONT-191	930	652.00
68		J_ONT-193	930	683.62
69		J_ONT-195	930	670.00
70		J_ONT-197	930	665.00
71		J_ONT-199	930	668.00
72		J_ONT-201	930	673.00
73		J_ONT-203	930	676.00
74		J_ONT-205	930	677.00
75		J_ONT-207	930	683.00
76		J_ONT-209	930	676.00
77		J_ONT-211	930	671.02
78		J_ONT-213	930	667.00
79		J_ONT-215	930	669.00
80		J_ONT-217	930	669.00
81		J_ONT-219	930	670.00
82		J_ONT-221	930	675.00
83		J_ONT-223	930	679.00
84		J_ONT-225	930	680.00
85		J_ONT-227	930	685.00
86		J_ONT-229	930	677.00
87		J_ONT-231	930	677.00
88		J_ONT-233	930	675.00
89		J_ONT-235	930	678.00
90		J_ONT-237	930	673.00
91		J_ONT-239	1050	798.05
92		J_ONT-243	1050	775.00
93		J_ONT-247	1050	795.00
94		J_ONT-249	1050	785.00
95		J_ONT-251	1050	791.00
96		J_ONT-253	1050	800.00
97		J_ONT-255	1050	795.00
98		J_ONT-257	1299	0.00
99		J_ONT-259	1299	0.00
100		J_ONT-261	1299	0.00
101		J_ONT-263	1299	0.00
102		J_ONT-265	930	662.00

Near Term Scenario - City of Ontario - Junction Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
103		J_ONT-267	930	672.50
104		J_ONT-271	930	662.00
105		J_ONT-273	930	666.81
106		J_ONT-275	930	663.85
107		J_ONT-277	930	654.00
108		J_ONT-279	930	654.00
109		J_ONT-281	930	654.00
110		J_ONT-283	930	658.00
111		J_ONT-285	930	661.00
112		J_ONT-287	930	661.00
113		J_ONT-289	930	730.83
114		J_ONT-291	930	748.00
115		J_ONT-295	930	754.00
116		J_ONT-297	930	755.00
117		J_ONT-299	930	755.00
118		J_ONT-301	930	698.61
119		J_ONT-305	1050	752.15
120		J_ONT-313	930	750.65
121		J_ONT-315	930	737.00
122		J_ONT-317	930	735.00
123		J_ONT-319	930	705.67
124		J_ONT-321	930	630.05
125		J_ONT-325	930	663.56
126		J_ONT-333	1158	898.39
127		J_ONT-341	1158	897.00
128		J_ONT-343	1158	897.00
129		J_ONT-351	1158	905.98
130		J_ONT-357	1158	907.23
131		J_ONT-359	1299	1,125.73
132		J_ONT-361	1299	1,022.00
133		J_ONT-363	1299	1,027.86
134		J_ONT-365	1299	1,013.84
135		J_ONT-367	1299	1,015.12
136		J_ONT-369	1299	1,020.00
137		J_ONT-371	1299	1,020.00
138		J_ONT-373	1299	1,012.03
139		J_ONT-377	1299	975.08
140		J_ONT-379	1299	1,012.28
141		J_ONT-381	1299	990.66
142		J_ONT-383	1299	988.07
143		J_ONT-387	1299	979.36
144		J_ONT-399	1299	967.15
145		J_ONT-401	1299	975.71
146		J_ONT-403	1299	972.20
147		J_ONT-405	1158	906.93
148		J_ONT-407	1299	970.00
149		J_ONT-409	930	636.83
150		J_ONT-421	1299	962.00
151		J_ONT-423	930	717.61
152		J_ONT-425	930	699.76
153		J_ONT-427	930	699.76

Near Term Scenario - City of Ontario - Junction Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
154		J_ONT-473	1158	973.90
155		J_ONT-477	1299	983.86
156		J_ONT-489	1158	912.00
157		J_ONT-503	1299	870.00
158		J_ONT-507	1299	1,020.00
159		J_ONT-509	1299	1,010.42
160		J_ONT-511	1299	1,010.97
161		J_ONT-513	1158	863.00
162		J_ONT-515	1158	867.04
163		J_ONT-537	930	706.89
164		J_ONT-569	930	653.59
165		J_ONT-609	930	665.39
166		J_ONT-613	930	684.00
167		J_ONT-77	930	660.94
168		J_ONT-99	1050	791.41
169		ONT66	1050	780.00
170		ONT68	1050	787.87
171		ONT72	1050	786.40
172		ONT76	930	694.43
173		ONTFRAN-3581	930	728.00
174		ONTFRAN-3583	930	723.56
175		ONTFRAN-3591	930	706.58
176		ONTFRAN-3592	930	725.00
177		ONTFRAN-3593	930	730.70
178		ONTFRAN-3594	930	731.73
179		ONTFRAN-3595	930	737.21
180		ONTFRAN-3596	930	706.61
181		ONTFRAN-3597	930	699.76
182		ONTFRAN-3598	930	706.52
183		ONTFRAN-3599	930	683.13
184		ONTFRAN-3600	930	701.34
185		ONTFRAN-3601	930	674.45
186		ONTFRAN-3603	930	663.78
187		ONTFRAN-3605	930	655.40
188		ONTFRAN-3606	930	650.00
189		ONTFRAN-3607	930	636.83
190		ONTFRAN-3608	930	658.46
191		ONTFRAN-3618	930	768.59
192		ONTFRAN-3619	930	768.76
193		ONTFRAN-3620	930	750.00
194		ONTFRAN-3622	930	750.00
195		ONTFRAN-3626	930	730.63
196		ONTJ114	1158	832.20
197		ONTJ12	930	670.00
198		ONTJ19	930	660.59
199		ONTNEWJ-198	1299	1,141.76
200		ONTNEWJ-212	1050	798.63
201		ONTNEWJ-214	1050	795.78
202		ONTNEWJ-224	1050	761.30
203		ONTNEWJ-262	1299	1,112.46
204		ONTNEWJ-278	1299	983.47

Near Term Scenario - City of Ontario - Junction Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
205		ONTNEWJ-322	1299	1,112.00
206		ONTNEWJ-340	1050	777.10
207		ONTNEWJ-348	1158	973.90
208		ONTNEWJ-354	1050	798.84
209		ONTNEWJ-356	1050	773.92
210		ONTNEWJ-378	1158	905.98
211		ONTNEWJ-396	1158	950.07
212		ONTNEWJ-398	1299	966.59
213		ONTNEWJ-399	1299	966.59
214		ONTNEWJ-430	1050	750.81
215		ONTNEWJ-432	1050	753.22
216		ONTNEWJ-436	1050	768.59
217		ONTNEWJ-438	1050	768.76
218		ONTNEWJ-470	1299	1,005.00
219		ONTNEWJ-478	1299	1,002.83
220		ONTNEWJ-482	1299	988.07
221		ONTNEWJ-492	1050	815.00
222		ONTNEWJ-496	1050	803.00
223		ONTNEWJ-498	1050	803.00
224		ONTNEWJ-500	1050	790.00
225		ONTNEWJ-502	1050	752.00
226		ONTNEWJ-510	1299	962.00
227		ONTNEWJ-516	1299	969.00
228		ONTNEWJ-520	1299	998.00
229		ONTNEWJ-522	1299	977.00
230		ONTNEWJ-526	1299	967.00
231		ONTNEWJ-528	1299	970.00
232		ONTNEWJ-530	1158	947.00
233		ONTNEWJ-542	1158	923.00
234		ONTNEWJ-544	1158	924.00
235		ONTNEWJ-546	1158	909.00
236		ONTNEWJ-548	1158	917.00
237		ONTNEWJ-550	1158	896.00
238		ONTNEWJ-554	1158	901.00
239		ONTNEWJ-555	1158	880.00
240		ONTNEWJ-556	1158	870.00
241		ONTNEWJ-558	1158	863.00
242		ONTNEWJ-560	1158	883.00
243		ONTNEWJ-562	1158	895.00
244		ONTNEWJ-564	1158	905.00
245		ONTNEWJ-568	1158	915.00
246		ONTNEWJ-576	1158	815.00
247		ONTNEWJ-578	1158	841.00
248		ONTNEWJ-582	1158	854.00
249		ONTNEWJ-584	1158	842.00
250		ONTNEWJ-586	1158	842.00
251		ONTNEWJ-588	1158	845.00
252		ONTNEWJ-592	1158	864.00
253		ONTNEWJ-598	1299	995.00
254		ONTNEWJ-622	1299	1,110.00
255		ONTNEWJ-628	1158	956.00

Near Term Scenario - City of Ontario - Junction Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
256	☐	ONTNEWJ-631	1050	805.00
257	☐	ONTNEWJ-632	1050	800.00
258	☐	ONTNEWJ-634	1050	812.00
259	☐	ONTNEWJ-636	1050	800.00
260	☐	ONTNEWJ-638	1050	803.00
261	☐	ONTNEWJ-640	1299	1,020.00
262	☐	ONTNEWJ-646	1299	1,020.00
263	☐	ONTNEWJ-908	1299	1,099.00
264	☐	ONTNEWJ-910	1299	967.00
265	☐	ONTNEWJ-914	1299	992.50
266	☐	ONTNEWJ-934	1158	936.00
267	☐	ONTNEWJ-936	1158	934.00
268	☐	ONTNEWJ-950	1299	1,020.00
269	☐	ONTNEWJ402	930	652.53
270	☐	ONTNEWJ_630	1050	805.00
271	☐	ONTPHLP-3606	930	753.22
272	☐	ONTPHLP-3610	1050	799.50
273	☐	ONTPICKUP-12	1050	760.27
274	☐	ONTPICKUP-14	1050	777.77
275	☐	ONTPICKUP-17	1050	790.00
276	☐	ONTPICKUP-30	1158	835.00
277	☐	ONTPICKUP-32	1158	925.00
278	☐	ONTPICKUP-42	1299	1,093.00
279	☐	ONTPICKUP-48	1158	884.75
280	☐	ONTPICKUP-51	1299	1,110.62
281	☐	ONTPICKUP-6	1158	961.87
282	☐	ONTPICKUP-65	1158	910.16
283	☐	ONTPICKUP-68	1299	968.54
284	☐	ONTPICKUP-71	1158	907.45
285	☐	ONTPICKUP-72	1299	1,094.10
286	☐	ONTTOP50-10	1158	974.34
287	☐	ONTTOP50-15	1299	979.36
288	☐	ONTTOP50-18	1299	988.07
289	☐	ONTTOP50-22	1299	973.68
290	☐	ONTTOP50-40	1299	1,109.15
291	☐	ONTTOP50-48	1158	877.76
292	☐	ONTTOP50-6	1050	761.11

Near Term Scenario - City of Ontario - Junctions Input Data

* NEAR-TERM *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)
1		J1272	37.97	Landscape
2		J1274	48.55	Landscape
3		J1276	5.26	Landscape
4		J1280	15.30	Landscape
5		J1288	15.59	LANDSCAPE
6		J1290	21.80	Landscape
7		J1292	0.00	
8		J1294	120.13	Ontario_1158
9		J1296	0.00	
10		J1302	0.00	
11		J1304	0.00	
12		J1308	0.00	
13		J1314	0.00	
14		J1316	28.99	Landscape
15		J1320	206.67	Landscape
16		J1322	0.00	
17		J1324	0.00	
18		J1404	0.00	
19		J1406	64.76	Landscape
20		J1408	1.47	Landscape
21		J1410	0.00	
22		J1412	0.00	
23		J1414	0.00	
24		J1416	0.00	
25		J1586	0.00	
26		J1592	0.00	
27		J1596	0.00	
28		JKELLOG	0.00	
29		JSCH_HYD	8.77	Ontario_Ranch
30		J_ONT-1	50.66	Landscape
31		J_ONT-103	13.15	Ontario_Ranch
32		J_ONT-105	0.00	
33		J_ONT-107	0.00	
34		J_ONT-109	0.00	
35		J_ONT-113	0.00	
36		J_ONT-115	0.00	
37		J_ONT-117	0.00	
38		J_ONT-119	0.00	
39		J_ONT-133	0.00	
40		J_ONT-135	0.00	
41		J_ONT-137	242.69	Ontario_Ranch
42		J_ONT-139	0.00	
43		J_ONT-141	0.00	
44		J_ONT-143	0.00	
45		J_ONT-145	0.00	
46		J_ONT-147	0.00	
47		J_ONT-149	0.00	
48		J_ONT-151	0.00	
49		J_ONT-153	0.00	
50		J_ONT-155	0.00	
51		J_ONT-157	0.00	
52		J_ONT-159	0.00	
53		J_ONT-161	0.00	
54		J_ONT-163	242.09	Ontario_Ranch
55		J_ONT-165	0.00	
56		J_ONT-167	0.00	
57		J_ONT-169	0.00	

Near Term Scenario - City of Ontario - Junctions Input Data

* NEAR-TERM *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)
58	☐	J_ONT-171	0.00	
59	☐	J_ONT-173	93.35	Ontario_Ranch
60	☐	J_ONT-175	0.00	
61	☐	J_ONT-177	0.00	
62	☐	J_ONT-179	125.68	Ontario_Ranch
63	☐	J_ONT-181	0.00	
64	☐	J_ONT-185	0.00	
65	☐	J_ONT-187	0.00	
66	☐	J_ONT-189	0.00	
67	☐	J_ONT-191	0.00	
68	☐	J_ONT-193	0.00	
69	☐	J_ONT-195	0.00	
70	☐	J_ONT-197	0.00	
71	☐	J_ONT-199	0.00	
72	☐	J_ONT-201	0.00	
73	☐	J_ONT-203	0.00	
74	☐	J_ONT-205	128.35	Ontario_Ranch
75	☐	J_ONT-207	0.00	
76	☐	J_ONT-209	16.88	Ontario_Ranch
77	☐	J_ONT-211	0.00	
78	☐	J_ONT-213	0.00	
79	☐	J_ONT-215	0.00	
80	☐	J_ONT-217	0.00	
81	☐	J_ONT-219	0.00	
82	☐	J_ONT-221	0.00	
83	☐	J_ONT-223	0.00	
84	☐	J_ONT-225	0.00	
85	☐	J_ONT-227	0.00	
86	☐	J_ONT-229	0.00	
87	☐	J_ONT-231	0.00	
88	☐	J_ONT-233	0.00	
89	☐	J_ONT-235	0.00	
90	☐	J_ONT-237	0.00	
91	☐	J_ONT-239	0.00	
92	☐	J_ONT-243	0.00	
93	☐	J_ONT-247	100.00	ONTARIO_RANCH
94	☐	J_ONT-249	0.00	
95	☐	J_ONT-251	0.00	
96	☐	J_ONT-253	0.00	
97	☐	J_ONT-255	0.00	
98	☐	J_ONT-257	50.00	Landscape
99	☐	J_ONT-259	25.51	Landscape
100	☐	J_ONT-261	0.00	
101	☐	J_ONT-263	0.00	Landscape
102	☐	J_ONT-265	0.00	
103	☐	J_ONT-267	0.00	
104	☐	J_ONT-271	0.00	
105	☐	J_ONT-273	82.66	Ontario_Ranch
106	☐	J_ONT-275	0.00	
107	☐	J_ONT-277	0.00	
108	☐	J_ONT-279	0.00	
109	☐	J_ONT-281	0.00	
110	☐	J_ONT-283	0.00	
111	☐	J_ONT-285	0.00	
112	☐	J_ONT-287	0.00	
113	☐	J_ONT-289	0.00	
114	☐	J_ONT-291	0.00	

Near Term Scenario - City of Ontario - Junctions Input Data

* NEAR-TERM *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)
115	☐	J_ONT-295	0.00	
116	☐	J_ONT-297	25.60	Ontario_Ranch
117	☐	J_ONT-299	0.00	
118	☐	J_ONT-301	9.16	Ontario_Ranch
119	☐	J_ONT-305	49.47	Ontario_Ranch
120	☐	J_ONT-313	6.98	Ontario_Ranch
121	☐	J_ONT-315	0.00	
122	☐	J_ONT-317	0.00	
123	☐	J_ONT-319	0.00	
124	☐	J_ONT-321	0.00	
125	☐	J_ONT-325	0.00	
126	☐	J_ONT-333	0.00	
127	☐	J_ONT-341	0.00	
128	☐	J_ONT-343	0.00	
129	☐	J_ONT-351	0.00	
130	☐	J_ONT-357	0.00	
131	☐	J_ONT-359	26.15	Landscape
132	☐	J_ONT-361	64.38	Landscape
133	☐	J_ONT-363	0.00	
134	☐	J_ONT-365	0.00	
135	☐	J_ONT-367	0.00	
136	☐	J_ONT-369	42.55	Landscape
137	☐	J_ONT-371	0.00	
138	☐	J_ONT-373	0.00	
139	☐	J_ONT-377	40.87	Landscape
140	☐	J_ONT-379	59.95	Landscape
141	☐	J_ONT-381	0.00	
142	☐	J_ONT-383	5.13	Landscape
143	☐	J_ONT-387	0.00	
144	☐	J_ONT-399	0.00	
145	☐	J_ONT-401	28.43	Landscape
146	☐	J_ONT-403	0.00	
147	☐	J_ONT-405	0.00	
148	☐	J_ONT-407	2.67	Landscape
149	☐	J_ONT-409	105.04	ONTARIO_RANCH
150	☐	J_ONT-421	0.00	
151	☐	J_ONT-423	0.00	
152	☐	J_ONT-425	0.00	
153	☐	J_ONT-427		
154	☐	J_ONT-473		
155	☐	J_ONT-477	0.00	
156	☐	J_ONT-489		
157	☐	J_ONT-503	18.18	Landscape
158	☐	J_ONT-507	0.00	
159	☐	J_ONT-509	0.00	
160	☐	J_ONT-511	50.04	Landscape
161	☐	J_ONT-513	24.54	ONTARIO_1158
162	☐	J_ONT-515		
163	☐	J_ONT-537		
164	☐	J_ONT-569		
165	☐	J_ONT-609		
166	☐	J_ONT-613	8.96	LANDSCAPE
167	☐	J_ONT-77	84.42	Ontario_Ranch
168	☐	J_ONT-99	0.00	
169	☐	ONT66	1.42	Ontario_Ranch
170	☐	ONT68	0.00	
171	☐	ONT72	0.00	

Near Term Scenario - City of Ontario - Junctions Input Data

* NEAR-TERM *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)
172	☐	ONT76	0.00	
173	☐	ONTFRAN-3581	0.00	
174	☐	ONTFRAN-3583	11.04	ONTARIO_RANCH
175	☐	ONTFRAN-3591	313.31	Ontario_Ranch
176	☐	ONTFRAN-3592	191.42	Ontario_Ranch
177	☐	ONTFRAN-3593	0.00	
178	☐	ONTFRAN-3594	300.90	Ontario_Ranch
179	☐	ONTFRAN-3595	92.83	Ontario_Ranch
180	☐	ONTFRAN-3596	0.00	
181	☐	ONTFRAN-3597	237.79	Ontario_Ranch
182	☐	ONTFRAN-3598	88.00	Ontario_Ranch
183	☐	ONTFRAN-3599	0.00	
184	☐	ONTFRAN-3600	0.00	
185	☐	ONTFRAN-3601	0.00	
186	☐	ONTFRAN-3603	0.00	
187	☐	ONTFRAN-3605	71.22	Ontario_Ranch
188	☐	ONTFRAN-3606	101.70	Ontario_Ranch
189	☐	ONTFRAN-3607	59.64	Ontario_Ranch
190	☐	ONTFRAN-3608	109.42	Ontario_Ranch
191	☐	ONTFRAN-3618	0.00	
192	☐	ONTFRAN-3619	0.00	
193	☐	ONTFRAN-3620	220.30	Ontario_Ranch
194	☐	ONTFRAN-3622	0.00	
195	☐	ONTFRAN-3626	0.00	
196	☐	ONTJ114	103.79	Ontario_1158
197	☐	ONTJ12	79.39	Ontario_Ranch
198	☐	ONTJ19	0.00	
199	☐	ONTNEWJ-198	1.10	Landscape
200	☐	ONTNEWJ-212	0.00	
201	☐	ONTNEWJ-214	207.68	Ontario_Ranch
202	☐	ONTNEWJ-224	0.00	
203	☐	ONTNEWJ-262	0.00	
204	☐	ONTNEWJ-278	95.39	Landscape
205	☐	ONTNEWJ-322	0.00	
206	☐	ONTNEWJ-340	0.00	
207	☐	ONTNEWJ-348	0.00	
208	☐	ONTNEWJ-354	0.00	
209	☐	ONTNEWJ-356	0.00	
210	☐	ONTNEWJ-378	0.00	
211	☐	ONTNEWJ-396	0.00	
212	☐	ONTNEWJ-398	0.00	
213	☐	ONTNEWJ-399	0.00	
214	☐	ONTNEWJ-430	165.08	Ontario_Ranch
215	☐	ONTNEWJ-432	0.00	
216	☐	ONTNEWJ-436	0.00	
217	☐	ONTNEWJ-438	0.00	
218	☐	ONTNEWJ-470	35.41	Landscape
219	☐	ONTNEWJ-478	0.00	
220	☐	ONTNEWJ-482	0.00	
221	☐	ONTNEWJ-492	136.65	ONTARIO_RANCH
222	☐	ONTNEWJ-496	0.00	
223	☐	ONTNEWJ-498	139.62	ONTARIO_RANCH
224	☐	ONTNEWJ-500	0.00	
225	☐	ONTNEWJ-502	0.00	
226	☐	ONTNEWJ-510	130.36	Landscape
227	☐	ONTNEWJ-516	0.00	
228	☐	ONTNEWJ-520	6.53	Landscape

Near Term Scenario - City of Ontario - Junctions Input Data

* NEAR-TERM *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)
229		ONTNEWJ-522	0.00	
230		ONTNEWJ-526	56.39	Landscape
231		ONTNEWJ-528	0.00	
232		ONTNEWJ-530	0.00	
233		ONTNEWJ-542	0.00	
234		ONTNEWJ-544	0.00	
235		ONTNEWJ-546	0.00	
236		ONTNEWJ-548	0.00	
237		ONTNEWJ-550	0.00	
238		ONTNEWJ-554	255.60	Ontario_1158
239		ONTNEWJ-555	0.00	
240		ONTNEWJ-556	0.00	
241		ONTNEWJ-558	24.54	ONTARIO_1158
242		ONTNEWJ-560	0.00	
243		ONTNEWJ-562	0.00	
244		ONTNEWJ-564	0.00	
245		ONTNEWJ-568	0.00	
246		ONTNEWJ-576	0.00	
247		ONTNEWJ-578	0.00	
248		ONTNEWJ-582	0.00	
249		ONTNEWJ-584	0.00	
250		ONTNEWJ-586	0.00	
251		ONTNEWJ-588	0.00	
252		ONTNEWJ-592	0.00	
253		ONTNEWJ-598	46.98	Landscape
254		ONTNEWJ-622	0.00	
255		ONTNEWJ-628	89.99	Ontario_1158
256		ONTNEWJ-631	0.00	
257		ONTNEWJ-632	0.00	
258		ONTNEWJ-634	139.62	ONTARIO_RANCH
259		ONTNEWJ-636	72.48	ONTARIO_RANCH
260		ONTNEWJ-638	72.48	ONTARIO_RANCH
261		ONTNEWJ-640	0.00	
262		ONTNEWJ-646	61.33	Landscape
263		ONTNEWJ-908	138.60	Landscape
264		ONTNEWJ-910	0.00	
265		ONTNEWJ-914	0.00	
266		ONTNEWJ-934	0.00	
267		ONTNEWJ-936	0.00	
268		ONTNEWJ-950	0.00	
269		ONTNEWJ402	702.34	ONTARIO_RANCH
270		ONTNEWJ_630	139.62	ONTARIO_RANCH
271		ONTPHLP-3606	0.00	
272		ONTPHLP-3610	372.78	Ontario_Ranch
273		ONTPICKUP-12	0.00	
274		ONTPICKUP-14	157.69	Ontario_Ranch
275		ONTPICKUP-17	0.00	
276		ONTPICKUP-30	0.00	
277		ONTPICKUP-32	254.39	Ontario_1158
278		ONTPICKUP-42	0.00	
279		ONTPICKUP-48	0.00	
280		ONTPICKUP-51	0.00	
281		ONTPICKUP-6	0.00	
282		ONTPICKUP-65	0.00	
283		ONTPICKUP-68	82.87	Landscape
284		ONTPICKUP-71	0.00	
285		ONTPICKUP-72	25.00	Landscape

Near Term Scenario - City of Ontario - Junctions Input Data

* NEAR-TERM *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)
286	☐	ONTTOP50-10	0.00	
287	☐	ONTTOP50-15	118.61	Landscape
288	☐	ONTTOP50-18	0.00	
289	☐	ONTTOP50-22	0.00	
290	☐	ONTTOP50-40	0.00	
291	☐	ONTTOP50-48	0.00	
292	☐	ONTTOP50-6	0.00	

Near Term Scenario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
1	☐	2011_P14	373.88	8.00	130.00	0.00
2	☐	2011_P15	962.69	8.00	100.00	0.00
3	☐	2011_P17	325.69	8.00	130.00	0.00
4	☐	2011_P18	128.01	12.00	130.00	0.00
5	☐	2011_P19	536.66	12.00	130.00	0.00
6	☐	800ZONE_V1	98.84	16.00	150.00	0.00
7	☐	800ZONE_V2	61.66	16.00	150.00	0.00
8	☐	ONT283	45.13	42.00	130.00	0.00
9	☐	ONT9024	1,861.37	24.00	129.90	0.00
10	☐	ONT9034	878.87	16.00	130.00	0.00
11	☐	ONT9036	1,494.62	16.00	130.00	0.00
12	☐	ONT9042	1,301.52	16.00	130.00	0.00
13	☐	ONT9048	1,466.41	12.00	130.00	0.00
14	☐	ONT9052	1,456.84	12.00	130.00	0.00
15	☐	ONT9068	2,509.56	12.00	130.00	0.00
16	☐	ONTFRAN-3590	2,281.59	12.00	130.00	0.00
17	☐	ONTFRAN-3600	2,415.15	24.00	130.00	0.00
18	☐	ONTFRAN-3617	1,125.95	24.00	130.00	0.00
19	☐	ONTFRAN-3618	302.48	12.00	130.00	0.00
20	☐	ONTFRAN-3620	616.50	12.00	130.00	0.00
21	☐	ONTFRAN-3621	2,561.70	12.00	130.00	0.00
22	☐	ONTFRAN-3622	2,654.69	12.00	130.00	0.00
23	☐	ONTFRAN-3624	3,119.97	8.00	130.00	0.00
24	☐	ONTFRAN-3625	3,403.01	12.00	130.00	0.00
25	☐	ONTFRAN-3626	2,648.24	12.00	130.00	0.00
26	☐	ONTFRAN-3627	2,180.56	16.00	130.00	0.00
27	☐	ONTFRAN-3628	1,393.06	16.00	130.00	0.00
28	☐	ONTFRAN-3629	1,795.09	16.00	130.00	0.00
29	☐	ONTFRAN-3632	1,788.53	16.00	130.00	0.00
30	☐	ONTFRAN-3633	2,552.79	8.00	130.00	0.00
31	☐	ONTFRAN-3634	2,316.14	16.00	130.00	0.00
32	☐	ONTFRAN-3635	1,319.73	8.00	130.00	0.00
33	☐	ONTFRAN-3640	2,653.41	8.00	130.00	0.00
34	☐	ONTFRAN-3642	2,718.37	8.00	130.00	0.00
35	☐	ONTFRAN-3645	1,341.66	12.00	130.00	0.00
36	☐	ONTFRAN-3693	1,301.23	12.00	130.00	0.00
37	☐	ONTFRAN-3694	1,162.41	16.00	130.00	0.00
38	☐	ONTFRAN-3706	139.34	24.00	130.00	0.00
39	☐	ONTNEWP-10016	157.83	8.00	130.00	0.00
40	☐	ONTNEWP-10017	96.03	8.00	130.00	0.00
41	☐	ONTNEWP-10026	910.92	8.00	130.00	0.00
42	☐	ONTNEWP-10044	201.93	8.00	130.00	0.00
43	☐	ONTNEWP-908	878.23	8.00	130.00	0.00
44	☐	ONTNEWP-910	380.88	8.00	130.00	0.00
45	☐	ONTNEWP-914	642.60	12.00	130.00	0.00
46	☐	ONTNEWP-9170	207.39	8.00	130.00	0.00
47	☐	ONTNEWP-9252	412.78	8.00	130.00	0.00
48	☐	ONTNEWP-9276	100.39	24.00	129.90	0.00
49	☐	ONTNEWP-9320	1,078.67	8.00	130.00	0.00
50	☐	ONTNEWP-9322	178.65	8.00	130.00	0.00
51	☐	ONTNEWP-934	606.33	8.00	130.00	0.00
52	☐	ONTNEWP-9384	83.35	12.00	130.00	0.00
53	☐	ONTNEWP-9400	1,614.80	8.00	130.00	0.00
54	☐	ONTNEWP-9434	58.47	8.00	130.00	0.00
55	☐	ONTNEWP-9440	258.65	8.00	130.00	0.00
56	☐	ONTNEWP-9494	108.24	8.00	130.00	0.00
57	☐	ONTNEWP-9512	142.43	8.00	130.00	0.00

Near Term Scenario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
58	☐	ONTNEWP-9514	73.92	8.00	130.00	0.00
59	☐	ONTNEWP-9554	1,604.77	24.00	130.00	0.00
60	☐	ONTNEWP-9556	40.59	8.00	130.00	0.00
61	☐	ONTNEWP-9572	56.47	8.00	130.00	0.00
62	☐	ONTNEWP-9578	275.26	8.00	130.00	0.00
63	☐	ONTNEWP-9590	55.67	8.00	130.00	0.00
64	☐	ONTNEWP-9596	1,084.77	16.00	130.00	0.00
65	☐	ONTNEWP-9600	425.19	8.00	130.00	0.00
66	☐	ONTNEWP-9602	628.83	24.00	129.90	0.00
67	☐	ONTNEWP-9662	74.14	8.00	130.00	0.00
68	☐	ONTNEWP-9664	888.03	8.00	130.00	0.00
69	☐	ONTNEWP-9668	465.68	8.00	130.00	0.00
70	☐	ONTNEWP-9704	606.10	8.00	130.00	0.00
71	☐	ONTNEWP-9712	297.60	12.00	130.00	0.00
72	☐	ONTNEWP-9714	170.69	8.00	130.00	0.00
73	☐	ONTNEWP-9774	2,010.90	8.00	130.00	0.00
74	☐	ONTNEWP-9776	2,636.37	16.00	130.00	0.00
75	☐	ONTNEWP-9778	1,315.66	12.00	130.00	0.00
76	☐	ONTNEWP-9780	2,567.84	8.00	130.00	0.00
77	☐	ONTNEWP-9786	2,634.84	8.00	130.00	0.00
78	☐	ONTNEWP-9798	413.06	12.00	130.00	0.00
79	☐	ONTNEWP-9810	493.88	24.00	130.00	0.00
80	☐	ONTNEWP-9846	649.71	16.00	130.00	0.00
81	☐	ONTNEWP-9854	225.67	8.00	130.00	0.00
82	☐	ONTNEWP-9860	2,193.91	8.00	130.00	0.00
83	☐	ONTNEWP-9861	444.03	8.00	130.00	0.00
84	☐	ONTNEWP-9864	490.66	12.00	130.00	0.00
85	☐	ONTNEWP-9870	152.28	24.00	130.00	0.00
86	☐	ONTNEWP-9884	483.65	8.00	130.00	0.00
87	☐	ONTNEWP-9885	1,032.54	8.00	130.00	0.00
88	☐	ONTNEWP-9886	966.94	8.00	130.00	0.00
89	☐	ONTNEWP-9887	1,672.19	8.00	130.00	0.00
90	☐	ONTNEWP-9889	804.75	8.00	130.00	0.00
91	☐	ONTNEWP-9890	343.61	12.00	130.00	0.00
92	☐	ONTNEWP-9891	490.48	8.00	130.00	0.00
93	☐	ONTNEWP-9892	972.35	12.00	130.00	0.00
94	☐	ONTNEWP-9893	586.37	8.00	130.00	0.00
95	☐	ONTNEWP-9894	500.54	12.00	130.00	0.00
96	☐	ONTNEWP-9895	821.31	8.00	130.00	0.00
97	☐	ONTNEWP-9896	662.68	12.00	130.00	0.00
98	☐	ONTNEWP-9899	2,644.11	12.00	130.00	0.00
99	☐	ONTNEWP-9900	2,385.20	12.00	130.00	0.00
100	☐	ONTNEWP-9902	1,713.42	8.00	130.00	0.00
101	☐	ONTNEWP-9912	1,165.49	8.00	130.00	0.00
102	☐	ONTNEWP-9913	1,000.33	8.00	130.00	0.00
103	☐	ONTNEWP-9916	1,880.87	8.00	130.00	0.00
104	☐	ONTNEWP-9918	1,712.19	8.00	130.00	0.00
105	☐	ONTNEWP-9919	25.63	8.00	130.00	0.00
106	☐	ONTNEWP-9920	697.71	8.00	130.00	0.00
107	☐	ONTNEWP-9922	1,349.84	8.00	130.00	0.00
108	☐	ONTNEWP-9924	1,772.79	8.00	130.00	0.00
109	☐	ONTNEWP-9926	2,665.81	8.00	130.00	0.00
110	☐	ONTNEWP-9928	1,570.82	8.00	130.00	0.00
111	☐	ONTNEWP-9932	1,189.23	8.00	130.00	0.00
112	☐	ONTNEWP-9936	583.37	8.00	130.00	0.00
113	☐	ONTNEWP-9940	2,657.09	8.00	130.00	0.00
114	☐	ONTNEWP-9942	2,628.90	8.00	130.00	0.00

Near Term Scenario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
115	☐	ONTNEWP-9944	1,311.26	12.00	130.00	0.00
116	☐	ONTNEWP-9946	444.01	8.00	130.00	0.00
117	☐	ONTNEWP-9958	843.27	8.00	130.00	0.00
118	☐	ONTNEWP-9960	760.67	8.00	130.00	0.00
119	☐	ONTNEWP-9962	321.07	8.00	130.00	0.00
120	☐	ONTNEWP-9964	1,865.93	8.00	130.00	0.00
121	☐	ONTNEWP-9968	1,671.54	8.00	130.00	0.00
122	☐	ONTNEWP-9972	1,343.85	8.00	130.00	0.00
123	☐	ONTNEWP-9974	2,640.61	12.00	130.00	0.00
124	☐	ONTNEWP649	2,763.21	8.00	130.00	0.00
125	☐	ONTP10024	1,339.83	12.00	130.00	0.00
126	☐	ONTPHLP-3615	2,658.69	12.00	130.00	0.00
127	☐	P10142	198.19	30.00	130.00	0.00
128	☐	P10326	1,331.58	12.00	130.00	0.00
129	☐	P10328	1,338.27	12.00	130.00	0.00
130	☐	P10330	3,591.48	12.00	130.00	0.00
131	☐	P10332	788.30	8.00	130.00	0.00
132	☐	P10334	885.54	12.00	100.00	0.00
133	☐	P10340	2,655.53	8.00	130.00	0.00
134	☐	P10342	1,686.44	8.00	130.00	0.00
135	☐	P10344	500.45	8.00	130.00	0.00
136	☐	P10346	1,214.04	12.00	130.00	0.00
137	☐	P10350	1,717.07	8.00	130.00	0.00
138	☐	P10354	1,409.44	16.00	130.00	0.00
139	☐	P10356	147.70	8.00	130.00	0.00
140	☐	P10360	937.27	12.00	130.00	0.00
141	☐	P10364	1,352.40	12.00	130.00	0.00
142	☐	P10366	1,324.73	8.00	130.00	0.00
143	☐	P10368	411.46	8.00	130.00	0.00
144	☐	P10372	923.19	12.00	130.00	0.00
145	☐	P10374	1,588.12	8.00	130.00	0.00
146	☐	P10376	420.57	8.00	100.00	0.00
147	☐	P10422	2,685.84	16.00	130.00	0.00
148	☐	P10506	1,088.71	12.00	130.00	0.00
149	☐	P10508	764.84	12.00	130.00	0.00
150	☐	P10510	966.88	8.00	130.00	0.00
151	☐	P10512	826.31	8.00	130.00	0.00
152	☐	P10514	358.14	8.00	130.00	0.00
153	☐	P10516	72.06	8.00	130.00	0.00
154	☐	P10518	840.93	8.00	130.00	0.00
155	☐	P10520	813.87	8.00	130.00	0.00
156	☐	P10522	1,047.91	8.00	130.00	0.00
157	☐	P10550	1,424.31	8.00	130.00	0.00
158	☐	P186	2,742.17	16.00	130.00	0.00
159	☐	P190	2,615.63	8.00	130.00	0.00
160	☐	P39	666.18	8.00	130.00	0.00
161	☐	P41	227.50	8.00	130.00	0.00
162	☐	P63	300.71	8.00	130.00	0.00
163	☐	P81	1,764.35	16.00	130.00	0.00
164	☐	P87	621.53	8.00	130.00	0.00
165	☐	PHYD_LAT	464.40	6.00	130.00	0.00
166	☐	PKELLOG	1,300.25	12.00	130.00	0.00
167	☐	PSCH_1	1,829.52	12.00	130.00	0.00
168	☐	P_ONT-102	2,572.48	16.00	130.00	0.00
169	☐	P_ONT-120	1,052.44	8.00	130.00	0.00
170	☐	P_ONT-122	2,468.11	30.00	130.00	0.00
171	☐	P_ONT-128	560.40	16.00	130.00	0.00

Near Term Scenario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
172	☐	P_ONT-146	67.80	12.00	130.00	0.00
173	☐	P_ONT-148	77.35	12.00	130.00	0.00
174	☐	P_ONT-150	74.86	12.00	130.00	0.00
175	☐	P_ONT-152	117.20	12.00	130.00	0.00
176	☐	P_ONT-154	83.00	24.00	130.00	0.00
177	☐	P_ONT-156	22.31	24.00	130.00	0.00
178	☐	P_ONT-158	19.05	24.00	130.00	0.00
179	☐	P_ONT-160	9.11	24.00	130.00	0.00
180	☐	P_ONT-174	69.50	12.00	130.00	0.00
181	☐	P_ONT-176	1,242.53	24.00	130.00	0.00
182	☐	P_ONT-178	1,255.50	12.00	100.00	0.00
183	☐	P_ONT-180	587.21	8.00	130.00	0.00
184	☐	P_ONT-182	668.29	8.00	130.00	0.00
185	☐	P_ONT-184	564.54	8.00	130.00	0.00
186	☐	P_ONT-186	1,420.26	8.00	130.00	0.00
187	☐	P_ONT-188	26.06	4.00	130.00	0.00
188	☐	P_ONT-190	297.83	8.00	130.00	0.00
189	☐	P_ONT-192	1,225.11	8.00	130.00	0.00
190	☐	P_ONT-194	60.97	8.00	130.00	0.00
191	☐	P_ONT-196	1,680.54	12.00	130.00	0.00
192	☐	P_ONT-198	2,658.00	16.00	130.00	0.00
193	☐	P_ONT-2	94.46	8.00	130.00	0.00
194	☐	P_ONT-200	471.02	8.00	130.00	0.00
195	☐	P_ONT-204	969.62	8.00	130.00	0.00
196	☐	P_ONT-206	47.18	8.00	130.00	0.00
197	☐	P_ONT-208	521.07	8.00	130.00	0.00
198	☐	P_ONT-210	1,123.08	8.00	130.00	0.00
199	☐	P_ONT-212	59.09	8.00	130.00	0.00
200	☐	P_ONT-214	272.70	8.00	130.00	0.00
201	☐	P_ONT-216	2,006.79	8.00	130.00	0.00
202	☐	P_ONT-218	1,692.61	8.00	130.00	0.00
203	☐	P_ONT-220	599.34	8.00	130.00	0.00
204	☐	P_ONT-222	570.91	8.00	130.00	0.00
205	☐	P_ONT-224	172.01	8.00	130.00	0.00
206	☐	P_ONT-226	1,324.95	16.00	130.00	0.00
207	☐	P_ONT-228	970.68	8.00	130.00	0.00
208	☐	P_ONT-230	1,192.23	16.00	130.00	0.00
209	☐	P_ONT-232	162.89	8.00	130.00	0.00
210	☐	P_ONT-234	1,424.05	8.00	130.00	0.00
211	☐	P_ONT-236	391.16	8.00	130.00	0.00
212	☐	P_ONT-238	270.79	8.00	130.00	0.00
213	☐	P_ONT-240	140.69	8.00	130.00	0.00
214	☐	P_ONT-242	22.56	2.00	130.00	0.00
215	☐	P_ONT-244	187.64	16.00	130.00	0.00
216	☐	P_ONT-246	746.58	8.00	130.00	0.00
217	☐	P_ONT-248	670.54	8.00	130.00	0.00
218	☐	P_ONT-250	143.89	8.00	130.00	0.00
219	☐	P_ONT-252	443.25	8.00	130.00	0.00
220	☐	P_ONT-254	648.48	8.00	130.00	0.00
221	☐	P_ONT-256	120.48	8.00	130.00	0.00
222	☐	P_ONT-258	1,808.44	8.00	130.00	0.00
223	☐	P_ONT-260	952.15	8.00	130.00	0.00
224	☐	P_ONT-262	1,292.82	12.00	130.00	0.00
225	☐	P_ONT-264	919.91	8.00	130.00	0.00
226	☐	P_ONT-266	346.22	8.00	130.00	0.00
227	☐	P_ONT-268	168.63	8.00	130.00	0.00
228	☐	P_ONT-270	686.73	8.00	130.00	0.00

Near Term Scenario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
229	☐	P_ONT-272	462.41	8.00	100.00	0.00
230	☐	P_ONT-274	107.99	8.00	130.00	0.00
231	☐	P_ONT-276	734.97	8.00	130.00	0.00
232	☐	P_ONT-278	210.60	8.00	130.00	0.00
233	☐	P_ONT-280	654.69	8.00	100.00	0.00
234	☐	P_ONT-282	458.27	8.00	130.00	0.00
235	☐	P_ONT-284	150.92	8.00	130.00	0.00
236	☐	P_ONT-286	338.69	8.00	130.00	0.00
237	☐	P_ONT-288	418.63	8.00	130.00	0.00
238	☐	P_ONT-290	226.11	8.00	130.00	0.00
239	☐	P_ONT-292	407.83	8.00	130.00	0.00
240	☐	P_ONT-294	359.41	8.00	130.00	0.00
241	☐	P_ONT-296	482.43	8.00	130.00	0.00
242	☐	P_ONT-298	238.49	8.00	130.00	0.00
243	☐	P_ONT-300	804.32	8.00	130.00	0.00
244	☐	P_ONT-302	1,603.88	8.00	130.00	0.00
245	☐	P_ONT-304	735.32	8.00	130.00	0.00
246	☐	P_ONT-306	976.70	8.00	130.00	0.00
247	☐	P_ONT-308	328.33	8.00	130.00	0.00
248	☐	P_ONT-310	1,319.62	8.00	130.00	0.00
249	☐	P_ONT-312	418.46	8.00	130.00	0.00
250	☐	P_ONT-314	546.30	8.00	130.00	0.00
251	☐	P_ONT-316	533.90	8.00	130.00	0.00
252	☐	P_ONT-318	497.34	8.00	130.00	0.00
253	☐	P_ONT-322	555.31	8.00	130.00	0.00
254	☐	P_ONT-324	468.49	8.00	130.00	0.00
255	☐	P_ONT-326	512.82	8.00	130.00	0.00
256	☐	P_ONT-328	1,153.66	8.00	130.00	0.00
257	☐	P_ONT-330	433.22	8.00	130.00	0.00
258	☐	P_ONT-332	213.37	8.00	130.00	0.00
259	☐	P_ONT-334	48.14	2.00	130.00	0.00
260	☐	P_ONT-336	1,358.61	8.00	130.00	0.00
261	☐	P_ONT-338	499.45	8.00	130.00	0.00
262	☐	P_ONT-340	27.22	4.00	130.00	0.00
263	☐	P_ONT-342	67.98	8.00	130.00	0.00
264	☐	P_ONT-344	27.74	4.00	130.00	0.00
265	☐	P_ONT-346	31.87	2.00	130.00	0.00
266	☐	P_ONT-348	656.78	12.00	130.00	0.00
267	☐	P_ONT-350	524.15	8.00	130.00	0.00
268	☐	P_ONT-352	780.77	8.00	130.00	0.00
269	☐	P_ONT-354	480.54	8.00	130.00	0.00
270	☐	P_ONT-356	33.09	2.00	130.00	0.00
271	☐	P_ONT-358	923.64	16.00	130.00	0.00
272	☐	P_ONT-362	850.40	8.00	130.00	0.00
273	☐	P_ONT-368	310.37	24.00	130.00	0.00
274	☐	P_ONT-370	344.46	8.00	130.00	0.00
275	☐	P_ONT-372	309.82	8.00	130.00	0.00
276	☐	P_ONT-374	305.99	12.00	130.00	0.00
277	☐	P_ONT-376	2,490.34	12.00	130.00	0.00
278	☐	P_ONT-378	131.65	8.00	130.00	0.00
279	☐	P_ONT-382	855.29	8.00	130.00	0.00
280	☐	P_ONT-388	1,296.73	8.00	130.00	0.00
281	☐	P_ONT-406	92.92	8.00	130.00	0.00
282	☐	P_ONT-408	116.28	8.00	130.00	0.00
283	☐	P_ONT-410	608.38	8.00	130.00	0.00
284	☐	P_ONT-412	400.63	8.00	130.00	0.00
285	☐	P_ONT-418	159.12	8.00	130.00	0.00

Near Term Scenario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
286	☐	P_ONT-420	1,302.86	8.00	130.00	0.00
287	☐	P_ONT-422	874.68	8.00	130.00	0.00
288	☐	P_ONT-424	69.57	8.00	130.00	0.00
289	☐	P_ONT-426	102.02	8.00	130.00	0.00
290	☐	P_ONT-428	368.51	12.00	130.00	0.00
291	☐	P_ONT-430	167.29	12.00	130.00	0.00
292	☐	P_ONT-432	289.20	12.00	130.00	0.00
293	☐	P_ONT-434	71.34	12.00	130.00	0.00
294	☐	P_ONT-438	483.28	12.00	130.00	0.00
295	☐	P_ONT-440	578.60	16.00	130.00	0.00
296	☐	P_ONT-442	440.06	12.00	130.00	0.00
297	☐	P_ONT-444	69.36	12.00	130.00	0.00
298	☐	P_ONT-446	2,017.90	12.00	130.00	0.00
299	☐	P_ONT-456	301.25	8.00	130.00	0.00
300	☐	P_ONT-458	524.66	8.00	130.00	0.00
301	☐	P_ONT-460	743.53	8.00	130.00	0.00
302	☐	P_ONT-462	251.49	8.00	130.00	0.00
303	☐	P_ONT-466	1,390.97	8.00	130.00	0.00
304	☐	P_ONT-468	2,607.09	8.00	130.00	0.00
305	☐	P_ONT-470	275.56	12.00	130.00	0.00
306	☐	P_ONT-476	2,555.59	8.00	130.00	0.00
307	☐	P_ONT-480	1,044.89	8.00	130.00	0.00
308	☐	P_ONT-482	1,786.78	16.00	130.00	0.00
309	☐	P_ONT-484	684.16	12.00	130.00	0.00
310	☐	P_ONT-486	1,433.86	8.00	130.00	0.00
311	☐	P_ONT-534	889.56	12.00	130.00	0.00
312	☐	P_ONT-552	1,641.00	8.00	130.00	0.00
313	☐	P_ONT-560	5,250.71	12.00	130.00	0.00
314	☐	P_ONT-566	2,653.80	8.00	130.00	0.00
315	☐	P_ONT-570	116.47	12.00	130.00	0.00
316	☐	P_ONT-572	28.49	12.00	130.00	0.00
317	☐	P_ONT-574	36.83	12.00	130.00	0.00
318	☐	P_ONT-576	758.73	8.00	130.00	0.00
319	☐	P_ONT-578	795.55	8.00	130.00	0.00
320	☐	P_ONT-580	670.59	8.00	130.00	0.00
321	☐	P_ONT-598	61.31	16.00	130.00	0.00
322	☐	P_ONT-618	317.43	12.00	130.00	0.00
323	☐	P_ONT-666	68.58	8.00	130.00	0.00
324	☐	P_ONT-668	900.10	8.00	130.00	0.00
325	☐	P_ONT-676	4,250.25	8.00	130.00	0.00
326	☐	P_ONT-680	1,044.59	8.00	130.00	0.00
327	☐	P_ONT-90	1,342.35	8.00	130.00	0.00

Near Term - City of Ontario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
1		JKELLOG	93.29	06:10	85.38	20:30	89.93	7.91
2		JSCH_HYD	93.29	06:10	85.37	20:30	89.93	7.92
3		J1272	134.00	20:00	102.94	00:20	121.56	31.06
4		J1274	125.33	20:00	94.62	00:20	113.00	30.71
5		J1276	138.76	20:00	107.10	00:20	126.12	31.67
6		J1280	133.13	20:00	102.07	00:20	120.69	31.06
7		J1288	129.23	20:00	98.46	00:20	116.88	30.77
8		J1290	146.13	20:00	114.41	00:20	133.47	31.72
9		J1292	273.90	15:40	144.88	22:40	184.74	129.03
10		J1294	243.58	15:40	113.68	22:40	152.66	129.90
11		J1296	235.34	15:40	106.80	22:40	144.50	128.55
12		J1302	129.67	20:00	102.18	00:20	119.00	27.48
13		J1304	255.70	15:40	125.79	22:40	165.95	129.92
14		J1308	127.50	20:00	100.94	00:20	117.30	26.56
15		J1314	104.53	20:00	72.63	00:20	91.86	31.91
16		J1316	104.53	20:00	72.61	00:20	91.85	31.92
17		J1320	122.63	04:40	98.39	00:20	113.66	24.24
18		J1322	132.48	20:00	106.22	00:20	122.65	26.26
19		J1324	132.48	20:00	105.82	00:20	122.36	26.66
20		J1404	129.67	20:00	103.00	00:20	119.51	26.66
21		J1406	125.77	20:00	99.10	00:20	115.72	26.67
22		J1408	119.27	20:00	92.60	00:20	109.23	26.67
23		J1410	122.30	20:00	95.63	00:20	112.26	26.67
24		J1412	122.30	20:00	95.64	00:20	112.28	26.66
25		J1414	126.42	20:00	99.86	00:20	116.44	26.56
26		J1416	134.21	20:00	107.66	00:20	124.18	26.56
27		ONT66	125.35	05:00	115.79	20:30	122.93	9.56
28		ONTFRAN-3608	120.99	18:00	79.81	23:30	105.68	41.18
29		ONTPHLP-3610	116.90	05:00	50.60	23:30	96.09	66.30
30		ONTNEWJ-470	129.67	20:00	103.25	00:20	119.75	26.42
31		ONTFRAN-3583	92.83	06:10	84.92	20:30	89.48	7.91
32		ONTTOP50-40	84.54	20:00	52.67	00:20	71.87	31.87
33		ONTNEWJ-262	83.10	20:00	51.23	00:20	70.44	31.87
34		ONTPICKUP-51	83.90	20:00	52.03	00:20	71.24	31.87
35		ONTNEWJ-322	83.30	20:00	51.44	00:20	70.64	31.87
36		ONTNEWJ-198	70.41	20:00	38.51	00:20	57.73	31.90
37		ONTNEWJ-516	145.26	20:00	112.12	00:20	132.14	33.14
38		ONTNEWJ-510	148.30	20:00	115.17	00:20	135.18	33.13
39		ONTNEWJ-908	88.93	20:00	59.14	00:20	76.86	29.79
40		ONTNEWJ-278	138.99	20:00	110.54	00:20	127.89	28.45
41		ONTTOP50-15	140.78	20:00	112.03	00:20	129.47	28.74
42		ONTTOP50-18	137.00	20:00	108.84	00:20	126.03	28.16
43		ONTNEWJ-520	132.70	20:00	105.05	00:20	121.98	27.65
44		ONTNEWJ-526	146.13	20:00	118.03	00:20	135.26	28.10
45		ONTNEWJ-910	146.13	20:00	118.07	00:20	135.27	28.06
46		ONTNEWJ-522	141.80	20:00	113.77	00:20	130.95	28.02
47		ONTNEWJ-914	135.08	20:00	107.35	00:20	124.33	27.73
48		ONTTOP50-22	143.24	20:00	115.06	00:20	132.34	28.18
49		ONTPICKUP-68	145.46	20:00	117.07	00:20	134.50	28.39
50		ONTNEWJ-398	146.31	20:00	117.96	00:20	135.36	28.35
51		ONTNEWJ-528	144.83	20:00	116.15	00:20	133.77	28.68
52		ONTNEWJ-598	134.00	20:00	107.26	00:20	123.86	26.74
53		ONTNEWJ-646	123.17	20:00	96.45	00:20	112.99	26.72
54		ONTPICKUP-48	238.49	15:40	110.91	22:40	146.57	127.58
55		ONTNEWJ-396	210.18	15:40	81.32	22:40	118.84	128.87
56		ONTNEWJ-530	211.51	15:40	82.37	22:40	120.11	129.14
57		ONTNEWJ-628	207.62	15:40	77.83	22:40	116.00	129.78

Near Term - City of Ontario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
58	☐	ONTNEWJ-542	221.91	15:40	92.84	22:40	130.58	129.07
59	☐	ONTNEWJ-544	221.48	15:40	92.41	22:40	130.15	129.07
60	☐	ONTNEWJ-546	227.98	15:40	98.91	22:40	136.65	129.07
61	☐	ONTNEWJ-548	224.51	15:40	95.44	22:40	133.18	129.07
62	☐	ONTNEWJ-934	216.28	15:40	87.99	22:40	125.16	128.29
63	☐	ONTNEWJ-936	217.15	15:40	88.86	22:40	126.03	128.29
64	☐	ONTNEWJ-550	233.61	15:40	103.85	22:40	142.19	129.77
65	☐	ONTNEWJ-576	268.71	15:40	139.90	22:40	178.41	128.81
66	☐	ONTNEWJ-554	231.44	15:40	97.04	22:40	139.02	134.40
67	☐	ONTNEWJ-560	239.24	15:40	107.22	22:40	148.13	132.02
68	☐	ONTNEWJ-562	234.04	15:40	104.38	22:40	144.22	129.66
69	☐	ONTNEWJ-564	229.71	15:40	100.05	22:40	139.89	129.66
70	☐	ONTNEWJ-556	244.88	15:40	115.77	22:40	154.22	129.10
71	☐	ONTNEWJ-558	247.91	15:40	118.62	22:40	157.19	129.29
72	☐	ONTNEWJ-378	229.29	15:40	95.01	22:40	136.32	134.28
73	☐	ONTTOP50-48	241.51	15:40	112.97	22:40	150.67	128.55
74	☐	ONTNEWJ-555	240.54	15:40	112.00	22:40	149.70	128.55
75	☐	ONTNEWJ-498	115.38	05:00	55.71	23:30	96.70	59.68
76	☐	ONTNEWJ-634	111.48	05:00	49.60	23:30	92.09	61.88
77	☐	ONTNEWJ-632	116.68	05:00	53.44	23:30	96.84	63.24
78	☐	ONTNEWJ-631	114.51	05:00	49.55	23:30	94.11	64.96
79	☐	ONTNEWJ_630	114.51	05:00	48.50	23:30	93.77	66.01
80	☐	ONTNEWJ-496	115.38	05:00	56.82	23:30	97.07	58.56
81	☐	ONTNEWJ-638	115.38	05:00	55.48	23:30	96.63	59.91
82	☐	ONTNEWJ-636	116.68	05:00	56.26	23:30	97.76	60.43
83	☐	ONTNEWJ-492	110.18	05:00	39.38	23:30	87.91	70.80
84	☐	ONTNEWJ-582	251.81	15:40	122.86	22:40	162.10	128.95
85	☐	ONTNEWJ-584	257.01	15:40	128.06	22:40	167.30	128.95
86	☐	ONTNEWJ-586	257.01	15:40	128.06	22:40	167.30	128.95
87	☐	ONTNEWJ-578	257.44	15:40	128.49	22:40	167.73	128.95
88	☐	ONTNEWJ-588	255.71	15:40	126.76	22:40	166.00	128.95
89	☐	ONTFRAN-3596	100.14	18:00	63.63	23:30	86.48	36.52
90	☐	ONTFRAN-3597	103.11	18:00	69.31	23:30	90.27	33.80
91	☐	ONTFRAN-3598	100.18	18:00	72.58	23:30	89.26	27.61
92	☐	ONTFRAN-3592	92.18	18:00	67.56	23:30	82.21	24.62
93	☐	ONTJ12	115.87	18:00	57.17	23:30	94.95	58.70
94	☐	ONTFRAN-3603	118.52	06:10	59.20	23:30	97.42	59.32
95	☐	ONTFRAN-3605	122.22	06:10	62.32	23:30	100.86	59.90
96	☐	ONTFRAN-3606	124.60	06:10	67.27	23:30	104.05	57.34
97	☐	ONTFRAN-3607	130.36	06:10	83.58	22:40	113.24	46.78
98	☐	ONTNEWJ-432	136.95	05:00	124.56	20:30	134.49	12.39
99	☐	ONTNEWJ-502	137.48	05:00	122.46	23:30	132.59	15.01
100	☐	ONTNEWJ-430	138.00	05:00	117.13	23:30	131.19	20.87
101	☐	ONTFRAN-3619	73.22	18:00	53.29	23:30	64.45	19.92
102	☐	ONTNEWJ-438	130.22	05:00	65.08	23:30	109.81	65.14
103	☐	ONTFRAN-3622	81.34	18:00	40.33	23:30	66.33	41.02
104	☐	ONTFRAN-3595	86.89	18:00	47.96	23:30	72.50	38.92
105	☐	ONTFRAN-3594	89.26	18:00	54.77	23:30	76.21	34.49
106	☐	ONTFRAN-3618	73.29	18:00	53.37	23:30	64.52	19.92
107	☐	ONTNEWJ-436	130.29	05:00	73.96	23:30	112.82	56.33
108	☐	ONTFRAN-3593	89.71	18:00	64.95	23:30	79.66	24.76
109	☐	ONTTOP50-10	199.67	15:40	73.18	22:40	108.13	126.49
110	☐	ONTNEWJ-348	199.86	15:40	73.37	22:40	108.32	126.49
111	☐	ONTNEWJ-592	247.47	15:40	118.14	22:40	157.84	129.33
112	☐	ONTNEWJ-622	84.17	20:00	52.30	00:20	71.50	31.86
113	☐	ONTNEWJ-482	137.00	20:00	109.10	00:20	126.20	27.90
114	☐	ONTPICKUP-32	221.05	15:40	77.38	22:40	125.02	143.66

Near Term - City of Ontario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
115		ONTPICKUP-71	228.65	15:40	89.35	22:40	134.05	139.30
116		ONTNEWJ-568	225.38	15:40	83.85	22:40	130.05	141.53
117		ONTPICKUP-65	227.48	15:40	93.20	22:40	134.51	134.28
118		ONTFRAN-3620	81.35	18:00	59.54	23:30	72.19	21.81
119		ONT76	105.42	18:00	77.92	23:30	94.54	27.50
120		ONTNEWJ402	123.54	18:00	67.53	23:30	103.43	56.01
121		ONTFRAN-3600	102.36	06:10	88.99	23:30	96.23	13.38
122		ONTFRAN-3601	114.07	18:00	89.03	23:30	104.01	25.04
123		ONTPHLP-3606	80.00	06:10	71.98	20:50	76.18	8.01
124		ONTFRAN-3591	100.16	18:00	84.29	23:30	93.17	15.87
125		ONTNEWJ-224	133.45	05:00	121.86	20:30	131.00	11.59
126		ONTTOP50-6	133.53	05:00	121.94	20:30	131.09	11.59
127		ONTPICKUP-12	133.90	05:00	122.20	20:30	131.45	11.70
128		ONTFRAN-3581	90.88	18:00	77.58	23:30	84.76	13.30
129		ONTFRAN-3626	89.75	18:00	76.63	23:30	83.68	13.12
130		ONTNEWJ-214	118.51	05:00	42.50	23:30	94.55	76.01
131		ONTNEWJ-212	117.27	05:00	49.98	23:30	96.15	67.30
132		ONTNEWJ-354	117.18	05:00	50.10	23:30	96.12	67.09
133		ONT68	121.94	05:00	84.23	23:30	110.17	37.71
134		ONT72	122.57	05:00	92.55	23:30	113.18	30.03
135		ONTPICKUP-17	121.01	05:00	90.99	23:30	111.62	30.03
136		ONTNEWJ-356	127.98	05:00	111.01	23:30	122.63	16.97
137		ONTNEWJ-500	121.01	05:00	83.31	23:30	109.25	37.71
138		ONTPICKUP-14	126.31	05:00	119.97	20:30	124.64	6.35
139		ONTNEWJ-340	126.60	05:00	120.29	20:30	124.97	6.32
140		ONTFRAN-3599	110.31	18:00	84.99	23:30	100.16	25.32
141		ONTJ19	120.08	18:00	95.04	23:30	110.02	25.04
142		ONTJ114	261.25	15:40	131.34	22:40	171.50	129.92
143		ONTPICKUP-30	260.04	15:40	130.12	22:40	170.28	129.92
144		ONTNEWJ-478	130.61	20:00	104.75	00:20	120.98	25.86
145		ONTNEWJ-640	123.17	20:00	96.53	00:20	112.99	26.64
146		ONTNEWJ-950	123.17	20:00	96.56	00:20	112.97	26.60
147		ONTPICKUP-6	205.07	15:40	78.06	22:40	113.35	127.01
148		ONTPICKUP-42	91.53	20:00	59.87	00:20	78.93	31.67
149		ONTPICKUP-72	91.06	20:00	59.37	00:20	78.45	31.69
150		ONTNEWJ-399	146.31	20:00	117.99	00:20	135.37	28.32
151		J1586	83.74	20:00	51.87	00:20	71.07	31.86
152		J1592	144.83	20:00	112.05	00:20	131.83	32.78
153		J1596	120.67	05:00	67.55	23:30	104.13	53.12
154		J_ONT-1	123.17	20:00	91.27	00:20	110.49	31.90
155		J_ONT-77	119.78	06:10	59.76	23:30	98.43	60.01
156		J_ONT-99	120.40	05:00	67.01	23:30	103.77	53.39
157		J_ONT-103	137.34	05:00	124.78	20:30	134.87	12.55
158		J_ONT-105	80.38	06:10	72.46	20:30	76.62	7.92
159		J_ONT-107	137.34	05:00	124.70	20:30	134.87	12.63
160		J_ONT-109	80.38	06:10	72.47	20:30	76.62	7.92
161		J_ONT-113	73.99	18:00	54.46	23:30	65.33	19.54
162		J_ONT-115	131.00	05:00	73.52	23:30	113.22	57.48
163		J_ONT-117	74.00	18:00	54.79	23:30	65.42	19.21
164		J_ONT-119	131.00	05:00	73.33	23:30	113.17	57.67
165		J_ONT-133	95.11	18:00	80.35	23:30	88.50	14.76
166		J_ONT-135	90.01	18:00	71.46	23:30	82.08	18.56
167		J_ONT-137	93.48	18:00	76.99	23:30	86.29	16.49
168		J_ONT-139	94.35	18:00	78.78	23:30	87.46	15.57
169		J_ONT-141	95.65	18:00	80.07	23:30	88.76	15.57
170		J_ONT-143	92.18	18:00	75.69	23:30	84.99	16.49
171		J_ONT-145	95.65	18:00	80.07	23:30	88.76	15.57

Near Term - City of Ontario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
172		J_ONT-147	96.08	18:00	73.38	23:30	86.78	22.70
173		J_ONT-149	96.51	18:00	73.61	23:30	87.15	22.90
174		J_ONT-151	85.57	18:00	67.64	23:30	77.81	17.93
175		J_ONT-153	85.68	18:00	67.71	23:30	77.92	17.97
176		J_ONT-155	78.32	18:00	60.17	23:30	70.49	18.14
177		J_ONT-157	90.88	18:00	66.26	23:30	80.91	24.62
178		J_ONT-159	86.11	18:00	61.49	23:30	76.14	24.62
179		J_ONT-161	94.34	18:00	69.72	23:30	84.37	24.62
180		J_ONT-163	96.94	18:00	73.35	23:30	87.36	23.59
181		J_ONT-165	103.44	18:00	76.83	23:30	92.87	26.61
182		J_ONT-167	96.94	18:00	72.99	23:30	87.24	23.95
183		J_ONT-169	98.68	18:00	74.72	23:30	88.97	23.95
184		J_ONT-171	103.01	18:00	76.40	23:30	92.43	26.61
185		J_ONT-173	104.74	18:00	77.38	23:30	93.92	27.36
186		J_ONT-175	105.17	18:00	77.81	23:30	94.35	27.36
187		J_ONT-177	107.22	18:00	79.83	23:30	96.38	27.39
188		J_ONT-179	108.74	18:00	81.81	23:30	98.05	26.93
189		J_ONT-181	119.41	18:00	83.76	23:30	105.90	35.66
190		J_ONT-185	116.97	18:00	82.39	23:30	103.80	34.59
191		J_ONT-187	119.04	18:00	83.45	23:30	105.55	35.59
192		J_ONT-189	123.80	18:00	88.21	23:30	110.30	35.59
193		J_ONT-191	123.80	18:00	88.21	23:30	110.30	35.59
194		J_ONT-193	110.10	18:00	84.56	23:30	99.87	25.54
195		J_ONT-195	116.00	18:00	82.91	23:30	103.31	33.09
196		J_ONT-197	118.16	18:00	83.86	23:30	105.08	34.30
197		J_ONT-199	116.86	18:00	82.42	23:30	103.74	34.44
198		J_ONT-201	114.70	18:00	80.69	23:30	101.71	34.00
199		J_ONT-203	113.40	18:00	80.27	23:30	100.70	33.13
200		J_ONT-205	112.97	18:00	80.00	23:30	100.32	32.97
201		J_ONT-207	110.37	18:00	77.24	23:30	97.67	33.13
202		J_ONT-209	113.40	18:00	79.35	23:30	100.40	34.05
203		J_ONT-211	115.55	18:00	82.47	23:30	102.87	33.09
204		J_ONT-213	117.30	18:00	84.21	23:30	104.62	33.09
205		J_ONT-215	116.43	18:00	83.34	23:30	103.75	33.09
206		J_ONT-217	116.43	18:00	83.34	23:30	103.75	33.09
207		J_ONT-219	116.00	18:00	83.11	23:30	103.38	32.89
208		J_ONT-221	113.83	18:00	82.95	23:30	101.86	30.88
209		J_ONT-223	112.10	18:00	81.87	23:30	100.34	30.23
210		J_ONT-225	111.67	18:00	80.55	23:30	99.62	31.12
211		J_ONT-227	109.50	18:00	78.89	23:30	97.62	30.61
212		J_ONT-229	112.97	18:00	82.16	23:30	101.02	30.81
213		J_ONT-231	112.97	18:00	82.07	23:30	100.99	30.90
214		J_ONT-233	113.83	18:00	82.94	23:30	101.86	30.89
215		J_ONT-235	112.53	18:00	81.64	23:30	100.56	30.89
216		J_ONT-237	114.70	18:00	84.47	23:30	102.94	30.23
217		J_ONT-239	117.53	05:00	48.66	23:30	95.89	68.86
218		J_ONT-243	127.51	05:00	61.24	23:30	106.73	66.27
219		J_ONT-247	118.85	05:00	50.03	23:30	97.23	68.82
220		J_ONT-249	123.18	05:00	54.87	23:30	101.73	68.31
221		J_ONT-251	120.58	05:00	51.76	23:30	98.96	68.82
222		J_ONT-253	116.68	05:00	47.86	23:30	95.06	68.82
223		J_ONT-255	118.85	05:00	50.53	23:30	97.39	68.31
224		J_ONT-257	565.13	20:00	536.31	00:20	554.03	28.82
225		J_ONT-259	565.13	20:00	536.33	00:20	554.03	28.80
226		J_ONT-261	565.13	20:00	536.35	00:20	554.04	28.79
227		J_ONT-263	565.13	20:00	536.36	00:20	554.04	28.77
228		J_ONT-265	119.46	18:00	84.19	23:30	106.07	35.28

Near Term - City of Ontario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
229		J_ONT-267	114.91	18:00	81.82	23:30	102.22	33.10
230		J_ONT-271	119.46	18:00	84.19	23:30	106.07	35.28
231		J_ONT-273	117.38	18:00	82.11	23:30	103.98	35.28
232		J_ONT-275	118.66	18:00	83.15	23:30	105.19	35.52
233		J_ONT-277	122.93	18:00	87.41	23:30	109.46	35.52
234		J_ONT-279	122.93	18:00	87.41	23:30	109.46	35.52
235		J_ONT-281	122.93	18:00	87.34	23:30	109.43	35.59
236		J_ONT-283	121.20	18:00	85.61	23:30	107.70	35.59
237		J_ONT-285	119.89	18:00	83.26	23:30	106.06	36.63
238		J_ONT-287	119.89	18:00	83.26	23:30	106.06	36.63
239		J_ONT-289	89.65	18:00	64.96	23:30	79.64	24.69
240		J_ONT-291	82.22	18:00	64.19	23:30	74.43	18.02
241		J_ONT-295	79.62	18:00	61.55	23:30	71.81	18.07
242		J_ONT-297	79.18	18:00	58.43	23:30	70.51	20.75
243		J_ONT-299	79.18	18:00	61.04	23:30	71.36	18.14
244		J_ONT-301	103.61	18:00	84.50	23:30	95.54	19.11
245		J_ONT-305	137.42	05:00	123.48	20:30	133.33	13.93
246		J_ONT-313	81.10	06:10	72.56	20:50	77.03	8.54
247		J_ONT-315	86.98	18:00	68.83	23:30	79.16	18.15
248		J_ONT-317	87.85	18:00	69.54	23:30	79.98	18.31
249		J_ONT-319	100.53	18:00	85.10	23:30	93.70	15.43
250		J_ONT-321	133.32	18:00	116.69	23:30	126.08	16.63
251		J_ONT-325	118.79	18:00	83.25	23:30	105.31	35.54
252		J_ONT-333	232.58	15:40	100.59	22:40	140.68	131.98
253		J_ONT-341	233.18	15:40	103.74	22:40	141.79	129.43
254		J_ONT-343	233.18	15:40	104.30	22:40	141.97	128.88
255		J_ONT-351	229.29	15:40	96.93	22:40	136.95	132.35
256		J_ONT-357	228.75	15:40	90.21	22:40	134.40	138.54
257		J_ONT-359	77.35	20:00	45.45	00:20	64.68	31.90
258		J_ONT-361	122.30	20:00	95.63	00:20	112.28	26.67
259		J_ONT-363	119.76	20:00	93.09	00:20	109.73	26.67
260		J_ONT-365	125.84	20:00	99.18	00:20	115.80	26.66
261		J_ONT-367	125.28	20:00	98.63	00:20	115.11	26.64
262		J_ONT-369	123.17	20:00	96.53	00:20	112.98	26.63
263		J_ONT-371	123.17	20:00	96.54	00:20	112.98	26.62
264		J_ONT-373	126.62	20:00	100.05	00:20	116.42	26.57
265		J_ONT-377	142.63	20:00	114.50	00:20	131.75	28.13
266		J_ONT-379	126.51	20:00	99.18	00:20	115.90	27.33
267		J_ONT-381	135.88	20:00	107.85	00:20	124.97	28.03
268		J_ONT-383	137.00	20:00	109.05	00:20	126.14	27.95
269		J_ONT-387	140.78	20:00	112.31	00:20	129.66	28.46
270		J_ONT-399	146.06	20:00	113.13	00:20	133.01	32.93
271		J_ONT-401	142.35	20:00	109.94	00:20	129.47	32.42
272		J_ONT-403	143.88	20:00	112.17	00:20	131.23	31.70
273		J_ONT-405	228.88	15:40	94.60	22:40	135.91	134.28
274		J_ONT-407	144.83	20:00	112.05	00:20	131.83	32.78
275		J_ONT-409	130.38	06:10	92.47	22:40	116.17	37.91
276		J_ONT-421	148.30	20:00	115.17	00:20	135.18	33.13
277		J_ONT-423	95.38	18:00	69.08	23:30	84.86	26.30
278		J_ONT-425	103.11	18:00	69.19	23:30	90.23	33.92
279		J_ONT-427	103.11	18:00	69.31	23:30	90.27	33.80
280		J_ONT-473	199.86	15:40	73.37	22:40	108.32	126.49
281		J_ONT-477	138.82	20:00	110.40	00:20	127.73	28.43
282		J_ONT-489	226.68	15:40	99.23	22:40	134.81	127.45
283		J_ONT-503	188.16	20:00	154.98	00:20	175.03	33.18
284		J_ONT-507	123.17	20:00	96.56	00:20	112.98	26.61
285		J_ONT-509	127.32	20:00	100.75	00:20	117.12	26.57

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
286		J_ONT-511	127.08	20:00	100.51	00:20	116.88	26.57
287		J_ONT-513	247.91	15:40	118.63	22:40	157.20	129.28
288		J_ONT-515	246.16	15:40	116.92	22:40	155.46	129.24
289		J_ONT-537	100.02	18:00	72.46	23:30	89.12	27.56
290		J_ONT-569	123.08	18:00	69.72	23:30	103.83	53.37
291		J_ONT-609	117.94	18:00	61.18	23:30	97.60	56.76
292		J_ONT-613	268.75	20:00	237.98	00:20	256.41	30.77

Near Term Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
1	☐	800ZONE_V1	344.24	15:00	0.00	00:00	24.45	344.24
2	☐	800ZONE_V2	344.24	15:00	0.00	00:00	24.45	344.24
3	☐	PSCH_1	69.94	00:00	0.00	05:00	23.63	69.94
4	☐	PKELLOG	30.97	00:00	0.00	05:00	10.46	30.97
5	☐	PHYD_LAT	30.97	00:00	0.00	05:00	10.46	30.97
6	☐	P10142	9,638.79	04:00	0.00	18:10	3,900.03	9,638.79
7	☐	P10326	589.54	02:10	0.00	05:00	199.22	589.54
8	☐	P10328	460.15	02:10	0.00	05:00	155.50	460.15
9	☐	P10330	365.86	02:10	0.00	05:00	123.64	365.86
10	☐	P10332	317.96	02:10	0.00	05:00	107.45	317.96
11	☐	P10334	27.08	00:00	0.00	05:00	9.15	27.08
12	☐	P10340	43.45	00:00	0.00	05:00	14.68	43.45
13	☐	P10342	38.59	00:00	0.00	05:00	13.04	38.59
14	☐	P10344	0.00	00:00	0.00	00:00	0.00	0.00
15	☐	P10346	507.63	00:00	0.00	05:00	171.54	507.63
16	☐	P10350	0.00	00:00	0.00	00:00	0.00	0.00
17	☐	P10354	1,074.44	01:20	0.00	20:00	500.28	1,074.44
18	☐	P10356	311.37	03:50	0.00	05:00	105.22	311.37
19	☐	P10360	359.84	21:00	0.00	20:00	213.41	359.84
20	☐	P10364	48.24	01:20	0.00	05:00	16.30	48.24
21	☐	P10366	51.31	00:00	0.00	05:00	17.34	51.31
22	☐	P10368	51.31	00:00	0.00	05:00	17.34	51.31
23	☐	P10372	731.56	01:20	0.00	20:00	358.80	731.56
24	☐	P10374	365.76	02:10	0.00	20:00	235.18	365.76
25	☐	P10376	209.37	02:10	0.00	20:00	132.67	209.37
26	☐	P10422	2,562.60	04:10	0.00	18:10	1,079.04	2,562.60
27	☐	P10506	261.90	08:00	0.00	20:00	123.50	261.90
28	☐	P10508	261.90	08:00	0.00	20:00	158.62	261.90
29	☐	P10510	145.36	08:00	0.00	20:00	73.57	145.36
30	☐	P10512	53.35	08:00	0.00	20:00	27.70	53.35
31	☐	P10514	2.60	00:00	0.00	05:00	0.88	2.60
32	☐	P10516	106.94	02:10	0.00	20:00	58.81	106.94
33	☐	P10518	102.43	02:10	0.00	20:00	73.86	102.43
34	☐	P10520	106.94	02:10	0.00	20:00	58.81	106.94
35	☐	P10522	116.54	08:00	0.00	20:00	81.34	116.54
36	☐	P10550	116.54	08:00	0.00	20:00	81.34	116.54
37	☐	ONT9036	6,530.15	23:30	0.00	05:00	2,258.66	6,530.15
38	☐	ONTFRAN-3622	1,253.96	23:30	0.00	18:10	414.84	1,253.96
39	☐	ONT9042	756.39	04:20	0.00	18:10	210.10	756.39
40	☐	ONTNEWP-9322	0.00	00:00	0.00	00:00	0.00	0.00
41	☐	ONTNEWP-9512	48.23	04:00	0.00	05:00	16.30	48.23
42	☐	ONTNEWP-9514	0.00	00:00	0.00	00:00	0.00	0.00
43	☐	ONTNEWP-9919	0.00	00:00	0.00	00:00	0.00	0.00
44	☐	ONTNEWP-10026	269.97	00:00	0.00	05:00	91.23	269.97
45	☐	ONTNEWP-934	0.00	00:00	0.00	00:00	0.00	0.00
46	☐	ONTNEWP-10044	0.00	00:00	0.00	00:00	0.00	0.00
47	☐	ONTNEWP-9885	492.86	00:00	0.00	05:00	166.55	492.86
48	☐	ONTNEWP-9887	492.86	00:00	0.00	05:00	166.55	492.86
49	☐	ONTNEWP-9889	492.86	00:00	0.00	05:00	166.55	492.86
50	☐	ONTNEWP-9891	492.86	00:00	0.00	05:00	166.55	492.86
51	☐	ONTNEWP-9893	511.71	00:00	0.00	05:00	172.92	511.71
52	☐	ONTNEWP-9895	255.85	00:00	0.00	05:00	86.46	255.85
53	☐	ONTNEWP-9962	0.00	00:00	0.00	00:00	0.00	0.00
54	☐	ONTNEWP-9964	0.00	00:00	0.00	00:00	0.00	0.00
55	☐	ONTNEWP-9968	0.00	00:00	0.00	00:00	0.00	0.00
56	☐	ONTNEWP-9798	1,655.46	23:30	0.00	04:20	475.02	1,655.46
57	☐	ONTNEWP-9572	0.00	00:00	0.00	00:00	0.00	0.00

Near Term Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
58	☐	ONTNEWP-9320	48.23	00:00	0.00	05:00	16.30	48.23
59	☐	ONTNEWP-10016	0.00	00:00	0.00	00:00	0.00	0.00
60	☐	ONTNEWP-9774	582.73	00:00	0.00	05:00	196.92	582.73
61	☐	ONTNEWP-9884	4.73	00:00	0.00	05:00	1.60	4.73
62	☐	ONTNEWP-9886	32.18	00:00	0.00	05:00	10.87	32.18
63	☐	ONTNEWP-9384	495.21	01:20	0.00	20:00	304.54	495.21
64	☐	ONTNEWP-9892	504.29	01:20	0.00	20:00	307.61	504.29
65	☐	ONTNEWP-9900	99.81	00:00	0.00	05:00	33.73	99.81
66	☐	ONTNEWP-910	99.81	00:00	0.00	05:00	33.73	99.81
67	☐	ONTNEWP-9896	352.67	00:00	0.00	05:00	119.18	352.67
68	☐	ONTNEWP-9712	280.33	00:00	0.00	05:00	94.73	280.33
69	☐	ONTNEWP-9902	133.65	00:00	0.00	05:00	45.17	133.65
70	☐	ONTNEWP-9890	452.48	00:00	0.00	05:00	152.91	452.48
71	☐	ONTNEWP-914	452.48	00:00	0.00	05:00	152.91	452.48
72	☐	ONTNEWP-9894	452.48	00:00	0.00	05:00	152.91	452.48
73	☐	ONTNEWP-9913	83.15	00:00	0.00	05:00	28.10	83.15
74	☐	ONTNEWP-9861	108.55	00:00	0.00	05:00	36.68	108.55
75	☐	ONTNEWP-9912	0.00	00:00	0.00	00:00	0.00	0.00
76	☐	ONTNEWP-9668	763.17	00:00	0.00	05:00	257.90	763.17
77	☐	ONTNEWP-9664	763.17	00:00	0.00	05:00	257.90	763.17
78	☐	ONTNEWP-9662	0.00	00:00	0.00	00:00	0.00	0.00
79	☐	ONTNEWP-9400	214.16	22:40	0.00	20:00	68.08	214.16
80	☐	ONTNEWP-9704	214.16	22:40	0.00	20:00	68.08	214.16
81	☐	ONTNEWP-9916	125.56	04:40	0.00	20:00	36.84	125.56
82	☐	ONTNEWP-9918	214.25	22:40	0.00	20:00	68.47	214.25
83	☐	ONTNEWP-9928	299.82	22:40	0.00	20:00	100.04	299.82
84	☐	ONTNEWP-9926	166.80	05:00	0.00	20:00	48.39	166.80
85	☐	ONTNEWP-9920	0.00	00:00	0.00	00:00	0.00	0.00
86	☐	ONTNEWP-9922	0.00	00:00	0.00	00:00	0.00	0.00
87	☐	ONTNEWP-9924	0.00	00:00	0.00	00:00	0.00	0.00
88	☐	ONTNEWP-9932	458.26	22:40	0.00	20:00	146.74	458.26
89	☐	ONTNEWP-9936	147.24	00:00	0.00	05:00	49.76	147.24
90	☐	ONTNEWP-9940	414.26	04:00	0.00	20:00	149.53	414.26
91	☐	ONTNEWP-9942	414.26	04:00	0.00	20:00	149.53	414.26
92	☐	ONTNEWP-9944	0.00	00:00	0.00	00:00	0.00	0.00
93	☐	ONTNEWP-908	245.32	00:00	0.00	05:00	82.90	245.32
94	☐	ONTNEWP-9846	968.33	01:20	0.00	20:00	464.42	968.33
95	☐	ONTNEWP-9440	0.00	00:00	0.00	00:00	0.00	0.00
96	☐	ONTNEWP-9958	0.00	00:00	0.00	00:00	0.00	0.00
97	☐	ONTNEWP-9972	0.00	00:00	0.00	00:00	0.00	0.00
98	☐	ONTNEWP-9960	0.00	00:00	0.00	00:00	0.00	0.00
99	☐	ONTNEWP-9864	1,478.59	00:00	0.00	05:00	499.66	1,478.59
100	☐	ONTNEWP-9860	482.37	00:00	0.00	05:00	163.01	482.37
101	☐	ONTFRAN-3693	1,229.73	00:00	0.00	06:00	402.84	1,229.73
102	☐	ONTFRAN-3621	1,954.40	23:30	0.00	18:10	658.94	1,954.40
103	☐	ONTFRAN-3625	369.96	04:10	0.00	18:10	125.16	369.96
104	☐	ONTNEWP649	303.81	04:00	0.00	18:10	101.57	303.81
105	☐	ONTFRAN-3624	303.81	04:00	0.00	18:10	101.57	303.81
106	☐	ONTFRAN-3626	1,508.56	04:00	0.00	18:10	510.39	1,508.56
107	☐	ONTNEWP-9776	0.00	00:00	0.00	00:00	0.00	0.00
108	☐	ONTNEWP-9899	414.26	04:00	0.00	20:00	149.53	414.26
109	☐	ONTNEWP-9974	414.26	04:00	0.00	20:00	149.53	414.26
110	☐	ONTNEWP-9780	231.77	21:00	0.00	05:00	83.68	231.77
111	☐	ONTNEWP-9786	653.39	21:00	0.00	05:00	231.60	653.39
112	☐	ONTNEWP-9778	1,990.30	00:00	0.00	05:00	672.58	1,990.30
113	☐	ONTFRAN-3694	3,349.22	23:30	0.00	18:10	1,155.20	3,349.22
114	☐	ONTFRAN-3620	463.43	04:20	0.00	18:10	185.33	463.43

Near Term Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
115		ONTFRAN-3628	756.39	04:20	0.00	18:10	210.10	756.39
116		ONTFRAN-3640	332.38	04:00	0.00	18:10	151.25	332.38
117		ONTFRAN-3635	235.69	21:20	0.00	18:10	113.05	235.69
118		ONT9048	2,995.21	21:20	0.00	18:10	1,045.57	2,995.21
119		ONT9068	515.95	21:20	0.00	18:10	207.75	515.95
120		ONTFRAN-3634	0.00	00:00	0.00	00:00	0.00	0.00
121		ONTFRAN-3632	750.10	04:00	0.00	18:10	277.93	750.10
122		ONTFRAN-3633	750.10	04:00	0.00	18:10	277.93	750.10
123		ONTNEWP-9870	6,166.06	20:30	0.00	05:00	335.76	6,166.06
124		ONTFRAN-3642	691.38	04:00	0.00	18:10	272.56	691.38
125		ONTFRAN-3645	2,514.87	21:20	0.00	18:10	874.44	2,514.87
126		ONTFRAN-3627	1,680.88	23:30	0.00	18:10	566.76	1,680.88
127		ONTFRAN-3618	1,581.08	04:00	0.00	18:10	614.85	1,581.08
128		ONT9052	1,179.58	04:00	0.00	18:10	503.25	1,179.58
129		ONTFRAN-3590	1,929.68	04:00	0.00	18:10	765.42	1,929.68
130		ONTFRAN-3629	3,974.29	04:00	0.00	18:10	1,585.09	3,974.29
131		ONTFRAN-3617	6,791.60	23:30	0.00	18:10	2,719.50	6,791.60
132		ONTFRAN-3600	9,614.14	04:00	0.00	18:10	3,891.70	9,614.14
133		ONT9024	6,166.06	20:30	0.00	05:00	335.76	6,166.06
134		ONTNEWP-9276	6,166.06	20:30	0.00	05:00	335.76	6,166.06
135		ONTNEWP-9434	0.00	00:00	0.00	00:00	0.00	0.00
136		ONTNEWP-9602	6,166.06	20:30	0.00	05:00	335.76	6,166.06
137		ONTFRAN-3706	6,791.60	23:30	0.00	18:10	2,719.50	6,791.60
138		ONTNEWP-9252	672.03	23:30	0.00	05:00	232.82	672.03
139		ONTNEWP-9590	672.03	23:30	0.00	05:00	232.82	672.03
140		ONTNEWP-9170	672.03	23:30	0.00	05:00	232.82	672.03
141		ONTPHLP-3615	2,256.60	23:30	0.00	05:00	774.34	2,256.60
142		ONT9034	6,530.15	23:30	0.00	05:00	2,258.66	6,530.15
143		ONTNEWP-9600	0.00	00:00	0.00	00:00	0.00	0.00
144		ONTNEWP-9854	0.00	00:00	0.00	00:00	0.00	0.00
145		ONTNEWP-9556	556.65	00:00	0.00	05:00	188.11	556.65
146		ONTNEWP-9554	8,605.91	20:30	0.00	05:00	2,596.11	8,605.91
147		ONTNEWP-9810	8,884.24	20:30	0.00	05:00	2,784.22	8,884.24
148		ONTNEWP-9596	6,530.15	23:30	0.00	05:00	2,258.66	6,530.15
149		ONTNEWP-10017	48.24	02:20	0.00	05:00	16.30	48.24
150		ONTNEWP-9946	763.17	00:00	0.00	05:00	257.90	763.17
151		ONT283	0.00	00:00	0.00	00:00	0.00	0.00
152		ONTNEWP-9714	146.68	00:00	0.00	05:00	49.57	146.68
153		ONTNEWP-9578	0.00	00:00	0.00	00:00	0.00	0.00
154		ONTNEWP-9494	44.25	00:00	0.00	05:00	14.95	44.25
155		ONTP10024	280.33	00:00	0.00	05:00	94.73	280.33
156		2011_P14	0.00	00:00	0.00	00:00	0.00	0.00
157		2011_P15	0.00	00:00	0.00	00:00	0.00	0.00
158		2011_P17	365.76	02:10	0.00	20:00	235.18	365.76
159		2011_P18	261.90	08:00	0.00	20:00	158.62	261.90
160		2011_P19	271.27	21:00	0.00	20:00	183.69	271.27
161		P39	360.39	00:00	0.00	05:00	121.79	360.39
162		P41	262.92	02:10	0.00	05:00	88.85	262.92
163		P63	0.00	00:00	0.00	00:00	0.00	0.00
164		P81	6,530.14	23:30	0.00	05:00	2,258.66	6,530.14
165		P87	156.39	02:10	0.00	20:00	102.52	156.39
166		P186	1,655.46	23:30	0.00	04:20	747.70	1,655.46
167		P190	86.82	17:30	0.00	18:10	66.29	86.82
168		P_ONT-2	89.67	00:00	0.00	05:00	30.30	89.67
169		P_ONT-90	235.69	21:20	0.00	18:10	113.05	235.69
170		P_ONT-102	2,283.24	23:30	0.00	05:00	811.73	2,283.24
171		P_ONT-120	757.36	00:00	0.00	05:00	255.94	757.36

Near Term Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
172		P_ONT-122	9,638.79	04:00	0.00	18:10	3,844.42	9,638.79
173		P_ONT-128	1,655.46	23:30	0.00	04:20	475.04	1,655.46
174		P_ONT-146	1,655.46	23:30	0.00	04:20	475.02	1,655.46
175		P_ONT-148	1,655.46	23:30	0.00	04:20	475.02	1,655.46
176		P_ONT-150	1,655.46	23:30	0.00	04:20	475.04	1,655.46
177		P_ONT-152	1,655.46	23:30	0.00	04:20	475.04	1,655.46
178		P_ONT-154	5,764.17	20:30	0.00	00:00	64.13	5,764.17
179		P_ONT-156	5,764.17	20:30	0.00	00:00	64.13	5,764.17
180		P_ONT-158	5,764.17	20:30	0.00	00:00	64.13	5,764.17
181		P_ONT-160	5,764.17	20:30	0.00	00:00	64.13	5,764.17
182		P_ONT-174	1,990.30	00:00	0.00	05:00	672.58	1,990.30
183		P_ONT-176	5,534.20	23:30	0.00	18:10	2,254.45	5,534.20
184		P_ONT-178	874.55	04:00	0.00	18:10	321.28	874.55
185		P_ONT-180	391.37	04:00	0.00	18:10	143.78	391.37
186		P_ONT-182	391.37	04:00	0.00	18:10	143.78	391.37
187		P_ONT-184	0.00	00:00	0.00	00:00	0.00	0.00
188		P_ONT-186	420.58	04:10	0.00	18:10	175.55	420.58
189		P_ONT-188	0.00	00:00	0.00	00:00	0.00	0.00
190		P_ONT-190	0.00	00:00	0.00	00:00	0.00	0.00
191		P_ONT-192	633.35	04:00	0.00	18:10	238.17	633.35
192		P_ONT-194	633.35	04:00	0.00	18:10	238.17	633.35
193		P_ONT-196	994.56	04:10	0.00	18:10	413.68	994.56
194		P_ONT-198	2,834.14	04:00	0.00	18:10	1,172.19	2,834.14
195		P_ONT-200	231.05	23:30	0.00	18:10	83.19	231.05
196		P_ONT-204	90.35	21:40	0.00	05:00	30.53	90.35
197		P_ONT-206	0.00	00:00	0.00	00:00	0.00	0.00
198		P_ONT-208	0.00	00:00	0.00	00:00	0.00	0.00
199		P_ONT-210	0.00	00:00	0.00	00:00	0.00	0.00
200		P_ONT-212	1,235.32	23:30	0.00	18:10	439.28	1,235.32
201		P_ONT-214	380.75	23:30	0.00	18:10	150.50	380.75
202		P_ONT-216	380.75	23:30	0.00	18:10	150.50	380.75
203		P_ONT-218	0.00	00:00	0.00	00:00	0.00	0.00
204		P_ONT-220	0.00	00:00	0.00	00:00	0.00	0.00
205		P_ONT-222	380.75	23:30	0.00	18:10	150.50	380.75
206		P_ONT-224	0.00	00:00	0.00	00:00	0.00	0.00
207		P_ONT-226	1,208.37	04:10	0.00	18:10	429.54	1,208.37
208		P_ONT-228	51.23	23:30	0.00	18:10	39.14	51.23
209		P_ONT-230	2,221.74	04:00	0.00	18:10	787.25	2,221.74
210		P_ONT-232	866.74	21:00	0.00	18:10	303.13	866.74
211		P_ONT-234	285.33	21:00	0.00	18:10	99.44	285.33
212		P_ONT-236	132.58	21:00	0.00	18:10	46.77	132.58
213		P_ONT-238	132.58	21:00	0.00	18:10	46.77	132.58
214		P_ONT-240	0.00	00:00	0.00	00:00	0.00	0.00
215		P_ONT-242	0.00	00:00	0.00	00:00	0.00	0.00
216		P_ONT-244	2,221.74	04:00	0.00	18:10	998.24	2,221.74
217		P_ONT-246	451.44	23:30	0.00	18:10	157.01	451.44
218		P_ONT-248	451.44	23:30	0.00	18:10	157.01	451.44
219		P_ONT-250	325.50	23:30	0.00	18:10	113.24	325.50
220		P_ONT-252	325.50	23:30	0.00	18:10	113.24	325.50
221		P_ONT-254	385.10	23:30	0.00	18:10	133.38	385.10
222		P_ONT-256	385.10	23:30	0.00	18:10	133.38	385.10
223		P_ONT-258	0.00	00:00	0.00	00:00	0.00	0.00
224		P_ONT-260	59.60	00:00	0.00	05:00	20.14	59.60
225		P_ONT-262	2,503.80	23:30	0.00	18:10	872.57	2,503.80
226		P_ONT-264	50.98	04:20	0.00	18:10	9.72	50.98
227		P_ONT-266	50.98	04:20	0.00	18:10	9.72	50.98
228		P_ONT-268	50.98	04:20	0.00	18:10	9.72	50.98

Near Term Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
229	☐	P_ONT-270	0.00	00:00	0.00	00:00	0.00	0.00
230	☐	P_ONT-272	565.77	21:00	0.00	18:10	192.06	565.77
231	☐	P_ONT-274	481.55	21:00	0.00	18:10	161.73	481.55
232	☐	P_ONT-276	101.11	04:10	0.00	18:10	37.51	101.11
233	☐	P_ONT-278	606.45	21:00	0.00	18:10	208.58	606.45
234	☐	P_ONT-280	606.46	21:00	0.00	18:10	208.58	606.46
235	☐	P_ONT-282	0.00	00:00	0.00	00:00	0.00	0.00
236	☐	P_ONT-284	50.42	04:10	0.00	18:10	19.22	50.42
237	☐	P_ONT-286	0.00	00:00	0.00	00:00	0.00	0.00
238	☐	P_ONT-288	50.42	04:10	0.00	18:10	19.22	50.42
239	☐	P_ONT-290	208.97	21:00	0.00	18:10	70.67	208.97
240	☐	P_ONT-292	751.51	21:00	0.00	18:10	255.82	751.51
241	☐	P_ONT-294	249.71	21:20	0.00	18:10	85.83	249.71
242	☐	P_ONT-296	208.97	21:00	0.00	18:10	70.67	208.97
243	☐	P_ONT-298	501.85	21:00	0.00	18:10	171.10	501.85
244	☐	P_ONT-300	710.82	21:00	0.00	18:10	241.77	710.82
245	☐	P_ONT-302	733.09	00:00	0.00	05:00	247.73	733.09
246	☐	P_ONT-304	421.62	21:00	0.00	05:00	147.92	421.62
247	☐	P_ONT-306	68.62	21:00	0.00	05:00	28.64	68.62
248	☐	P_ONT-308	421.62	21:00	0.00	05:00	147.93	421.62
249	☐	P_ONT-310	421.62	21:00	0.00	05:00	147.92	421.62
250	☐	P_ONT-312	0.00	00:00	0.00	00:00	0.00	0.00
251	☐	P_ONT-314	0.00	00:00	0.00	00:00	0.00	0.00
252	☐	P_ONT-316	0.00	00:00	0.00	00:00	0.00	0.00
253	☐	P_ONT-318	133.65	00:00	0.00	05:00	45.17	133.65
254	☐	P_ONT-322	45.15	00:00	0.00	05:00	15.26	45.15
255	☐	P_ONT-324	45.15	00:00	0.00	05:00	15.26	45.15
256	☐	P_ONT-326	88.50	00:00	0.00	05:00	29.91	88.50
257	☐	P_ONT-328	386.65	21:00	0.00	18:10	131.85	386.65
258	☐	P_ONT-330	424.36	21:00	0.00	18:10	145.37	424.36
259	☐	P_ONT-332	0.00	00:00	0.00	00:00	0.00	0.00
260	☐	P_ONT-334	0.00	00:00	0.00	00:00	0.00	0.00
261	☐	P_ONT-336	132.58	21:00	0.00	18:10	46.77	132.58
262	☐	P_ONT-338	0.00	00:00	0.00	00:00	0.00	0.00
263	☐	P_ONT-340	0.00	00:00	0.00	00:00	0.00	0.00
264	☐	P_ONT-342	0.00	00:00	0.00	00:00	0.00	0.00
265	☐	P_ONT-344	0.00	00:00	0.00	00:00	0.00	0.00
266	☐	P_ONT-346	0.00	00:00	0.00	00:00	0.00	0.00
267	☐	P_ONT-348	463.43	04:20	0.00	18:10	185.33	463.43
268	☐	P_ONT-350	90.35	21:40	0.00	05:00	30.53	90.35
269	☐	P_ONT-352	90.35	21:40	0.00	05:00	30.53	90.35
270	☐	P_ONT-354	0.00	00:00	0.00	00:00	0.00	0.00
271	☐	P_ONT-356	90.35	00:00	0.00	05:00	30.53	90.35
272	☐	P_ONT-358	4,006.61	04:00	0.00	18:10	1,596.01	4,006.61
273	☐	P_ONT-362	582.73	00:00	0.00	05:00	196.92	582.73
274	☐	P_ONT-368	9,638.79	04:00	0.00	18:10	3,900.03	9,638.79
275	☐	P_ONT-370	231.05	23:30	0.00	18:10	83.19	231.05
276	☐	P_ONT-372	231.05	23:30	0.00	18:10	83.19	231.05
277	☐	P_ONT-374	1,179.58	04:00	0.00	18:10	503.25	1,179.58
278	☐	P_ONT-376	1,581.08	04:00	0.00	18:10	614.85	1,581.08
279	☐	P_ONT-378	132.58	21:00	0.00	18:10	46.77	132.58
280	☐	P_ONT-382	311.37	03:50	0.00	05:00	105.22	311.37
281	☐	P_ONT-388	458.26	22:40	0.00	20:00	146.74	458.26
282	☐	P_ONT-406	763.17	22:20	0.00	05:00	257.90	763.17
283	☐	P_ONT-408	763.17	22:20	0.00	05:00	257.90	763.17
284	☐	P_ONT-410	763.17	22:20	0.00	05:00	257.90	763.17
285	☐	P_ONT-412	763.17	22:20	0.00	05:00	257.90	763.17

Near Term Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
286		P_ONT-418	763.17	00:00	0.00	05:00	257.90	763.17
287		P_ONT-420	1.95	00:00	0.00	05:00	0.66	1.95
288		P_ONT-422	53.35	08:00	0.00	20:00	26.88	53.35
289		P_ONT-424	2.60	00:00	0.00	05:00	0.88	2.60
290		P_ONT-426	102.43	02:10	0.00	20:00	73.86	102.43
291		P_ONT-428	261.90	08:00	0.00	20:00	158.62	261.90
292		P_ONT-430	271.27	21:00	0.00	20:00	183.69	271.27
293		P_ONT-432	271.27	21:00	0.00	20:00	183.69	271.27
294		P_ONT-434	271.27	21:00	0.00	20:00	183.69	271.27
295		P_ONT-438	280.33	00:00	0.00	05:00	94.73	280.33
296		P_ONT-440	968.33	01:20	0.00	20:00	464.42	968.33
297		P_ONT-442	495.21	01:20	0.00	20:00	304.54	495.21
298		P_ONT-444	338.27	08:00	0.00	20:00	247.48	338.27
299		P_ONT-446	338.27	08:00	0.00	20:00	247.48	338.27
300		P_ONT-456	262.92	02:10	0.00	05:00	88.85	262.92
301		P_ONT-458	267.64	02:10	0.00	05:00	90.44	267.64
302		P_ONT-460	38.59	00:00	0.00	05:00	13.04	38.59
303		P_ONT-462	0.00	00:00	0.00	00:00	0.00	0.00
304		P_ONT-466	901.91	04:00	0.00	18:10	343.71	901.91
305		P_ONT-468	1,272.69	04:00	0.00	18:10	469.01	1,272.69
306		P_ONT-470	495.21	01:20	0.00	20:00	304.54	495.21
307		P_ONT-476	89.67	00:00	0.00	05:00	30.30	89.67
308		P_ONT-480	0.00	00:00	0.00	00:00	0.00	0.00
309		P_ONT-482	1,680.88	23:30	0.00	18:10	566.76	1,680.88
310		P_ONT-484	369.96	04:10	0.00	18:10	125.16	369.96
311		P_ONT-486	0.00	00:00	0.00	00:00	0.00	0.00
312		P_ONT-534	495.21	01:20	0.00	20:00	304.54	495.21
313		P_ONT-552	0.00	00:00	0.00	00:00	0.00	0.00
314		P_ONT-560	338.27	08:00	0.00	20:00	176.82	338.27
315		P_ONT-566	32.18	00:00	0.00	05:00	10.87	32.18
316		P_ONT-570	271.27	21:00	0.00	20:00	183.69	271.27
317		P_ONT-572	359.84	21:00	0.00	20:00	213.41	359.84
318		P_ONT-574	359.84	21:00	0.00	20:00	213.41	359.84
319		P_ONT-576	866.74	21:00	0.00	18:10	303.13	866.74
320		P_ONT-578	73.62	00:00	0.00	05:00	24.88	73.62
321		P_ONT-580	73.62	00:00	0.00	05:00	24.88	73.62
322		P_ONT-598	1,680.88	23:30	0.00	18:10	566.76	1,680.88
323		P_ONT-618	2,995.21	21:20	0.00	18:10	1,045.57	2,995.21
324		P_ONT-666	231.05	23:30	0.00	18:10	83.19	231.05
325		P_ONT-668	515.95	21:20	0.00	18:10	207.75	515.95
326		P_ONT-676	386.65	21:00	0.00	18:10	131.85	386.65
327		P_ONT-680	15.86	00:00	0.00	05:00	5.36	15.86

Future Model Scenario

Future Scenario - City of Ontario - Junctions Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
1		J1272	1299	995.00
2		J1274	1299	1,015.00
3		J1276	1299	984.00
4		J1280	1299	997.00
5		J1288	1299	1,006.00
6		J1290	1299	967.00
7		J1292	1158	803.00
8		J1294	1158	873.00
9		J1296	1158	892.00
10		J1302	1299	1,005.00
11		J1304	1158	845.00
12		J1308	1299	1,010.00
13		J1314	1299	1,063.00
14		J1316	1299	1,063.00
15		J1320	1299	1,022.00
16		J1322	1299	998.50
17		J1324	1299	998.50
18		J1404	1299	1,005.00
19		J1406	1299	1,014.00
20		J1408	1299	1,029.00
21		J1410	1299	1,022.00
22		J1412	1299	1,022.00
23		J1414	1299	1,012.50
24		J1416	1299	994.50
25		J1586	1299	1,111.00
26		J1592	1299	970.00
27		J1596	1050	790.80
28		JKELLOG	930	722.50
29		JSCH_HYD	930	722.50
30		J_ONT-1	1299	1,020.00
31		J_ONT-103	1050	752.33
32		J_ONT-105	930	752.33
33		J_ONT-107	1050	752.33
34		J_ONT-109	930	752.33
35		J_ONT-113	930	766.97
36		J_ONT-115	1050	766.95
37		J_ONT-117	930	766.95
38		J_ONT-119	1050	766.95
39		J_ONT-13	1158	935.00
40		J_ONT-133	930	718.23
41		J_ONT-135	930	730.00
42		J_ONT-137	930	722.00
43		J_ONT-139	930	720.00
44		J_ONT-141	930	717.00
45		J_ONT-143	930	725.00
46		J_ONT-145	930	717.00
47		J_ONT-147	930	716.00
48		J_ONT-149	930	715.00
49		J_ONT-15	1158	928.00
50		J_ONT-151	930	740.26
51		J_ONT-153	930	740.00

Future Scenario - City of Ontario - Junctions Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
52	☐	J_ONT-155	930	757.00
53	☐	J_ONT-157	930	728.00
54	☐	J_ONT-159	930	739.00
55	☐	J_ONT-161	930	720.00
56	☐	J_ONT-163	930	714.00
57	☐	J_ONT-165	930	699.00
58	☐	J_ONT-167	930	714.00
59	☐	J_ONT-169	930	710.00
60	☐	J_ONT-17	1158	881.00
61	☐	J_ONT-171	930	700.00
62	☐	J_ONT-173	930	696.00
63	☐	J_ONT-175	930	695.00
64	☐	J_ONT-177	930	690.26
65	☐	J_ONT-179	930	686.77
66	☐	J_ONT-181	930	662.11
67	☐	J_ONT-185	930	667.75
68	☐	J_ONT-187	930	662.97
69	☐	J_ONT-189	930	652.00
70	☐	J_ONT-19	1158	848.00
71	☐	J_ONT-191	930	652.00
72	☐	J_ONT-193	930	683.62
73	☐	J_ONT-195	930	670.00
74	☐	J_ONT-197	930	665.00
75	☐	J_ONT-199	930	668.00
76	☐	J_ONT-201	930	673.00
77	☐	J_ONT-203	930	676.00
78	☐	J_ONT-205	930	677.00
79	☐	J_ONT-207	930	683.00
80	☐	J_ONT-209	930	676.00
81	☐	J_ONT-211	930	671.02
82	☐	J_ONT-213	930	667.00
83	☐	J_ONT-215	930	669.00
84	☐	J_ONT-217	930	669.00
85	☐	J_ONT-219	930	670.00
86	☐	J_ONT-221	930	675.00
87	☐	J_ONT-223	930	679.00
88	☐	J_ONT-225	930	680.00
89	☐	J_ONT-227	930	685.00
90	☐	J_ONT-229	930	677.00
91	☐	J_ONT-231	930	677.00
92	☐	J_ONT-233	930	675.00
93	☐	J_ONT-235	930	678.00
94	☐	J_ONT-237	930	673.00
95	☐	J_ONT-239	1050	798.05
96	☐	J_ONT-243	1050	775.00
97	☐	J_ONT-247	1050	795.00
98	☐	J_ONT-249	1050	785.00
99	☐	J_ONT-251	1050	791.00
100	☐	J_ONT-253	1050	800.00
101	☐	J_ONT-255	1050	795.00
102	☐	J_ONT-257	1299	0.00

Future Scenario - City of Ontario - Junctions Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
103		J_ONT-259	1299	0.00
104		J_ONT-261	1299	0.00
105		J_ONT-263	1299	0.00
106		J_ONT-265	930	662.00
107		J_ONT-267	930	672.50
108		J_ONT-271	930	662.00
109		J_ONT-273	930	666.81
110		J_ONT-275	930	663.85
111		J_ONT-277	930	654.00
112		J_ONT-279	930	654.00
113		J_ONT-281	930	654.00
114		J_ONT-283	930	658.00
115		J_ONT-285	930	661.00
116		J_ONT-287	930	661.00
117		J_ONT-289	930	730.83
118		J_ONT-291	930	748.00
119		J_ONT-295	930	754.00
120		J_ONT-297	930	755.00
121		J_ONT-299	930	755.00
122		J_ONT-3	1299	1,006.00
123		J_ONT-301	930	698.61
124		J_ONT-305	1050	752.15
125		J_ONT-313	930	750.65
126		J_ONT-315	930	737.00
127		J_ONT-317	930	735.00
128		J_ONT-319	930	705.67
129		J_ONT-321	930	630.05
130		J_ONT-325	930	663.56
131		J_ONT-333	1158	898.39
132		J_ONT-341	1158	897.00
133		J_ONT-343	1158	897.00
134		J_ONT-351	1158	905.98
135		J_ONT-357	1158	907.23
136		J_ONT-359	1299	1,125.73
137		J_ONT-361	1299	1,022.00
138		J_ONT-363	1299	1,027.86
139		J_ONT-365	1299	1,013.84
140		J_ONT-367	1299	1,015.12
141		J_ONT-369	1299	1,020.00
142		J_ONT-37	1158	930.00
143		J_ONT-371	1299	1,020.00
144		J_ONT-373	1299	1,012.03
145		J_ONT-377	1299	975.08
146		J_ONT-379	1299	1,012.28
147		J_ONT-381	1299	990.66
148		J_ONT-383	1299	988.07
149		J_ONT-385	1299	983.47
150		J_ONT-387	1299	979.36
151		J_ONT-39	1158	925.00
152		J_ONT-399	1299	967.15
153		J_ONT-401	1299	975.71

Future Scenario - City of Ontario - Junctions Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
154		J_ONT-403	1299	972.20
155		J_ONT-405	1158	906.93
156		J_ONT-407	1299	970.00
157		J_ONT-409	930	636.83
158		J_ONT-41	1158	900.00
159		J_ONT-421	1299	962.00
160		J_ONT-423	930	717.61
161		J_ONT-425	930	699.76
162		J_ONT-427	930	699.76
163		J_ONT-43	1158	926.00
164		J_ONT-433	1299	1,006.00
165		J_ONT-437	1299	1,006.00
166		J_ONT-441	1158	901.86
167		J_ONT-443	1158	927.00
168		J_ONT-45	1158	878.00
169		J_ONT-467	1050	784.72
170		J_ONT-469	1158	824.00
171		J_ONT-47	1158	870.00
172		J_ONT-473	1158	973.90
173		J_ONT-477	1299	983.86
174		J_ONT-489	1158	912.00
175		J_ONT-49	1158	838.00
176		J_ONT-491	1158	878.00
177		J_ONT-495	1299	96.70
178		J_ONT-499	1158	875.30
179		J_ONT-501	1158	870.00
180		J_ONT-503	1299	870.00
181		J_ONT-507	1299	1,020.00
182		J_ONT-509	1299	1,010.42
183		J_ONT-51	1158	868.00
184		J_ONT-511	1299	1,010.97
185		J_ONT-513	1158	863.00
186		J_ONT-515	1158	867.04
187		J_ONT-523	1158	928.55
188		J_ONT-525	1158	876.30
189		J_ONT-53	1158	851.00
190		J_ONT-531	1158	869.04
191		J_ONT-533	1050	805.94
192		J_ONT-535	1050	784.72
193		J_ONT-537	930	706.89
194		J_ONT-543	930	749.66
195		J_ONT-545	1050	748.04
196		J_ONT-547	1050	719.31
197		J_ONT-55	1050	842.00
198		J_ONT-567	930	661.07
199		J_ONT-569	930	653.59
200		J_ONT-571		928.55
201		J_ONT-573	1158	928.55
202		J_ONT-575	1158	928.55
203		J_ONT-577	1158	928.55
204		J_ONT-579	1158	928.55

Future Scenario - City of Ontario - Junctions Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
205		J_ONT-583	1158	928.55
206		J_ONT-587	1050	875.30
207		J_ONT-589	1158	875.30
208		J_ONT-59	1050	840.00
209		J_ONT-609	930	665.39
210		J_ONT-61	1050	850.00
211		J_ONT-611	930	665.41
212		J_ONT-613	930	684.00
213		J_ONT-63	1050	841.00
214		J_ONT-77	930	660.94
215		J_ONT-89	1050	796.00
216		J_ONT-99	1050	791.41
217		ONT66	1050	780.00
218		ONT68	1050	787.87
219		ONT72	1050	786.40
220		ONT76	930	694.43
221		ONT84	930	730.00
222		ONTFRAN-3571	1050	776.17
223		ONTFRAN-3574	930	751.37
224		ONTFRAN-3575	930	748.04
225		ONTFRAN-3576	930	750.84
226		ONTFRAN-3577	930	750.28
227		ONTFRAN-3578	930	746.00
228		ONTFRAN-3581	930	728.00
229		ONTFRAN-3582	930	729.23
230		ONTFRAN-3583	930	723.56
231		ONTFRAN-3584	930	722.25
232		ONTFRAN-3585	930	718.48
233		ONTFRAN-3586	930	717.32
234		ONTFRAN-3587	930	721.32
235		ONTFRAN-3588	930	691.13
236		ONTFRAN-3591	930	706.58
237		ONTFRAN-3592	930	725.00
238		ONTFRAN-3593	930	730.70
239		ONTFRAN-3594	930	731.73
240		ONTFRAN-3595	930	737.21
241		ONTFRAN-3596	930	706.61
242		ONTFRAN-3597	930	699.76
243		ONTFRAN-3598	930	706.52
244		ONTFRAN-3599	930	683.13
245		ONTFRAN-3600	930	701.34
246		ONTFRAN-3601	930	674.45
247		ONTFRAN-3602	930	676.18
248		ONTFRAN-3603	930	663.78
249		ONTFRAN-3605	930	655.40
250		ONTFRAN-3606	930	650.00
251		ONTFRAN-3607	930	636.83
252		ONTFRAN-3608	930	658.46
253		ONTFRAN-3609	930	679.25
254		ONTFRAN-3611	930	735.93
255		ONTFRAN-3618	930	768.59

Future Scenario - City of Ontario - Junctions Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
256		ONTFRAN-3619	930	768.76
257		ONTFRAN-3620	930	750.00
258		ONTFRAN-3621	930	746.40
259		ONTFRAN-3622	930	750.00
260		ONTFRAN-3626	930	730.63
261		ONTJ10	930	684.00
262		ONTJ114	1158	832.20
263		ONTJ12	930	670.00
264		ONTJ145	1050	774.66
265		ONTJ18	930	686.00
266		ONTJ19	930	660.59
267		ONTJ76	1050	778.34
268		ONTNEWJ-198	1299	1,141.76
269		ONTNEWJ-212	1050	798.63
270		ONTNEWJ-214	1050	795.78
271		ONTNEWJ-222	1050	775.88
272		ONTNEWJ-224	1050	761.30
273		ONTNEWJ-262	1299	1,112.46
274		ONTNEWJ-278	1299	983.47
275		ONTNEWJ-322	1299	1,112.00
276		ONTNEWJ-334	1050	785.99
277		ONTNEWJ-336	1050	775.86
278		ONTNEWJ-338	1050	778.12
279		ONTNEWJ-340	1050	777.10
280		ONTNEWJ-348	1158	973.90
281		ONTNEWJ-354	1050	798.84
282		ONTNEWJ-356	1050	773.92
283		ONTNEWJ-378	1158	905.98
284		ONTNEWJ-396	1158	950.07
285		ONTNEWJ-398	1299	966.59
286		ONTNEWJ-399	1299	966.59
287		ONTNEWJ-418	1050	748.04
288		ONTNEWJ-420	1050	750.84
289		ONTNEWJ-424	1050	750.28
290		ONTNEWJ-426	1050	746.00
291		ONTNEWJ-428	1050	778.10
292		ONTNEWJ-430	1050	750.81
293		ONTNEWJ-432	1050	753.22
294		ONTNEWJ-436	1050	768.59
295		ONTNEWJ-438	1050	768.76
296		ONTNEWJ-440	1050	778.53
297		ONTNEWJ-456	1050	751.37
298		ONTNEWJ-458	1050	787.43
299		ONTNEWJ-470	1299	1,005.00
300		ONTNEWJ-478	1299	1,002.83
301		ONTNEWJ-482	1299	988.07
302		ONTNEWJ-492	1050	815.00
303		ONTNEWJ-496	1050	803.00
304		ONTNEWJ-498	1050	803.00
305		ONTNEWJ-500	1050	790.00
306		ONTNEWJ-502	1050	752.00

Future Scenario - City of Ontario - Junctions Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
307		ONTNEWJ-510	1299	962.00
308		ONTNEWJ-516	1299	969.00
309		ONTNEWJ-520	1299	998.00
310		ONTNEWJ-522	1299	977.00
311		ONTNEWJ-526	1299	967.00
312		ONTNEWJ-528	1299	970.00
313		ONTNEWJ-530	1158	947.00
314		ONTNEWJ-542	1158	923.00
315		ONTNEWJ-544	1158	924.00
316		ONTNEWJ-546	1158	909.00
317		ONTNEWJ-548	1158	917.00
318		ONTNEWJ-550	1158	896.00
319		ONTNEWJ-554	1158	901.00
320		ONTNEWJ-555	1158	880.00
321		ONTNEWJ-556	1158	870.00
322		ONTNEWJ-558	1158	863.00
323		ONTNEWJ-560	1158	883.00
324		ONTNEWJ-562	1158	895.00
325		ONTNEWJ-564	1158	905.00
326		ONTNEWJ-568	1158	915.00
327		ONTNEWJ-576	1158	815.00
328		ONTNEWJ-578	1158	841.00
329		ONTNEWJ-582	1158	854.00
330		ONTNEWJ-584	1158	842.00
331		ONTNEWJ-585	1158	867.00
332		ONTNEWJ-586	1158	842.00
333		ONTNEWJ-588	1158	845.00
334		ONTNEWJ-591	1158	872.50
335		ONTNEWJ-592	1158	864.00
336		ONTNEWJ-598	1299	995.00
337		ONTNEWJ-622	1299	1,110.00
338		ONTNEWJ-628	1158	956.00
339		ONTNEWJ-631	1050	805.00
340		ONTNEWJ-632	1050	800.00
341		ONTNEWJ-634	1050	812.00
342		ONTNEWJ-636	1050	800.00
343		ONTNEWJ-638	1050	803.00
344		ONTNEWJ-640	1299	1,020.00
345		ONTNEWJ-646	1299	1,020.00
346		ONTNEWJ-908	1299	1,099.00
347		ONTNEWJ-910	1299	967.00
348		ONTNEWJ-914	1299	992.50
349		ONTNEWJ-934	1158	936.00
350		ONTNEWJ-936	1158	934.00
351		ONTNEWJ-950	1299	1,020.00
352		ONTNEWJ392	930	778.53
353		ONTNEWJ398	930	672.00
354		ONTNEWJ400	930	672.80
355		ONTNEWJ402	930	652.53
356		ONTNEWJ_630	1050	805.00
357		ONTPHLP-2235	1050	769.70

Future Scenario - City of Ontario - Junctions Input Data Elevations and Zones

		ID (Char)	Zone (Char)	Elevation (ft)
358		ONTPHLP-2241	1050	780.86
359		ONTPHLP-2263	1050	783.02
360		ONTPHLP-3507	1050	778.10
361		ONTPHLP-3606	930	753.22
362		ONTPHLP-3610	1050	799.50
363		ONTPICKUP-12	1050	760.27
364		ONTPICKUP-14	1050	777.77
365		ONTPICKUP-17	1050	790.00
366		ONTPICKUP-30	1158	835.00
367		ONTPICKUP-32	1158	925.00
368		ONTPICKUP-42	1299	1,093.00
369		ONTPICKUP-48	1158	884.75
370		ONTPICKUP-51	1299	1,110.62
371		ONTPICKUP-6	1158	961.87
372		ONTPICKUP-65	1158	910.16
373		ONTPICKUP-68	1299	968.54
374		ONTPICKUP-70	1050	777.55
375		ONTPICKUP-71	1158	907.45
376		ONTPICKUP-72	1299	1,094.10
377		ONTPICKUP-9	1050	775.82
378		ONTTOP50-10	1158	974.34
379		ONTTOP50-15	1299	979.36
380		ONTTOP50-18	1299	988.07
381		ONTTOP50-20	1050	776.21
382		ONTTOP50-22	1299	973.68
383		ONTTOP50-23	1050	773.61
384		ONTTOP50-25	1050	771.36
385		ONTTOP50-40	1299	1,109.15
386		ONTTOP50-48	1158	877.76
387		ONTTOP50-6	1050	761.11

Future Scenario - CIty of Ontario - Junctions Input Data

* ULTIMATE *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Pattern 2 (Char)
1	☐	J1272	0.00	LANDSCAPE	
2	☐	J1274	40.55	LANDSCAPE	
3	☐	J1276	5.26	LANDSCAPE	
4	☐	J1280	53.20	LANDSCAPE	
5	☐	J1288	15.59	LANDSCAPE	
6	☐	J1290	21.80	LANDSCAPE	
7	☐	J1292	64.32	Ontario_1158	
8	☐	J1294	204.18	Ontario_1158	
9	☐	J1296	0.00		
10	☐	J1302	0.00		
11	☐	J1304	0.00		
12	☐	J1308	0.00		
13	☐	J1314	0.00		
14	☐	J1316	28.99	LANDSCAPE	
15	☐	J1320	206.00	LANDSCAPE	
16	☐	J1322	0.00		
17	☐	J1324	0.00		
18	☐	J1404	0.00		
19	☐	J1406	64.76	LANDSCAPE	
20	☐	J1408	1.47	LANDSCAPE	
21	☐	J1410	58.93	LANDSCAPE	
22	☐	J1412	0.00		
23	☐	J1414	0.00		
24	☐	J1416	0.00		
25	☐	J1586	0.00		
26	☐	J1592	0.00		
27	☐	J1596	48.57	LANDSCAPE	
28	☐	JKELLOG	0.00	Ontario_Ranch	
29	☐	JSCH_HYD	5.92	Ontario_Ranch	
30	☐	J_ONT-1	50.66	LANDSCAPE	
31	☐	J_ONT-103	6.86	LANDSCAPE	
32	☐	J_ONT-105	0.00	Ontario_Ranch	
33	☐	J_ONT-107	0.00		
34	☐	J_ONT-109	0.00		
35	☐	J_ONT-113	50.12	Ontario_Ranch	
36	☐	J_ONT-115	0.00		
37	☐	J_ONT-117	0.00	Ontario_Ranch	
38	☐	J_ONT-119	0.00		
39	☐	J_ONT-13	15.60	LANDSCAPE	
40	☐	J_ONT-133	0.00	Ontario_Ranch	
41	☐	J_ONT-135	0.00	Ontario_Ranch	
42	☐	J_ONT-137	163.89	Ontario_Ranch	
43	☐	J_ONT-139	0.00	Ontario_Ranch	
44	☐	J_ONT-141	0.00	Ontario_Ranch	
45	☐	J_ONT-143	0.00	Ontario_Ranch	
46	☐	J_ONT-145	0.00	Ontario_Ranch	
47	☐	J_ONT-147	0.00	Ontario_Ranch	
48	☐	J_ONT-149	0.00	Ontario_Ranch	
49	☐	J_ONT-15	69.72	LANDSCAPE	
50	☐	J_ONT-151	0.00	Ontario_Ranch	
51	☐	J_ONT-153	0.00	Ontario_Ranch	
52	☐	J_ONT-155	0.00	Ontario_Ranch	
53	☐	J_ONT-157	0.00	Ontario_Ranch	
54	☐	J_ONT-159	0.00	Ontario_Ranch	
55	☐	J_ONT-161	0.00	Ontario_Ranch	
56	☐	J_ONT-163	163.49	Ontario_Ranch	
57	☐	J_ONT-165	0.00	Ontario_Ranch	

Future Scenario - CIty of Ontario - Junctions Input Data

* ULTIMATE *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Pattern 2 (Char)
58	☐	J_ONT-167	0.00	Ontario_Ranch	
59	☐	J_ONT-169	0.00	Ontario_Ranch	
60	☐	J_ONT-17	32.73	LANDSCAPE	
61	☐	J_ONT-171	0.00	Ontario_Ranch	
62	☐	J_ONT-173	63.04	Ontario_Ranch	
63	☐	J_ONT-175	0.00	Ontario_Ranch	
64	☐	J_ONT-177	120.14	Ontario_Ranch	
65	☐	J_ONT-179	84.87	Ontario_Ranch	
66	☐	J_ONT-181	0.00	Ontario_Ranch	
67	☐	J_ONT-185	0.00	Ontario_Ranch	
68	☐	J_ONT-187	0.00	Ontario_Ranch	
69	☐	J_ONT-189	0.00	Ontario_Ranch	
70	☐	J_ONT-19	14.51	LANDSCAPE	
71	☐	J_ONT-191	0.00	Ontario_Ranch	
72	☐	J_ONT-193	0.00	Ontario_Ranch	
73	☐	J_ONT-195	0.00	Ontario_Ranch	
74	☐	J_ONT-197	0.00	Ontario_Ranch	
75	☐	J_ONT-199	0.00	Ontario_Ranch	
76	☐	J_ONT-201	0.00	Ontario_Ranch	
77	☐	J_ONT-203	0.00	Ontario_Ranch	
78	☐	J_ONT-205	86.68	Ontario_Ranch	
79	☐	J_ONT-207	0.00	Ontario_Ranch	
80	☐	J_ONT-209	11.40	Ontario_Ranch	
81	☐	J_ONT-211	10.23	Ontario_Ranch	
82	☐	J_ONT-213	0.00	Ontario_Ranch	
83	☐	J_ONT-215	0.00	Ontario_Ranch	
84	☐	J_ONT-217	0.00	Ontario_Ranch	
85	☐	J_ONT-219	0.00	Ontario_Ranch	
86	☐	J_ONT-221	0.00	Ontario_Ranch	
87	☐	J_ONT-223	0.00	Ontario_Ranch	
88	☐	J_ONT-225	0.00	Ontario_Ranch	
89	☐	J_ONT-227	0.00	Ontario_Ranch	
90	☐	J_ONT-229	0.00	Ontario_Ranch	
91	☐	J_ONT-231	0.00	Ontario_Ranch	
92	☐	J_ONT-233	0.00	Ontario_Ranch	
93	☐	J_ONT-235	0.00	Ontario_Ranch	
94	☐	J_ONT-237	0.00	Ontario_Ranch	
95	☐	J_ONT-239			
96	☐	J_ONT-243	0.00		
97	☐	J_ONT-247	10.82	LANDSCAPE	
98	☐	J_ONT-249	20.70	LANDSCAPE	
99	☐	J_ONT-251	0.00		
100	☐	J_ONT-253	0.00		
101	☐	J_ONT-255	0.00		
102	☐	J_ONT-257	50.00	LANDSCAPE	
103	☐	J_ONT-259	25.51	LANDSCAPE	
104	☐	J_ONT-261	0.00		
105	☐	J_ONT-263	0.00	LANDSCAPE	
106	☐	J_ONT-265	0.00	Ontario_Ranch	
107	☐	J_ONT-267	0.00	Ontario_Ranch	
108	☐	J_ONT-271	0.00	Ontario_Ranch	
109	☐	J_ONT-273	55.82	Ontario_Ranch	
110	☐	J_ONT-275	0.00	Ontario_Ranch	
111	☐	J_ONT-277	0.00	Ontario_Ranch	
112	☐	J_ONT-279	0.00	Ontario_Ranch	
113	☐	J_ONT-281	0.00	Ontario_Ranch	
114	☐	J_ONT-283	0.00	Ontario_Ranch	

Future Scenario - CIty of Ontario - Junctions Input Data

* ULTIMATE *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Pattern 2 (Char)
115	☐	J_ONT-285	0.00	Ontario_Ranch	
116	☐	J_ONT-287	0.00	Ontario_Ranch	
117	☐	J_ONT-289	0.00	Ontario_Ranch	
118	☐	J_ONT-291	0.00	Ontario_Ranch	
119	☐	J_ONT-295	0.00	Ontario_Ranch	
120	☐	J_ONT-297	17.29	Ontario_Ranch	
121	☐	J_ONT-299	0.00	Ontario_Ranch	
122	☐	J_ONT-3	13.72	LANDSCAPE	
123	☐	J_ONT-301	6.18	Ontario_Ranch	
124	☐	J_ONT-305	25.80	LANDSCAPE	
125	☐	J_ONT-313	4.72	Ontario_Ranch	
126	☐	J_ONT-315	0.00	Ontario_Ranch	
127	☐	J_ONT-317	0.00	Ontario_Ranch	
128	☐	J_ONT-319	0.00	Ontario_Ranch	
129	☐	J_ONT-321	0.00	Ontario_Ranch	
130	☐	J_ONT-325	0.00	Ontario_Ranch	
131	☐	J_ONT-333	0.00		
132	☐	J_ONT-341	0.00		
133	☐	J_ONT-343	0.00		
134	☐	J_ONT-351	0.00		
135	☐	J_ONT-357	0.00		
136	☐	J_ONT-359	26.15	LANDSCAPE	
137	☐	J_ONT-361	64.38	LANDSCAPE	
138	☐	J_ONT-363	0.00		
139	☐	J_ONT-365	0.00		
140	☐	J_ONT-367	0.00		
141	☐	J_ONT-369	42.55	LANDSCAPE	
142	☐	J_ONT-37	6.80	LANDSCAPE	
143	☐	J_ONT-371	0.00		
144	☐	J_ONT-373	0.00		
145	☐	J_ONT-377	40.87	LANDSCAPE	
146	☐	J_ONT-379	59.95	LANDSCAPE	
147	☐	J_ONT-381	0.00		
148	☐	J_ONT-383	5.13	LANDSCAPE	
149	☐	J_ONT-385	59.03	LANDSCAPE	
150	☐	J_ONT-387	0.00		
151	☐	J_ONT-39	53.87	LANDSCAPE	
152	☐	J_ONT-399	0.00		
153	☐	J_ONT-401	28.43	LANDSCAPE	
154	☐	J_ONT-403	0.00		
155	☐	J_ONT-405	0.00		
156	☐	J_ONT-407	2.67	LANDSCAPE	
157	☐	J_ONT-409	70.93	Ontario_Ranch	
158	☐	J_ONT-41	76.68	LANDSCAPE	
159	☐	J_ONT-421	50.00	LANDSCAPE	
160	☐	J_ONT-423	44.49	Ontario_Ranch	
161	☐	J_ONT-425	0.00	Ontario_Ranch	
162	☐	J_ONT-427	0.00	Ontario_Ranch	
163	☐	J_ONT-43	0.00		
164	☐	J_ONT-433	13.72	LANDSCAPE	
165	☐	J_ONT-437	0.00		
166	☐	J_ONT-441	89.64	Ontario_1158	
167	☐	J_ONT-443	20.53	Ontario_1158	
168	☐	J_ONT-45	33.94	LANDSCAPE	
169	☐	J_ONT-467	49.45	LANDSCAPE	
170	☐	J_ONT-469	288.07	Ontario_1158	
171	☐	J_ONT-47	184.19	LANDSCAPE	

Future Scenario - CIty of Ontario - Junctions Input Data

* ULTIMATE *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Pattern 2 (Char)
172	☐	J_ONT-473	0.00		
173	☐	J_ONT-477	0.00		
174	☐	J_ONT-489		Ontario_1158	
175	☐	J_ONT-49	5.07	LANDSCAPE	
176	☐	J_ONT-491	79.39	Ontario_1158	
177	☐	J_ONT-495	46.28	LANDSCAPE	
178	☐	J_ONT-499	6.85	LANDSCAPE	
179	☐	J_ONT-501	36.40	LANDSCAPE	
180	☐	J_ONT-503	18.18	LANDSCAPE	
181	☐	J_ONT-507	0.00		
182	☐	J_ONT-509	0.00		
183	☐	J_ONT-51	22.28	LANDSCAPE	
184	☐	J_ONT-511	50.04	LANDSCAPE	
185	☐	J_ONT-513	0.00		
186	☐	J_ONT-515	0.00		
187	☐	J_ONT-523	13.36	LANDSCAPE	
188	☐	J_ONT-525	6.53	LANDSCAPE	
189	☐	J_ONT-53	80.58	LANDSCAPE	
190	☐	J_ONT-531	21.59	LANDSCAPE	
191	☐	J_ONT-533	134.45	LANDSCAPE	
192	☐	J_ONT-535	19.75	LANDSCAPE	
193	☐	J_ONT-537	272.64	Ontario_Ranch	
194	☐	J_ONT-543	24.70	Ontario_Ranch	
195	☐	J_ONT-545	37.57	LANDSCAPE	
196	☐	J_ONT-547	51.48	Ontario_Ranch	
197	☐	J_ONT-55	0.00		
198	☐	J_ONT-567	45.00	Ontario_Ranch	
199	☐	J_ONT-569	48.43	Ontario_Ranch	
200	☐	J_ONT-571	4.59	LANDSCAPE	
201	☐	J_ONT-573	11.04	LANDSCAPE	
202	☐	J_ONT-575			
203	☐	J_ONT-577	22.93	LANDSCAPE	
204	☐	J_ONT-579			
205	☐	J_ONT-583	27.90	LANDSCAPE	
206	☐	J_ONT-587			
207	☐	J_ONT-589			
208	☐	J_ONT-59	24.92	LANDSCAPE	
209	☐	J_ONT-609	0.00	ONTARIO_RANCH	
210	☐	J_ONT-61	9.05	LANDSCAPE	
211	☐	J_ONT-611	0.00	ONTARIO_RANCH	
212	☐	J_ONT-613	8.96	ONTARIO_RANCH	
213	☐	J_ONT-63	31.61	LANDSCAPE	
214	☐	J_ONT-77	57.01	Ontario_Ranch	
215	☐	J_ONT-89	0.00		
216	☐	J_ONT-99	0.00		
217	☐	ONT66	0.74	LANDSCAPE	
218	☐	ONT68	0.00		
219	☐	ONT72	0.00		
220	☐	ONT76	0.00	Ontario_Ranch	
221	☐	ONT84	0.00	Ontario_Ranch	
222	☐	ONTFRAN-3571	72.12	LANDSCAPE	
223	☐	ONTFRAN-3574	75.41	Ontario_Ranch	
224	☐	ONTFRAN-3575	64.61	Ontario_Ranch	
225	☐	ONTFRAN-3576	62.80	Ontario_Ranch	
226	☐	ONTFRAN-3577	43.95	Ontario_Ranch	
227	☐	ONTFRAN-3578	42.95	Ontario_Ranch	
228	☐	ONTFRAN-3581	0.00	Ontario_Ranch	

Future Scenario - CIty of Ontario - Junctions Input Data

* ULTIMATE *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Pattern 2 (Char)
229	☐	ONTFRAN-3582	123.22	Ontario_Ranch	
230	☐	ONTFRAN-3583	7.46	Ontario_Ranch	
231	☐	ONTFRAN-3584	127.89	Ontario_Ranch	
232	☐	ONTFRAN-3585	117.61	Ontario_Ranch	
233	☐	ONTFRAN-3586	140.29	Ontario_Ranch	
234	☐	ONTFRAN-3587	62.63	Ontario_Ranch	
235	☐	ONTFRAN-3588	108.45	Ontario_Ranch	
236	☐	ONTFRAN-3591	211.58	Ontario_Ranch	
237	☐	ONTFRAN-3592	129.27	Ontario_Ranch	
238	☐	ONTFRAN-3593	68.86	Ontario_Ranch	
239	☐	ONTFRAN-3594	103.20	ONTARIO_RANCH	
240	☐	ONTFRAN-3595	62.69	Ontario_Ranch	
241	☐	ONTFRAN-3596	63.14	Ontario_Ranch	
242	☐	ONTFRAN-3597	160.58	Ontario_Ranch	
243	☐	ONTFRAN-3598	59.42	Ontario_Ranch	
244	☐	ONTFRAN-3599	0.00	Ontario_Ranch	
245	☐	ONTFRAN-3600	128.84	Ontario_Ranch	
246	☐	ONTFRAN-3601	89.90	Ontario_Ranch	
247	☐	ONTFRAN-3602	41.72	Ontario_Ranch	
248	☐	ONTFRAN-3603	0.00	Ontario_Ranch	
249	☐	ONTFRAN-3605	48.10	Ontario_Ranch	
250	☐	ONTFRAN-3606	68.68	Ontario_Ranch	
251	☐	ONTFRAN-3607	40.28	Ontario_Ranch	
252	☐	ONTFRAN-3608	73.89	Ontario_Ranch	
253	☐	ONTFRAN-3609	81.84	Ontario_Ranch	
254	☐	ONTFRAN-3611	100.46	Ontario_Ranch	
255	☐	ONTFRAN-3618		Ontario_Ranch	
256	☐	ONTFRAN-3619	100.88	Ontario_Ranch	
257	☐	ONTFRAN-3620	148.77	Ontario_Ranch	
258	☐	ONTFRAN-3621	93.23	Ontario_Ranch	
259	☐	ONTFRAN-3622	103.00	ONTARIO_RANCH	
260	☐	ONTFRAN-3626	0.00	Ontario_Ranch	
261	☐	ONTJ10	0.00	Ontario_Ranch	
262	☐	ONTJ114	176.41	Ontario_1158	
263	☐	ONTJ12	53.61	Ontario_Ranch	
264	☐	ONTJ145	0.00		
265	☐	ONTJ18	295.14	Ontario_Ranch	
266	☐	ONTJ19	0.00	Ontario_Ranch	
267	☐	ONTJ76	0.00		
268	☐	ONTNEWJ-198	1.10	LANDSCAPE	
269	☐	ONTNEWJ-212	0.00		
270	☐	ONTNEWJ-214	108.31	LANDSCAPE	
271	☐	ONTNEWJ-222	0.00		
272	☐	ONTNEWJ-224	0.00		
273	☐	ONTNEWJ-262	0.00		
274	☐	ONTNEWJ-278	95.39	LANDSCAPE	
275	☐	ONTNEWJ-322	0.00		
276	☐	ONTNEWJ-334	35.72	LANDSCAPE	
277	☐	ONTNEWJ-336	0.00		
278	☐	ONTNEWJ-338	0.00		
279	☐	ONTNEWJ-340	0.00		
280	☐	ONTNEWJ-348	0.00		
281	☐	ONTNEWJ-354	0.00		
282	☐	ONTNEWJ-356	0.00		
283	☐	ONTNEWJ-378	0.00		
284	☐	ONTNEWJ-396	0.00		
285	☐	ONTNEWJ-398	0.00	LANDSCAPE	

Future Scenario - CIty of Ontario - Junctions Input Data

* ULTIMATE *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Pattern 2 (Char)
286	☐	ONTNEWJ-399	0.00		
287	☐	ONTNEWJ-418	62.01	LANDSCAPE	
288	☐	ONTNEWJ-420	47.01	LANDSCAPE	
289	☐	ONTNEWJ-424	52.29	LANDSCAPE	
290	☐	ONTNEWJ-426	36.34	LANDSCAPE	
291	☐	ONTNEWJ-428	0.00		
292	☐	ONTNEWJ-430	86.09	LANDSCAPE	
293	☐	ONTNEWJ-432	0.00		
294	☐	ONTNEWJ-436	55.56	LANDSCAPE	
295	☐	ONTNEWJ-438	0.00		
296	☐	ONTNEWJ-440	22.21	LANDSCAPE	
297	☐	ONTNEWJ-456	27.15	LANDSCAPE	
298	☐	ONTNEWJ-458	30.56	LANDSCAPE	
299	☐	ONTNEWJ-470	35.41	LANDSCAPE	
300	☐	ONTNEWJ-478	37.08	LANDSCAPE	
301	☐	ONTNEWJ-482	0.00		
302	☐	ONTNEWJ-492	123.42	LANDSCAPE	
303	☐	ONTNEWJ-496	0.00		
304	☐	ONTNEWJ-498	72.81	LANDSCAPE	
305	☐	ONTNEWJ-500	0.00		
306	☐	ONTNEWJ-502	8.39	LANDSCAPE	
307	☐	ONTNEWJ-510	80.36	LANDSCAPE	
308	☐	ONTNEWJ-516	0.00		
309	☐	ONTNEWJ-520	6.53	LANDSCAPE	
310	☐	ONTNEWJ-522	0.00		
311	☐	ONTNEWJ-526	56.39	LANDSCAPE	
312	☐	ONTNEWJ-528	0.00		
313	☐	ONTNEWJ-530			
314	☐	ONTNEWJ-542	289.43	Ontario_1158	
315	☐	ONTNEWJ-544	0.00		
316	☐	ONTNEWJ-546	130.69	Ontario_1158	
317	☐	ONTNEWJ-548	47.08	Ontario_1158	
318	☐	ONTNEWJ-550	256.29	Ontario_1158	
319	☐	ONTNEWJ-554	434.43	Ontario_1158	
320	☐	ONTNEWJ-555	0.00		
321	☐	ONTNEWJ-556	57.48	Ontario_1158	
322	☐	ONTNEWJ-558	83.42	Ontario_1158	
323	☐	ONTNEWJ-560	140.07	Ontario_1158	
324	☐	ONTNEWJ-562	180.71	Ontario_1158	
325	☐	ONTNEWJ-564	180.00	ONTARIO_1158	
326	☐	ONTNEWJ-568	0.00		
327	☐	ONTNEWJ-576	58.91	ONTARIO_1158	
328	☐	ONTNEWJ-578	2.94	Ontario_1158	
329	☐	ONTNEWJ-582	61.19	Ontario_1158	
330	☐	ONTNEWJ-584	0.00		
331	☐	ONTNEWJ-585	184.14	ONTARIO_1158	
332	☐	ONTNEWJ-586	0.00		
333	☐	ONTNEWJ-588	0.00		
334	☐	ONTNEWJ-591	53.71	Ontario_1158	
335	☐	ONTNEWJ-592	62.45	Ontario_1158	
336	☐	ONTNEWJ-598	46.98	LANDSCAPE	
337	☐	ONTNEWJ-622	0.00		
338	☐	ONTNEWJ-628	152.95	Ontario_1158	
339	☐	ONTNEWJ-631	0.00		
340	☐	ONTNEWJ-632	0.00		
341	☐	ONTNEWJ-634	72.81	LANDSCAPE	
342	☐	ONTNEWJ-636	75.60	LANDSCAPE	

Future Scenario - CIty of Ontario - Junctions Input Data

* ULTIMATE *		ID (Char)	Demand 1 (gpm)	Pattern 1 (Char)	Pattern 2 (Char)
343	☐	ONTNEWJ-638	0.00		
344	☐	ONTNEWJ-640	0.00		
345	☐	ONTNEWJ-646	61.33	LANDSCAPE	
346	☐	ONTNEWJ-908	138.60	LANDSCAPE	
347	☐	ONTNEWJ-910	50.00	LANDSCAPE	
348	☐	ONTNEWJ-914	0.00		
349	☐	ONTNEWJ-934	0.00		
350	☐	ONTNEWJ-936	4.03	Ontario_1158	
351	☐	ONTNEWJ-950	0.00		
352	☐	ONTNEWJ392	0.00	Ontario_Ranch	
353	☐	ONTNEWJ398	171.91	Ontario_Ranch	
354	☐	ONTNEWJ400	398.54	Ontario_Ranch	
355	☐	ONTNEWJ402	474.30	Ontario_Ranch	
356	☐	ONTNEWJ_630	72.81	LANDSCAPE	
357	☐	ONTPHLP-2235	25.59	LANDSCAPE	
358	☐	ONTPHLP-2241	65.98	LANDSCAPE	
359	☐	ONTPHLP-2263	39.32	LANDSCAPE	
360	☐	ONTPHLP-3507	0.00		
361	☐	ONTPHLP-3606	9.97	Ontario_Ranch	
362	☐	ONTPHLP-3610	194.41	LANDSCAPE	
363	☐	ONTPICKUP-12	38.84	LANDSCAPE	
364	☐	ONTPICKUP-14	82.24	LANDSCAPE	
365	☐	ONTPICKUP-17	0.00		
366	☐	ONTPICKUP-30	0.00		
367	☐	ONTPICKUP-32	232.38	ONTARIO_1158	
368	☐	ONTPICKUP-42	0.00		
369	☐	ONTPICKUP-48	0.00		
370	☐	ONTPICKUP-51	0.00		
371	☐	ONTPICKUP-6	0.00		
372	☐	ONTPICKUP-65	20.00	ONTARIO_1158	
373	☐	ONTPICKUP-68	82.87	LANDSCAPE	
374	☐	ONTPICKUP-70	0.00		
375	☐	ONTPICKUP-71	0.00		
376	☐	ONTPICKUP-72	25.00	LANDSCAPE	
377	☐	ONTPICKUP-9	0.00		
378	☐	ONTTOP50-10	0.00		
379	☐	ONTTOP50-15	118.61	LANDSCAPE	
380	☐	ONTTOP50-18	0.00		
381	☐	ONTTOP50-20	0.00		
382	☐	ONTTOP50-22	0.00		
383	☐	ONTTOP50-23	0.00		
384	☐	ONTTOP50-25	0.00		
385	☐	ONTTOP50-40	0.00		
386	☐	ONTTOP50-48	0.00		
387	☐	ONTTOP50-6	0.00		

Future Scenario - City of Ontario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
1	☐	2011_P14	373.88	8.00	130.00	0.00
2	☐	2011_P15	962.69	8.00	100.00	0.00
3	☐	2011_P17	325.69	8.00	130.00	0.00
4	☐	2011_P18	128.01	12.00	130.00	0.00
5	☐	2011_P19	536.66	12.00	130.00	0.00
6	☐	800ZONE_V1	98.84	16.00	150.00	0.00
7	☐	800ZONE_V2	61.66	16.00	150.00	0.00
8	☐	ONT283	45.13	42.00	130.00	0.00
9	☐	ONT9008	1,370.98	12.00	130.00	0.00
10	☐	ONT9010	842.75	16.00	130.00	0.00
11	☐	ONT9012	2,656.26	16.00	130.00	0.00
12	☐	ONT9024	1,861.37	24.00	129.90	0.00
13	☐	ONT9034	878.87	16.00	130.00	0.00
14	☐	ONT9036	1,494.62	16.00	130.00	0.00
15	☐	ONT9042	1,301.52	16.00	130.00	0.00
16	☐	ONT9048	1,466.41	12.00	130.00	0.00
17	☐	ONT9050	473.48	16.00	130.00	0.00
18	☐	ONT9052	1,456.84	12.00	130.00	0.00
19	☐	ONT9056	1,239.77	16.00	130.00	0.00
20	☐	ONT9068	2,509.56	12.00	130.00	0.00
21	☐	ONT9072	1,016.82	8.00	130.00	0.00
22	☐	ONT9092	2,634.74	12.00	130.00	0.00
23	☐	ONTFRAN-3590	2,281.59	12.00	130.00	0.00
24	☐	ONTFRAN-3592	1,970.13	16.00	130.00	0.00
25	☐	ONTFRAN-3593	2,529.21	8.00	130.00	0.00
26	☐	ONTFRAN-3594	2,666.85	24.00	130.00	0.00
27	☐	ONTFRAN-3595	2,631.10	24.00	130.00	0.00
28	☐	ONTFRAN-3596	2,618.91	24.00	130.00	0.00
29	☐	ONTFRAN-3597	1,275.34	24.00	130.00	0.00
30	☐	ONTFRAN-3600	2,415.15	24.00	130.00	0.00
31	☐	ONTFRAN-3603	2,283.90	16.00	130.00	0.00
32	☐	ONTFRAN-3604	613.34	8.00	130.00	0.00
33	☐	ONTFRAN-3606	2,662.17	8.00	130.00	0.00
34	☐	ONTFRAN-3607	2,641.39	8.00	130.00	0.00
35	☐	ONTFRAN-3608	2,641.37	8.00	130.00	0.00
36	☐	ONTFRAN-3608A	1,339.15	12.00	130.00	0.00
37	☐	ONTFRAN-3609	2,615.85	8.00	130.00	0.00
38	☐	ONTFRAN-3610	2,614.80	8.00	130.00	0.00
39	☐	ONTFRAN-3611	2,043.19	8.00	130.00	0.00
40	☐	ONTFRAN-3614	1,959.04	8.00	130.00	0.00
41	☐	ONTFRAN-3615	2,652.56	8.00	130.00	0.00
42	☐	ONTFRAN-3617	1,125.95	24.00	130.00	0.00
43	☐	ONTFRAN-3618	302.48	12.00	130.00	0.00
44	☐	ONTFRAN-3620	616.50	12.00	130.00	0.00
45	☐	ONTFRAN-3621	2,561.70	12.00	130.00	0.00
46	☐	ONTFRAN-3622	2,654.69	12.00	130.00	0.00
47	☐	ONTFRAN-3624	3,119.97	8.00	130.00	0.00
48	☐	ONTFRAN-3625	3,403.01	12.00	130.00	0.00
49	☐	ONTFRAN-3626	2,648.24	12.00	130.00	0.00
50	☐	ONTFRAN-3627	2,180.56	16.00	130.00	0.00
51	☐	ONTFRAN-3628	1,393.06	16.00	130.00	0.00
52	☐	ONTFRAN-3629	1,795.09	16.00	130.00	0.00
53	☐	ONTFRAN-3631	2,616.96	8.00	130.00	0.00
54	☐	ONTFRAN-3632	1,788.53	16.00	130.00	0.00
55	☐	ONTFRAN-3633	2,552.79	8.00	130.00	0.00
56	☐	ONTFRAN-3634	2,316.14	16.00	130.00	0.00
57	☐	ONTFRAN-3635	1,319.73	8.00	130.00	0.00

Future Scenario - City of Ontario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
58	☐	ONTFRAN-3637	2,616.60	12.00	130.00	0.00
59	☐	ONTFRAN-3639	904.14	8.00	130.00	0.00
60	☐	ONTFRAN-3640	2,653.41	8.00	130.00	0.00
61	☐	ONTFRAN-3641	1,997.13	8.00	130.00	0.00
62	☐	ONTFRAN-3642	2,718.37	8.00	130.00	0.00
63	☐	ONTFRAN-3645	1,341.66	12.00	130.00	0.00
64	☐	ONTFRAN-3646	1,766.65	8.00	130.00	0.00
65	☐	ONTFRAN-3647	2,617.97	8.00	130.00	0.00
66	☐	ONTFRAN-3649	2,632.58	8.00	130.00	0.00
67	☐	ONTFRAN-3651	38.70	8.00	130.00	0.00
68	☐	ONTFRAN-3652	1,944.50	8.00	130.00	0.00
69	☐	ONTFRAN-3693	1,301.23	12.00	130.00	0.00
70	☐	ONTFRAN-3694	1,162.41	16.00	130.00	0.00
71	☐	ONTFRAN-3696	2,551.39	12.00	130.00	0.00
72	☐	ONTFRAN-3697	1,344.09	12.00	130.00	0.00
73	☐	ONTFRAN-3706	139.34	24.00	130.00	0.00
74	☐	ONTNEWP-10016	157.83	8.00	130.00	0.00
75	☐	ONTNEWP-10017	96.03	8.00	130.00	0.00
76	☐	ONTNEWP-10026	910.92	8.00	130.00	0.00
77	☐	ONTNEWP-10044	201.93	8.00	130.00	0.00
78	☐	ONTNEWP-908	878.23	8.00	130.00	0.00
79	☐	ONTNEWP-910	380.88	8.00	130.00	0.00
80	☐	ONTNEWP-914	642.60	12.00	130.00	0.00
81	☐	ONTNEWP-9170	207.39	8.00	130.00	0.00
82	☐	ONTNEWP-918	3,929.14	8.00	130.00	0.00
83	☐	ONTNEWP-9240	565.90	12.00	130.00	0.00
84	☐	ONTNEWP-9244	1,342.42	16.00	130.00	0.00
85	☐	ONTNEWP-9252	412.78	8.00	130.00	0.00
86	☐	ONTNEWP-9254	341.15	8.00	130.00	0.00
87	☐	ONTNEWP-9276	100.39	24.00	129.90	0.00
88	☐	ONTNEWP-9320	1,078.67	8.00	130.00	0.00
89	☐	ONTNEWP-9322	178.65	8.00	130.00	0.00
90	☐	ONTNEWP-934	606.33	8.00	130.00	0.00
91	☐	ONTNEWP-9344	31.34	8.00	130.00	0.00
92	☐	ONTNEWP-9346	57.84	8.00	130.00	0.00
93	☐	ONTNEWP-9348	154.03	8.00	130.00	0.00
94	☐	ONTNEWP-9384	83.35	12.00	130.00	0.00
95	☐	ONTNEWP-9400	1,614.80	8.00	130.00	0.00
96	☐	ONTNEWP-9434	58.47	8.00	130.00	0.00
97	☐	ONTNEWP-9440	258.65	8.00	130.00	0.00
98	☐	ONTNEWP-9494	108.24	8.00	130.00	0.00
99	☐	ONTNEWP-9512	142.43	8.00	130.00	0.00
100	☐	ONTNEWP-9514	73.92	8.00	130.00	0.00
101	☐	ONTNEWP-9542	965.29	8.00	130.00	0.00
102	☐	ONTNEWP-9546	6.59	16.00	130.00	0.00
103	☐	ONTNEWP-9548	2.62	8.00	130.00	0.00
104	☐	ONTNEWP-9550	468.93	16.00	130.00	0.00
105	☐	ONTNEWP-9552	47.61	8.00	130.00	0.00
106	☐	ONTNEWP-9554	1,604.77	24.00	130.00	0.00
107	☐	ONTNEWP-9556	40.59	8.00	130.00	0.00
108	☐	ONTNEWP-9566	263.75	8.00	130.00	0.00
109	☐	ONTNEWP-9572	56.47	8.00	130.00	0.00
110	☐	ONTNEWP-9578	275.26	8.00	130.00	0.00
111	☐	ONTNEWP-9590	55.67	8.00	130.00	0.00
112	☐	ONTNEWP-9596	1,084.77	16.00	130.00	0.00
113	☐	ONTNEWP-9600	425.19	8.00	130.00	0.00
114	☐	ONTNEWP-9602	628.83	24.00	129.90	0.00

Future Scenario - City of Ontario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
115	☐	ONTNEWP-9662	74.14	8.00	130.00	0.00
116	☐	ONTNEWP-9664	888.03	8.00	130.00	0.00
117	☐	ONTNEWP-9668	465.68	8.00	130.00	0.00
118	☐	ONTNEWP-9704	606.10	8.00	130.00	0.00
119	☐	ONTNEWP-9712	297.60	12.00	130.00	0.00
120	☐	ONTNEWP-9714	170.69	8.00	130.00	0.00
121	☐	ONTNEWP-9740	2,623.36	8.00	130.00	0.00
122	☐	ONTNEWP-9746	2,575.44	8.00	130.00	0.00
123	☐	ONTNEWP-9750	1,338.53	24.00	130.00	0.00
124	☐	ONTNEWP-9756	2,667.65	12.00	130.00	0.00
125	☐	ONTNEWP-9760	1,269.50	8.00	130.00	0.00
126	☐	ONTNEWP-9762	2,619.10	8.00	130.00	0.00
127	☐	ONTNEWP-9764	2,625.40	8.00	130.00	0.00
128	☐	ONTNEWP-9766	2,669.30	8.00	130.00	0.00
129	☐	ONTNEWP-9768	1,964.17	8.00	130.00	0.00
130	☐	ONTNEWP-9774	2,010.90	8.00	130.00	0.00
131	☐	ONTNEWP-9776	2,636.37	16.00	130.00	0.00
132	☐	ONTNEWP-9778	1,315.66	12.00	130.00	0.00
133	☐	ONTNEWP-9780	2,567.84	8.00	130.00	0.00
134	☐	ONTNEWP-9782	2,488.92	8.00	130.00	0.00
135	☐	ONTNEWP-9784	1,882.18	8.00	130.00	0.00
136	☐	ONTNEWP-9786	2,634.84	8.00	130.00	0.00
137	☐	ONTNEWP-9790	722.03	24.00	130.00	0.00
138	☐	ONTNEWP-9798	413.06	12.00	130.00	0.00
139	☐	ONTNEWP-9810	493.88	24.00	130.00	0.00
140	☐	ONTNEWP-9816	1,775.77	8.00	130.00	0.00
141	☐	ONTNEWP-9818	2,550.88	8.00	130.00	0.00
142	☐	ONTNEWP-9846	649.71	16.00	130.00	0.00
143	☐	ONTNEWP-9854	225.67	8.00	130.00	0.00
144	☐	ONTNEWP-9860	2,193.91	8.00	130.00	0.00
145	☐	ONTNEWP-9861	444.03	8.00	130.00	0.00
146	☐	ONTNEWP-9864	490.66	12.00	130.00	0.00
147	☐	ONTNEWP-9870	152.28	24.00	130.00	0.00
148	☐	ONTNEWP-9884	483.65	8.00	130.00	0.00
149	☐	ONTNEWP-9885	1,032.54	8.00	130.00	0.00
150	☐	ONTNEWP-9886	966.94	8.00	130.00	0.00
151	☐	ONTNEWP-9887	1,672.19	8.00	130.00	0.00
152	☐	ONTNEWP-9889	804.75	8.00	130.00	0.00
153	☐	ONTNEWP-9890	343.61	12.00	130.00	0.00
154	☐	ONTNEWP-9891	490.48	8.00	130.00	0.00
155	☐	ONTNEWP-9892	972.35	12.00	130.00	0.00
156	☐	ONTNEWP-9893	586.37	8.00	130.00	0.00
157	☐	ONTNEWP-9894	500.54	12.00	130.00	0.00
158	☐	ONTNEWP-9895	821.31	8.00	130.00	0.00
159	☐	ONTNEWP-9896	662.68	12.00	130.00	0.00
160	☐	ONTNEWP-9899	2,644.11	12.00	130.00	0.00
161	☐	ONTNEWP-9900	2,385.20	12.00	130.00	0.00
162	☐	ONTNEWP-9901	2,634.73	8.00	130.00	0.00
163	☐	ONTNEWP-9902	1,713.42	8.00	130.00	0.00
164	☐	ONTNEWP-9912	1,165.49	8.00	130.00	0.00
165	☐	ONTNEWP-9913	1,000.33	8.00	130.00	0.00
166	☐	ONTNEWP-9916	1,880.87	8.00	130.00	0.00
167	☐	ONTNEWP-9918	1,712.19	8.00	130.00	0.00
168	☐	ONTNEWP-9919	25.63	8.00	130.00	0.00
169	☐	ONTNEWP-9920	697.71	8.00	130.00	0.00
170	☐	ONTNEWP-9922	1,349.84	8.00	130.00	0.00
171	☐	ONTNEWP-9924	1,772.79	8.00	130.00	0.00

Future Scenario - City of Ontario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
172	☐	ONTNEWP-9926	2,665.81	8.00	130.00	0.00
173	☐	ONTNEWP-9928	1,570.82	8.00	130.00	0.00
174	☐	ONTNEWP-9932	1,189.23	8.00	130.00	0.00
175	☐	ONTNEWP-9936	583.37	8.00	130.00	0.00
176	☐	ONTNEWP-9940	2,657.09	8.00	130.00	0.00
177	☐	ONTNEWP-9942	2,628.90	8.00	130.00	0.00
178	☐	ONTNEWP-9944	1,311.26	12.00	130.00	0.00
179	☐	ONTNEWP-9946	444.01	8.00	130.00	0.00
180	☐	ONTNEWP-9958	843.27	8.00	130.00	0.00
181	☐	ONTNEWP-9960	760.67	8.00	130.00	0.00
182	☐	ONTNEWP-9962	321.07	8.00	130.00	0.00
183	☐	ONTNEWP-9964	1,865.93	8.00	130.00	0.00
184	☐	ONTNEWP-9968	1,671.54	8.00	130.00	0.00
185	☐	ONTNEWP-9972	1,343.85	8.00	130.00	0.00
186	☐	ONTNEWP-9974	2,640.61	12.00	130.00	0.00
187	☐	ONTNEWP509	2,644.06	12.00	130.00	0.00
188	☐	ONTNEWP511	2,616.39	16.00	130.00	0.00
189	☐	ONTNEWP519	2,631.88	12.00	130.00	0.00
190	☐	ONTNEWP529	2,593.21	12.00	130.00	0.00
191	☐	ONTNEWP619	1,331.48	16.00	130.00	0.00
192	☐	ONTNEWP649	2,763.21	8.00	130.00	0.00
193	☐	ONTP10024	1,339.83	12.00	130.00	0.00
194	☐	ONTP11	1,309.18	12.00	130.00	0.00
195	☐	ONTP19	206.43	16.00	130.00	0.00
196	☐	ONTPHLP-3607	2,680.07	8.00	130.00	0.00
197	☐	ONTPHLP-3615	2,658.69	12.00	130.00	0.00
198	☐	P10142	198.19	30.00	130.00	0.00
199	☐	P10326	1,331.58	12.00	130.00	0.00
200	☐	P10328	1,338.27	12.00	130.00	0.00
201	☐	P10330	3,591.48	12.00	130.00	0.00
202	☐	P10332	788.30	8.00	130.00	0.00
203	☐	P10334	885.54	12.00	100.00	0.00
204	☐	P10340	2,655.53	8.00	130.00	0.00
205	☐	P10342	1,686.44	8.00	130.00	0.00
206	☐	P10344	500.45	8.00	130.00	0.00
207	☐	P10346	1,214.04	12.00	130.00	0.00
208	☐	P10350	1,717.07	8.00	130.00	0.00
209	☐	P10354	1,409.44	16.00	130.00	0.00
210	☐	P10356	147.70	8.00	130.00	0.00
211	☐	P10360	937.27	12.00	130.00	0.00
212	☐	P10364	1,352.40	12.00	130.00	0.00
213	☐	P10366	1,324.73	8.00	130.00	0.00
214	☐	P10368	411.46	8.00	130.00	0.00
215	☐	P10372	923.19	12.00	130.00	0.00
216	☐	P10374	1,588.12	8.00	130.00	0.00
217	☐	P10376	420.57	8.00	100.00	0.00
218	☐	P10422	2,685.84	16.00	130.00	0.00
219	☐	P10506	1,088.71	12.00	130.00	0.00
220	☐	P10508	764.84	12.00	130.00	0.00
221	☐	P10510	966.88	8.00	130.00	0.00
222	☐	P10512	826.31	8.00	130.00	0.00
223	☐	P10514	358.14	8.00	130.00	0.00
224	☐	P10516	72.06	8.00	130.00	0.00
225	☐	P10518	840.93	8.00	130.00	0.00
226	☐	P10520	813.87	8.00	130.00	0.00
227	☐	P10522	1,047.91	8.00	130.00	0.00
228	☐	P10550	1,424.31	8.00	130.00	0.00

Future Scenario - City of Ontario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
229	☐	P186	2,742.17	16.00	130.00	0.00
230	☐	P188	1,406.38	12.00	130.00	0.00
231	☐	P190	2,615.63	8.00	130.00	0.00
232	☐	P39	666.18	8.00	130.00	0.00
233	☐	P41	227.50	8.00	130.00	0.00
234	☐	P63	300.71	8.00	130.00	0.00
235	☐	P73	722.78	12.00	130.00	0.00
236	☐	P81	1,764.35	16.00	130.00	0.00
237	☐	P87	621.53	8.00	130.00	0.00
238	☐	PHYD_LAT	464.40	6.00	130.00	0.00
239	☐	PKELLOG	1,300.25	12.00	130.00	0.00
240	☐	PSCH_1	1,829.52	12.00	130.00	0.00
241	☐	P_ONT-102	2,572.48	16.00	130.00	0.00
242	☐	P_ONT-120	1,052.44	8.00	130.00	0.00
243	☐	P_ONT-122	2,468.11	30.00	130.00	0.00
244	☐	P_ONT-126	1,600.17	8.00	130.00	0.00
245	☐	P_ONT-128	560.40	16.00	130.00	0.00
246	☐	P_ONT-146	67.80	12.00	130.00	0.00
247	☐	P_ONT-148	77.35	12.00	130.00	0.00
248	☐	P_ONT-150	74.86	12.00	130.00	0.00
249	☐	P_ONT-152	117.20	12.00	130.00	0.00
250	☐	P_ONT-154	83.00	24.00	130.00	0.00
251	☐	P_ONT-156	22.31	24.00	130.00	0.00
252	☐	P_ONT-158	19.05	24.00	130.00	0.00
253	☐	P_ONT-16	397.11	12.00	130.00	0.00
254	☐	P_ONT-160	9.11	24.00	130.00	0.00
255	☐	P_ONT-174	69.50	12.00	130.00	0.00
256	☐	P_ONT-176	1,242.53	24.00	130.00	0.00
257	☐	P_ONT-178	1,255.50	12.00	100.00	0.00
258	☐	P_ONT-18	3,391.08	12.00	130.00	0.00
259	☐	P_ONT-180	587.21	8.00	130.00	0.00
260	☐	P_ONT-182	668.29	8.00	130.00	0.00
261	☐	P_ONT-184	564.54	8.00	130.00	0.00
262	☐	P_ONT-186	1,420.26	8.00	130.00	0.00
263	☐	P_ONT-188	26.06	4.00	130.00	0.00
264	☐	P_ONT-190	297.83	8.00	130.00	0.00
265	☐	P_ONT-192	1,225.11	8.00	130.00	0.00
266	☐	P_ONT-194	60.97	8.00	130.00	0.00
267	☐	P_ONT-196	1,680.54	12.00	130.00	0.00
268	☐	P_ONT-198	2,658.00	16.00	130.00	0.00
269	☐	P_ONT-2	94.46	8.00	130.00	0.00
270	☐	P_ONT-20	3,844.58	16.00	130.00	0.00
271	☐	P_ONT-200	471.02	8.00	130.00	0.00
272	☐	P_ONT-204	969.62	8.00	130.00	0.00
273	☐	P_ONT-206	47.18	8.00	130.00	0.00
274	☐	P_ONT-208	521.07	8.00	130.00	0.00
275	☐	P_ONT-210	1,123.08	8.00	130.00	0.00
276	☐	P_ONT-212	59.09	8.00	130.00	0.00
277	☐	P_ONT-214	272.70	8.00	130.00	0.00
278	☐	P_ONT-216	2,006.79	8.00	130.00	0.00
279	☐	P_ONT-218	1,692.61	8.00	130.00	0.00
280	☐	P_ONT-220	599.34	8.00	130.00	0.00
281	☐	P_ONT-222	570.91	8.00	130.00	0.00
282	☐	P_ONT-224	172.01	8.00	130.00	0.00
283	☐	P_ONT-226	1,324.95	16.00	130.00	0.00
284	☐	P_ONT-228	970.68	8.00	130.00	0.00
285	☐	P_ONT-230	1,192.23	16.00	130.00	0.00

Future Scenario - City of Ontario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
286	☐	P_ONT-232	162.89	8.00	130.00	0.00
287	☐	P_ONT-234	1,424.05	8.00	130.00	0.00
288	☐	P_ONT-236	391.16	8.00	130.00	0.00
289	☐	P_ONT-238	270.79	8.00	130.00	0.00
290	☐	P_ONT-240	140.69	8.00	130.00	0.00
291	☐	P_ONT-242	22.56	2.00	130.00	0.00
292	☐	P_ONT-244	187.64	16.00	130.00	0.00
293	☐	P_ONT-246	746.58	8.00	130.00	0.00
294	☐	P_ONT-248	670.54	8.00	130.00	0.00
295	☐	P_ONT-250	143.89	8.00	130.00	0.00
296	☐	P_ONT-252	443.25	8.00	130.00	0.00
297	☐	P_ONT-254	648.48	8.00	130.00	0.00
298	☐	P_ONT-256	120.48	8.00	130.00	0.00
299	☐	P_ONT-258	1,808.44	8.00	130.00	0.00
300	☐	P_ONT-260	952.15	8.00	130.00	0.00
301	☐	P_ONT-262	1,292.82	12.00	130.00	0.00
302	☐	P_ONT-264	919.91	8.00	130.00	0.00
303	☐	P_ONT-266	346.22	8.00	130.00	0.00
304	☐	P_ONT-268	168.63	8.00	130.00	0.00
305	☐	P_ONT-270	686.73	8.00	130.00	0.00
306	☐	P_ONT-272	462.41	8.00	100.00	0.00
307	☐	P_ONT-274	107.99	8.00	130.00	0.00
308	☐	P_ONT-276	734.97	8.00	130.00	0.00
309	☐	P_ONT-278	210.60	8.00	130.00	0.00
310	☐	P_ONT-28	418.53	8.00	130.00	0.00
311	☐	P_ONT-280	654.69	8.00	100.00	0.00
312	☐	P_ONT-282	458.27	8.00	130.00	0.00
313	☐	P_ONT-284	150.92	8.00	130.00	0.00
314	☐	P_ONT-286	338.69	8.00	130.00	0.00
315	☐	P_ONT-288	418.63	8.00	130.00	0.00
316	☐	P_ONT-290	226.11	8.00	130.00	0.00
317	☐	P_ONT-292	407.83	8.00	130.00	0.00
318	☐	P_ONT-294	359.41	8.00	130.00	0.00
319	☐	P_ONT-296	482.43	8.00	130.00	0.00
320	☐	P_ONT-298	238.49	8.00	130.00	0.00
321	☐	P_ONT-300	804.32	8.00	130.00	0.00
322	☐	P_ONT-302	1,603.88	8.00	130.00	0.00
323	☐	P_ONT-304	735.32	8.00	130.00	0.00
324	☐	P_ONT-306	976.70	8.00	130.00	0.00
325	☐	P_ONT-308	328.33	8.00	130.00	0.00
326	☐	P_ONT-310	1,319.62	8.00	130.00	0.00
327	☐	P_ONT-312	418.46	8.00	130.00	0.00
328	☐	P_ONT-314	546.30	8.00	130.00	0.00
329	☐	P_ONT-316	533.90	8.00	130.00	0.00
330	☐	P_ONT-318	497.34	8.00	130.00	0.00
331	☐	P_ONT-322	555.31	8.00	130.00	0.00
332	☐	P_ONT-324	468.49	8.00	130.00	0.00
333	☐	P_ONT-326	512.82	8.00	130.00	0.00
334	☐	P_ONT-328	1,153.66	8.00	130.00	0.00
335	☐	P_ONT-330	433.22	8.00	130.00	0.00
336	☐	P_ONT-332	213.37	8.00	130.00	0.00
337	☐	P_ONT-334	48.14	2.00	130.00	0.00
338	☐	P_ONT-336	1,358.61	8.00	130.00	0.00
339	☐	P_ONT-338	499.45	8.00	130.00	0.00
340	☐	P_ONT-340	27.22	4.00	130.00	0.00
341	☐	P_ONT-342	67.98	8.00	130.00	0.00
342	☐	P_ONT-344	27.74	4.00	130.00	0.00

Future Scenario - City of Ontario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
343	☐	P_ONT-346	31.87	2.00	130.00	0.00
344	☐	P_ONT-348	656.78	12.00	130.00	0.00
345	☐	P_ONT-350	524.15	8.00	130.00	0.00
346	☐	P_ONT-352	780.77	8.00	130.00	0.00
347	☐	P_ONT-354	480.54	8.00	130.00	0.00
348	☐	P_ONT-356	33.09	2.00	130.00	0.00
349	☐	P_ONT-358	923.64	16.00	130.00	0.00
350	☐	P_ONT-362	850.40	8.00	130.00	0.00
351	☐	P_ONT-368	310.37	24.00	130.00	0.00
352	☐	P_ONT-370	344.46	8.00	130.00	0.00
353	☐	P_ONT-372	309.82	8.00	130.00	0.00
354	☐	P_ONT-374	305.99	12.00	130.00	0.00
355	☐	P_ONT-376	2,490.34	12.00	130.00	0.00
356	☐	P_ONT-378	131.65	8.00	130.00	0.00
357	☐	P_ONT-382	855.29	8.00	130.00	0.00
358	☐	P_ONT-388	1,296.73	8.00	130.00	0.00
359	☐	P_ONT-40	1,467.46	8.00	130.00	0.00
360	☐	P_ONT-406	92.92	8.00	130.00	0.00
361	☐	P_ONT-408	116.28	8.00	130.00	0.00
362	☐	P_ONT-410	608.38	8.00	130.00	0.00
363	☐	P_ONT-412	400.63	8.00	130.00	0.00
364	☐	P_ONT-418	159.12	8.00	130.00	0.00
365	☐	P_ONT-42	2,736.68	8.00	130.00	0.00
366	☐	P_ONT-420	1,302.86	8.00	130.00	0.00
367	☐	P_ONT-422	874.68	8.00	130.00	0.00
368	☐	P_ONT-424	69.57	8.00	130.00	0.00
369	☐	P_ONT-426	102.02	8.00	130.00	0.00
370	☐	P_ONT-428	368.51	12.00	130.00	0.00
371	☐	P_ONT-430	167.29	12.00	130.00	0.00
372	☐	P_ONT-432	289.20	12.00	130.00	0.00
373	☐	P_ONT-434	71.34	12.00	130.00	0.00
374	☐	P_ONT-438	483.28	12.00	130.00	0.00
375	☐	P_ONT-44	2,592.84	8.00	130.00	0.00
376	☐	P_ONT-440	578.60	16.00	130.00	0.00
377	☐	P_ONT-442	440.06	12.00	130.00	0.00
378	☐	P_ONT-444	69.36	12.00	130.00	0.00
379	☐	P_ONT-446	2,017.90	12.00	130.00	0.00
380	☐	P_ONT-456	301.25	8.00	130.00	0.00
381	☐	P_ONT-458	524.66	8.00	130.00	0.00
382	☐	P_ONT-46	1,177.08	8.00	130.00	0.00
383	☐	P_ONT-460	743.53	8.00	130.00	0.00
384	☐	P_ONT-462	251.49	8.00	130.00	0.00
385	☐	P_ONT-466	1,390.97	8.00	130.00	0.00
386	☐	P_ONT-468	2,607.09	8.00	130.00	0.00
387	☐	P_ONT-470	275.56	12.00	130.00	0.00
388	☐	P_ONT-476	2,555.59	8.00	130.00	0.00
389	☐	P_ONT-48	2,855.66	16.00	130.00	0.00
390	☐	P_ONT-480	1,044.89	8.00	130.00	0.00
391	☐	P_ONT-482	1,786.78	16.00	130.00	0.00
392	☐	P_ONT-484	684.16	12.00	130.00	0.00
393	☐	P_ONT-486	1,433.86	8.00	130.00	0.00
394	☐	P_ONT-492	1,090.79	8.00	130.00	0.00
395	☐	P_ONT-494	554.75	8.00	130.00	0.00
396	☐	P_ONT-498	2,685.60	8.00	130.00	0.00
397	☐	P_ONT-50	1,601.31	8.00	130.00	0.00
398	☐	P_ONT-500	2,519.57	8.00	130.00	0.00
399	☐	P_ONT-52	2,662.25	8.00	130.00	0.00

Future Scenario - City of Ontario - Pipes Input Data

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
400	☐	P_ONT-524	1,294.60	12.00	130.00	0.00
401	☐	P_ONT-526	3,298.62	8.00	130.00	0.00
402	☐	P_ONT-528	7,292.54	8.00	130.00	0.00
403	☐	P_ONT-530	2,637.53	8.00	130.00	0.00
404	☐	P_ONT-534	889.56	12.00	130.00	0.00
405	☐	P_ONT-54	1,909.55	8.00	130.00	0.00
406	☐	P_ONT-540	2,640.63	12.00	130.00	0.00
407	☐	P_ONT-542	2,608.65	12.00	130.00	0.00
408	☐	P_ONT-544	2,636.77	12.00	130.00	0.00
409	☐	P_ONT-552	1,641.00	8.00	130.00	0.00
410	☐	P_ONT-554	1,167.02	8.00	130.00	0.00
411	☐	P_ONT-556	3,553.98	8.00	130.00	0.00
412	☐	P_ONT-56	1,383.26	8.00	130.00	0.00
413	☐	P_ONT-560	5,250.71	12.00	130.00	0.00
414	☐	P_ONT-562	1,296.20	16.00	130.00	0.00
415	☐	P_ONT-564	678.64	16.00	130.00	0.00
416	☐	P_ONT-566	2,653.80	8.00	130.00	0.00
417	☐	P_ONT-570	116.47	12.00	130.00	0.00
418	☐	P_ONT-572	28.49	12.00	130.00	0.00
419	☐	P_ONT-574	36.83	12.00	130.00	0.00
420	☐	P_ONT-576	758.73	8.00	130.00	0.00
421	☐	P_ONT-578	795.55	8.00	130.00	0.00
422	☐	P_ONT-580	670.59	8.00	130.00	0.00
423	☐	P_ONT-590	2,146.67	8.00	130.00	0.00
424	☐	P_ONT-592	2,061.96	8.00	130.00	0.00
425	☐	P_ONT-594	1,940.76	8.00	130.00	0.00
426	☐	P_ONT-596	683.92	8.00	130.00	0.00
427	☐	P_ONT-598	61.31	16.00	130.00	0.00
428	☐	P_ONT-600	2,062.76	8.00	130.00	0.00
429	☐	P_ONT-602	2,072.82	16.00	130.00	0.00
430	☐	P_ONT-604	2,057.98	8.00	130.00	0.00
431	☐	P_ONT-606	2,146.26	8.00	130.00	0.00
432	☐	P_ONT-612	640.78	8.00	130.00	0.00
433	☐	P_ONT-614	2,612.68	8.00	130.00	0.00
434	☐	P_ONT-616	1,742.40	8.00	130.00	0.00
435	☐	P_ONT-618	317.43	12.00	130.00	0.00
436	☐	P_ONT-62	1,312.78	8.00	130.00	0.00
437	☐	P_ONT-622	784.11	8.00	130.00	0.00
438	☐	P_ONT-624	2,854.88	8.00	130.00	0.00
439	☐	P_ONT-626	1,216.92	8.00	130.00	0.00
440	☐	P_ONT-628	4,355.94	8.00	130.00	0.00
441	☐	P_ONT-630	973.05	8.00	130.00	0.00
442	☐	P_ONT-632	625.08	8.00	130.00	0.00
443	☐	P_ONT-634	53.30	16.00	130.00	0.00
444	☐	P_ONT-638	4,806.69	8.00	130.00	0.00
445	☐	P_ONT-64	1,704.69	16.00	130.00	0.00
446	☐	P_ONT-642	850.38	16.00	130.00	0.00
447	☐	P_ONT-646	77.99	16.00	130.00	0.00
448	☐	P_ONT-648	81.53	16.00	130.00	0.00
449	☐	P_ONT-66	2,647.75	16.00	130.00	0.00
450	☐	P_ONT-666	68.58	8.00	130.00	0.00
451	☐	P_ONT-668	900.10	8.00	130.00	0.00
452	☐	P_ONT-670	881.03	16.00	130.00	0.00
453	☐	P_ONT-672	2,627.67	16.00	130.00	0.00
454	☐	P_ONT-674	2,617.82	16.00	130.00	0.00
455	☐	P_ONT-676	4,250.25	8.00	130.00	0.00
456	☐	P_ONT-678	3,844.58	16.00	130.00	0.00

* 2017_PIPES *		ID (Char)	Length (ft)	Diameter (in)	Roughness (Double)	Minor Loss (Double)
457	☐	P_ONT-680	1,044.59	8.00	130.00	0.00
458	☐	P_ONT-90	1,342.35	8.00	130.00	0.00
459	☐	P_ONT-92	2,633.59	8.00	130.00	0.00

Future Scenario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
1	☐	J_ONT-1	123.72	20:00	80.15	00:30	101.20	43.58
2	☐	J_ONT-103	127.34	05:00	109.91	20:40	126.62	17.42
3	☐	J_ONT-105	81.58	08:00	72.43	20:40	76.50	9.15
4	☐	J_ONT-107	127.34	05:00	109.74	20:40	126.62	17.60
5	☐	J_ONT-109	81.58	08:00	72.45	20:40	76.50	9.13
6	☐	J_ONT-113	75.24	08:00	54.84	21:00	66.14	20.40
7	☐	J_ONT-115	121.00	05:00	103.71	21:00	118.41	17.29
8	☐	J_ONT-117	75.25	08:00	54.94	21:00	66.16	20.31
9	☐	J_ONT-119	121.00	05:00	103.66	21:00	118.41	17.35
10	☐	J_ONT-13	98.02	05:00	88.65	21:00	94.99	9.37
11	☐	J_ONT-133	96.35	08:00	82.28	21:00	89.66	14.07
12	☐	J_ONT-135	91.26	08:00	74.40	21:00	83.55	16.86
13	☐	J_ONT-137	94.72	08:00	79.77	21:00	87.72	14.95
14	☐	J_ONT-139	95.59	08:00	81.11	21:00	88.75	14.48
15	☐	J_ONT-141	96.89	08:00	82.41	21:00	90.05	14.48
16	☐	J_ONT-143	93.42	08:00	78.47	21:00	86.42	14.95
17	☐	J_ONT-145	96.89	08:00	82.41	21:00	90.05	14.48
18	☐	J_ONT-147	97.32	08:00	78.30	21:00	88.89	19.03
19	☐	J_ONT-149	97.76	08:00	78.62	21:00	89.28	19.13
20	☐	J_ONT-15	101.05	05:00	91.76	21:00	98.05	9.29
21	☐	J_ONT-151	86.81	08:00	70.01	21:00	79.11	16.80
22	☐	J_ONT-153	86.92	08:00	70.12	21:00	79.23	16.80
23	☐	J_ONT-155	79.56	08:00	62.68	21:00	71.84	16.87
24	☐	J_ONT-157	92.12	08:00	71.57	21:00	83.13	20.55
25	☐	J_ONT-159	87.36	08:00	66.80	21:00	78.36	20.55
26	☐	J_ONT-161	95.59	08:00	75.04	21:00	86.59	20.55
27	☐	J_ONT-163	98.19	08:00	78.76	21:00	89.62	19.43
28	☐	J_ONT-165	104.69	08:00	83.47	21:00	95.53	21.22
29	☐	J_ONT-167	98.19	08:00	78.55	21:00	89.55	19.64
30	☐	J_ONT-169	99.92	08:00	80.28	21:00	91.28	19.64
31	☐	J_ONT-17	121.41	05:00	113.30	21:00	118.80	8.11
32	☐	J_ONT-171	104.25	08:00	83.03	21:00	95.10	21.22
33	☐	J_ONT-173	105.99	08:00	84.32	21:00	96.68	21.67
34	☐	J_ONT-175	106.42	08:00	84.75	21:00	97.12	21.67
35	☐	J_ONT-177	108.48	08:00	86.70	21:00	99.14	21.77
36	☐	J_ONT-179	109.99	08:00	88.61	21:00	100.80	21.38
37	☐	J_ONT-181	120.67	08:00	98.04	21:00	111.07	22.63
38	☐	J_ONT-185	118.23	08:00	95.60	21:00	108.62	22.62
39	☐	J_ONT-187	120.30	08:00	97.66	21:00	110.69	22.64
40	☐	J_ONT-189	125.05	08:00	102.41	21:00	115.45	22.64
41	☐	J_ONT-19	135.71	05:00	127.57	21:00	133.09	8.14
42	☐	J_ONT-191	125.05	08:00	102.41	21:00	115.45	22.64
43	☐	J_ONT-193	111.35	08:00	90.69	21:00	102.42	20.67
44	☐	J_ONT-195	117.25	08:00	95.03	21:00	107.79	22.22
45	☐	J_ONT-197	119.42	08:00	97.00	21:00	109.89	22.42
46	☐	J_ONT-199	118.12	08:00	95.52	21:00	108.52	22.61
47	☐	J_ONT-201	115.95	08:00	93.41	21:00	106.38	22.55
48	☐	J_ONT-203	114.65	08:00	92.25	21:00	105.12	22.41
49	☐	J_ONT-205	114.22	08:00	91.84	21:00	104.70	22.38
50	☐	J_ONT-207	111.62	08:00	89.21	21:00	102.09	22.41
51	☐	J_ONT-209	114.65	08:00	92.09	21:00	105.07	22.56
52	☐	J_ONT-211	116.81	08:00	94.94	21:00	107.48	21.87
53	☐	J_ONT-213	118.55	08:00	96.64	21:00	109.20	21.91
54	☐	J_ONT-215	117.69	08:00	95.69	21:00	108.31	22.00
55	☐	J_ONT-217	117.69	08:00	95.69	21:00	108.31	22.00
56	☐	J_ONT-219	117.25	08:00	95.03	21:00	107.79	22.22
57	☐	J_ONT-221	115.09	08:00	93.05	21:00	105.68	22.03

Future Scenario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
58		J_ONT-223	113.35	08:00	91.43	21:00	103.98	21.93
59		J_ONT-225	112.92	08:00	90.80	21:00	103.48	22.12
60		J_ONT-227	110.75	08:00	88.70	21:00	101.33	22.06
61		J_ONT-229	114.22	08:00	92.15	21:00	104.80	22.07
62		J_ONT-231	114.22	08:00	92.15	21:00	104.80	22.07
63		J_ONT-233	115.09	08:00	93.04	21:00	105.67	22.04
64		J_ONT-235	113.79	08:00	91.74	21:00	104.37	22.04
65		J_ONT-237	115.95	08:00	94.03	21:00	106.58	21.93
66		J_ONT-239	107.53	05:00	89.74	21:00	104.63	17.78
67		J_ONT-243	117.51	05:00	99.75	21:00	114.63	17.76
68		J_ONT-247	108.85	05:00	91.06	21:00	105.95	17.79
69		J_ONT-249	113.18	05:00	95.39	21:00	110.29	17.79
70		J_ONT-251	110.58	05:00	92.79	21:00	107.69	17.79
71		J_ONT-253	106.68	05:00	88.89	21:00	103.79	17.79
72		J_ONT-255	108.85	05:00	91.06	21:00	105.95	17.79
73		J_ONT-257	566.43	05:50	527.27	00:30	547.26	39.15
74		J_ONT-259	566.43	05:50	527.29	00:30	547.27	39.13
75		J_ONT-261	566.43	05:50	527.30	00:30	547.27	39.12
76		J_ONT-263	566.43	05:50	527.32	00:30	547.28	39.11
77		J_ONT-265	120.72	08:00	98.03	21:00	111.10	22.69
78		J_ONT-267	116.17	08:00	93.55	21:00	106.57	22.61
79		J_ONT-271	120.72	08:00	98.03	21:00	111.10	22.69
80		J_ONT-273	118.64	08:00	95.95	21:00	109.01	22.69
81		J_ONT-275	119.92	08:00	97.27	21:00	110.31	22.65
82		J_ONT-277	124.19	08:00	101.54	21:00	114.58	22.65
83		J_ONT-279	124.19	08:00	101.54	21:00	114.58	22.65
84		J_ONT-281	124.19	08:00	101.55	21:00	114.58	22.64
85		J_ONT-283	122.45	08:00	99.81	21:00	112.85	22.64
86		J_ONT-285	121.15	08:00	98.50	21:00	111.54	22.66
87		J_ONT-287	121.15	08:00	98.50	21:00	111.54	22.66
88		J_ONT-289	90.90	08:00	70.16	21:00	81.83	20.74
89		J_ONT-291	83.46	08:00	66.63	21:00	75.75	16.83
90		J_ONT-295	80.86	08:00	64.01	21:00	73.14	16.85
91		J_ONT-297	80.42	08:00	62.61	21:00	72.40	17.81
92		J_ONT-299	80.42	08:00	63.55	21:00	72.70	16.87
93		J_ONT-3	129.79	20:00	85.91	00:30	107.22	43.88
94		J_ONT-301	104.86	08:00	88.06	21:00	97.24	16.80
95		J_ONT-305	127.42	05:00	112.22	20:40	126.72	15.19
96		J_ONT-313	82.31	08:00	72.66	21:00	77.06	9.65
97		J_ONT-315	88.22	08:00	71.40	21:00	80.52	16.82
98		J_ONT-317	89.09	08:00	72.26	21:00	81.39	16.83
99		J_ONT-319	101.80	08:00	87.00	21:00	94.87	14.80
100		J_ONT-321	134.56	08:00	119.26	21:00	127.45	15.31
101		J_ONT-325	120.04	08:00	97.40	21:00	110.43	22.65
102		J_ONT-333	174.31	20:00	73.92	04:00	111.77	100.39
103		J_ONT-341	174.66	20:00	103.09	04:00	120.64	71.58
104		J_ONT-343	174.66	20:00	103.64	04:00	120.82	71.03
105		J_ONT-351	170.77	20:00	96.32	04:00	115.81	74.45
106		J_ONT-357	170.23	20:00	90.28	04:00	113.48	79.95
107		J_ONT-359	77.91	20:00	34.30	00:30	55.24	43.61
108		J_ONT-361	124.07	05:50	88.63	00:30	106.82	35.43
109		J_ONT-363	121.52	05:50	86.07	00:30	104.25	35.44
110		J_ONT-365	127.59	05:50	92.21	00:30	110.33	35.37
111		J_ONT-367	126.89	05:50	91.67	00:30	109.43	35.22
112		J_ONT-369	124.76	05:50	89.56	00:30	107.28	35.20
113		J_ONT-37	100.18	05:00	89.97	21:00	96.88	10.22
114		J_ONT-371	124.76	05:50	89.57	00:30	107.27	35.19

Future Scenario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
115		J_ONT-373	128.18	05:50	93.06	00:30	110.66	35.12
116		J_ONT-377	143.92	05:50	105.46	00:30	124.98	38.46
117		J_ONT-379	127.88	05:50	91.21	00:30	109.57	36.67
118		J_ONT-381	137.11	05:50	99.05	00:30	118.24	38.06
119		J_ONT-383	138.25	05:50	100.34	00:30	119.45	37.91
120		J_ONT-385	140.12	05:50	101.25	00:30	120.91	38.87
121		J_ONT-387	141.90	05:50	103.05	00:30	122.69	38.85
122		J_ONT-39	102.35	05:00	91.85	21:00	98.96	10.50
123		J_ONT-399	146.62	20:00	103.68	00:30	125.12	42.95
124		J_ONT-401	142.91	20:00	100.48	00:30	121.58	42.43
125		J_ONT-403	144.52	05:50	103.42	00:30	123.95	41.10
126		J_ONT-405	170.36	20:00	94.01	04:00	114.78	76.35
127		J_ONT-407	145.39	20:00	102.60	00:30	123.94	42.79
128		J_ONT-409	131.63	08:00	115.54	21:00	124.28	16.08
129		J_ONT-41	113.18	05:00	102.46	21:00	109.72	10.72
130		J_ONT-421	148.86	20:00	105.62	00:30	127.26	43.24
131		J_ONT-423	96.62	08:00	75.01	21:00	87.28	21.61
132		J_ONT-425	104.36	08:00	82.04	21:00	94.76	22.32
133		J_ONT-427	104.36	08:00	81.98	21:00	94.75	22.38
134		J_ONT-43	101.91	05:00	92.63	21:00	98.92	9.29
135		J_ONT-433	129.79	20:00	85.91	00:30	107.22	43.88
136		J_ONT-437	129.79	20:00	85.92	00:30	107.22	43.87
137		J_ONT-441	171.48	20:00	95.70	04:00	111.26	75.78
138		J_ONT-443	161.56	20:00	90.69	04:00	107.37	70.87
139		J_ONT-45	122.71	05:00	115.66	21:00	120.44	7.06
140		J_ONT-467	113.30	05:00	105.44	20:40	112.05	7.86
141		J_ONT-469	207.04	20:00	95.03	04:00	142.57	112.01
142		J_ONT-47	126.18	05:00	107.92	21:00	120.26	18.26
143		J_ONT-473	140.27	20:00	70.30	04:00	82.71	69.96
144		J_ONT-477	139.96	05:50	101.17	00:30	120.78	38.79
145		J_ONT-489	167.09	20:00	93.17	04:00	107.47	73.92
146		J_ONT-49	140.05	05:00	121.78	21:00	134.12	18.26
147		J_ONT-491	183.11	20:00	111.58	04:00	129.88	71.53
148		J_ONT-495	523.79	20:00	479.95	00:30	501.23	43.84
149		J_ONT-499	123.88	05:00	117.35	21:00	121.79	6.53
150		J_ONT-501	126.18	05:00	119.65	21:00	124.08	6.53
151		J_ONT-503	188.72	20:00	145.52	00:30	167.14	43.20
152		J_ONT-507	124.75	05:50	89.58	00:30	107.25	35.16
153		J_ONT-509	128.87	05:50	93.77	00:30	111.35	35.11
154		J_ONT-51	127.05	05:00	107.17	21:00	120.60	19.87
155		J_ONT-511	128.64	05:50	93.53	00:30	111.11	35.11
156		J_ONT-513	189.93	20:00	119.28	04:00	138.15	70.65
157		J_ONT-515	188.18	20:00	117.53	04:00	136.40	70.65
158		J_ONT-523	100.81	05:00	91.15	21:00	97.69	9.66
159		J_ONT-525	123.45	05:00	110.91	21:00	119.39	12.54
160		J_ONT-53	134.41	05:00	114.24	21:00	127.87	20.17
161		J_ONT-531	126.60	05:00	107.42	21:00	120.38	19.18
162		J_ONT-533	104.11	05:00	96.76	21:00	102.71	7.35
163		J_ONT-535	113.30	05:00	105.53	20:40	112.41	7.78
164		J_ONT-537	101.27	08:00	79.21	21:00	91.80	22.06
165		J_ONT-543	82.74	08:00	71.07	21:00	77.02	11.67
166		J_ONT-545	129.20	05:00	121.08	20:40	127.88	8.11
167		J_ONT-547	95.89	08:00	82.69	21:00	89.58	13.19
168		J_ONT-55	88.48	05:00	83.65	21:00	87.21	4.83
169		J_ONT-567	121.12	08:00	103.88	21:00	113.42	17.24
170		J_ONT-569	124.37	08:00	100.77	21:00	114.48	23.60
171		J_ONT-571	100.81	05:00	91.18	21:00	97.71	9.63

Future Scenario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
172		J_ONT-573	100.81	05:00	90.43	21:00	97.46	10.38
173		J_ONT-575	100.81	05:00	90.43	21:00	97.46	10.38
174		J_ONT-577	100.81	05:00	90.41	21:00	97.45	10.40
175		J_ONT-579	100.81	05:00	90.41	21:00	97.45	10.40
176		J_ONT-583	100.81	05:00	90.55	21:00	97.50	10.26
177		J_ONT-587	74.05	05:00	69.05	21:00	72.44	5.01
178		J_ONT-589	123.88	05:00	117.38	21:00	121.79	6.50
179		J_ONT-59	89.35	05:00	85.52	21:00	88.12	3.83
180		J_ONT-609	119.25	08:00	97.72	21:00	110.06	21.53
181		J_ONT-61	85.02	05:00	80.40	21:00	83.53	4.62
182		J_ONT-611	119.24	08:00	98.12	21:00	110.19	21.12
183		J_ONT-613	269.31	20:00	227.70	00:30	248.10	41.61
184		J_ONT-63	88.92	05:00	86.93	21:00	88.18	1.99
185		J_ONT-77	121.18	08:00	101.92	21:00	112.79	19.26
186		J_ONT-89	108.41	05:00	90.34	21:00	105.43	18.07
187		J_ONT-99	110.40	05:00	94.24	21:00	108.00	16.16
188		J1272	134.56	20:00	92.96	00:30	113.39	41.60
189		J1274	125.89	20:00	84.39	00:30	104.71	41.50
190		J1276	139.32	20:00	97.64	00:30	118.23	41.68
191		J1280	133.69	20:00	92.08	00:30	112.51	41.62
192		J1288	129.79	20:00	88.19	00:30	108.58	41.60
193		J1290	146.87	05:50	105.97	00:30	126.48	40.90
194		J1292	217.07	20:00	150.94	21:00	172.36	66.13
195		J1294	185.59	20:00	113.17	04:00	133.24	72.42
196		J1296	177.04	20:00	106.16	04:00	124.02	70.88
197		J1302	131.01	05:50	94.01	00:30	112.58	36.99
198		J1304	198.65	20:00	129.55	21:00	151.73	69.10
199		J1308	129.05	05:50	93.95	00:30	111.53	35.10
200		J1314	105.09	20:00	61.47	00:30	82.42	43.62
201		J1316	105.09	20:00	61.46	00:30	82.41	43.63
202		J1320	124.57	05:50	94.37	00:30	109.82	30.20
203		J1322	134.31	05:50	99.59	00:30	117.40	34.72
204		J1324	134.15	05:50	98.86	00:30	116.78	35.29
205		J1404	131.30	05:50	96.04	00:30	113.87	35.26
206		J1406	127.51	05:50	92.12	00:30	110.25	35.39
207		J1408	121.02	05:50	85.58	00:30	103.76	35.44
208		J1410	124.06	05:50	88.61	00:30	106.79	35.44
209		J1412	124.07	05:50	88.65	00:30	106.83	35.42
210		J1414	128.19	05:50	92.97	00:30	111.03	35.23
211		J1416	135.94	05:50	100.80	00:30	118.71	35.14
212		J1586	84.29	20:00	40.72	00:30	61.63	43.58
213		J1592	145.39	20:00	102.60	00:30	123.94	42.79
214		J1596	110.67	05:00	94.53	21:00	108.27	16.14
215		JKELLOG	94.51	08:00	82.29	21:00	88.59	12.22
216		JSCH_HYD	94.51	08:00	82.28	21:00	88.58	12.23
217		ONT66	115.35	05:00	103.10	20:40	114.71	12.25
218		ONT68	111.94	05:00	98.21	21:00	110.13	13.73
219		ONT72	112.57	05:00	99.58	20:40	111.07	12.99
220		ONT76	106.67	08:00	84.76	21:00	97.27	21.91
221		ONT84	91.26	08:00	78.41	21:00	85.01	12.85
222		ONTFRAN-3571	117.01	05:00	109.20	20:40	116.06	7.81
223		ONTFRAN-3574	82.00	08:00	70.02	21:00	76.16	11.98
224		ONTFRAN-3575	83.44	08:00	72.12	21:00	77.86	11.32
225		ONTFRAN-3576	82.23	08:00	71.06	21:00	76.71	11.16
226		ONTFRAN-3577	82.47	08:00	71.58	21:00	77.05	10.89
227		ONTFRAN-3578	84.32	08:00	73.82	21:00	79.05	10.50
228		ONTFRAN-3581	92.12	08:00	79.02	21:00	85.75	13.10

Future Scenario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
229		ONTFRAN-3582	91.59	08:00	78.83	21:00	85.39	12.76
230		ONTFRAN-3583	94.05	08:00	82.10	21:00	88.23	11.95
231		ONTFRAN-3584	94.61	08:00	82.14	21:00	88.60	12.47
232		ONTFRAN-3585	96.25	08:00	83.21	21:00	90.00	13.04
233		ONTFRAN-3586	96.75	08:00	83.56	21:00	90.44	13.19
234		ONTFRAN-3587	95.02	08:00	82.24	21:00	88.84	12.77
235		ONTFRAN-3588	108.10	08:00	95.22	21:00	101.84	12.88
236		ONTFRAN-3591	101.40	08:00	86.56	21:00	94.45	14.84
237		ONTFRAN-3592	93.42	08:00	72.87	21:00	84.43	20.55
238		ONTFRAN-3593	90.95	08:00	70.04	21:00	81.81	20.91
239		ONTFRAN-3594	90.51	08:00	68.48	21:00	80.98	22.02
240		ONTFRAN-3595	88.13	08:00	65.97	21:00	78.55	22.16
241		ONTFRAN-3596	101.39	08:00	78.82	21:00	91.70	22.57
242		ONTFRAN-3597	104.36	08:00	81.98	21:00	94.75	22.38
243		ONTFRAN-3598	101.43	08:00	79.37	21:00	91.96	22.06
244		ONTFRAN-3599	111.56	08:00	91.01	21:00	102.68	20.55
245		ONTFRAN-3600	103.67	08:00	89.07	21:00	96.83	14.60
246		ONTFRAN-3601	115.33	08:00	94.63	21:00	106.40	20.70
247		ONTFRAN-3602	114.58	08:00	93.24	21:00	105.45	21.34
248		ONTFRAN-3603	119.95	08:00	99.64	21:00	111.19	20.31
249		ONTFRAN-3605	123.58	08:00	105.97	21:00	115.75	17.61
250		ONTFRAN-3606	125.92	08:00	109.36	21:00	118.43	16.56
251		ONTFRAN-3607	131.63	08:00	115.14	21:00	124.16	16.49
252		ONTFRAN-3608	122.25	08:00	99.46	21:00	112.61	22.80
253		ONTFRAN-3609	113.25	08:00	90.49	21:00	103.58	22.76
254		ONTFRAN-3611	88.69	08:00	76.73	21:00	82.87	11.96
255		ONTFRAN-3618	74.53	08:00	54.06	21:00	65.43	20.48
256		ONTFRAN-3619	74.46	08:00	53.06	21:00	65.09	21.40
257		ONTFRAN-3620	82.59	08:00	62.29	21:00	73.62	20.30
258		ONTFRAN-3621	84.15	08:00	62.17	21:00	74.63	21.98
259		ONTFRAN-3622	82.59	08:00	60.46	21:00	73.01	22.13
260		ONTFRAN-3626	90.98	08:00	77.97	21:00	84.64	13.02
261		ONTJ10	111.19	08:00	91.59	21:00	102.67	19.60
262		ONTJ114	204.20	20:00	135.10	21:00	157.28	69.10
263		ONTJ12	117.25	08:00	95.91	21:00	108.13	21.34
264		ONTJ145	117.66	05:00	109.84	20:40	116.67	7.82
265		ONTJ18	110.32	08:00	89.20	21:00	101.27	21.12
266		ONTJ19	121.33	08:00	100.24	21:00	112.29	21.09
267		ONTJ76	116.07	05:00	108.30	20:40	115.18	7.77
268		ONTNEWJ_630	104.51	05:00	87.30	21:00	101.77	17.21
269		ONTNEWJ-198	70.97	20:00	27.35	00:30	48.29	43.61
270		ONTNEWJ-212	107.27	05:00	89.59	21:00	104.41	17.69
271		ONTNEWJ-214	108.51	05:00	90.42	21:00	105.52	18.09
272		ONTNEWJ-222	117.13	05:00	109.30	20:40	116.07	7.83
273		ONTNEWJ-224	123.45	05:00	107.68	20:40	122.76	15.77
274		ONTNEWJ-262	83.66	20:00	40.08	00:30	61.00	43.58
275		ONTNEWJ-278	140.12	05:50	101.29	00:30	120.92	38.84
276		ONTNEWJ-322	83.86	20:00	40.28	00:30	61.20	43.58
277		ONTNEWJ-334	112.75	05:00	104.77	20:40	111.45	7.98
278		ONTNEWJ-336	117.14	05:00	109.31	20:40	116.08	7.83
279		ONTNEWJ-338	116.16	05:00	108.38	20:40	115.26	7.78
280		ONTNEWJ-340	116.60	05:00	108.13	20:40	116.11	8.47
281		ONTNEWJ-348	140.27	20:00	70.30	04:00	82.71	69.96
282		ONTNEWJ-354	107.18	05:00	89.51	21:00	104.32	17.68
283		ONTNEWJ-356	117.98	05:00	105.42	20:40	116.98	12.56
284		ONTNEWJ-378	170.77	20:00	94.42	04:00	115.19	76.35
285		ONTNEWJ392	70.23	08:00	48.68	21:00	60.82	21.55

Future Scenario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
286	☐	ONTNEWJ-396	151.51	20:00	69.47	04:00	93.48	82.04
287	☐	ONTNEWJ398	116.39	08:00	100.99	21:00	109.30	15.40
288	☐	ONTNEWJ-398	147.60	05:50	108.92	00:30	128.59	38.69
289	☐	ONTNEWJ-399	147.60	05:50	108.95	00:30	128.60	38.65
290	☐	ONTNEWJ400	116.04	08:00	97.86	21:00	108.02	18.18
291	☐	ONTNEWJ402	124.82	08:00	101.11	21:00	114.90	23.71
292	☐	ONTNEWJ-418	129.20	05:00	121.14	20:40	127.96	8.06
293	☐	ONTNEWJ-420	127.98	05:00	119.97	20:40	126.95	8.01
294	☐	ONTNEWJ-424	128.22	05:00	120.21	20:40	127.35	8.01
295	☐	ONTNEWJ-426	130.08	05:00	122.04	20:40	129.40	8.04
296	☐	ONTNEWJ-428	116.17	05:00	108.78	20:40	115.68	7.39
297	☐	ONTNEWJ-430	128.00	05:00	119.75	20:40	127.39	8.24
298	☐	ONTNEWJ-432	126.95	05:00	109.81	20:40	126.24	17.14
299	☐	ONTNEWJ-436	120.29	05:00	103.33	21:00	117.75	16.96
300	☐	ONTNEWJ-438	120.22	05:00	102.60	21:00	117.39	17.62
301	☐	ONTNEWJ-440	115.98	05:00	98.02	21:00	113.03	17.97
302	☐	ONTNEWJ-456	127.75	05:00	119.64	20:40	126.42	8.11
303	☐	ONTNEWJ-458	112.13	05:00	104.05	20:40	110.80	8.08
304	☐	ONTNEWJ-470	131.46	05:50	96.53	00:30	114.43	34.93
305	☐	ONTNEWJ-478	132.51	05:50	98.41	00:30	115.92	34.10
306	☐	ONTNEWJ-482	138.30	05:50	100.28	00:30	119.51	38.02
307	☐	ONTNEWJ-492	100.18	05:00	81.52	21:00	97.00	18.66
308	☐	ONTNEWJ-496	105.38	05:00	88.79	21:00	102.84	16.59
309	☐	ONTNEWJ-498	105.38	05:00	88.70	21:00	102.81	16.68
310	☐	ONTNEWJ-500	111.01	05:00	97.28	21:00	109.21	13.73
311	☐	ONTNEWJ-502	127.48	05:00	114.30	20:40	126.81	13.18
312	☐	ONTNEWJ-510	148.86	20:00	105.71	00:30	127.29	43.15
313	☐	ONTNEWJ-516	145.82	20:00	102.66	00:30	124.25	43.16
314	☐	ONTNEWJ-520	134.02	05:50	96.66	00:30	115.45	37.36
315	☐	ONTNEWJ-522	143.09	05:50	104.73	00:30	124.19	38.36
316	☐	ONTNEWJ-526	147.34	05:50	108.13	00:30	128.07	39.21
317	☐	ONTNEWJ-528	146.12	05:50	107.11	00:30	127.01	39.01
318	☐	ONTNEWJ-530	152.86	20:00	66.52	04:00	93.48	86.33
319	☐	ONTNEWJ-542	163.30	20:00	73.09	04:00	102.84	90.22
320	☐	ONTNEWJ-544	162.87	20:00	70.93	04:00	101.85	91.94
321	☐	ONTNEWJ-546	169.37	20:00	74.09	04:00	107.26	95.28
322	☐	ONTNEWJ-548	165.90	20:00	70.25	04:00	103.67	95.65
323	☐	ONTNEWJ-550	175.15	20:00	82.54	04:00	114.45	92.62
324	☐	ONTNEWJ-554	173.40	20:00	64.52	04:00	108.85	108.88
325	☐	ONTNEWJ-555	182.24	20:00	111.36	04:00	129.22	70.88
326	☐	ONTNEWJ-556	186.89	20:00	116.60	04:00	135.24	70.29
327	☐	ONTNEWJ-558	189.93	20:00	118.79	04:00	138.00	71.13
328	☐	ONTNEWJ-560	181.63	20:00	76.29	21:00	119.91	105.35
329	☐	ONTNEWJ-562	176.87	20:00	84.15	21:00	121.43	92.72
330	☐	ONTNEWJ-564	172.53	20:00	79.36	21:00	116.95	93.18
331	☐	ONTNEWJ-568	166.86	20:00	84.38	04:00	109.28	82.48
332	☐	ONTNEWJ-576	210.94	20:00	142.71	04:00	160.74	68.23
333	☐	ONTNEWJ-578	200.18	20:00	132.78	21:00	152.70	67.40
334	☐	ONTNEWJ-582	194.54	20:00	126.25	21:00	146.77	68.30
335	☐	ONTNEWJ-584	199.74	20:00	132.09	21:00	152.18	67.66
336	☐	ONTNEWJ-585	189.06	20:00	98.50	21:00	134.71	90.56
337	☐	ONTNEWJ-586	199.74	20:00	132.09	21:00	152.18	67.66
338	☐	ONTNEWJ-588	198.44	20:00	131.05	21:00	150.96	67.40
339	☐	ONTNEWJ-591	75.27	05:00	73.26	21:00	74.53	2.01
340	☐	ONTNEWJ-592	190.36	20:00	106.75	21:00	138.28	83.61
341	☐	ONTNEWJ-598	135.67	05:50	100.30	00:30	118.27	35.37
342	☐	ONTNEWJ-622	84.73	20:00	41.15	00:30	62.07	43.58

Future Scenario - Junction Output - Pressure Range Report

		ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
343		ONTNEWJ-628	148.96	20:00	60.92	04:00	89.03	88.03
344		ONTNEWJ-631	104.51	05:00	87.39	21:00	101.80	17.13
345		ONTNEWJ-632	106.68	05:00	89.70	21:00	104.01	16.98
346		ONTNEWJ-634	101.48	05:00	84.61	21:00	98.85	16.87
347		ONTNEWJ-636	106.68	05:00	89.82	21:00	104.05	16.86
348		ONTNEWJ-638	105.38	05:00	88.68	21:00	102.80	16.70
349		ONTNEWJ-640	124.77	05:50	89.56	00:30	107.29	35.20
350		ONTNEWJ-646	124.80	05:50	89.49	00:30	107.35	35.32
351		ONTNEWJ-908	89.49	20:00	48.59	00:30	68.58	40.90
352		ONTNEWJ-910	147.38	05:50	108.53	00:30	128.28	38.86
353		ONTNEWJ-914	136.39	05:50	98.80	00:30	117.75	37.59
354		ONTNEWJ-934	157.66	20:00	86.94	04:00	103.52	70.71
355		ONTNEWJ-936	158.53	20:00	87.77	04:00	104.38	70.75
356		ONTNEWJ-950	124.74	05:50	89.59	00:30	107.24	35.16
357		ONTPHLP-2235	119.81	05:00	112.27	20:40	119.20	7.54
358		ONTPHLP-2241	114.97	05:00	107.24	20:40	114.16	7.73
359		ONTPHLP-2263	114.04	05:00	106.18	20:40	112.85	7.86
360		ONTPHLP-3507	116.17	05:00	108.84	20:40	115.71	7.33
361		ONTPHLP-3606	81.19	08:00	71.98	21:00	76.09	9.21
362		ONTPHLP-3610	106.90	05:00	89.27	21:00	104.05	17.63
363		ONTPICKUP-12	123.90	05:00	107.94	20:40	123.20	15.96
364		ONTPICKUP-14	116.31	05:00	107.84	20:40	115.81	8.48
365		ONTPICKUP-17	111.01	05:00	98.02	20:40	109.51	12.99
366		ONTPICKUP-30	202.99	20:00	133.88	21:00	156.06	69.10
367		ONTPICKUP-32	162.53	20:00	78.24	04:00	104.36	84.29
368		ONTPICKUP-42	92.09	20:00	48.75	00:30	69.64	43.35
369		ONTPICKUP-48	178.90	20:00	104.48	04:00	118.94	74.41
370		ONTPICKUP-51	84.46	20:00	40.88	00:30	61.80	43.58
371		ONTPICKUP-6	145.48	20:00	73.36	04:00	86.80	72.11
372		ONTPICKUP-65	168.96	20:00	92.60	04:00	113.38	76.36
373		ONTPICKUP-68	146.76	05:50	108.03	00:30	127.73	38.72
374		ONTPICKUP-70	116.41	05:00	108.63	20:40	115.50	7.78
375		ONTPICKUP-71	170.13	20:00	89.54	04:00	113.17	80.59
376		ONTPICKUP-72	91.62	20:00	48.24	00:30	69.14	43.38
377		ONTPICKUP-9	117.16	05:00	109.33	20:40	116.10	7.83
378		ONTTOP50-10	140.08	20:00	70.11	04:00	82.51	69.96
379		ONTTOP50-15	141.75	05:50	102.52	00:30	122.26	39.23
380		ONTTOP50-18	138.20	05:50	99.90	00:30	119.23	38.30
381		ONTTOP50-20	116.99	05:00	109.16	20:40	115.93	7.83
382		ONTTOP50-22	144.53	05:50	106.01	00:30	125.58	38.52
383		ONTTOP50-23	118.12	05:00	110.30	20:40	117.12	7.82
384		ONTTOP50-25	119.09	05:00	111.55	20:40	118.48	7.54
385		ONTTOP50-40	85.10	20:00	41.51	00:30	62.43	43.58
386		ONTTOP50-48	183.21	20:00	112.33	04:00	130.19	70.88
387		ONTTOP50-6	123.53	05:00	107.76	20:40	122.84	15.77

Future Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
1	☐	800ZONE_V1	0.00	00:00	0.00	00:00	0.00	0.00
2	☐	800ZONE_V2	0.00	00:00	0.00	00:00	0.00	0.00
3	☐	PSCH_1	464.64	04:00	0.00	05:50	156.98	464.64
4	☐	PKELLOG	450.23	04:00	0.00	05:50	152.46	450.23
5	☐	PHYD_LAT	17.77	00:00	0.00	05:00	6.01	17.77
6	☐	P10142	7,088.67	21:00	0.00	05:50	2,450.44	7,088.67
7	☐	P10326	464.90	21:00	0.00	20:00	250.12	464.90
8	☐	P10328	338.66	21:00	0.00	20:00	208.12	338.66
9	☐	P10330	244.49	21:00	0.00	20:00	177.12	244.49
10	☐	P10332	317.96	00:00	0.00	05:00	107.45	317.96
11	☐	P10334	94.16	00:00	0.00	05:00	31.82	94.16
12	☐	P10340	54.47	00:00	0.00	05:00	18.41	54.47
13	☐	P10342	224.84	10:40	0.00	20:00	181.08	224.84
14	☐	P10344	192.95	00:00	0.00	05:00	65.20	192.95
15	☐	P10346	1,035.25	01:20	0.00	05:00	349.84	1,035.25
16	☐	P10350	238.18	00:20	0.00	05:00	80.49	238.18
17	☐	P10354	1,654.75	04:00	0.00	20:00	901.48	1,654.75
18	☐	P10356	529.22	00:10	0.00	05:00	178.84	529.22
19	☐	P10360	454.01	21:00	0.00	20:00	304.24	454.01
20	☐	P10364	48.24	02:40	0.00	05:00	16.30	48.24
21	☐	P10366	51.31	00:00	0.00	05:00	17.34	51.31
22	☐	P10368	51.31	00:00	0.00	05:00	17.34	51.31
23	☐	P10372	929.16	04:00	0.00	20:00	494.92	929.16
24	☐	P10374	564.54	04:00	0.00	20:00	371.70	564.54
25	☐	P10376	297.60	04:00	0.00	20:00	201.63	297.60
26	☐	P10422	2,508.77	21:40	0.00	05:50	848.06	2,508.77
27	☐	P10506	367.24	10:40	0.00	20:00	223.50	367.24
28	☐	P10508	367.24	10:40	0.00	20:00	251.29	367.24
29	☐	P10510	203.83	10:40	0.00	20:00	135.16	203.83
30	☐	P10512	97.56	21:00	0.00	20:00	65.80	97.56
31	☐	P10514	2.60	00:00	0.00	05:00	0.88	2.60
32	☐	P10516	155.57	04:00	0.00	20:00	90.17	155.57
33	☐	P10518	142.03	04:00	0.00	20:00	111.47	142.03
34	☐	P10520	155.57	04:00	0.00	20:00	90.17	155.57
35	☐	P10522	163.42	10:40	0.00	20:00	126.71	163.42
36	☐	P10550	163.42	10:40	0.00	20:00	126.71	163.42
37	☐	ONT9036	2,396.30	21:00	0.00	05:00	688.49	2,396.30
38	☐	ONTFRAN-3622	216.79	21:40	0.00	05:50	71.87	216.79
39	☐	ONT9042	751.97	21:40	0.00	05:50	248.54	751.97
40	☐	ONTNEWP-9322	0.00	00:00	0.00	00:00	0.00	0.00
41	☐	ONTNEWP-9512	48.23	01:20	0.00	05:00	16.30	48.23
42	☐	ONTNEWP-9514	0.00	00:00	0.00	00:00	0.00	0.00
43	☐	ONTNEWP-9919	0.00	00:00	0.00	00:00	0.00	0.00
44	☐	ONTNEWP-10026	458.86	00:00	0.00	05:00	155.06	458.86
45	☐	ONTNEWP-934	73.68	00:00	0.00	05:00	24.90	73.68
46	☐	ONTNEWP-10044	0.00	00:00	0.00	00:00	0.00	0.00
47	☐	ONTNEWP-9885	128.88	00:00	0.00	05:00	43.55	128.88
48	☐	ONTNEWP-9887	128.88	00:00	0.00	05:00	43.55	128.88
49	☐	ONTNEWP-9889	128.88	00:00	0.00	05:00	43.55	128.88
50	☐	ONTNEWP-9891	128.88	00:00	0.00	05:00	43.55	128.88
51	☐	ONTNEWP-9893	133.81	00:00	0.00	05:00	45.22	133.81
52	☐	ONTNEWP-9895	133.81	00:00	0.00	05:00	45.22	133.81
53	☐	ONTNEWP-9962	0.00	00:00	0.00	00:00	0.00	0.00
54	☐	ONTNEWP-9964	183.56	00:00	0.00	05:00	62.03	183.56
55	☐	ONTNEWP-9968	0.00	00:00	0.00	00:00	0.00	0.00
56	☐	ONT9010	704.28	21:40	0.00	05:00	261.70	704.28
57	☐	ONT9012	931.07	21:40	0.00	05:00	339.75	931.07

Future Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
58		ONT9056	1,051.14	21:40	0.00	05:00	382.70	1,051.14
59		ONTNEWP-9240	478.26	21:40	0.00	05:00	182.82	478.26
60		ONTNEWP-9244	739.23	21:40	0.00	05:00	273.51	739.23
61		ONTNEWP-9344	0.00	00:00	0.00	00:00	0.00	0.00
62		ONTNEWP-9346	0.00	00:00	0.00	00:00	0.00	0.00
63		ONTNEWP-9348	0.00	00:00	0.00	00:00	0.00	0.00
64		ONTNEWP-9546	478.26	21:40	0.00	05:00	182.82	478.26
65		ONTNEWP-9548	0.00	00:00	0.00	00:00	0.00	0.00
66		ONTNEWP-9550	704.28	21:40	0.00	05:00	261.70	704.28
67		ONTNEWP-9552	0.00	00:00	0.00	00:00	0.00	0.00
68		ONTNEWP-9798	842.16	21:00	0.00	04:10	163.30	842.16
69		ONTNEWP-9572	0.00	00:00	0.00	00:00	0.00	0.00
70		ONTNEWP-9320	48.23	00:00	0.00	05:00	16.30	48.23
71		ONTNEWP-10016	0.00	00:00	0.00	00:00	0.00	0.00
72		ONTNEWP-9774	531.33	20:40	0.00	05:00	14.16	531.33
73		ONTNEWP-9884	4.73	00:00	0.00	05:00	1.60	4.73
74		ONTNEWP-9886	32.18	00:00	0.00	05:00	10.87	32.18
75		ONTNEWP-9384	746.26	04:00	0.00	20:00	481.72	746.26
76		ONTNEWP-9892	755.34	04:00	0.00	20:00	484.79	755.34
77		ONTNEWP-9566	104.48	00:00	0.00	05:00	35.31	104.48
78		ONTNEWP-9900	429.06	04:00	0.00	20:00	257.75	429.06
79		ONTNEWP-910	340.56	04:00	0.00	20:00	227.84	340.56
80		ONTNEWP-9896	352.67	00:00	0.00	05:00	119.18	352.67
81		ONTNEWP-9712	280.33	00:00	0.00	05:00	94.73	280.33
82		ONTNEWP-9902	133.65	00:00	0.00	05:00	45.17	133.65
83		ONTNEWP-9890	781.73	04:00	0.00	20:00	376.93	781.73
84		ONTNEWP-914	781.73	04:00	0.00	20:00	376.93	781.73
85		ONTNEWP-9894	781.73	04:00	0.00	20:00	376.93	781.73
86		ONTNEWP-9913	83.15	00:00	0.00	05:00	28.10	83.15
87		ONTNEWP-9861	108.55	00:00	0.00	05:00	36.68	108.55
88		ONTNEWP-918	240.75	04:00	0.00	20:00	194.11	240.75
89		ONTNEWP-9912	73.68	00:00	0.00	05:00	24.90	73.68
90		ONTNEWP-9668	697.14	00:00	0.00	05:00	235.59	697.14
91		ONTNEWP-9664	697.14	00:00	0.00	05:00	235.59	697.14
92		ONTNEWP-9662	60.00	00:00	0.00	05:00	20.28	60.00
93		ONTNEWP-9400	953.05	21:00	30.36	04:50	395.83	922.69
94		ONTNEWP-9704	953.05	21:00	30.36	04:50	395.83	922.69
95		ONTNEWP-9916	494.20	21:00	45.63	20:00	241.83	448.57
96		ONTNEWP-9918	1,236.17	21:00	23.28	20:00	452.20	1,212.90
97		ONTNEWP-9928	1,385.85	21:00	54.77	20:00	554.97	1,331.08
98		ONTNEWP-9926	328.76	21:00	12.08	20:10	222.44	316.68
99		ONTNEWP-9920	533.30	00:00	0.00	05:00	180.22	533.30
100		ONTNEWP-9922	533.30	00:00	0.00	05:00	180.22	533.30
101		ONTNEWP-9924	141.24	00:00	0.00	05:00	47.73	141.24
102		ONTNEWP-9932	945.74	21:00	71.77	04:40	516.62	873.96
103		ONTNEWP-9936	250.26	01:20	0.00	05:00	84.57	250.26
104		ONTNEWP-9940	413.52	04:00	123.67	20:00	357.43	289.85
105		ONTNEWP-9942	833.73	04:00	123.67	20:00	499.43	710.06
106		ONTNEWP-9944	540.00	00:00	0.00	05:00	182.48	540.00
107		ONTNEWP-9901	552.42	00:00	0.00	05:00	186.68	552.42
108		ONT9008	478.26	21:40	0.00	05:00	182.82	478.26
109		ONTNEWP-9542	142.85	21:00	0.00	05:00	46.64	142.85
110		ONTNEWP-9816	79.63	21:00	0.00	05:00	25.28	79.63
111		ONTNEWP-908	245.32	00:00	0.00	05:00	82.90	245.32
112		ONTNEWP-9846	1,548.63	04:00	0.00	20:00	865.63	1,548.63
113		ONTNEWP-9440	0.00	00:00	0.00	00:00	0.00	0.00
114		ONTNEWP-9958	176.73	00:00	0.00	05:00	59.72	176.73

Future Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
115	☐	ONTNEWP-9972	192.39	02:10	0.00	05:00	65.01	192.39
116	☐	ONTNEWP-9960	183.56	23:10	0.00	05:00	62.03	183.56
117	☐	ONTNEWP-9864	386.65	00:00	0.00	05:00	130.66	386.65
118	☐	ONTNEWP-9860	218.45	00:00	0.00	05:00	73.82	218.45
119	☐	ONTFRAN-3693	113.53	21:00	0.00	05:50	27.98	113.53
120	☐	ONTNEWP509	422.53	21:00	0.00	05:50	132.40	422.53
121	☐	ONTFRAN-3621	633.62	21:40	0.00	05:50	213.63	633.62
122	☐	ONTFRAN-3696	426.92	21:00	0.00	05:50	127.79	426.92
123	☐	ONTFRAN-3697	147.22	21:00	0.00	05:50	33.27	147.22
124	☐	ONTFRAN-3625	253.01	21:00	0.00	05:50	70.92	253.01
125	☐	ONTNEWP649	116.62	21:00	0.00	05:50	35.78	116.62
126	☐	ONTFRAN-3624	88.36	21:40	0.00	05:50	29.23	88.36
127	☐	ONTFRAN-3626	379.12	21:40	0.00	05:50	124.59	379.12
128	☐	ONTNEWP511	422.53	21:00	0.00	05:50	132.40	422.53
129	☐	ONTNEWP-9776	1,152.09	21:00	0.00	05:50	362.46	1,152.09
130	☐	ONTNEWP-9899	1,915.85	04:00	123.67	20:00	865.11	1,792.18
131	☐	ONTNEWP-9974	2,655.61	04:00	123.67	20:00	1,115.10	2,531.93
132	☐	ONTNEWP-9780	45.10	20:50	0.00	05:00	12.80	45.10
133	☐	ONTNEWP-9784	99.55	21:40	0.00	05:00	33.57	99.55
134	☐	ONTNEWP-9786	188.11	21:40	0.00	05:00	61.56	188.11
135	☐	ONTNEWP-9778	520.46	00:00	0.00	05:00	175.88	520.46
136	☐	ONTFRAN-3694	1,430.63	21:00	0.00	05:50	447.26	1,430.63
137	☐	ONTFRAN-3620	553.27	21:40	0.00	05:50	185.16	553.27
138	☐	ONTFRAN-3628	751.97	21:40	0.00	05:50	248.54	751.97
139	☐	ONTFRAN-3595	1,908.87	04:00	0.00	05:50	651.91	1,908.87
140	☐	ONTNEWP-9764	133.29	21:40	0.00	05:00	48.72	133.29
141	☐	ONTFRAN-3594	1,409.18	04:00	0.00	05:50	482.05	1,409.18
142	☐	ONTNEWP-9766	148.46	21:40	0.00	05:00	56.35	148.46
143	☐	ONTFRAN-3592	904.34	04:00	0.00	05:50	309.47	904.34
144	☐	ONTNEWP-9768	107.20	21:40	0.00	05:00	39.60	107.20
145	☐	ONTNEWP-9818	30.99	20:40	0.00	05:00	7.00	30.99
146	☐	ONTFRAN-3640	210.70	21:40	0.00	05:50	74.44	210.70
147	☐	ONTFRAN-3641	405.19	21:40	0.00	05:50	137.63	405.19
148	☐	ONT9092	947.54	21:40	0.00	05:50	332.64	947.54
149	☐	ONTNEWP529	1,034.73	21:40	0.00	05:50	354.87	1,034.73
150	☐	ONTNEWP519	946.52	21:40	0.00	05:50	321.62	946.52
151	☐	ONTP11	1,081.40	21:40	0.00	05:50	367.41	1,081.40
152	☐	ONTFRAN-3637	1,452.65	21:40	0.00	05:50	487.70	1,452.65
153	☐	ONTFRAN-3639	208.62	21:40	0.00	05:50	70.48	208.62
154	☐	ONTFRAN-3635	314.35	21:40	0.00	05:50	106.97	314.35
155	☐	ONTP19	774.52	21:00	0.00	05:50	264.83	774.52
156	☐	ONT9072	140.52	21:00	0.00	05:50	47.43	140.52
157	☐	ONT9048	686.70	21:00	0.00	05:50	233.07	686.70
158	☐	ONT9068	910.16	21:40	0.00	05:50	310.01	910.16
159	☐	ONTFRAN-3634	774.52	21:00	0.00	05:50	264.83	774.52
160	☐	ONTFRAN-3632	520.74	21:00	0.00	05:50	173.64	520.74
161	☐	ONTFRAN-3633	538.78	21:40	0.00	05:50	182.33	538.78
162	☐	ONTFRAN-3631	280.17	04:00	0.00	05:50	97.21	280.17
163	☐	ONTNEWP-9870	8,254.40	20:40	0.00	05:00	183.09	8,254.40
164	☐	ONT9050	1,121.17	21:40	0.00	05:50	369.64	1,121.17
165	☐	ONTNEWP619	1,121.17	21:40	0.00	05:50	369.64	1,121.17
166	☐	ONTFRAN-3603	1,768.72	21:40	0.00	05:50	587.22	1,768.72
167	☐	ONTNEWP-9750	1,538.93	21:00	0.00	05:00	488.52	1,538.93
168	☐	ONTNEWP-9790	1,538.93	21:00	0.00	05:00	488.52	1,538.93
169	☐	ONTNEWP-9756	529.97	21:00	0.00	05:00	105.81	529.97
170	☐	ONTPHLP-3607	141.18	21:00	0.00	05:00	27.65	141.18
171	☐	ONTNEWP-9746	100.13	21:00	0.00	05:00	26.76	100.13

Future Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
172	☐	ONTFRAN-3593	99.56	21:00	0.00	05:00	35.75	99.56
173	☐	ONTNEWP-9740	88.37	21:00	0.00	05:00	27.33	88.37
174	☐	ONTFRAN-3652	309.34	04:00	0.00	05:50	104.89	309.34
175	☐	ONTFRAN-3597	2,753.55	04:00	0.00	05:50	938.28	2,753.55
176	☐	ONTNEWP-9760	140.36	21:40	0.00	05:00	49.81	140.36
177	☐	ONTFRAN-3596	2,315.36	04:00	0.00	05:50	789.85	2,315.36
178	☐	ONTFRAN-3642	59.19	09:20	0.00	05:50	20.91	59.19
179	☐	ONTNEWP-9762	150.81	21:40	0.00	05:00	53.65	150.81
180	☐	ONTFRAN-3649	152.19	04:10	0.00	05:50	52.30	152.19
181	☐	ONTFRAN-3606	274.65	04:00	0.00	05:50	93.38	274.65
182	☐	ONTFRAN-3607	311.28	04:00	0.00	05:50	106.19	311.28
183	☐	ONTFRAN-3610	311.00	04:00	0.00	05:50	107.26	311.00
184	☐	ONTFRAN-3604	51.67	04:40	0.00	05:50	7.65	51.67
185	☐	ONTFRAN-3609	84.36	04:20	0.00	05:50	27.49	84.36
186	☐	ONTFRAN-3611	35.73	09:20	0.00	05:50	7.99	35.73
187	☐	ONTFRAN-3608	172.88	04:00	0.00	05:50	58.92	172.88
188	☐	ONTFRAN-3651	578.68	21:00	0.00	05:50	187.07	578.68
189	☐	ONTFRAN-3615	102.75	04:40	0.00	05:50	34.46	102.75
190	☐	ONTFRAN-3614	105.14	04:00	0.00	05:50	37.58	105.14
191	☐	ONTNEWP-9782	60.23	21:40	0.00	05:00	20.28	60.23
192	☐	ONTFRAN-3646	102.35	21:40	0.00	05:50	33.66	102.35
193	☐	ONTFRAN-3645	784.68	21:40	0.00	05:50	269.86	784.68
194	☐	ONTFRAN-3627	1,096.63	21:00	0.00	05:50	348.98	1,096.63
195	☐	ONTFRAN-3647	160.53	21:00	0.00	05:50	50.77	160.53
196	☐	ONTFRAN-3618	1,265.22	21:40	0.00	05:50	426.26	1,265.22
197	☐	ONT9052	439.81	21:40	0.00	05:50	144.76	439.81
198	☐	ONTFRAN-3590	1,087.21	21:40	0.00	05:50	362.47	1,087.21
199	☐	ONTFRAN-3629	3,074.48	21:40	0.00	05:50	1,056.52	3,074.48
200	☐	ONTFRAN-3617	5,483.86	04:00	0.00	05:50	1,889.20	5,483.86
201	☐	ONTFRAN-3600	7,044.62	21:00	0.00	05:50	2,435.55	7,044.62
202	☐	ONT9024	8,300.22	20:40	0.00	05:00	206.32	8,300.22
203	☐	ONTNEWP-9276	8,300.22	20:40	0.00	05:00	206.32	8,300.22
204	☐	ONTNEWP-9434	0.00	00:00	0.00	00:00	0.00	0.00
205	☐	ONTNEWP-9602	8,254.40	20:40	0.00	05:00	183.09	8,254.40
206	☐	ONTFRAN-3706	4,592.91	21:00	0.00	05:50	1,555.28	4,592.91
207	☐	ONTNEWP-9252	149.44	21:00	0.00	05:00	48.16	149.44
208	☐	ONTNEWP-9590	149.44	21:00	0.00	05:00	48.16	149.44
209	☐	ONTNEWP-9170	149.44	21:00	0.00	05:00	48.16	149.44
210	☐	ONTPHLP-3615	695.04	21:00	0.00	05:00	225.47	695.04
211	☐	ONT9034	2,396.29	21:00	0.00	05:00	688.49	2,396.29
212	☐	ONTNEWP-9600	0.00	00:00	0.00	00:00	0.00	0.00
213	☐	ONTNEWP-9854	0.00	00:00	0.00	00:00	0.00	0.00
214	☐	ONTNEWP-9254	60.23	21:40	0.00	05:00	20.28	60.23
215	☐	ONTNEWP-9556	145.56	00:00	0.00	05:00	49.19	145.56
216	☐	ONTNEWP-9554	9,337.19	20:40	0.00	05:00	895.26	9,337.19
217	☐	ONTNEWP-9810	9,434.23	20:40	0.00	05:00	944.45	9,434.23
218	☐	ONTNEWP-9596	2,396.30	21:00	0.00	05:00	688.49	2,396.30
219	☐	ONTNEWP-10017	48.24	02:40	0.00	05:00	16.30	48.24
220	☐	ONTNEWP-9946	697.14	00:00	0.00	05:00	235.59	697.14
221	☐	ONT283	0.00	00:00	0.00	00:00	0.00	0.00
222	☐	ONTNEWP-9714	146.68	00:00	0.00	05:00	49.57	146.68
223	☐	ONTNEWP-9578	0.00	00:00	0.00	00:00	0.00	0.00
224	☐	ONTNEWP-9494	44.25	00:00	0.00	05:00	14.95	44.25
225	☐	ONTFRAN-3608A	432.46	04:00	0.00	05:50	146.46	432.46
226	☐	ONTP10024	280.33	00:00	0.00	05:00	94.73	280.33
227	☐	2011_P14	0.00	00:00	0.00	00:00	0.00	0.00
228	☐	2011_P15	0.00	00:00	0.00	00:00	0.00	0.00

Future Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
229	☐	2011_P17	498.91	04:00	0.00	20:00	349.53	498.91
230	☐	2011_P18	367.24	10:40	0.00	20:00	251.29	367.24
231	☐	2011_P19	367.24	10:40	0.00	20:00	275.43	367.24
232	☐	P39	612.54	00:00	0.00	05:00	207.00	612.54
233	☐	P41	262.92	00:00	0.00	05:00	88.85	262.92
234	☐	P63	0.00	00:00	0.00	00:00	0.00	0.00
235	☐	P73	478.26	21:40	0.00	05:00	182.82	478.26
236	☐	P81	2,396.29	21:00	0.00	05:00	688.49	2,396.29
237	☐	P87	201.31	04:00	0.00	20:00	147.89	201.31
238	☐	P186	907.13	04:10	0.00	05:50	249.98	907.13
239	☐	P188	1,081.40	21:40	0.00	05:50	367.41	1,081.40
240	☐	P190	275.03	21:40	0.00	05:50	94.32	275.03
241	☐	P_ONT-2	89.67	00:00	0.00	05:00	30.30	89.67
242	☐	P_ONT-16	412.01	23:10	0.00	05:00	139.23	412.01
243	☐	P_ONT-18	535.41	00:50	0.00	05:00	180.93	535.41
244	☐	P_ONT-20	941.31	21:00	0.00	05:00	308.10	941.31
245	☐	P_ONT-28	24.28	00:00	0.00	05:00	8.21	24.28
246	☐	P_ONT-40	243.11	00:00	0.00	05:00	82.15	243.11
247	☐	P_ONT-42	95.35	00:00	0.00	05:00	32.22	95.35
248	☐	P_ONT-44	135.72	00:00	0.00	05:00	45.87	135.72
249	☐	P_ONT-46	0.00	00:00	0.00	00:00	0.00	0.00
250	☐	P_ONT-48	1,185.85	00:50	0.00	05:00	400.74	1,185.85
251	☐	P_ONT-50	566.82	00:00	0.00	05:00	191.55	566.82
252	☐	P_ONT-52	8.97	00:00	0.00	05:00	3.03	8.97
253	☐	P_ONT-54	220.28	00:00	0.00	05:00	74.44	220.28
254	☐	P_ONT-56	142.63	00:00	0.00	05:00	48.20	142.63
255	☐	P_ONT-62	339.99	20:40	0.00	05:00	75.62	339.99
256	☐	P_ONT-64	1,338.50	00:50	0.00	05:00	452.32	1,338.50
257	☐	P_ONT-66	1,665.54	21:00	0.00	05:00	542.84	1,665.54
258	☐	P_ONT-90	314.35	21:40	0.00	05:50	106.97	314.35
259	☐	P_ONT-92	210.35	21:40	0.00	05:50	70.58	210.35
260	☐	P_ONT-102	1,094.83	21:00	0.00	05:00	258.10	1,094.83
261	☐	P_ONT-120	490.99	20:40	0.00	05:00	31.65	490.99
262	☐	P_ONT-122	7,061.17	04:00	0.00	05:50	2,358.62	7,061.17
263	☐	P_ONT-126	20.14	09:20	0.00	05:50	5.38	20.14
264	☐	P_ONT-128	691.79	21:00	0.00	05:00	122.86	691.79
265	☐	P_ONT-146	842.16	21:00	0.00	04:10	163.30	842.16
266	☐	P_ONT-148	842.16	21:00	0.00	04:10	163.30	842.16
267	☐	P_ONT-150	842.15	21:00	0.00	04:10	163.30	842.15
268	☐	P_ONT-152	842.15	21:00	0.00	04:10	163.30	842.15
269	☐	P_ONT-154	8,737.29	20:40	0.00	00:00	165.53	8,737.29
270	☐	P_ONT-156	8,737.29	20:40	0.00	00:00	165.53	8,737.29
271	☐	P_ONT-158	8,737.29	20:40	0.00	00:00	165.53	8,737.29
272	☐	P_ONT-160	8,737.29	20:40	0.00	00:00	165.53	8,737.29
273	☐	P_ONT-174	520.46	00:00	0.00	05:00	175.88	520.46
274	☐	P_ONT-176	4,591.31	04:00	0.00	05:50	1,582.96	4,591.31
275	☐	P_ONT-178	627.61	21:40	0.00	05:50	211.56	627.61
276	☐	P_ONT-180	280.86	21:40	0.00	05:50	94.68	280.86
277	☐	P_ONT-182	280.86	21:40	0.00	05:50	94.68	280.86
278	☐	P_ONT-184	0.00	00:00	0.00	00:00	0.00	0.00
279	☐	P_ONT-186	416.79	21:40	0.00	05:50	140.09	416.79
280	☐	P_ONT-188	0.00	00:00	0.00	00:00	0.00	0.00
281	☐	P_ONT-190	0.00	00:00	0.00	00:00	0.00	0.00
282	☐	P_ONT-192	452.69	21:40	0.00	05:50	154.78	452.69
283	☐	P_ONT-194	452.69	21:40	0.00	05:50	154.78	452.69
284	☐	P_ONT-196	941.09	21:40	0.00	05:50	316.21	941.09
285	☐	P_ONT-198	2,596.53	21:40	0.00	05:50	880.28	2,596.53

Future Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
286		P_ONT-200	62.60	21:00	0.00	05:50	14.69	62.60
287		P_ONT-204	51.86	02:50	0.00	05:00	17.52	51.86
288		P_ONT-206	0.00	00:00	0.00	00:00	0.00	0.00
289		P_ONT-208	0.00	00:00	0.00	00:00	0.00	0.00
290		P_ONT-210	0.00	00:00	0.00	00:00	0.00	0.00
291		P_ONT-212	779.57	04:00	0.00	05:50	264.82	779.57
292		P_ONT-214	289.11	04:00	0.00	05:50	99.08	289.11
293		P_ONT-216	289.11	04:00	0.00	05:50	99.08	289.11
294		P_ONT-218	0.00	00:00	0.00	00:00	0.00	0.00
295		P_ONT-220	0.00	00:00	0.00	00:00	0.00	0.00
296		P_ONT-222	289.11	04:00	0.00	05:50	99.08	289.11
297		P_ONT-224	0.00	00:00	0.00	00:00	0.00	0.00
298		P_ONT-226	1,183.01	21:40	0.00	05:50	395.22	1,183.01
299		P_ONT-228	100.00	04:00	0.00	05:50	35.18	100.00
300		P_ONT-230	1,670.87	21:40	0.00	05:50	559.39	1,670.87
301		P_ONT-232	130.98	21:00	0.00	05:50	38.12	130.98
302		P_ONT-234	36.53	20:50	0.00	05:50	5.26	36.53
303		P_ONT-236	52.14	21:40	0.00	05:50	17.87	52.14
304		P_ONT-238	52.14	21:40	0.00	05:50	17.87	52.14
305		P_ONT-240	0.00	00:00	0.00	00:00	0.00	0.00
306		P_ONT-242	0.00	00:00	0.00	00:00	0.00	0.00
307		P_ONT-244	1,670.87	21:40	0.00	05:50	559.39	1,670.87
308		P_ONT-246	168.29	21:40	0.00	05:50	57.46	168.29
309		P_ONT-248	168.29	21:40	0.00	05:50	57.46	168.29
310		P_ONT-250	110.10	21:40	0.00	05:50	37.36	110.10
311		P_ONT-252	110.10	21:40	0.00	05:50	37.36	110.10
312		P_ONT-254	144.30	21:40	0.00	05:50	48.92	144.30
313		P_ONT-256	144.30	21:40	0.00	05:50	48.92	144.30
314		P_ONT-258	0.00	00:00	0.00	00:00	0.00	0.00
315		P_ONT-260	34.21	00:00	0.00	05:00	11.56	34.21
316		P_ONT-262	986.87	21:40	0.00	05:50	335.43	986.87
317		P_ONT-264	171.51	21:40	0.00	05:50	57.38	171.51
318		P_ONT-266	171.51	21:40	0.00	05:50	57.38	171.51
319		P_ONT-268	171.51	21:40	0.00	05:50	57.38	171.51
320		P_ONT-270	0.00	00:00	0.00	00:00	0.00	0.00
321		P_ONT-272	155.52	21:00	0.00	05:50	51.76	155.52
322		P_ONT-274	22.98	09:20	0.00	05:50	3.33	22.98
323		P_ONT-276	151.04	21:40	0.00	05:50	51.04	151.04
324		P_ONT-278	233.24	21:40	0.00	05:50	79.05	233.24
325		P_ONT-280	233.25	21:40	0.00	05:50	79.05	233.25
326		P_ONT-282	0.00	00:00	0.00	00:00	0.00	0.00
327		P_ONT-284	85.43	21:40	0.00	05:50	28.21	85.43
328		P_ONT-286	0.00	00:00	0.00	00:00	0.00	0.00
329		P_ONT-288	85.43	21:40	0.00	05:50	28.21	85.43
330		P_ONT-290	35.09	21:00	0.00	05:50	9.55	35.09
331		P_ONT-292	259.92	21:00	0.00	05:50	87.28	259.92
332		P_ONT-294	109.00	21:40	0.00	05:50	36.84	109.00
333		P_ONT-296	35.09	21:00	0.00	05:50	9.55	35.09
334		P_ONT-298	151.84	21:00	0.00	05:50	50.44	151.84
335		P_ONT-300	186.94	21:00	0.00	05:50	59.99	186.94
336		P_ONT-302	132.57	21:00	0.00	05:00	44.50	132.57
337		P_ONT-304	145.98	21:40	0.00	05:00	48.77	145.98
338		P_ONT-306	16.87	21:00	0.00	05:00	3.66	16.87
339		P_ONT-308	12.61	20:50	0.00	05:00	2.82	12.61
340		P_ONT-310	46.43	21:40	0.00	05:00	15.20	46.43
341		P_ONT-312	0.00	00:00	0.00	00:00	0.00	0.00
342		P_ONT-314	0.00	00:00	0.00	00:00	0.00	0.00

Future Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
343	☐	P_ONT-316	0.00	00:00	0.00	00:00	0.00	0.00
344	☐	P_ONT-318	133.65	00:00	0.00	05:00	45.17	133.65
345	☐	P_ONT-322	45.15	00:00	0.00	05:00	15.26	45.15
346	☐	P_ONT-324	45.15	00:00	0.00	05:00	15.26	45.15
347	☐	P_ONT-326	88.50	00:00	0.00	05:00	29.91	88.50
348	☐	P_ONT-328	40.99	20:50	0.00	05:50	5.11	40.99
349	☐	P_ONT-330	118.98	21:00	0.00	05:50	40.10	118.98
350	☐	P_ONT-332	0.00	00:00	0.00	00:00	0.00	0.00
351	☐	P_ONT-334	0.00	00:00	0.00	00:00	0.00	0.00
352	☐	P_ONT-336	52.14	21:40	0.00	05:50	17.87	52.14
353	☐	P_ONT-338	0.00	00:00	0.00	00:00	0.00	0.00
354	☐	P_ONT-340	0.00	00:00	0.00	00:00	0.00	0.00
355	☐	P_ONT-342	0.00	00:00	0.00	00:00	0.00	0.00
356	☐	P_ONT-344	0.00	00:00	0.00	00:00	0.00	0.00
357	☐	P_ONT-346	0.00	00:00	0.00	00:00	0.00	0.00
358	☐	P_ONT-348	553.27	21:40	0.00	05:50	185.16	553.27
359	☐	P_ONT-350	51.86	02:50	0.00	05:00	17.52	51.86
360	☐	P_ONT-352	51.86	02:50	0.00	05:00	17.52	51.86
361	☐	P_ONT-354	0.00	00:00	0.00	00:00	0.00	0.00
362	☐	P_ONT-356	51.86	00:00	0.00	05:00	17.52	51.86
363	☐	P_ONT-358	3,093.03	21:40	0.00	05:50	1,062.78	3,093.03
364	☐	P_ONT-362	521.43	20:40	0.00	05:00	18.32	521.43
365	☐	P_ONT-368	7,058.76	21:00	0.00	05:50	2,440.33	7,058.76
366	☐	P_ONT-370	62.60	21:00	0.00	05:50	14.69	62.60
367	☐	P_ONT-372	62.60	21:00	0.00	05:50	14.69	62.60
368	☐	P_ONT-374	439.81	21:40	0.00	05:50	144.76	439.81
369	☐	P_ONT-376	1,265.22	21:40	0.00	05:50	426.26	1,265.22
370	☐	P_ONT-378	52.14	21:40	0.00	05:50	17.87	52.14
371	☐	P_ONT-382	529.22	00:10	0.00	05:00	178.84	529.22
372	☐	P_ONT-388	945.74	21:00	71.77	04:40	516.62	873.96
373	☐	P_ONT-406	757.14	00:00	0.00	05:00	255.86	757.14
374	☐	P_ONT-408	757.14	00:00	0.00	05:00	255.86	757.14
375	☐	P_ONT-410	757.14	00:00	0.00	05:00	255.86	757.14
376	☐	P_ONT-412	757.14	00:00	0.00	05:00	255.86	757.14
377	☐	P_ONT-418	697.14	00:00	0.00	05:00	235.59	697.14
378	☐	P_ONT-420	1.95	00:00	0.00	05:00	0.66	1.95
379	☐	P_ONT-422	74.81	10:40	0.00	20:00	51.66	74.81
380	☐	P_ONT-424	2.60	00:00	0.00	05:00	0.88	2.60
381	☐	P_ONT-426	142.03	04:00	0.00	20:00	111.47	142.03
382	☐	P_ONT-428	367.24	10:40	0.00	20:00	251.29	367.24
383	☐	P_ONT-430	367.24	10:40	0.00	20:00	275.43	367.24
384	☐	P_ONT-432	367.24	10:40	0.00	20:00	275.43	367.24
385	☐	P_ONT-434	367.24	10:40	0.00	20:00	275.43	367.24
386	☐	P_ONT-438	280.33	00:00	0.00	05:00	94.73	280.33
387	☐	P_ONT-440	1,548.63	04:00	0.00	20:00	865.63	1,548.63
388	☐	P_ONT-442	746.26	04:00	0.00	20:00	481.72	746.26
389	☐	P_ONT-444	479.93	10:40	0.00	20:00	389.36	479.93
390	☐	P_ONT-446	479.93	10:40	0.00	20:00	389.36	479.93
391	☐	P_ONT-456	262.92	00:00	0.00	05:00	88.85	262.92
392	☐	P_ONT-458	267.64	00:00	0.00	05:00	90.44	267.64
393	☐	P_ONT-460	224.84	10:40	0.00	20:00	181.08	224.84
394	☐	P_ONT-462	60.00	00:00	0.00	05:00	20.28	60.00
395	☐	P_ONT-466	174.09	21:40	0.00	05:50	61.13	174.09
396	☐	P_ONT-468	386.89	21:40	0.00	05:50	132.55	386.89
397	☐	P_ONT-470	746.26	04:00	0.00	20:00	481.72	746.26
398	☐	P_ONT-476	89.67	00:00	0.00	05:00	30.30	89.67
399	☐	P_ONT-480	88.50	00:00	0.00	05:00	29.91	88.50

Future Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
400	☐	P_ONT-482	963.16	21:00	0.00	05:50	303.87	963.16
401	☐	P_ONT-484	253.01	21:00	0.00	05:50	70.92	253.01
402	☐	P_ONT-486	0.00	00:00	0.00	00:00	0.00	0.00
403	☐	P_ONT-492	48.57	00:00	0.00	05:00	16.41	48.57
404	☐	P_ONT-494	24.28	00:00	0.00	05:00	8.21	24.28
405	☐	P_ONT-498	268.92	00:00	0.00	05:00	90.88	268.92
406	☐	P_ONT-500	61.60	00:00	0.00	05:00	20.82	61.60
407	☐	P_ONT-524	340.16	21:40	0.00	05:00	139.15	340.16
408	☐	P_ONT-526	339.99	20:40	0.00	05:00	75.62	339.99
409	☐	P_ONT-528	864.22	00:00	0.00	05:00	292.05	864.22
410	☐	P_ONT-530	25.68	00:00	0.00	05:00	8.68	25.68
411	☐	P_ONT-534	746.26	04:00	0.00	20:00	481.72	746.26
412	☐	P_ONT-540	313.58	09:20	0.00	05:50	100.32	313.58
413	☐	P_ONT-542	349.30	04:30	0.00	05:50	104.29	349.30
414	☐	P_ONT-544	604.02	04:00	0.00	05:50	209.01	604.02
415	☐	P_ONT-552	0.00	00:00	0.00	00:00	0.00	0.00
416	☐	P_ONT-554	238.17	00:00	0.00	05:00	80.49	238.17
417	☐	P_ONT-556	130.48	00:00	0.00	05:00	44.09	130.48
418	☐	P_ONT-560	479.93	10:40	0.00	20:00	326.59	479.93
419	☐	P_ONT-562	1,245.92	00:50	0.00	05:00	421.04	1,245.92
420	☐	P_ONT-564	64.43	00:00	0.00	05:00	21.77	64.43
421	☐	P_ONT-566	32.18	00:00	0.00	05:00	10.87	32.18
422	☐	P_ONT-570	367.24	10:40	0.00	20:00	275.43	367.24
423	☐	P_ONT-572	454.01	21:00	0.00	20:00	304.24	454.01
424	☐	P_ONT-574	454.01	21:00	0.00	20:00	304.24	454.01
425	☐	P_ONT-576	130.98	21:00	0.00	05:50	38.12	130.98
426	☐	P_ONT-578	250.26	00:00	0.00	05:00	84.57	250.26
427	☐	P_ONT-580	0.00	00:00	0.00	00:00	0.00	0.00
428	☐	P_ONT-590	555.27	00:00	0.00	05:00	187.64	555.27
429	☐	P_ONT-592	182.06	00:00	0.00	05:00	61.52	182.06
430	☐	P_ONT-594	181.34	20:40	0.00	05:00	75.10	181.34
431	☐	P_ONT-596	34.95	00:00	0.00	05:00	11.81	34.95
432	☐	P_ONT-598	145.23	21:00	0.00	05:50	29.89	145.23
433	☐	P_ONT-600	40.70	21:40	0.00	05:00	17.12	40.70
434	☐	P_ONT-602	830.24	04:00	0.00	05:50	284.60	830.24
435	☐	P_ONT-604	142.73	21:40	0.00	05:50	49.84	142.73
436	☐	P_ONT-606	113.56	21:40	0.00	05:50	39.31	113.56
437	☐	P_ONT-612	363.47	21:40	0.00	05:50	123.53	363.47
438	☐	P_ONT-614	106.09	04:40	0.00	05:50	21.08	106.09
439	☐	P_ONT-616	343.62	21:40	0.00	05:50	116.11	343.62
440	☐	P_ONT-618	541.42	21:00	0.00	05:50	183.97	541.42
441	☐	P_ONT-622	40.59	24:00	0.00	05:00	13.72	40.59
442	☐	P_ONT-624	60.13	23:10	0.00	05:00	20.32	60.13
443	☐	P_ONT-626	141.28	23:10	0.00	05:00	47.74	141.28
444	☐	P_ONT-628	23.65	00:00	0.00	05:00	7.99	23.65
445	☐	P_ONT-630	0.00	00:00	0.00	00:00	0.00	0.00
446	☐	P_ONT-632	0.00	00:00	0.00	00:00	0.00	0.00
447	☐	P_ONT-634	1,322.48	00:50	0.00	05:00	446.91	1,322.48
448	☐	P_ONT-638	109.51	23:10	0.00	05:00	37.01	109.51
449	☐	P_ONT-642	1,322.48	00:50	0.00	05:00	446.91	1,322.48
450	☐	P_ONT-646	1,322.48	00:50	0.00	05:00	446.91	1,322.48
451	☐	P_ONT-648	1,322.48	00:50	0.00	05:00	446.91	1,322.48
452	☐	P_ONT-666	62.60	21:00	0.00	05:50	14.69	62.60
453	☐	P_ONT-668	158.55	21:40	0.00	05:50	54.96	158.55
454	☐	P_ONT-670	256.79	04:50	0.00	05:50	32.58	256.79
455	☐	P_ONT-672	751.61	21:40	0.00	05:50	255.73	751.61
456	☐	P_ONT-674	161.13	00:00	0.00	05:00	54.45	161.13

Future Scenario - Pipe Output - Pipe Flow Range Report

		ID	Max.Value (gpm)	Max.Time (hrs.)	Min.Value (gpm)	Min.Time (hrs.)	Average (gpm)	Difference (gpm)
457	☐	P_ONT-676	108.96	21:00	0.00	05:50	32.09	108.96
458	☐	P_ONT-678	941.31	21:00	0.00	05:00	308.10	941.31
459	☐	P_ONT-680	26.88	00:00	0.00	05:00	9.08	26.88

APPENDIX D

The Metropolitan Water District of Southern California 2020 UWMP

2020
URBAN WATER MANAGEMENT PLAN

JUNE 2021

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

2020

URBAN WATER MANAGEMENT PLAN

JUNE 2021

WATER TOMORROW
Planning for the Future

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

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LIST OF ABBREVIATIONS

Abbreviation	Terms
Units of Measurement	
AF	Acre-Feet
AFY	Acre-feet per Year
TAF	Thousand Acre-Feet
MAF	Million Acre-Feet
cfs	Cubic feet per second
GPCD	Gallons per Capita per Day
MGD	Million gallons per Day
mg/L	Milligrams per liter
MW	Megawatts
µg/L	Micrograms per liter
ng/L	Nanograms per liter
pCi/L	Picocuries per liter
kWh	Kilo-Watt Hour
Acronyms	
AGWA	Association of Ground Water Agencies
AMPAC	American Pacific Corporation
AVEK	Antelope Valley East Kern Water Agency
AWE	Alliance for Water Efficiency
AWWA	American Water Works Association
BDCP	Bay Delta Conservation Plan
BMPs	Best Management Practices
CAP	Climate Action Plan
CAWCD	Central Arizona Water Conservation District
CBM	Condition-based maintenance
CCL3	Contaminant Candidate List 3
CCP	Conservation Credits Program
CCWD	Contra Costa Water District
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CECs	Constituents of Emerging Concern
CEQA	California Environmental Quality Act
CII	Commercial, Industrial, and Institutional
CMMS	Computerized Maintenance Management System
CO_2	Carbon Dioxide
CPE	Comprehensive Program Evaluation
CRA	Colorado River Aqueduct
CRSS	Colorado River Simulation System
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVWD	Coachella Valley Water District
CWC	California Water Code
CWSRF	Clean Water State Revolving Fund
CY	Calendar Year
DAC	Disadvantaged Community

LIST OF ABBREVIATIONS

Abbreviation	Terms
D/DBP	Disinfectants/Disinfection Byproduct
DBP	Disinfection Byproduct
DCP	Drought Contingency Plan
DDW	The SWRCB's Division of Drinking Water
DFW	Department of Fish and Wildlife
DLR	Detection Level for purposes of Reporting
DMM	Demand Management Measure
DOE	U.S. Department of Energy
DPC	Delta Protection Commission
DPR	Direct Potable Reuse
DRA	Drought Risk Assessment
DSOD	Division of Safety of Dams
DTSC	California Department of Toxic Substances Control
DVL	Diamond Valley Lake
DWA	Desert Water Agency
DWCV	Desert Water Agency/Coachella Valley Water District
DWR	California Department of Water Resources
ECLO	Existing Conveyance and Low Outflow
EDD	California Employment Development Department
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ELPH	Equivalent Level of Public Health Protection
ESA	Endangered Species Act
ESP	Energy Sustainability Plan
ET_o	Evapotranspiration
FSA	Future Supply Actions
FWUA	Friant Water Users Authority
FY	Fiscal Year
GHG	Greenhouse Gas Emissions
GRP	Groundwater Recovery Program
GWRS	Groundwater Replenishment System
HECW	High Efficiency Clothes Washer
HET	High Efficiency Toilet
HTC	Hyatt/Thermalito Complex
ICP	Innovative Conservation Program
ICS	Intentionally Created Surplus
IEUA	Inland Empire Utilities Agency
IID	Imperial Irrigation District
IPR	Indirect Potable Reuse
IRP	Integrated Water Resources Plan
IRPSIM	Integrated Water Resources Plan Simulation Model
JWPCP	Joint Water Pollution Control Plant
LAA	Los Angeles Aqueduct
LADWP	Los Angeles Department of Water and Power
LRP	Local Resources Program
M&I	Municipal & Industrial

LIST OF ABBREVIATIONS

Abbreviation	Terms
MCL	Maximum Contaminant Level
MFR	Multi-family Residential
MLPA	Marine Life Protected Area
MOU	Memorandum of Understanding
MWD	The Metropolitan Water District of Southern California
MWD-EDM	Metropolitan's Econometric Demand Model
MWDOC	Municipal Water District of Orange County
MWELO	Model Water Efficient Landscape Ordinance
MWQI	Municipal Water Quality Investigations
NASA	National Aeronautics and Space Administration
NDEP	Nevada Division of Environmental Protection
NDMA	N-nitrosodimethylamine
NEPA	National Environmental Policy Act
NERT	Nevada Environmental Response Trust
NMFS	National Marine Fisheries Services
OCWD	Orange County Water District
OEHHA	Office of Environmental Health Hazard Assessment
OMP&R	Operation, Maintenance, Power and Replacement
PFAS	Per- and polyfluoroalkyl substances
PFBS	Perfluorobutane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PG&E	Pacific Gas & Electric
PHG	Public Health Goal
polyDADMAC	polydiallyldimethylammonium chloride
PPCP	Pharmaceutical/Personal Care Product
PPRs	Present Perfected Rights
PVID	Palo Verde Irrigation District
QMCP	Quagga Mussel Control Program
QSA	Quantification Settlement Agreement
RDM	Robust Decision Making
RPAs	Reasonable and Prudent Alternatives
RRWP	Regional Recycled Water Program
RTP-12	2012-2035 Regional Transportation Plan/Sustainable Communities Strategy
RTS	Readiness-to-Serve Charge
RWA	Raw Water Augmentation
SAF	San Andreas Fault
SANDAG	San Diego Association of Governments
SAR	System Access Rate
SARI Line	Santa Ana Regional Interceptor Line
SB X7-7	Senate Bill X7-7, Water Conservation Act of 2009
SCAG	Southern California Association of Governments
SCWC	Southern California Water Coalition
SDCWA	San Diego County Water Authority
SDP	Seawater Desalination Program

LIST OF ABBREVIATIONS

Abbreviation	Terms
Series 13	SANDAG Series 13: 2050 Regional Growth Forecast
SFR	Single-Family Residential Model
SNMP	Salt and Nutrient Management Plan
SNWA	Southern Nevada Water Authority
SPR	System Power Rate
SRCSD	Sacramento Regional County Sanitation District
SRWSTF	Seismic Resilience Water Supply Task Force
SWC	State Water Contractors
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TVMWD	Three Valleys Municipal Water District
UCMR2	Unregulated Contaminant Monitoring Regulation 2
USBR	U.S. Department of the Interior, Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Services
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compound
WIFIA	Water Infrastructure Finance and Innovation Act
WRD	Water Replenishment District of Southern California
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDM Plan	Water Surplus and Drought Management Plan
WSR	Water Stewardship Rate
WUCA	Water Utility Climate Alliance
WUE	Water Use Efficiency
YCWA	Yuba County Water Agency

Phrases

2015 IRP Update	2015 Integrated Water Resources Plan, Water Tomorrow
Act	Urban Water Management Planning Act
Annual Assessments	Annual Water Supply and Demand Assessment
Arvin-Edison	Arvin-Edison Water Storage District
Bank	Governor’s Water Bank
Bay-Delta	San Francisco Bay/Sacramento-San Joaquin Delta
California Plan	California’s Colorado River Water Use Plan
Conservancy	Sacramento-San Joaquin Delta Conservancy
Council	Delta Stewardship Council
Delta	Sacramento/San Joaquin River Delta
Forum	Colorado River Basin Salinity Control Forum
Kern Delta	Kern Delta Water District
Metropolitan	The Metropolitan Water District of Southern California
MWD Act	Metropolitan Water District Act
Plan	Urban Water Management Plan
Policy	State Recycled Water Policy

LIST OF ABBREVIATIONS

Abbreviation	Terms
Regional Board	Regional Water Quality Control Board
Sanitation Districts	Los Angeles County Sanitation Districts
Science Board	Delta Independent Science Board
Semitropic	Semitropic Water Storage District

Summary of Compliance

SB X7-7	
Water Code § 10608.36 – Assessment of Measures, Programs, and Policies	Assess present and proposed future measures, programs, and policies to help achieve water use reduction targets • Metropolitan's actions to help achieve the urban per capita water use reduction pursuant to the goals set forth in SB X7-7 are discussed in Sections 3.4, 3.5, and 3.7.
Agency Coordination	
Water Code § 10610.2(a)(4)	Water suppliers should collaborate closely with local land-use authorities to ensure water demand forecasts are consistent with current land-use planning. • See Sections 2 and 5 and Appendix 1.
Water Code § 10620(d)(2) – Develop Water Shortage Contingency Plan	Each urban water supplier shall develop its own water shortage contingency plan. • See Section 2.5 and Appendix 4.
Water Code § 10620(d)(3) – Coordination with Appropriate Agencies	Describe the coordination of the plan preparation. • See Section 5.
Water Code § 10620(f) – Describe Resource Maximization/Import Minimization Plan	Discuss how water management tools and options are used to maximize resources and minimize the need to import water. • Metropolitan's planning strategy within the IRP and adaptive implementation approach are discussed in Section 2 and provide an overview of the water management tools and options. See pages 2-2 through 2-6. • Further details are provided in Sections 1.4 (conservation and local resources, pages 1-25 through 1-27), 3.4 (demand management and conservation, pages 3-37 through 3-55), and 3.5 (recycling, groundwater recovery, and desalination, pages 3-56 through 3-78.)
Water Code § 10621(b) – City and County Notification and Participation	Notify any city or county within service area of Urban Water Management Plan (UWMP) review & revision at least 60 days before public hearing. May consult with and obtain comments from notified cities and counties. • Notification and participation are discussed in Section 5, pages 5-1 through 5-10, and Appendix 12, DWR Submittal Table 10-1.
Water Code § 10621(f) – Plan Submittal to Department of Water Resources (DWR)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021 • Submission of the 2020 UWMP by the July 1, 2021 deadline is detailed in Section 5.
Contents of UWMP	
Water Code § 10630.5 – Simple Lay Description	Include a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, the agency's strategy for meeting its water needs, the challenges the agency faces, and any other information necessary to provide a general understanding of the plan. • The Simple Lay Description is contained in the Executive Summary.

Summary of Compliance

Water Code § 10631(a) – Service Area Information	Describe service area of supplier • Service area is discussed in Section 1.2, pages 1-6 through 1-10 and shown in Figure 1-1. Include current and projected population • Population is discussed in Section 1.3 and shown in Table 1-1, Figure 1-2, and Figure 1-3. • Population analysis is discussed in Appendix 1, page A.1-5. Projections are on page A.1-10, Table A.1-2. • Current and projected population are shown in Appendix 12, DWR Submittal Table 3-1. Population projections must be based on data from state, regional or local service agency projections • See footnote Table A.1-2, page A.1-10. Describe climate characteristics that affect water management • See Section 1.3, pages l-14 through l-16, Figure 1-5, and Table 1-4, and Section 2.6, pages 2-43 through 2-48. Describe other social, economic, and demographic factors affecting water management • See Section 1.3, pages 1-12 through 1-14 and Appendix 1. Describe current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information. • See methodologies and assumptions for developing projections of demand and water use in Section 2.2.
Water Code § 10631(b)(1-3) – Water Sources	Identify and quantify existing and planned water supply sources in 5-year increments to 20 years or as far as data is available • Current supplies and quantities are described in Section 1.4, pages 1-21 through 1-30. • Historic and current water supplies are described in Appendix 2. • Planned water supplies and quantities are discussed in Section 2, and details are provided in Appendix 3, and particularly in Table A.3-7, pages A.3-58 through A.3-70. • See Appendix 12, DWR Submittal Tables 6-8 and 6-9. Detailed discussion of anticipated supply availability under normal water year, single dry year, and droughts lasting at least 5 years, as well as more frequent and severe drought periods (as described in the drought risk assessment). For each water supply source, consider any information pertinent to the Section 10635 reliability analysis, including climate change. • See Section 2, Tables 2-4 through 2-7, pages 2-18 through 2-25. • See Section 2.2 (estimating demand on Metropolitan) page 2-9, • See Section 2.3 (water reliability assessment), pages 2-15 through 2-20, Section 2.4 (drought risk assessment), pages 2-21 through 2-25, Section 2.6 (other supply reliability risks), pages 2-43 through 2-48, and the discussions presented under the Colorado River and State Water Project (SWP), Sections 3.1 and 3.2. • See Section 3 and Appendices 3 and 5 • See Appendix 12, DWR Submittal Tables 7-1, 7-2, 7-3, 7-4, and 7-5.

	Describe the management of each supply source in correlation with the other supplies. • See Section 3 and Appendix 3. Describe the measures being taken to acquire and develop planned water supply sources. • See Section 3 and Appendix 3.
Water Code § 10631(b)(4) – If Groundwater Identified as Existing or Planned Source	Metropolitan does not supply groundwater. However, Metropolitan partners with various entities for groundwater storage and exchange programs. • See Sections 3.3, 3.5, and 3.6; Appendix 2 (pages A.2-4 through A.2-5, A.2-8 through A.2-9, A.2-15); and Appendix 3 (pages A.3-25 through A.3-28, A.3-31 through A.3-32, A.3-53 through A.3-55) for discussions of issues related to groundwater basins. • See Section 4 for salinity issues related to groundwater basins.
Water Code § 10631(c) – Transfer or Exchange Opportunities	Describe short-term and long-term exchange or transfer opportunities • Section 1.4 (augmenting water supplies), pages 1-27 through 1-28. • Section 3.1 (pages 3-3 through 3-12) describes plans for banking, exchange and transfer opportunities along the Colorado River and Aqueduct. • Section 3.2 (pages 3-13 through 3-30) describes plans for banking, exchange and transfer opportunities within the State Water Project. • Section 3.3 (pages 3-31 through 3-36) describes plans for banking, exchange and transfer opportunities within the Central Valley/State Water Project. • Section 3.6 (pages 3-79 through 3-82) describes plans for banking, exchange and transfer opportunities within the local region. • Further details are provided in Appendix 3, particularly Table A.3-7 on pages A.3-58 through A.3-70.
Water Code §§ 10631(d)(1) and (2) – Past, Current, and Projected Water Use	Urban retail water suppliers are to quantify past, current, and projected water use by sector in five-year increments • Not applicable to Metropolitan (which is a wholesaler) because this reporting requirement applies only to urban retail water suppliers. However, Metropolitan voluntarily provides this information in the following Sections: • See Section 1.3, page 1-13 and Figure 1-4 for historical retail water demands. • Past, current, and future water uses are shown in Appendix 1, Table A.1-13 on page A.1-14. Water uses by sector and county are shown in Tables A.1-6 through A.1-11 on pages A.1-13 through A.1-15. Water demands by sector are shown in Appendix 12 DWR Submittal Tables 4-1, 4-2, and 4-3. Identify and quantify sales to other agencies • See Section 1.3, page 1-13 and Figure 1-4 for historical retail water demands. • Historic sales are presented in Table A.2-2 on page A.2-3. • Metropolitan does not project sales by individual agency. However, total projected sales/demands to other agencies are shown in Section 2.2, pages 2-7 through 2-14.

Summary of Compliance

Water Code §§ 10631(d)(1)(J), (d)(3)(A)-(C) – Distribution System Water Loss	Urban retail water suppliers are to quantify distribution system water loss for each of the 5 years before the plan update • Not applicable to Metropolitan (which is a wholesaler) because this reporting requirement applies only to urban retail water suppliers. However, Metropolitan voluntarily provides this information in the following Sections: • Section 2.6, page 2-43, Appendix 7, Tables A.7-1 to A.7-5, and Appendix 12, DWR Submittal Table 4-4 (Optional for Wholesaler).
Water Code § 10631(d)(4)(A) and (B) – Water Savings Estimate	Water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans Provide citations to the codes, standards, ordinances, or transportation and land use plans used to make projections Indicate extent that water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. • See discussion on estimating demands and code-based conservation in Section 2, page 2-9 and Appendix 6.
Water Code § 10631(e)(2) – Description of Supplier's Water Demand Management Measures, Distribution System Asset Management, Assistance Programs	Provide narrative description of items in §10631(e)(1)(B)(ii), (iv), (vi), and (vii), distribution system asset management, and wholesale supplier assistance programs • See discussion on metering, Section 3.4, page 3-47. • See discussion on public education and outreach, Section 3.4, pages 3-38 through 3-43. • See discussion on water conservation programs, Section 3.4, pages 3-44 through 3-46. • See discussion on demand management and conservation, Section 3.4, pages 3-37 through 3-52. • See discussion on distribution system asset management, Section 3.4, pages 3-53 through 3-55. • See discussion on assistance programs to retail water agencies (rebate programs, public education and outreach, and other efforts to reduce water demand), Section 3.4, pages 3-37 through 3-52.
Water Code § 10631(f) – Planned Water Supply Projects and Programs	Detailed description of expected future supply projects & programs to meet projected water use Timeline for each proposed project or program Quantification of each project's normal water year yield (AFY) Quantification of each project's single dry-year water year yield (AFY) Quantification of each project's 5-year drought yield (AFY) • Section 3.1 (pages 3-3 through 3-12) describes plans for banking, exchange and transfer opportunities along the Colorado River and Aqueduct. • Section 3.2 (pages 3-13 through 3-30) describes plans for banking, exchange and transfer opportunities within the State Water Project. • Section 3.3 (pages 3-31 through 3-36) describes plans for banking, exchange and transfer opportunities within the Central Valley/State Water Project. • Section 3.6 (pages 3-79 through 3-82) describes plans for banking, exchange and transfer opportunities within the local region. • Further details are provided in Appendix 3, particularly Table A.3-7 on pages A.3-58 through A.3-70. • See Appendix 12, DWR Submittal Table 6-7.

Summary of Compliance

Water Code § 10631(g) – Opportunities for Development of Desalinated Water	Describe opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply • See discussion on groundwater recovery and seawater desalination in Section 1.4, pages 1-24 through 1-26, and Section 3.5, pages 3-56 through 3-73. • See Appendix 5, Table A.5-2 on pages A.5-9 through A.5-11 for a list of existing, under construction, CEQA, and conceptual groundwater recovery projects and their ultimate yield/capacity. • See Appendix 5, Table A.5-3 on page A.5-12 for a list of existing, CEQA, and conceptual seawater desalination projects.
Water Code § 10631(h) – If Supplier Relies on a Wholesale Supplier for Water	Urban water suppliers that rely on wholesale agency for water source must provide wholesale agency with water use projections in 5-year increments to 20 years or as far as data is available. Wholesaler to provide urban water suppliers with existing and planned water supply availability projections, by source, and planned water supply quantities over same 5-year increments and during various water-year types. • See discussions on Metropolitan and member agency coordination for the IRP Process in Sections 2 and 5. • See Appendix 3, Table A.3-7, and Appendix 12, DWR Submittal Table 2-4.
Water Code § 10631.1 – Projected Water Use for Low-Income Housing	Water use projections for single-family and multi-family residential housing for lower income households. • This is incorporated with the retail demand forecast, as reflected in Section 2 and Appendix 1.
Water Code § 10631.2 – Calculation or Estimation of Energy Intensity of Urban Water Systems	Must include any of the following that the supplier can readily obtain: estimated amount of energy for extraction or diversion (from sources), conveyance, treatment, distribution, treated water supplies compared to nontreated water supplies, and storage of water, and any other appropriate energy-related information. • Estimate of the amount of energy used and energy intensity is presented in Appendix 10. • See Section 3.8 for discussion of Metropolitan's Energy Management Initiative.
Water Shortage Contingency Plan	
Water Code § 10632 – Water Shortage Contingency Plan **Water Code § 10632(a)(1) – Analysis of Water Supply Reliability**	Every supplier shall prepare and adopt a water shortage contingency plan as part of its Plan. Water shortage contingency plan must include the analysis of water supply reliability conducted pursuant to Section 10635. • See Section 2.5 and Appendix 4 For Water Supply Reliability assessments • See Sections 2.2, 2.3, and 2.4

Summary of Compliance

Water Code § 10632(a)(2) – Procedures Used to Conduct Annual Water Supply and Demand Assessment	Written decision-making process used each year to determine water supply reliability. Key data inputs and assessment methodology to evaluate water supply reliability for current year and one dry year, including: (i) current year unconstrained demand, (ii) current year available supply, (iii) existing infrastructure capabilities and plausible constraints, (iv) locally applicable evaluation criteria used for each annual water supply and demand assessment, and (v) description and quantification of each water supply source. • See Section 2.5 and Appendix 4
Water Code § 10632(a)(3)(A) – Six Standard Water Shortage Levels	Six standard water shortage levels corresponding to ranges of up to 10, 20, 30, 40, and 50% shortages and greater than 50% shortage. Shortage levels shall be defined based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other conditions indicative of available water supply. Shortage levels also apply to catastrophic interruption of water supplies, including regional power outage, earthquake, Delta levee failure, and aqueduct failure. • See discussion of Water Shortage Contingency Plan in Section 2.5 and Appendix 4, including description of Metropolitan's Water Surplus and Drought Management Plan and Water Supply Allocation Plan. • See discussion of Metropolitan's Emergency Storage Objective developed under its catastrophic supply interruption plan in Section 2.5 and Appendix 8. • See Appendix 12, DWR Submittal Tables 8-1, 8-2, and 8-3
Water Code § 10632(a)(4) – Shortage Response Actions	Shortage response actions that align with the shortage levels and include: (i) supply augmentation actions, (ii) demand reduction actions, (iii) operational changes, (iv) mandatory prohibitions against specific water use practices, and (v) estimated extent to which the gap between supplies and demand will be reduced by each action. • See discussion of Water Shortage Contingency Plan in Section 2.5 and Appendix 4, including description of Metropolitan's Water Surplus and Drought Management Plan and Water Supply Allocation Plan. • See discussion of Metropolitan's Emergency Storage Objective developed under its catastrophic supply interruption plan in Section 2.5 and Appendix 8. • See Appendix 12, DWR Submittal Tables 8-1, 8-2, and 8-3.
Water Code § 10632(a)(5) – Communication Protocols and Procedures	Communication protocols and procedures to inform customers, the public, interested parties, and governments regarding: (i) any current or predicted shortages, (ii) any shortage response actions triggered or expected to be triggered, and (iii) any other relevant communications. • See Section 2.5 and Appendix 4.
Water Code § 10632(a)(6) – Customer Compliance, Enforcement, Appeal, and Exemption Procedures	For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions. • Not applicable to Metropolitan as a wholesaler.

Summary of Compliance

Water Code § 10632(a)(7) – Legal Authorities	Describe legal authorities that empower supplier to implement shortage response actions. Statement that supplier will declare a water shortage emergency in compliance with Chapter 3 (Water Code §§ 350-359 re Water Shortage Emergencies). Statement that supplier will coordinate with any city or county within which it supplies water supply services for the possible proclamation of a local emergency. • See Section 2.5 and Appendix 4.
Water Code § 10632(a)(8) – Financial Consequences	Describe financial consequences of and responses for drought conditions. Describe potential revenue reductions and expense increases associated with shortage response actions, and mitigation actions to address such reductions and increases. Describe cost of compliance with Chapter 3.3 (Water Code §§ 365-367 re Excessive Water Use During Drought). • See Sections 2.5 and 2.7, page 2-27, and Appendix 4.
Water Code § 10632(a)(9) – Monitoring and Reporting Requirements and Procedures for Customer Compliance and State Reporting	For an urban retail water supplier, monitoring and reporting requirements and procedures for monitoring customer compliance and to meet state reporting requirements. • Not applicable to Metropolitan as a wholesaler.
Water Code § 10632(a)(10) – Reevaluation and Improvement Procedures	Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan. • See Section 2.5 and Appendix 4.
Water Code § 10632(b) – Water Features	Analyze and define water features artificially supplied with water separately from swimming pools and spas when developing water shortage contingency plan • Not applicable to Metropolitan because prohibitions against specific water use practices are enforced on end users and are not within Metropolitan's authority as a wholesaler.
Water Code § 10632(c) – Plan Availability	Water shortage contingency plan shall be available to customers and any city or county within which the supplier provides water supplies no later than 30 days after adoption of the plan. • Posting of water shortage contingency plan on Metropolitan's website and provision of water shortage contingency plan to cities and counties are described in Section 5.
Water Code § 10632.5 – Seismic Risk Assessment and Mitigation Plan	Include a seismic risk assessment and mitigation plan. • See Section 2.5 and Appendix 9.

Summary of Compliance

Recycled Water Plan	
Water Code § 10633 – Recycled Water as Potential Water Source; Agency Coordination	Provide information, to the extent available, on recycled water and its potential as a water source in the supplier's service area. Coordinate plan preparation with local water, wastewater, groundwater, and planning agencies within supplier's service area. • See Section 1.4, pages 1-24 through 1-30, Section 3.5, pages 3-56 through 3-78, Tables 3-12 and 3-13 on pages 3-76 through 3-77, Appendix 2, pages A.2-8 through A.2-9, and Appendix 5, Table A.5-1. • Coordination of the plan preparation is discussed in Section 5.
Water Code § 10633(a) – Wastewater System Description	Describe the wastewater collection and treatment systems in the supplier's service area Quantify the volume of wastewater collected and treated • Not applicable to Metropolitan because it does not collect or treat the wastewater generated within its service area. Instead, Metropolitan provides a general narrative description of the wastewater collection and treatment systems operated by others in its service area. • See Section 3.5, pages 3-57 through 3-78, Table 3-8 on page 3-57, Tables 3-12 and 3-13 on pages 3-76 through 3-77, Appendix 2, pages A.2-8 through A.2-9, and Appendix 5, Table A.5-1.
Water Code § 10633(a) through (d) – Wastewater Disposal and Recycled Water Uses	Describes methods of wastewater disposal in the supplier's service area • Not applicable to Metropolitan because it does not dispose of wastewater within its service area. Instead, Metropolitan provides a general narrative description of wastewater disposal by others in its service area. • See Section 3.5, pages 3-57 through 3-78. Describe quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project. • Not applicable to Metropolitan because it does not treat or discharge recycled water. Instead, Metropolitan provides a general narrative description of the treatment and discharge of recycled water by others in its service area. • See Section 3.5, pages 3-57 through 3-78. Describe the current type, place and quantity of use of recycled water in supplier's service area Describe and quantify potential uses of recycled water Determination of technical and economic feasibility of serving the potential uses • Not applicable to Metropolitan because it does not use recycled water in its service area. Instead, Metropolitan provides a general narrative description of the use of recycled water by others in its service area, including potential uses and the technical and economic feasibility of serving the potential uses of recycled water • See Section 3.5, pages 3-56 through 3-78, Section 4, pages 4-6 through 4-7, Appendix 2, pages A.2-8 through A.2-9, and Table A.5-1.

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Water Code § 10633(e) – Projected Uses of Recycled Water	Projected use of recycled water in service area at the end of 5, 10, 15, and 20 years • See Section 2, Tables 2-1 through Table 2-3, pages 2-12 through 2-14 and Section 3.5. Compare UWMP 2015 projections with UWMP 2020 actual use of recycled water • The 2015 UWMP, Tables 2-1, 2-2, and 2-3 included the following projections for recycled water use in 2020 (without the Santa Ana River baseflow): 436 TAF for a single dry year; 427 TAF for a multiple dry year; and 436 TAF for an average year. In 2020, actual recycled water use is estimated at 441 TAF, as discussed in Table 3-14 on page 3-77 and Appendix 2, page A.2-8 of this 2020 UWMP. • See Appendix 12, DWR Submittal Table 6-5.
Water Code §§ 10633(f), (g) – Actions to Encourage Use of Recycled Water Plan to Optimize Use of Recycled Water	Describe actions, including financial incentives, that might be taken to encourage recycled water uses Describe projected results of these actions in terms of acre-feet of recycled water used per year Provide a plan to optimize the use of recycled water in the supplier's service area • Metropolitan provides a general narrative description of the actions it takes to encourage recycled water uses in its service area • See Section 1.4, pages 1-24 through 1-25, 1-27, Table 1-5, Section 3.5, pages 3-56 through 3-78, Tables 3-12 and 3-13 on pages 3-76 and 3-77, and Appendix 5, Table A.5-1.
Water Quality Impacts on Reliability	
Water Code § 10634 – Water Quality Impacts on Availability and Reliability of Supply	Discuss water quality of existing sources in 5-year increments to 20 years and how water quality affects water management strategies and supply reliability • See Section 3.2, SWP Water Quality, pages 3-25 through 3-27, 3-29. • See Section 4, Water Quality, pages 4-1 through 4-21.
Water Service Reliability	
Water Code § 10635(a) – Supply and Demand Comparison: Normal Water Year	Compare the projected normal water supply to projected normal water use over the next 20 years, in 5-year increments. • For projected water use, see Section 2, Table 2-3, page 2-14. • For projected water supply, see Table 2-6, page 2-19 and Table A.3-7 in Appendix 3, pages A.3-58 through A.3-70, and Appendix 12, DWR Submittal Table 7-2.
Water Code § 10635(a) – Supply and Demand Comparison: Single-Dry Year Scenario	Compare the projected single-dry year water supply to projected single-dry year water use over the next 20 years, in 5-year increments. • For projected water use, see Section 2, Table 2-1, page 2-12. • For projected water supply, see Table 2-4, page 2-17 and Table A.3-7 in Appendix 3, pages A.3-59 through A.3-70, and Appendix 12, DWR Submittal Table 7-3.

Summary of Compliance

Water Code § 10635(a) – Supply and Demand Comparison: 5-Year Drought Scenario	Project a 5-year drought period occurring between 2021-2025 and compare projected supply and demand during those years Project a 5-year drought period occurring between 2026-2030 and compare projected supply and demand during those years Project a 5-year drought period occurring between 2031-2035 and compare projected supply and demand during those years Project a 5-year drought period occurring between 2036-2040 and compare projected supply and demand during those years • Metropolitan has projected 5-year periods for the next 20 years. • For projected water use, see Section 2, Table 2-2, page 2-13. • For projected water supply, see Table 2-5, page 2-18 and Table A.3-7 in Appendix 3, pages A.3-58 through A.3-70. • See Appendix 12, DWR Submittal Table 7-4.
Water Code § 10635(b) – Drought Risk Assessment	Include a drought risk assessment for water service to customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the Plan. • See Section 2.4.
Water Code § 10635(b)(1) – Data, Methodology, and Basis	Describe the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a 5-year drought, starting from the year following when the assessment is conducted. • See Sections 2.1 and 2.4, and Appendices 1 and 3, specifically Table A.3-8.
Water Code § 10635(b)(2) – Reliability of Each Supply Source	Determine the reliability of each supply source under a variety of water shortage conditions. • See Section 2.3, specifically Tables 2-4, 2-5, and 2-6, and Appendix 3, specifically Tables A.3-7 and A.3-8.
Water Code § 10635(b)(3) – Comparison of Total Water Supply Sources to Total Projected Water Use	Compare the total water supply sources available with the total projected water use for the drought period. • See Section 2.3, specifically Tables 2-4, 2-5, and 2-6.
Water Code § 10635(b)(4) – Historical Drought Hydrology, Projected Supply and Demand Changes Due to Climate Change, Regulatory Changes, and Other Criteria	Consider historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria. • See Sections 1.4, 2.6, 4, and Appendices 1, 2, 3, and 6.
Water Code § 10635(c) – Plan Submittal to Cities and Counties	Supplier to provide portion of Plan on water service reliability to cities and counties within its service area no later than 60 days after Plan submittal. • Provision of Plan to cities and counties is described in Section 5.
Water Code § 10640 – Water Shortage Contingency Plan	Supplier to prepare a water shortage contingency plan pursuant to Section 10632, periodically review the water shortage contingency plan, and adopt any amendments or changes. • See Section 2.5 and Appendix 4.

Summary of Compliance

Water Code § 10641 – Consultations with public agency, state agency or experts	Supplier may consult with and obtain comments from any public agency, state agency, or any person with special expertise as to water demand management methods and techniques • Stakeholder, state agency, public agency, and expert participation, consultation, outreach, comments, and notification are described in Section 5.
Water Code § 10642 – Public Hearing; Notice; Adoption	Encourage involvement of diverse social, cultural & economic community groups prior to and during Plan and water shortage contingency plan preparation • See Section 5, pages 5-1 through 5-12. Prior to adoption, Plan and water shortage contingency plan available for public inspection and hold public hearing • See Section 5, pages 5-5 and 5-12. Provide proof of public hearing and notice • See Section 5, page 5-11. Provide meeting notice to any city or county in service area • See Section 5, pages 5-8 and 5-11, and Appendix 12, DWR Submittal Table 10-1. Provide notice pursuant to Chapter 17.5 of the Government Code • See Section 5, page 5-12. After hearing, Plan and water shortage contingency plan shall be adopted as prepared or as modified after hearing. • See Section 5, pages 5-13 and 5-15.
Water Code §§ 10615, 10643 – Plan Implementation	Include in Plan strategy and time schedule for implementation Implement Plan in accordance with the schedule set forth in the Plan • Metropolitan has conducted a review of its planning progress through the 2020 IRP Update, discussed in Section 2. In addition, in each section, Metropolitan has included an "Achievement to Date" that discusses progress towards its planning goals, current issues, and potential problems with continued implementation of the Plan. • Section 3 summarizes the implementation plan and continued progress in developing a diversified resource mix consistent with the IRP to meet the region's water supply needs DMM Programs • Metropolitan's conservation plan and approach are discussed in Section 3.4. Individual conservation programs are discussed on pages 3-44 through 3-48.
Water Code § 10644(a)(1) –Plan Submittal	Submit to DWR, the California State Library, and any city or county within service area copy of Plan no later than 30 days after adoption. • Plan submission is described in Section 5.
Water Code § 10644(a)(2) – Plan shall include any Standardized Forms, Tables, or Displays specified by DWR	Submit Plan electronically Include in Plan DWR's standardized forms, tables, or displays • Plan submission is described in Section 5. • DWR's standardized tables for wholesale urban water agencies are completed and presented in Appendix 12.
Water Code § 10644(b) – Water Shortage Contingency Plan Revision	Submit copy of revised water shortage contingency plan to DWR no later than 30 days after adoption. • Plan submission is described in Section 5 and Appendix 4.

Summary of Compliance

Water Code § 10645 – Plan and Water Shortage Contingency Plan Available for Public Review	No later than 30 days after plan submittal, the supplier and DWR to make the Plan and water shortage contingency plan available for public review during normal business hours. • Posting of Plan and water shortage contingency plan on Metropolitan's website for public review is described in Section 5.

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Executive Summary and Simple Lay Description of 2020 UWMP Findings

Metropolitan's 2020 Urban Water Management Plan (UWMP) has been prepared in compliance with the California Water Code (CWC)[1]. This Executive Summary satisfies the requirement of CWC Section 10630.5 to include a simple lay description of information necessary to provide a general understanding of the plan, including a description of Metropolitan's reliable water, as well as its needs, strategies, and potential challenges for the foreseeable future.

This plan provides an assessment of Metropolitan's water service reliability, describes and evaluates sources of water supply, efficient uses of water, demand management measures, implementation strategy and schedule, and other relevant information and programs. In addition to the water reliability assessments, the plan includes an evaluation of frequent and severe periods of droughts, as described in the Drought Risk Assessment, and the preparation and adoption of the Water Shortage Contingency Plan (WSCP).

Metropolitan's 2020 UWMP was developed as part of the 2020 Integrated Water Resources Plan (IRP) planning process and provides a representation of Metropolitan's planning elements reported under the conditions required by the Act. The IRP represents Metropolitan's comprehensive planning process and will serve as Metropolitan's blueprint for long-term water reliability, including key supply development and water use efficiency goals. Together, these plans serve as the reliability roadmap for the region. The planning process involved extensive coordination with Southern California's water agencies, municipal service providers, and public planning agencies. Metropolitan's Board of Directors provided oversight throughout the ongoing process for the development of the 2020 IRP that informed the preparation of the 2020 UWMP. Metropolitan's outreach efforts sought to engage the general public, businesses, environmental organizations, diverse communities, cities, counties, and other stakeholders with an interest in the future of Southern California's water supplies. The information included in the 2020 UWMP represents the most current and available planning projections of supply capability and demand forecasts developed through a collaborative process with the member agencies.

As with Metropolitan's previous plans, the 2020 UWMP does not explicitly discuss specific activities undertaken by its member agencies unless they relate to one of Metropolitan's water demand or supply management programs. Presumably, each member agency will discuss these activities in its UWMP.

Factors Considered for Metropolitan's Water Reliability Assessments for the UWMP

The Act requires reporting agencies to describe their water service reliability under the conditions associated with a normal water year, single dry-year, and droughts lasting at least five consecutive water years, with projected information in five-year increments for 20 years. The factors used to evaluate Metropolitan's supply and demand balance for the 2020 UWMP are

[1] This UWMP complies with the Urban Water Management Planning Act (Act), which was added by Statute 1983, Chapter 1009, became effective on January 1, 1984, and currently includes CWC Sections 10610 through 10657; and with CWC Section 10608.36 which was added by SB X7-7 in 2009.

presented below. Some of the considerations and resulting projections may change as Metropolitan's planning progresses. These changes may be reflected in future updates of the UWMP. Metropolitan and its member agencies have engaged in a comprehensive regional planning process called the IRP since the 1990s. In its 2020 IRP process, Metropolitan and its member agencies are using a scenario planning approach to identify and account for the broad range of uncertainty that the region faces in its water supplies and demands. Instead of focusing on a target for future water supply needs based on a single projected outcome of supplies and demands, this approach encouraged broader thinking and discussion of possible future conditions for local and imported water supply and retail demand, and the policy implications for Metropolitan and its service area. Adaptive management during implementation will allow flexibility in how the region prepares for the supply and demand conditions as they evolve through the future. The scenario planning in the 2020 IRP started with identifying the major drivers of change that impact water supply and demand for the region, understanding how they interact, and then assessing the potential scale of impact in the future. Data sources and quantification methods were identified that could be used for quantitative and qualitative analysis of the drivers and their impact on water supplies and demands. The detailed analyses of future local and imported water supplies; economic growth, demographics and water demands; and changing hydrology were incorporated into the UWMP. The IRP planning effort and policy discussions continued into 2021.

Hydrologic Conditions and Reporting Period

The 2020 UWMP presents Metropolitan's water reliability assessments from 2025 through 2045. As specified in the Act, there are three water-year types that must be included in the water service reliability assessment for the UWMP. To simulate hydrologic conditions for the required reliability assessments, Metropolitan assumed the following:

- <u>Normal Year</u>. The average of historic years 1922 to 2017 most closely represents the water supply conditions that Metropolitan considers available during a normal water year.
- <u>Single Dry Year</u>. The conditions for the year 1977 represent the lowest total water supply available to Metropolitan.
- <u>Five-Consecutive-Year Drought</u>. The five consecutive years of 1988 to 1992 represent the driest five-consecutive year historical sequence for Metropolitan's water supply. This five-year sequence is used to complete both Metropolitan's water service reliability and drought risk assessments.

Metropolitan developed and evaluated estimates of future demands and supplies from local sources and from Metropolitan sources based on a record of 96 years (1922-2017) of historic hydrology. Supply and demand analyses for the single dry year and droughts lasting at least five consecutive water years were based on conditions affecting the watershed and supplies from the SWP, as this supply availability fluctuates the most among Metropolitan's sources of supply. Using the same 96-year period of the SWP supply availability, 1977 is determined to be the single driest year and 1988-92 is the driest 5-year historical sequence that represents the lowest water supply available for SWP supplies to Metropolitan. In addition, staff analysis of the 8-river index, an indicator of river flow and runoff in the SWP watershed, indicated that 1977 is the single driest year and 1988-92 is the lowest 5 consecutive dry years from 1922 through 2017. The 8-river index is used by DWR and other water agencies as an estimate of the unimpaired runoff (or natural water production) of the Sacramento and San Joaquin River basins, which are sources of water for the SWP.

Demand Projections

Within Metropolitan's service area, retail water demands can be met with local supplies or imported supplies. In the UWMP, Metropolitan's supply reliability assessments focus on the future demands for Metropolitan's imported and other supplies. The expected firm demand on Metropolitan is the difference between total demands, adjusted for conservation, and projected total local supplies. Thus, in order to project the regional need for water, Metropolitan starts with a projection of total demand including retail Municipal and Industrial (M&I), retail agricultural, seawater barrier, and replenishment demands, determines the adjustments from total conservation, and subtracts the total local supplies that are available to meet a portion of those demands.

Total Demands

Demographic growth is a major driver of the current and future retail M&I water demand. Metropolitan updates its retail M&I projection periodically based on the release of official regional demographic and economic projections, and in the 2020 IRP, alternative demographic projections are being evaluated. The projections of retail M&I water demands used in the 2020 UWMP are based on demographic data and projections taken from the following reports:

- Southern California Association of Governments (SCAG) Connect SoCal: The 2020-2045 Regional Transportation Plan/Sustainable Community Strategy (May 2020)
- San Diego Association of Governments (SANDAG) San Diego Forward: The 2019 Federal Regional Transportation Plan (October 2019)

The SCAG and SANDAG regional growth forecasts are the core assumptions for the retail M&I demand forecasts for the UWMP assessments. These forecasts drive the estimating equations of the retail demand forecasting in Metropolitan's Econometric Demand Model (MWD-EDM). Both SCAG and SANDAG prepare demographic forecasts based on land use data for their respective regions through extensive processes that emphasize input from local planners and are done in coordination with local or regional land use authorities, incorporating essential information to reflect anticipated future populations and land uses. SCAG's and SANDAG's projections undergo extensive local review, incorporate zoning information from city and county general plans, and are supported by Environmental Impact Reports.

Retail agricultural demands consist of retail level water use for irrigating crops. Metropolitan's member agencies estimate agricultural water use based on many factors, including farm acreage, crop types, historical water use, and land use conversion. Each member agency estimates its agricultural demands differently, depending on availability of information. Metropolitan relies on member agencies' estimates of agricultural demands for the 2020 UWMP.

Metropolitan also includes in its assessment of total demands the local groundwater requirements for seawater barrier and groundwater basin replenishment. Seawater barrier demands represent the amount of water needed to hold back seawater intrusion into the coastal groundwater basins. Replenishment demands represent the amount of water that member agencies plan to use to replenish the groundwater basins and augment natural replenishment from precipitation. Metropolitan relies on member agencies' and groundwater management agencies' projections for these demands, as well as projections of local supplies that are also used to meet these demands.

Total Conservation

Projected regional water demand is adjusted to account for water conserved by best management practices from active, code-based, and price-effect conservation. Active conservation levels are derived by calculating water savings from all active program device-based savings installed to date. Code-based conservation levels are derived by calculating water savings from devices covered by existing water conservation ordinances and plumbing codes, including the state Model Water Efficient Landscape Ordinance, with replacement and new construction rates driven by demographic growth consistent with SCAG and SANDAG land use and transportation plans used to derive retail demand. Price-effect conservation is derived by calculating water savings by retail customers attributable to the effect of changes in the real (inflation adjusted) price of water.

Total Local Supplies

Projections of local supplies are based on information gathered from Metropolitan's annual local production surveys and communications between Metropolitan and member agency staff. The projections include groundwater and surface water production, recycled water and recovery of contaminated or degraded groundwater (funded under the Metropolitan's Local Resources Program, as well as local agency funded programs), and seawater desalination. The local supply projections presented in demand tables for the 2020 UWMP are consistent with the local supply projections reported in member agencies' UWMPs, with one variation being the Colorado River water SDCWA exchanges with Metropolitan for deliveries of blended Metropolitan water.

The total local supplies presented in the 2020 UWMP also include projections of Los Angeles Aqueduct deliveries from the Los Angeles Department of Water and Power (LADWP).

Water Use Reduction Achievement in 2020

On November 10, 2009, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SB X7-7 or the Water Conservation Act of 2009. This law is the water conservation component to the historic Delta legislative package, and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. According to CWC Section 10608.36, wholesale agencies are required to include in their UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve the water use reductions required under SB X7-7. Urban wholesale water suppliers are not required to comply with the target-setting and reporting requirements of SB X7-7.

As a wholesale water agency, Metropolitan is not required to establish or report on an urban water use reduction target. However, Metropolitan's regional conservation programs and local resource programs are designed to assist member agencies and retail water suppliers in the service area to comply with SB X7-7. Therefore, Metropolitan monitors the progress of its service area. Also, in compliance with SB X7-7, Metropolitan assesses its actions, programs, and policies to help achieve the water use reductions required by SB X7-7.

Based on an analysis of population, demand, and the methodologies for setting targets described in the legislation, Metropolitan's baseline per capita water use is 182 GPCD, and the 2020 reduction target is 146 GPCD. From 2011 to 2014, there was a slight increase in per capita water use explained in part by continued economic recovery and drier weather as compared to previous years. With mandatory restrictions from the state and implementation of Metropolitan's Water Supply Allocation Plan, Metropolitan's 2015 UWMP reported an interim water use reduction achievement of 131 gallons per capita per day (GPCD), which is a 28 percent reduction from the baseline. Over the last five years, Metropolitan continued to provide support for retail agency water use reduction efforts through technical assistance, legislation, code and standards updates, and financial incentives where needed to increase water use efficiency. Based on best available data as of January 2021, Metropolitan estimates a 2019 per capita water use of 121 GCPD, well exceeding Metropolitan's 2020 water use target of 146 GPCD with a 34 percent reduction from the baseline.

Supply Capabilities

The 2020 UWMP reports on Metropolitan's water reliability and identifies projected supplies to meet the long-term demand within its service area. For the 2020 UWMP reliability assessments, Metropolitan's supply capabilities are evaluated using the following assumptions for its imported supplies:

Colorado River Supplies

Colorado River supplies include Metropolitan's basic Colorado River apportionment, along with supplies that result from existing and committed programs, including those from the IID-MWD Conservation Program, the implementation of the Quantification Settlement Agreement (QSA) and related agreements, and the exchange agreement with SDCWA. The QSA established the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. Since the QSA, additional programs have been implemented to increase Metropolitan's supplies. These include the PVID Land Management, Crop Rotation, and Water Supply Program, as well as the Lower Colorado River Water Supply Project. The 2007 Interim Guidelines provided for the coordinated operation of Lake Powell and Lake Mead, as well as the Intentionally Created Surplus (ICS) program that allows Metropolitan to store water in Lake Mead. These stored supplies can be used to supply additional water to ensure that, when needed, Metropolitan can deliver up to Metropolitan's Colorado River Aqueduct (CRA) capacity of 1.25 MAF.

In light of declining reservoir levels, the Lower Basin Drought Contingency Plan (DCP) was signed in 2019. This agreement incentivizes storage in Lake Mead and requires certain volumes of water be stored in Lake Mead under certain Lake Mead elevation levels through 2026. Metropolitan is to store certain volumes of water in Lake Mead as DCP ICS once Lake Mead is below elevation 1,045 feet. This agreement also increases Metropolitan's flexibility to take delivery of water stored as ICS at Lake Mead elevations below 1,075 feet. The goal of this agreement is to keep Lake Mead above critical elevations, and overall, it increases Metropolitan's flexibility to store water in Lake Mead in greater volumes and to take delivery of stored water to fill the CRA as needed.

Projections for Colorado River supplies for the 2020 UWMP are based on the United States Bureau of Reclamation's (USBR) Colorado River Simulation System (CRSS) modeling developed in January 2021, which is the latest available at the time of production of this plan. USBR modeling is used to estimate Metropolitan's basic apportionment and the availability of QSA and other related programs.

State Water Project Supplies

State Water Project (SWP) supplies are estimated using the 2019 SWP Delivery Capability Report distributed by the California Department of Water Resources (DWR) in August 2020. The 2019 Delivery Capability Report presents the current DWR estimate of the amount of water deliveries for current (2020) conditions and conditions 20 years in the future under DWR's set of stated assumptions. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with water quality objectives established by the State Water Resources Control Board, the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fisheries Service issued on October 21, 2019, and the Incidental Take Permit issued by the California Department of Fish and Wildlife on March 31, 2020. In addition, these estimates incorporate amendments to the Coordinated Operations Agreement between the Central

Valley Project and the State Water Project made in 2018. Under the 2019 Delivery Capability Report, the delivery estimates for the SWP for 2019 conditions as percentage of Table A amounts are 7 percent, equivalent to 134 TAF for Metropolitan, under a single dry-year (1977) condition and 58 percent, equivalent to 1.1 MAF for Metropolitan, under the long-term average condition.

In dry, below-normal conditions, Metropolitan has increased the supplies received from the California Aqueduct by developing flexible Central Valley/SWP storage and transfer programs. Over the years, under the pumping restrictions of the SWP, Metropolitan has collaborated with the other contractors to develop numerous voluntary Central Valley/SWP storage and transfer programs. The goal of these storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the California Aqueduct during dry hydrologic conditions and regulatory restrictions.

Storage

A key component of Metropolitan's water supply capability is the amount of water in Metropolitan's storage facilities. Storage is a major component of Metropolitan's dry-year and emergency resource management strategy. Metropolitan's likelihood of having adequate supply capability to meet projected demands, without implementing the Water Supply Allocation Plan (WSAP), depends on its storage resources. Metropolitan's WSCP also underscores the importance of storage as it is identified as one of potential shortage response actions at various water shortage levels.

In developing the supply capabilities for the 2020 UWMP, Metropolitan assumed the current (2020) storage levels at the start of simulation and used the median storage levels going into each of the five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. All storage capability figures shown in the 2020 UWMP reflect actual storage program conveyance constraints. It is important to note that under some conditions, Metropolitan may choose to implement the WSAP in order to preserve storage reserves for a future year, instead of using the full supply capability. This can result in impacts at the retail level even under conditions where there may be adequate supply capabilities to meet demands.

Findings of the 2020 Urban Water Management Plan

The 2020 UWMP provides an assessment and summary of Metropolitan's water service reliability outlook through 2045 under the assumptions and cited sources of information described above. As a reporting document, the UWMP will be updated every five years to reflect changes in water demand and supply projections.

The 2020 UWMP satisfies all the content and process requirements mandated by the Act, including the required collaboration for its planning initiatives and report preparation. It should be noted that Metropolitan's primary planning venue is its IRP and that the scenario planning approach within its 2020 IRP is intended to extend Metropolitan's planning beyond single scenario outcomes like that shown within this UWMP. The key findings of Metropolitan's 2020 UWMP are as follows:

Water Service Reliability and Projected Water Supplies

- Metropolitan has completed its water service reliability assessment, under the stated UWMP assumptions and conditions required by the Act, and determined that it has supply capabilities sufficient to meet expected demands from 2025 through 2045 under a single dry-year condition and a period of drought lasting five consecutive water years, as presented in Figure ES-1, as well as in a normal water year hydrologic condition.

- Metropolitan has evaluated its water shortage risk, under the stated UWMP assumptions and conditions required by the Act, and determined that it has supply capabilities sufficient for a drought period that lasts five consecutive water years based on the driest five-year historic sequence for Metropolitan's water supply. This Drought Risk Assessment was completed starting from the year following when the assessment is conducted (2021 through 2025) and is presented in Figure ES-2.
- Metropolitan has plans for supply implementation and continued development of a diversified resource portfolio including programs in the Colorado River, SWP, Central Valley storage and transfers programs, local resource projects, and in-region storage that enables the region to meet its water supply needs.
- Metropolitan has developed comprehensive plans for stages of actions it would undertake to address frequent and severe periods of droughts; six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage; and a catastrophic interruption in water supplies through its Water Shortage Contingency Plan, Water Surplus and Drought Management Plan (WSDM Plan)[2], and Water Supply Allocation Plan (WSAP)[3].
- Metropolitan continues to invest in measures that will help improve the region's water use efficiency over time.
- Metropolitan continues to plan for emergency and catastrophic scenarios, recently revising an Emergency Storage Objective to manage against potential interruption in water supplies resulting from catastrophic occurrences within the Southern California region, including seismic events along the San Andreas fault, and Seismic Risk Assessment and Mitigation Plan to assess the vulnerability of Metropolitan's water system and mitigate those vulnerabilities. In addition, Metropolitan is working with the State on the Delta Risk Management Strategy to reduce the impacts of a seismic event in the Delta that would cause levee failure and disruption of SWP deliveries.
- Metropolitan has and will continue to regard water quality with paramount importance to water supply reliability. Metropolitan owns and operates five water treatment plants, three of which are among the 10 largest in the world. Metropolitan is a national leader in providing safe drinking water that meets increasingly stringent standards, testing for over 400 constituents and performing nearly 200,000 water quality tests annually on samples gathered throughout its distribution system. Metropolitan's Water Quality Laboratory analyzes these samples to ensure that Metropolitan's delivered water meets or surpasses all state and federal drinking water standards. Because treatment to remove specific contaminants can be more costly than measures to protect water at the source, Metropolitan also actively supports improved watershed protection programs for its source waters in the Colorado River and State Water Project.

[2] The WSDM plan is a coordinated plan used to direct Metropolitan's resource operations to help attain the region's reliability goal recognizing the interdependence of surplus and shortage actions. The WSCP is consistent with the WSDM Plan. See Attachment A in Appendix 4.

[3] The WSAP is intended as an equitable approach for encouraging water use efficiency and minimizing regional impacts in times of shortage consistent with the principles and considerations approved by the Board through the WSDM Plan. See Attachment B in Appendix 4.

Challenges Ahead and Strategies for Managing Reliability Risks

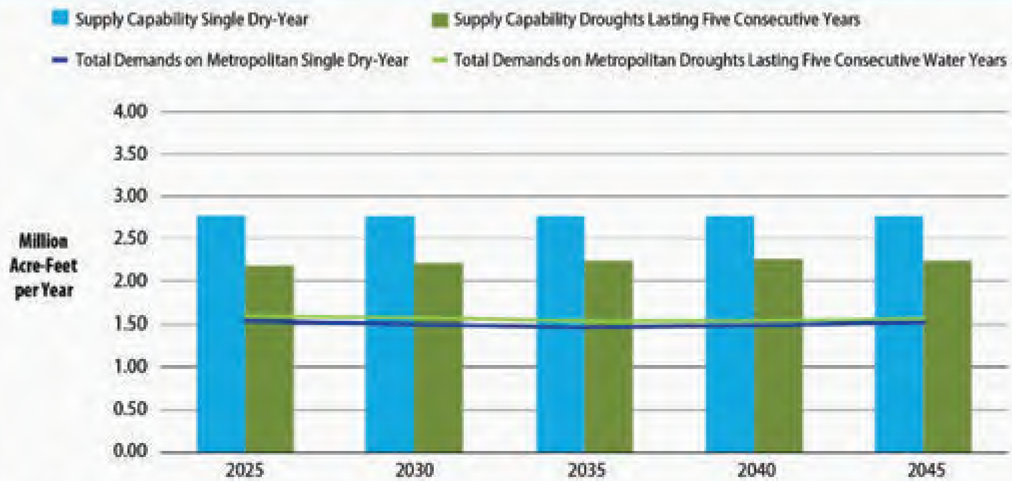
- Metropolitan faces a number of challenges in providing adequate, reliable, and high-quality supplemental water supplies for southern California: The Colorado River Basin has historically experienced large swings in annual hydrologic conditions; however, these swings have largely been buffered through a large volume of storage.
- Dramatic swings in annual hydrologic conditions have impacted water supplies available from the State Water Project (SWP) over the last decade. Metropolitan's efforts in building dry-year storage reserves, water banking and transfers have helped manage the wide swings in SWP allocations.
- With approximately 30 percent of Southern California's water supply transported across the Bay-Delta, its declining ecosystem has led to reduction in water supply deliveries. Operational constraints will likely continue until a long-term solution to the problems in the Bay-Delta is identified and implemented.
- Approximately half of the region's water supplies come from resources controlled or operated by local water agencies. These resources include water extracted from local groundwater basins, catchment of local surface water, non-Metropolitan imported water supplied through the Los Angeles Aqueduct, and Colorado River water exchanged for Metropolitan supplies.
- Water quality challenges, such as algae toxins, per- and polyfluoroalkyl substances (PFAS), and the identification of constituents of emerging concern, have a significant impact on the region's water supply conditions and underscore the importance of flexible and adaptive regional planning strategies.

Metropolitan continues to address these water supply challenges through a variety of actions that will maintain water reliability within its service area. Metropolitan's proactive measures include:

- **Continuing water conservation** by expanding outreach, adding devices, and increasing incentives to residents,
- **Increasing local resources** by providing incentives for on-site recycled water hook-up and the Local Resources Program (LRP),
- **Augmenting water supplies** through water transfers and exchanges,
- **Improving return capability of storage programs** to effectively take delivery of water when needed,
- **Maintaining dry year and emergency storage for the region** to remain reliable during periods of low supply and emergencies,
- **Modifying Metropolitan's distribution system** to enhance operational flexibility and efficient delivery of Colorado River, State Water Project, and in-region supplies within Metropolitan's service area,
- **Implementing shortage response actions** under the Water Shortage Contingency Plan and elements of the Water Surplus and Drought Management Plan and Water Supply Allocation Plan to distribute the limited imported supplies and preserve storage reserves, and
- **Responding to water quality concerns** by protecting the quality of the source water, developing water management programs that maintain and enhance water quality, and changing water treatment protocols or blending.

Sections 1.4 and 2.6 offer detailed discussions and additional insight on Metropolitan's current challenges, current available resources, short-term supply outlook, other supply reliability risks, and recent and near-term actions to meet these challenges.

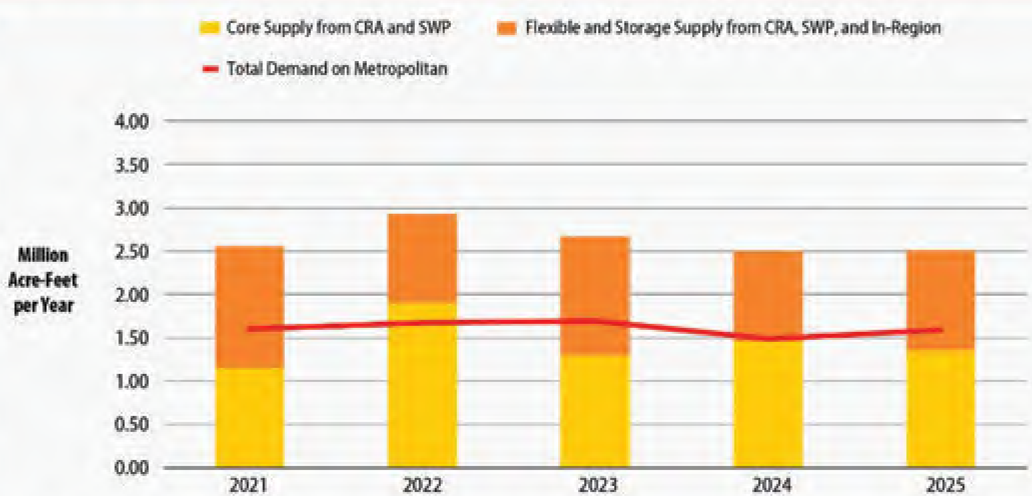
Figure ES -1 Supply Capabilities under Single Dry-Year and Droughts Lasting Five Consecutive Years



Notes:

1. Supply capabilities are derived using the simulated median storage level going into each of five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used.
2. Under some conditions, Metropolitan may choose to implement the WSAP in order to preserve storage reserves for a future year, instead of using the full supply capability. This can result in impacts at the retail level even under conditions where there may be adequate supply capabilities to meet firm demands.
3. All storage capability figures shown in the 2020 UWMP reflect actual storage program conveyance constraints.
4. Total demands on Metropolitan illustrated in the figure includes delivery obligations associated with Exchange with SDCWA.

Figure ES -2 Drought Risk Assessment for 2021-2025



Notes:

1. Drought risk assessment for 2021-2025 is based on historic 1988 to 1992 conditions (driest five consecutive year historic sequence for Metropolitan's water supply) .
2. Shortfall from core supplies may be met through supply augmentation actions by exercising Metropolitan's flexible supplies and storage from CRA, SWP, and In-Region.
3. As of January 2021, Metropolitan has 3.2 MAF of dry-years supplies that may be utilized to meet sfortfall from core supplies.
4. Metropolitan may also implement demand reduction and operational flexibility as part of its shortage response actions, if needed.
5. Total Demand on Metropolitan illustrated in the figure includes delivery obligations associated with Exchange with SDCWA.

Introduction 1

1.1 Introduction to this Document and the Agency

Organization of this Document

Metropolitan's 2020 Urban Water Management Plan (UWMP) was prepared in compliance with California Water Code (CWC) Sections 10610 through 10657 of the Urban Water Management Planning Act (Act), which were added by Statute 1983, Chapter 1009 and became effective on January 1, 1984, and Section 10608.36 of SB X7-7, which was enacted in 2009. In addition to complying with the Act, this report details Metropolitan's current situation and how it will meet the challenges of the future.

This document contains five sections. The first section is the Introduction that defines Metropolitan in terms of governance, structure, and current water supply status. This section also briefly outlines how Metropolitan will meet current and future challenges. The second section describes Metropolitan's planning activities and explains how the agency will manage the region's water resources to ensure a reliable water supply for the region. The third section describes the actions Metropolitan has taken to implement the plans outlined in Section 2 and lists future programs and activities. The fourth section addresses the issue of water quality and steps taken to deliver high-quality water to Metropolitan's service area. The fifth section details the public outreach component integrated with Metropolitan's planning processes. In addition, this document includes Appendices that contain supporting documents on the required and voluntary reporting elements. The sections are further described in detail below:

Section 1 - Introduction

In addition to demonstrating how this report complies with the Act, the 2020 UWMP details Metropolitan's current situation and outlines its plan for meeting the challenges of the future. The Introduction section includes:

- Discussion of the Act and Metropolitan's reporting responsibilities under the Act;
- Introduction to Metropolitan and description of its formation, purpose, service area, current and projected land uses, member agencies, and governance;
- Historical, economic, and demographic information on Metropolitan's service area;
- Discussion of Metropolitan's current condition, challenges, and resource planning strategies; and
- Evaluation of Metropolitan's supply capabilities during a drought lasting five consecutive water years.

Section 2 - Planning for the Future

The Planning for the Future section discusses how Metropolitan plans to meet Southern California's water needs in the future. The section highlights the importance of Integrated Water Resources Planning (IRP) by summarizing Metropolitan's planning processes over the years and emphasizes the need for Metropolitan to implement adaptive and multiple scenario planning strategies that will prepare the region to deal with uncertainties. This section also includes:

- Evaluation of regional water demand under a normal water year, single dry-year, and droughts lasting at least five years, for years 2025 through 2045;
- Evaluation of supply capabilities under a normal water year, single dry-year, and droughts lasting at least five consecutive water years, for years 2025 through 2045;
- Evaluation of frequent and severe periods of droughts, as described in the Drought Risk Assessment for years 2021 through 2025;
- Preparation and adoption of Water Shortage Contingency Plan (WSCP), including a discussion of Metropolitan's Emergency Storage Objective and Seismic Risk Assessment and Mitigation Plan;
- Discussion of other supply reliability risks including climate change; and
- Discussion of the different elements of Metropolitan's rate structure and revenue management.

Section 3 – Implementing the Plan

The Implementing the Plan section summarizes Metropolitan's progress in developing a diversified resource mix that enables the region to meet its water supply needs. The investments that Metropolitan has made and its continuing efforts in many different areas coalesce toward its goal of long-term supply reliability for the region. This section includes:

- Discussion of resources and program development for the Colorado River, SWP, Central Valley/SWP storage and transfers programs, conservation, local resources program (groundwater recovery, recycling, desalination), and groundwater; and
- Discussion of Metropolitan's measures, programs, and policies to help achieve the SB X7-7 goal of 20 percent water use reduction by 2020 and the region's progress in meeting this target.

Section 4 - Water Quality

The Water Quality section identifies key regional water quality issues and discusses the protection of the quality of source water and development of water management programs that maintain and enhance water quality. This section also includes:

- Discussion of water quality issues of concern, constituents of emerging concern, and water quality programs that Metropolitan has undertaken to protect its water supplies.

Section 5 – Coordination and Public Outreach

The Coordination and Public Outreach section presents the processes undertaken in the development of the 2020 IRP, 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP with the public and other stakeholders. It provides a list of all meetings and workshops conducted to promote and achieve consensus and collaborative planning. Included in this section are the public notification letters and announcements distributed by Metropolitan as required by the Act and copies of the Metropolitan resolutions adopting and approving the 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP for submittal to DWR.

Appendices

The appendices provide detailed background on the information presented in the 2020 UWMP.

Appendix 1 - Demand Forecast

Appendix 2 - Existing Regional Water Supplies

Appendix 3 - Justifications for Supply Projections

Appendix 4 - Water Shortage Contingency Plan

Appendix 5 - Local Projects

Appendix 6 - Conservation Estimates and Water Savings from Codes, Standards, and Ordinances

Appendix 7 - Distribution System Water Losses

Appendix 8 - Emergency Storage Objective

Appendix 9 - Seismic Risk Assessment and Mitigation Plan

Appendix 10 - Metropolitan's Energy Intensity Calculations, Including Conveyance and Distribution Generation

Appendix 11 - Quantifying Regional Self-Reliance and Reduced Reliance on Water Supplies from the Delta Watershed

Appendix 12 - DWR 2020 UWMP Submittal Tables

Urban Water Management Planning Act

This report has been prepared in compliance with Water Code Sections 10610 through 10657 of the Urban Water Management Planning Act (Act). This Act requires that "*every urban water supplier shall prepare and adopt an urban water management plan*" (Water Code § 10620(a)). An "urban water supplier" is defined as a supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually (Water Code § 10617). These plans must be filed with the California Department of Water Resources (DWR) every five years. Recent amendments to the Act changed the Water Code to require each urban supplier to update and submit its 2020 UWMP by July 1, 2021 and changed the update and submittal dates for subsequent UWMPs to July 1 in years ending in 6 and 1.

Changes in the Act since 2015

There have been numerous changes made and new requirements added to the Act since the 2015 UWMP. Set forth below is a general overview of the key current and new requirements for urban wholesale suppliers. Detailed descriptions of these existing and new requirements are provided in the various sections of this 2020 UWMP.

- Detailed evaluation of the supplies necessary to meet demands over at least a 20-year period, in five-year increments, under a normal water year, single dry-year, and droughts lasting at least five consecutive water years;
- Instead of a water shortage contingency analysis, suppliers must adopt a water shortage contingency plan which includes 10 prescribed elements, such as the procedures used to conduct an annual water supply and demand assessment; six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage; and shortage response actions that align with the defined shortage levels;
- Drought risk assessment which includes: (i) the data, methodology, and basis for one or more supply shortage conditions necessary to conduct a drought risk assessment for a 5-year

drought; (ii) a determination of the reliability of each supply source under a variety of water shortage conditions; (iii) a comparison of total available water supply sources to total projected water use for the drought period; and (iv) a consideration of historical drought hydrology, projected supplies and demands under climate change conditions, and anticipated regulatory changes;

- Water use projections, where available, must display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans;
- Simple lay description of information necessary to provide a general understanding of the UWMP;
- Description of supplier's service area must include current and projected land uses affecting supplier's water management planning;
- Seismic risk assessment and mitigation plan;
- Compliance with the Act is required in order for a supplier to be eligible for a water grant or loan;
- Energy information that a supplier can readily obtain; and
- Evaluation of reasonable and practical efficient water uses, recycling, and conservation activities.

Senate Bill 7 of the Seventh Extraordinary Session of 2009, Water Conservation in the Delta Legislative Package

In addition to changes to the Act, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SB X7-7, on November 10, 2009, which became effective February 3, 2010. This law was the water conservation component to the historic Delta legislative package and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. This implements the Governor's similar 2008 water use reduction goals. The law requires each urban retail water supplier to develop urban water use targets to help meet the 20 percent goal by 2020, and an interim urban water reduction target by 2015.

The bill states that the legislative intent is to require all water suppliers to increase the efficiency of use of water resources and to establish a framework to meet the state targets for urban water conservation called for by the Governor. The bill establishes methods for urban retail water suppliers to determine targets to help achieve increased water use efficiency by the year 2020. The law is intended to promote urban water conservation standards consistent with the California Urban Water Conservation Council's adopted best management practices.

Urban wholesale water suppliers are not required to perform all of the target-setting and reporting requirements of SB X7-7. However, wholesale agencies must include in their UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve the water use reductions required under this law (Water Code § 10608.36).

Sections 3.4, 3.5, and 3.7 of this plan address actions Metropolitan took to help urban retail water suppliers to achieve the urban per capita water use reduction pursuant to the goals set forth in SB X7-7.

Metropolitan's Compliance with the Urban Water Management Planning Act

As with Metropolitan's previous plans, this Plan does not explicitly discuss specific activities undertaken by member agencies unless they relate to one of Metropolitan's water demand or supply management programs. Presumably, each member agency will discuss these activities in its Urban Water Management Plan, but elements of this Plan do not necessarily have to be adopted by the urban water suppliers or the public agencies directly providing retail water.

DWR Guidance

In April 2021, DWR issued the final 2020 UWMP Guidebook for urban water suppliers (DWR Guidebook). The 2020 DWR Guidebook was updated from the 2015 version to reflect new legislation. As part of the Guidebook, DWR updated the Standardized Submittal Tables for the reporting and submittal of UWMP data to DWR. As mentioned above, water suppliers are required to use these Standardized Submittal Tables for electronic submittal of their UWMPs to DWR to satisfy the legislative requirement (Water Code § 10644(a)(2)). For the 2020 UWMP, Metropolitan electronically submitted the Standardized Submittal Tables to DWR through its Water Use Efficiency portal. In addition, Metropolitan included the Standardized Submittal Tables in this plan as Appendix 12.

The 2020 DWR Guidebook includes a voluntary checklist to show reporting of required elements to assist DWR with its review of the submitted UWMP. Included in the beginning of this 2020 UWMP is a compliance checklist, organized by Water Code section, which summarizes Metropolitan's response to the requirements of the Water Code and indicates where each required element can be found in the Plan.

1.2 The Metropolitan Water District of Southern California

Formation and Purpose

The Metropolitan Water District of Southern California (Metropolitan) is a public agency organized in 1928 by a vote of the electorates of 13 Southern California cities. The agency was enabled by the adoption of the original Metropolitan Water District Act (MWD Act) by the California Legislature "for the purpose of developing, storing and distributing water for domestic purposes." The MWD Act also allows Metropolitan to sell "surplus water not needed or required for domestic or municipal uses within the district for beneficial purposes." In 1992, the Metropolitan Board of Directors adopted the following mission statement:

> *"To provide its service area with adequate and reliable supplies of high quality water to meet present and future needs in an environmentally and economically responsible way."*

The first function of Metropolitan was building the Colorado River Aqueduct (CRA) to convey water from the Colorado River. Deliveries through the aqueduct to member agencies began in 1941 and supplemented the local water supplies of the Southern California member cities. In 1960, to meet growing water demands in its service area, Metropolitan contracted for participation in the State Water Project (SWP), which is owned and operated by DWR and would deliver additional water supplies via the California Aqueduct. SWP deliveries began in 1972. Metropolitan currently receives imported water from both of these sources: (1) Colorado River water via the CRA, and (2) the SWP via the California Aqueduct.

Service Area

Metropolitan's service area covers the Southern California coastal plain. It extends about 200 miles along the Pacific Ocean from the city of Oxnard on the north to the international boundary with Mexico on the south, and it reaches as far as 70 miles inland from the coast (Figure 1-1). The total area served is approximately 5,200 square miles, and it includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Table 1-1 shows that although only 14 percent of the land area of the six Southern California counties is within Metropolitan's service area, approximately 86 percent of the populations of those counties reside within Metropolitan's boundaries.

Member Agencies

Metropolitan is currently composed of 26 voluntary member agencies, including 14 cities, 11 municipal water districts, and one county water authority. Metropolitan is a water wholesaler with no retail customers. It provides treated and untreated water directly to its member agencies.

Metropolitan's 26 member agencies deliver to their customers a combination of local groundwater, local surface water, recycled water, and imported water purchased from or exchanged with Metropolitan. For some member agencies, Metropolitan supplies most of the water used within that agency's service area, while others obtain varying amounts of water from Metropolitan to supplement local supplies. Between 2011 and 2020, Metropolitan has provided between 40 and 50 percent of the municipal, industrial, and agricultural water used in its service area. The remaining water supply comes from local wells, local surface water, recycling, and the city of Los Angeles' aqueducts from the Owens Valley/Mono Basin east of the Sierra Nevada. Member agencies also implement conservation and other programs that can be considered part of their supplies.

Some member agencies provide retail water service, while others provide water to the local area as wholesalers. Table 1-2 shows Metropolitan's member agencies and the type of service that they provide. As shown in the table, 15 member agencies provide retail service to customers, 9 provide only wholesale service, and 2 provide a combination of both. Throughout Metropolitan's service area, approximately 250 retail water suppliers directly serve the population.

Metropolitan's member agencies serve residents in 152 cities and 89 unincorporated communities. Table 1-3 shows the member agencies of Metropolitan, as well as the cities and communities served by those member agencies. Figure 1-1 also shows the geographical area served by the member agencies.

Currently, member agencies receive water from Metropolitan at various delivery points, and pay for service through a rate structure made up of multiple components. The majority of these components consist of uniform volumetric rates, and the majority of the revenue is collected through these volumetric rates. Metropolitan's pricing and rate structure are described in detail in Section 2.7.

To aid in planning future water needs, member agencies advise Metropolitan in July of each year of how much water they anticipate they will need during the next five years. In addition, Metropolitan works with its member agencies to forecast future water demands.

Table 1-1
July 1, 2020 Area and Population in the
Six Counties of Metropolitan's Service Area

County	Total County	In Metropolitan Service Area	Percent in Metropolitan
Land Area (Square Miles)			
Los Angeles County	4,061	1,408	35%
Orange County	789	699	89%
Riverside County	7,208	1,057	15%
San Bernardino County	20,052	242	1%
San Diego County	4,200	1,420	34%
Ventura County	1,845	365	20%
Metropolitan's Service Area	**38,155**	**5,191**	**14%**
Population (Persons)			
Los Angeles County	10,172,000	9,275,000	91%
Orange County	3,191,000	3,184,000	100%
Riverside County	2,449,000	1,813,000	74%
San Bernardino County	2,184,000	872,000	40%
San Diego County	3,352,000	3,261,000	97%
Ventura County	841,000	630,000	75%
Metropolitan's Service Area	**22,189,000**	**19,035,000**	**86%**

Source: State of California, Department of Finance, E-2. California County Population Estimates and Components of Change by Year, July 1, 2010-2020. Sacramento, California, December 2020.

Table 1-2
Metropolitan's Member Agencies and Type of Water Service Provided

Member Agency	Retail or Wholesale
Los Angeles County	
Beverly Hills, City of	Retail
Burbank, City of	Retail
Central Basin Municipal Water District	Wholesale
Compton, City of	Retail
Foothill Municipal Water District	Wholesale
Glendale, City of	Retail
Las Virgenes Municipal Water District	Retail
Long Beach, City of	Retail
Los Angeles, City of	Retail
Pasadena, City of	Retail
San Fernando, City of	Retail
San Marino, City of	Retail
Santa Monica, City of	Retail
Three Valleys Municipal Water District	Wholesale
Torrance, City of	Retail
Upper San Gabriel Valley Municipal Water District	Wholesale
West Basin Municipal Water District	Wholesale
Orange County	
Anaheim, City of	Retail
Fullerton, City of	Retail
Municipal Water District of Orange County	Wholesale
Santa Ana, City of	Retail
Riverside County	
Eastern Municipal Water District	Retail & Wholesale
Western Municipal Water District	Retail & Wholesale
San Bernardino County	
Inland Empire Utilities Agency	Wholesale
San Diego County	
San Diego County Water Authority	Wholesale
Ventura County	
Calleguas Municipal Water District	Wholesale

Table 1-3
Member Agencies

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA					
Municipal Water Districts (11)		**Member Cities (14)**			**County Water Authorities (1)**
Calleguas	Las Virgenes	Anaheim	Glendale	San Marino	San Diego
Central Basin	Orange County	Beverly Hills	Long Beach	Santa Ana	
Foothill	Three Valleys	Burbank	Los Angeles	Santa Monica	
Inland Empire	Upper San Gabriel Valley	Compton	Pasadena	Torrance	
Eastern	West Basin	Fullerton	San Fernando		
	Western				

Calleguas MWD
- *Camarillo*
- *Camarillo Heights*
- *Fairview*
- *Lake Sherwood Valley*
- *Las Posas*
- *Moorpark*
- *NAWS Point Mugu*
- *NCBC Port Hueneme*
- *Oak Park*
- *Oxnard*
- *Port Hueneme*
- *Santa Rosa Valley*
- *Simi Valley*
- *Somis*
- *Thousand Oaks*

Central Basin MWD
- *Artesia*
- *Bell*
- *Bellflower*
- *Bell Gardens*
- *Cerritos*
- *Commerce*
- *Cudahy*
- *Downey*
- *East Los Angeles*
- *Florence*
- *Hawaiian Gardens*
- *Huntington Park*
- *La Habra Heights*
- *Lakewood*
- *La Mirada*
- *Lynwood*
- *Maywood*
- *Montebello*
- *Norwalk*
- *Paramount*
- *Pico Rivera*
- *Santa Fe Springs*
- *Signal Hill*
- *South Gate*
- *South Whittier*
- *Vernon*
- *Whittier*

Foothill MWD
- *Altadena*
- *La Cañada Flintridge*
- *La Crescenta*
- *Montrose*

Inland Empire
- *Chino*
- *Chino Hills*
- *Fontana*
- *Montclair*
- *Ontario*
- *Rancho Cucamonga*
- *Upland*

Eastern MWD
- *Good Hope*
- *Hemet*
- *Homeland*
- *Juniper Flats*
- *Lakeview*
- *Mead Valley*
- *Menifee*
- *Moreno Valley*
- *Murrieta*
- *Murrieta Hot Springs*
- *Nuevo*
- *North Canyon Lake*
- *Perris*
- *Quail Valley*
- *Romoland*
- *San Jacinto*
- *Sun City*
- *Temecula*
- *Valle Vista*
- *Winchester*

Las Virgenes MWD
- *Agoura*
- *Agoura Hills*
- *Calabasas*
- *Chatsworth*
- *Hidden Hills*
- *Lake Manor*
- *Malibu Lake*
- *Monte Nido*
- *Westlake Village*
- *West Hills*

MWD of Orange County
- *Aliso Viejo*
- *Brea*
- *Buena Park*
- *Capistrano Beach*
- *Corona Del Mar*
- *Costa Mesa*
- *Coto De Caza*
- *Cypress*
- *Dana Point*
- *Fountain Valley*
- *Garden Grove*
- *Huntington Beach*
- *Irvine*
- *Laguna Beach*
- *Laguna Hills*
- *Laguna Niguel*
- *Laguna Woods*
- *La Habra*
- *Lake Forest*
- *La Palma*
- *Leisure World*
- *Los Alamitos*
- *Mission Viejo*
- *Monarch Beach*
- *Newport Beach*
- *Orange*
- *Placentia*
- *Rancho Santa Margarita*
- *San Clemente*
- *South Laguna*

MWD of Orange County (cont.)
- *San Juan Capistrano*
- *Seal Beach*
- *Stanton*
- *Tustin*
- *Tustin Foothills*
- *Villa Park*
- *Westminster*
- *Yorba Linda*

Three Valleys MWD
- *Azusa*
- *Charter Oak*
- *Claremont*
- *Covina*
- *Covina Knolls*
- *Diamond Bar*
- *Glendora*
- *Industry*
- *La Verne*
- *Pomona*
- *Rowland Heights*
- *San Dimas*
- *So. San Jose Hills*
- *Walnut*
- *West Covina*

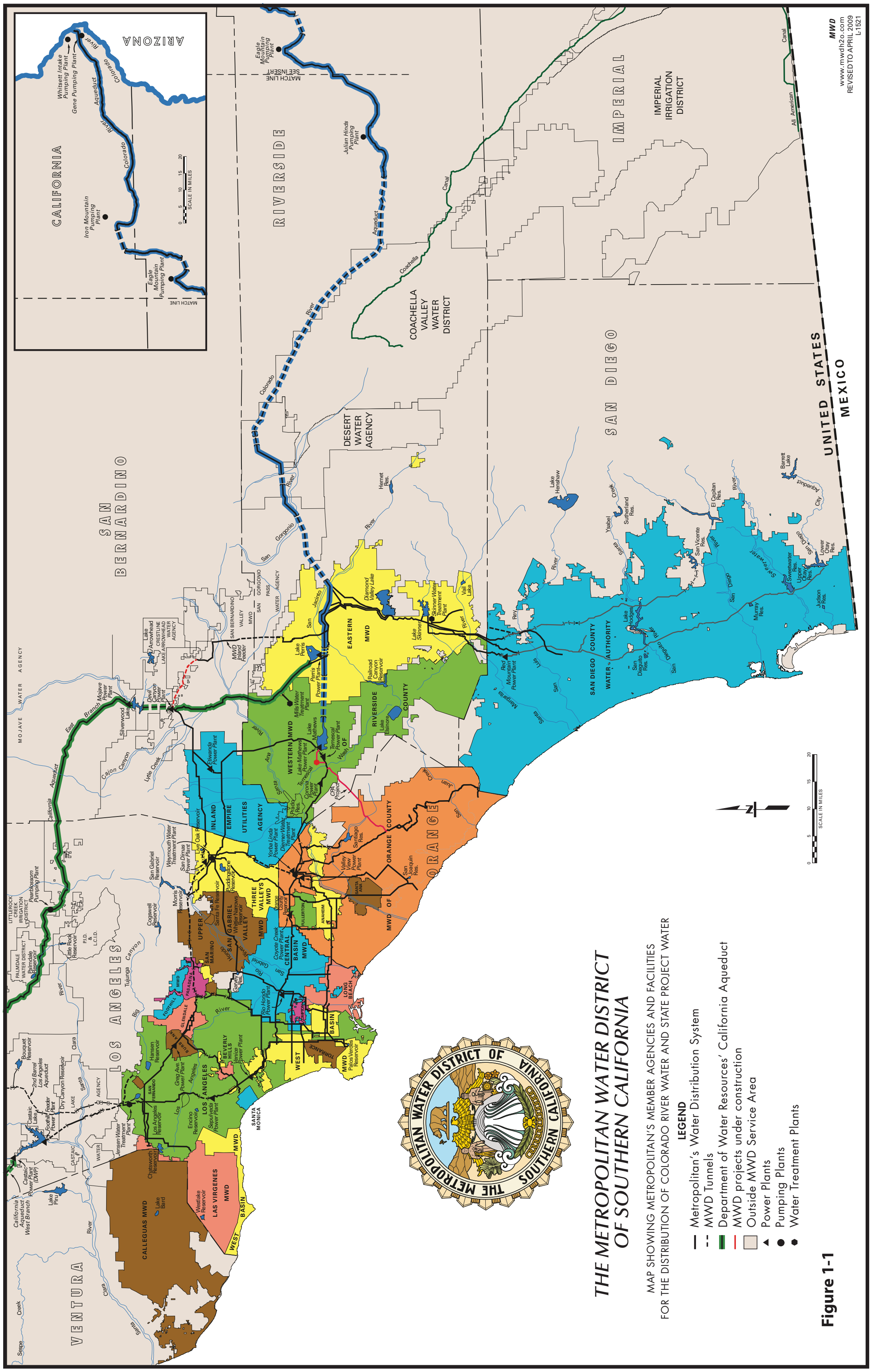
Upper San Gabriel Valley MWD
- *Arcadia*
- *Avocado Heights*
- *Baldwin Park*
- *Bradbury*
- *Citrus*
- *Covina*
- *Duarte*
- *El Monte*
- *Glendora*
- *Hacienda Heights*
- *Industry*
- *Irwindale*
- *La Puente*
- *Mayflower Village*
- *Monrovia*
- *Rosemead*
- *San Gabriel*
- *South El Monte*
- *South Pasadena*
- *South San Gabriel*
- *Temple City*
- *Valinda*
- *West Covina*
- *West Puente Valley*

West Basin MWD
- *Alondra Park*
- *Carson*
- *Culver City*
- *El Segundo*
- *Gardena*
- *Hawthorne*
- *Hermosa Beach*
- *Inglewood*
- *Ladera Heights*
- *Lawndale*
- *Lennox*

West Basin MWD (cont.)
- *Lomita*
- *Malibu*
- *Manhattan Beach*
- *Marina Del Rey*
- *Palos Verdes Estates*
- *Rancho Palos Verdes*
- *Redondo Beach*
- *Rolling Hills*
- *Rolling Hills Estates*
- *Ross-Sexton*
- *Topanga Canyon*
- *West Athens*
- *West Hollywood*

***Western MWD of* Riverside County**
- *Bedford Heights*
- *Canyon Lakes*
- *Corona*
- *Eagle Valley*
- *El Sobrante*
- *Jurupa*
- *Lake Elsinore*
- *Lake Mathews*
- *March AFB*
- *Murrieta*
- *Norco*
- *Riverside*
- *Rubidoux*
- *Temecula*
- *Temescal Canyon*
- *Woodcrest*

San Diego CWA
- *Alpine*
- *Bonita*
- *Bonsall*
- *Camp Pendleton*
- *Carlsbad*
- *Casa De Oro*
- *Chula Vista*
- *Del Mar*
- *El Cajon*
- *Encinitas*
- *Escondido*
- *Fallbrook*
- *Lakeside*
- *La Mesa*
- *Lemon Grove*
- *Mount Helix*
- *National City*
- *Oceanside*
- *Pauma Valley*
- *Poway*
- *Rainbow*
- *Ramona*
- *Rancho Santa Fe*
- *San Diego*
- *San Marcos*
- *Santee*
- *Solana Beach*
- *Spring Valley*
- *Valley Center*
- *Vista*


THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
MAP SHOWING METROPOLITAN'S MEMBER AGENCIES AND FACILITIES FOR THE DISTRIBUTION OF COLORADO RIVER WATER AND STATE PROJECT WATER
LEGEND
Metropolitan's Water Distribution System
MWD Tunnels
Department of Water Resources' California Aqueduct
MWD projects under construction
Outside MWD Service Area
Power Plants
Pumping Plants
Water Treatment Plants
VENTURA
LOS ANGELES
SAN BERNARDINO
RIVERSIDE
ORANGE
SAN DIEGO
IMPERIAL
CALIFORNIA
ARIZONA
UNITED STATES
MEXICO
COACHELLA VALLEY WATER DISTRICT
DESERT WATER AGENCY
IMPERIAL IRRIGATION DISTRICT
CALLEGUAS MWD
LAS VIRGENES MWD
WEST BASIN MWD
CENTRAL BASIN MWD
THREE VALLEYS MWD
UPPER SAN GABRIEL VALLEY MWD
INLAND EMPIRE UTILITIES AGENCY
WESTERN MWD OF RIVERSIDE COUNTY
EASTERN MWD
MWD OF ORANGE COUNTY
SAN DIEGO COUNTY WATER AUTHORITY
SANTA MONICA
BEVERLY HILLS
LONG BEACH
MWD
www.mwdh2o.com
REVISED TO APRIL 2009
L-1521
Figure 1-1

Board of Directors and Management Team

Metropolitan's Board of Directors currently consists of 38 directors. The Board consists of at least one representative from each member agency, with each agency's assessed valuation determining its additional representation and voting rights. Directors can be appointed by the chief executive officer of the member agency or be elected by a majority vote of the governing body of the agency. Metropolitan does not compensate directors for their service. The Board includes business, professional, and civic leaders. Board meetings are generally held on the second Tuesday of each month and are open to the public.

Throughout its history, the Board has delegated certain tasks to Metropolitan staff, which are codified in Metropolitan's Administrative Code. In addition, Metropolitan has developed policy principles to help achieve its mission to provide adequate and reliable supplies of high-quality water in an environmentally and economically responsible way. These policies can be found in a variety of documents including: specific policy statements, the Administrative Code, Board-adopted policy principles, and letters submitted to the Board. Policy statements are also embedded in formal Board meeting discussions and recorded in meeting minutes. The policies established by the Board are subject to all applicable laws and regulations. The management of Metropolitan is under the direction of its General Manager, who serves at the discretion of the Board, as do Metropolitan's General Auditor, General Counsel, and Ethics Officer.

1.3 Metropolitan Service Area Historical Information

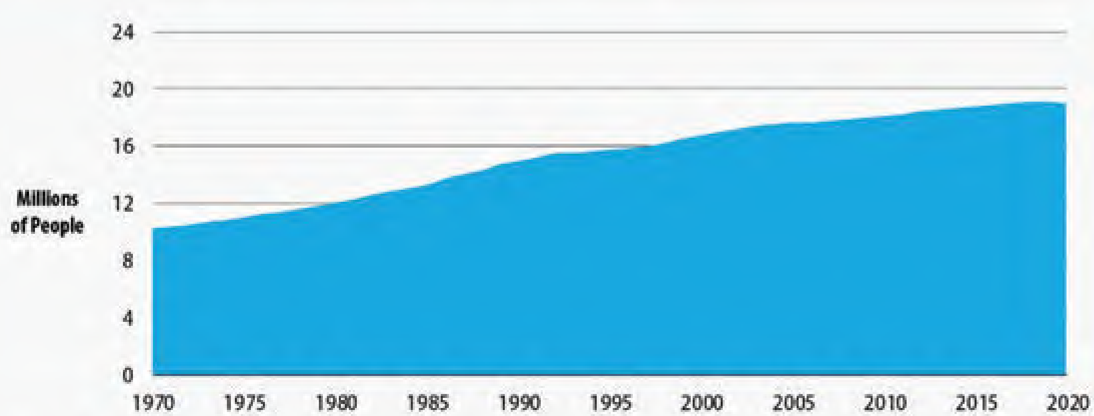
Population

In 1990, the population of Metropolitan's service area was approximately 15.0 million people. By 2020, it had reached an estimated 19.0 million, representing almost half of the state's population. In the past, annual growth has varied from about 200,000 annually in the 1970s and early-to-mid-1980s to more than 300,000 annually in the late 1980s. Population growth slowed due to economic recession during the early 1990s to just over 50,000 in 1995, before again rising to more than 250,000 per year in the period 1999 through 2002. Growth has generally averaged 90,000 persons per year during the last 10 years from 2011-2020. Figure 1-2 shows the service area population growth from 1970 to 2020. From 2019 to 2020, the region experienced net decline in population due to the COVID-19 pandemic.

The most populated cities within Metropolitan's service area are Los Angeles (largest city in the state), San Diego (second largest in the state), Long Beach, Anaheim, Santa Ana, and Riverside. The Department of Finance State Population Report from May 2020 reports biggest numeric increases occurring in the cities of Los Angeles and San Diego, consistent with their larger population base. Figure 1-3 shows the 5-year growth rates for the six counties within Metropolitan’s service area. As can be seen from this figure, there has been an overall decrease in population growth rate in the last 5 years. Appendix 1 presents a detailed discussion of the demographic trends in Southern California and their impacts on regional demand forecasts.

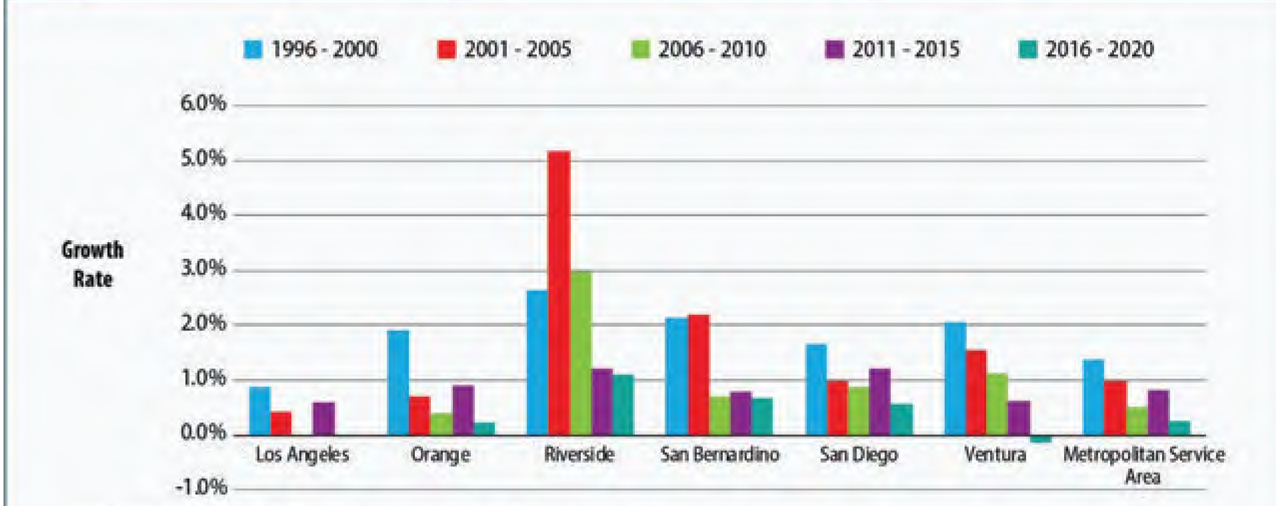
In preparing its demographic and growth forecast, Metropolitan relied on Southern California Association of Government’s (SCAG’s) 2020 Demographics and Growth Forecast Proposed Final Technical Report to the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The report includes information on social factors affecting water management such as race, ethnicity, and cultures. As noted in SCAG’s report, Southern California is one of the most diverse regions in the nation in race and ethnicity. Race and ethnicity are important for demographers to consider while forecasting since fertility and household formation have strong cultural underpinnings that vary based on these categories.

Figure 1-2 Service Area Population Growth 1970-2020



SOURCE: U.S. Census, California Department of Finance and Metropolitan

Figure 1-3 Average Annual Population Growth Rates in Metropolitan's Service Area



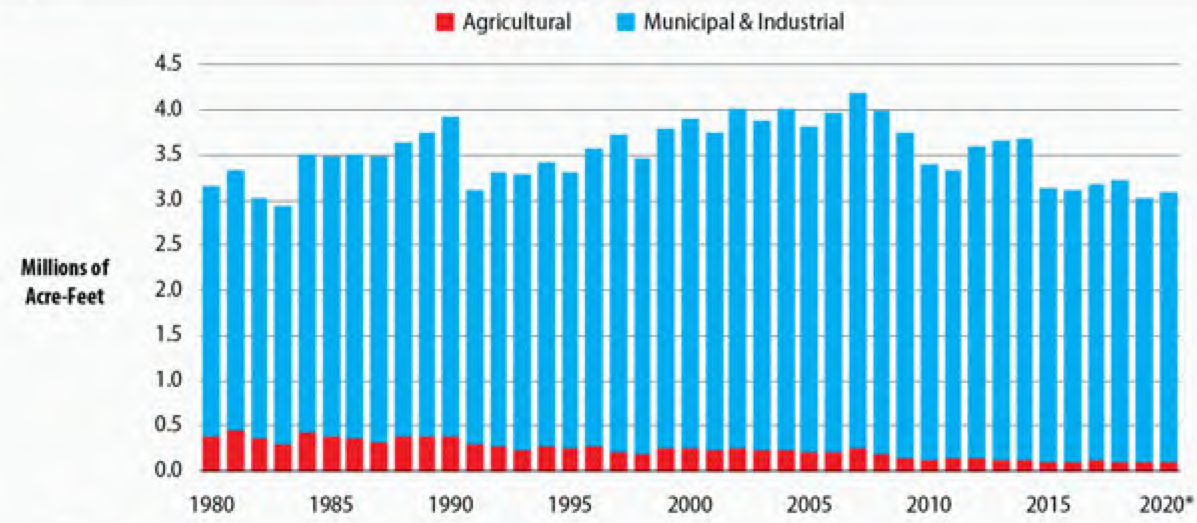
SOURCE: U.S. Census, California Department of Finance and Metropolitan

Historical Retail Water Demands

Figure 1-4 presents historical retail water demands on a calendar year basis in Metropolitan's service area. Since 1980, retail water demands varied from 2.9 million acre-feet (MAF) in 1983 to nearly 4.2 MAF in 2007. Following record demand in 1990 of over 3.9 MAF, due to the economic recession, drought impacts, conservation, and mandatory water use restrictions, demands declined to 3.1 MAF in 1991. Demand remained below the historic peak level as a result of continuing effects from the recession and the drought, coupled with a number of wet years and ongoing conservation efforts. In 2000, retail demands once again reached 3.9 MAF, reaching the early peak level for the first time in a decade. Since 2000, retail demands reached a new peak level in 2007 with nearly 4.2 MAF. Calendar year 2007 was the driest year since 1989, with precipitation measured at 5.66 inches in Downtown Los Angeles. Since the peak retail demand in 2007, a decrease in demand was observed during the economic recession of 2008-2012. Starting in 2012, the severe drought in California led to a massive conservation campaign and water use restriction by the State, Metropolitan, and local water agencies resulting in a decrease in demand in 2015. Demands remain low even after the mandatory restriction was lifted in the spring of 2017.

In 2020, about 96 percent of retail demands were used for municipal and industrial purposes (M&I), and 4 percent for agricultural purposes. The relative share of agricultural water use has declined due to urbanization and market factors, including the price of water. Agricultural water use accounted for 19 percent of total regional water demand in 1970, 12 percent in 1980, 10 percent in 1990, and 4 percent in 2010.

Figure 1-4 Retail Demand in Metropolitan's Service Area



*Data not available. 2020 estimated based on historical data.

Climate and Rainfall

As Figure 1-5 shows, Metropolitan's service area encompasses three major climate zones. Table 1-4 reports the average temperature and rainfall information for representative locations within those three zones for the 30-year period from 1990 to 2019. The evapotranspiration data (expressed as Et_o) are reported for the 30-year period of 1985 to 2014.

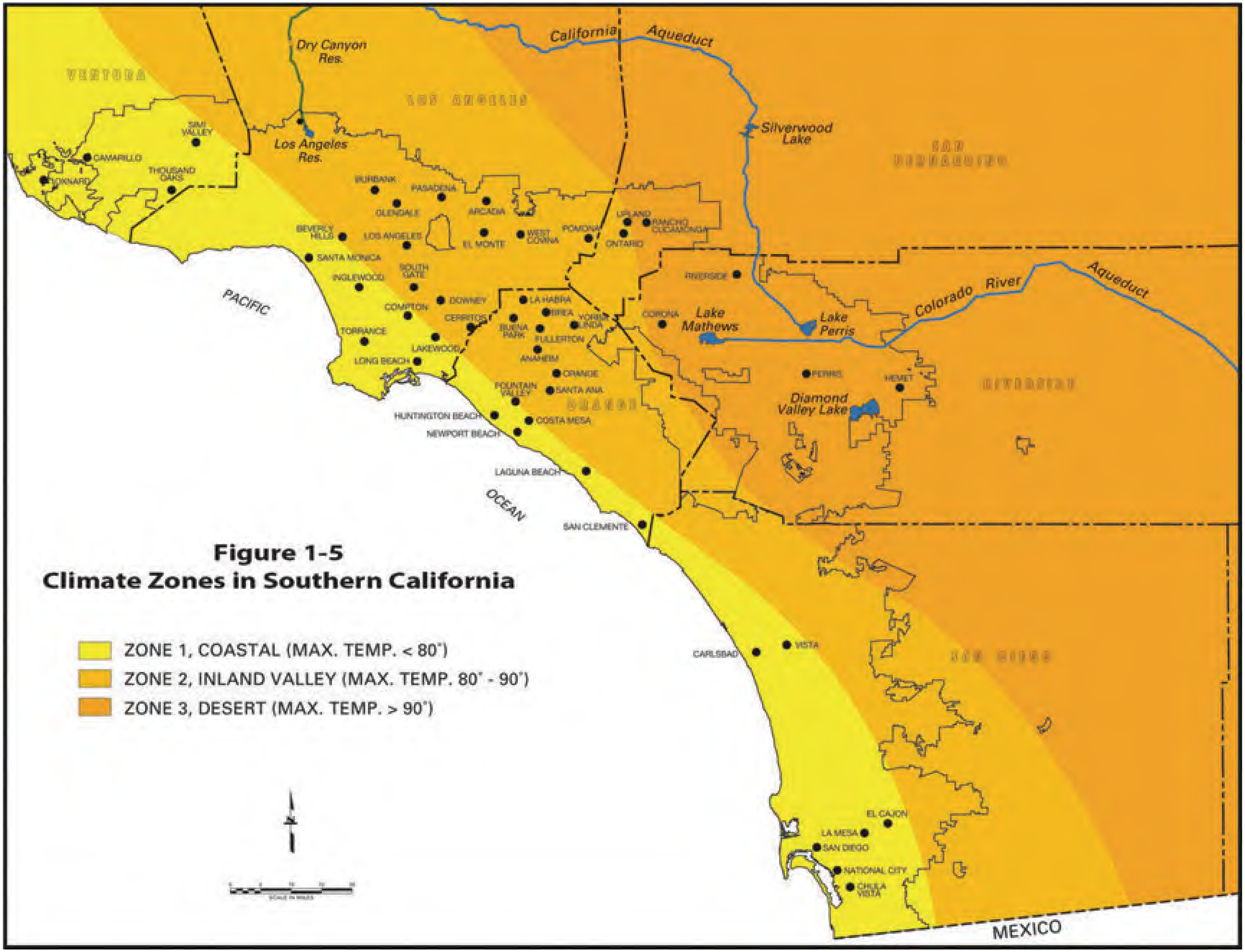


Figure 1-5
Climate Zones in Southern California

Table 1-4 Weather Variables in Three Zones in Metropolitan's Service Area

30-year Average (1990-2019)

Average Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Los Angeles County[1]	68.77	68.54	70.62	73.06	74.34	78.16	82.95	84.61	83.69	79.41	73.77	67.90	75.48
Riverside County[2]	65.89	65.55	66.45	68.22	68.98	71.18	74.87	76.85	76.64	74.04	70.15	65.42	70.35
San Diego County[3]	69.76	70.02	73.61	77.79	80.93	88.06	94.21	95.84	92.65	84.52	76.35	68.83	81.05

30-year Average (1990-2019)

Average Precipitation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Los Angeles County[1]	3.32	3.74	2.09	0.61	0.35	0.09	0.02	0.00	0.13	0.58	0.78	2.42	15.20
San Diego[2]	2.05	2.22	1.40	0.55	0.29	0.07	0.08	0.01	0.12	0.49	0.80	1.67	9.85
Riverside[3]	2.01	2.48	1.31	0.52	0.23	0.09	0.13	0.13	0.15	0.47	0.66	1.35	11.16

30-year Average (1985-2014)

Et_o[4]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Los Angeles County	2.2	2.7	3.7	4.7	5.5	5.8	6.2	5.9	5.0	3.9	2.6	1.9	50.1
San Diego	2.5	2.9	4.2	5.3	5.9	6.6	7.2	6.9	5.4	4.1	2.9	2.6	56.4
Riverside	2.1	2.4	3.4	4.6	5.1	5.3	5.7	5.6	4.3	3.6	2.4	2.0	46.5

1. Temperature and precipitation data are from the National Oceanic and Atmospheric Administration, USC Station KCQT. Last updated February 18, 2020.
2. Temperature and precipitation data are from the National Oceanic and Atmospheric Administration, Riverside Station KNOC. February 18, 2020.
3. Temperature and precipitation data are from the National Oceanic and Atmospheric Administration, San Diego Airport Station KSAN. Last updated February 18, 2020.
4. Eto values are from Model Water Efficient Landscape Ordinance, September 10, 2009, Appendix A: Reference Evapotranspiration (Eto) Table.
   Eto values were derived from: 1) California irrigation Management Information System (CIMIS); 2) Reference Evapotranspiration Zone Map, UC Department of Land, Air and Water Resources and California Department of Water Resources 1999; 3) Reference Evapotranspiration for California, UC Department of Resources, 1987, Bulletin 1922; and 4) Determining Daily Reference Evapotranspiration, UC Cooperative Extension, Division of Agriculture and Natural Resources, 1987, Publication Leaflet 21426.

1.4 Current Conditions

Current Challenges

Metropolitan faces a number of challenges in providing adequate, reliable, and high-quality supplemental water supplies for southern California. One of those challenges is widely variable hydrologic conditions that can have a significant impact on Metropolitan's imported water supply sources. This section offers a brief discussion of Metropolitan's current challenges, current available resources, short-term supply outlook, and recent and near-term actions to meet these challenges.

Dramatic swings in annual hydrologic conditions have characterized the past decade on the State Water Project (SWP). 2014 saw the lowest allocation of contract supplies from the SWP up to that point, and 2015 saw the lowest ever Northern Sierra snowpack. Just two years later in 2017, the SWP watershed experienced the highest ever Sacramento River runoff, and the highest SWP allocation since 2006. Wet conditions returned in 2019, helping Metropolitan to build dry-year storage reserves to record high levels. Dry conditions have returned in 2020. The year began with a dry January and the driest February on record. In addition to below average precipitation, the snowpack peaked in April at only 66 percent of the April 1 average measurement. This dry hydrology produced only 52 percent of average runoff for the water year. As a result, Metropolitan only received 20 percent of its contract water supplies in 2020. For calendar year 2021, the SWP allocation decreased from an initial allocation of 10 percent to five percent based on on-going dry conditions. The five percent SWP allocation for Metropolitan in 2014 and 2021 represents the lowest in the history of the SWP.

The Colorado River Basin has also historically experienced large swings in annual hydrologic conditions; however, these swings have largely been buffered through a large volume of storage. In 2020, the Upper Colorado River Basin snowpack peaked in April at 107 percent of average. However, April through July runoff was observed at just 52 percent of average due to hot and dry conditions in the late spring and early summer. This is an example of a potential change in relationship between precipitation and expected runoff. The Colorado River Basin experienced 5 consecutive years of significantly below average runoff starting in 2000, followed by a period of alternating years of above average, near average, and significantly below average runoff through 2020. This 21-year period has been mitigated by actions taken by Metropolitan in cooperation with the Bureau of Reclamation and the other Basin States to maintain system storage, avoiding a shortage declaration. At the close of 2020, however, system storage is at or near its lowest since 2000, so there is less water available to buffer future dry conditions.

Sacramento-San Joaquin River Delta Issues

The Sacramento-San Joaquin River Delta (Bay-Delta) is the hub of California's water supply and is critically important to the entire state. About 30 percent of Southern California's water supply moves across the Bay-Delta. The Bay-Delta's declining ecosystem, caused by a number of factors that include agricultural runoff, predation of native fish species, urban and agricultural discharge, changing ecosystem food supplies, and overall system operation, has led to reduction in water supply deliveries. Operational constraints will likely continue until a long-term solution to the problems in the Bay-Delta is identified and implemented.

Delta Conveyance

In his State of the State address delivered February 12, 2019, Governor Newsom announced that he did not "support WaterFix as currently configured," but does "support a single tunnel." On April 29, 2019, Governor Newsom issued Executive Order N-10-19, directing several agencies to (among other things), "inventory and assess… [c]urrent planning to modernize conveyance through the Bay Delta with a new single tunnel project." The Governor's announcement and Executive Order led to DWR's withdrawal of all approvals and environmental compliance documentation associated with California WaterFix. The CEQA process identified in this notice for the proposed Delta Conveyance Project will, as appropriate, utilize relevant information from the past environmental planning process for California WaterFix, but the proposed project will undergo a new stand-alone environmental analysis leading to issuance of a new EIR.

On January 15, 2020, DWR issued a Notice of Preparation of an Environmental Impact Report for the DCP. The proposed project would construct and operate new conveyance facilities in the Delta that would add to the existing SWP infrastructure. New intake facilities as points of diversion would be located in the north Delta along the Sacramento River between Freeport and the confluence with Sutter Slough. The new conveyance facilities would include a single main tunnel to convey water from the new intakes to the existing Banks Pumping Plant and potentially the federal Jones Pumping Plant in the south Delta. The new facilities would provide an alternate location for diversion of water from the Delta and would be operated in coordination with the existing south Delta pumping facilities. The new north Delta facilities would be sized to convey up to 6,000 cfs of water from the Sacramento River to the SWP facilities in the south Delta. DWR would operate the dual conveyance system in compliance with all state and federal regulatory requirements and would not reduce DWR's current ability to meet standards in the Delta to protect biological resources and water quality for beneficial uses.

2019 Biological Opinions

In August 2016, USBR and DWR reinitiated consultation with NMFS and USFWS on the Coordinated Long-term Operations of the CVP and SWP due to new information and science on declining listed fish species populations. On October 21, 2019, USFWS and NMFS released their Biological Opinions, and on February 18, 2020, USBR signed a Record of Decision, pursuant to the National Environmental Policy Act, completing its environmental review and adopting the 2019 Long-Term Operations Plan.

The 2019 Long-Term Operations Plan incorporates and updates many of the requirements contained in the previous 2008 and 2009 Biological Opinions. It also includes over $1 billion over a ten-year period in conservation, monitoring and new science, some of which is in the form of commitments carried forward from the previous 2008/2009 Biological Opinions. Those costs are shared by the SWP and CVP. The 2019 Long-Term Operations Plan and 2019 Biological Opinions are expected to increase SWP deliveries by an annual average of 200,000 acre-feet as compared to the previous Biological Opinions.

California ESA Incidental Take Permit

DWR described and analyzed its proposed SWP long-term operations plan for purposes of obtaining a new California ESA permit in its November 2019 Draft EIR. The 2019 Draft EIR proposed essentially the same operations plan as the federal 2019 Biological Opinions, with the addition of operations for the California ESA-listed Longfin smelt. The proposed project included an estimated $540 million in conservation, monitoring and science, much of which overlapped with DWR's share of the estimated $1 billion under the federal 2019 Biological Opinions. In December 2019, DWR submitted its application for an incidental take permit under the California ESA to the California Department of Fish and Wildlife (CDFW), with a modified State operations plan that added new outflow and environmental commitments. On March 27, 2020, DWR released its final EIR and Notice of Determination, describing and adopting a State operations plan with additional operational restrictions and additional conservation commitments. On March 31, 2020, CDFW issued a California ESA incidental take permit for the SWP that included further operational restrictions and outflow. The final approved project and incidental take permit reduce long-term average SWP deliveries by more than 200 TAF, which more than erased any potential improvement in SWP water supplies that were anticipated to result from the 2019 Biological Opinions. In addition, the approved project and incidental take permit add another estimated $218 million over a ten-year period in environmental commitments for the SWP beyond the SWP's share of the $1 billion required to comply with the 2019 Biological Opinions.

<u>Bay-Delta Water Quality Control Plan Update/Voluntary Agreements</u>

The Bay-Delta Plan is reviewed periodically, and new standards and allocations of responsibility can be imposed on the SWP as a result. The last review was completed in 2006, and the current review has been ongoing since approximately 2010 in a phased approach.

Phase 1 focuses on the southern Delta salinity objectives for the protection of agriculture, San Joaquin River flow objectives for the protection of fish and wildlife, and a program of implementation for achieving those objectives. Phase 2 considers the comprehensive review of the other elements of the Bay-Delta Plan, including but not limited to Sacramento River and Delta outflow objectives.

The SWRCB has also encouraged all stakeholders to work together to reach one or more voluntary agreements for consideration by the SWRCB that could implement the proposed amendments to the Bay-Delta Plan through a variety of tools, while seeking to protect water supply reliability. Metropolitan is participating in the Phase 2 proceedings and voluntary agreement negotiations. In March of 2019, DWR and CDFW put forward a project description and planning agreement that would allow the SWRCB to analyze the environmental impacts and benefits of the voluntary agreement alternative to the percentage of unimpaired flow framework.

In December 2018, the SWRCB adopted the Phase 1 Bay-Delta Plan amendments and Final Substitute Environmental Document. Among other things, the Phase 1 updates established new Lower San Joaquin River (LSJR) flow objectives and revised southern Delta salinity objectives. In July of 2018, the SWRCB released a framework that describes the draft proposal for Phase 2, which will update the flow requirements for the Delta and its contributing watersheds, including the Sacramento River and its tributaries. The framework provides additional details about the flow requirements staff is likely to propose, how these new requirements could be implemented, and preliminary information on their potential environmental benefits and water supply effects. The framework also states that the SWRCB is interested in receiving potential Bay-Delta Plan amendment language developed through the voluntary agreement process that would authorize, with the affirmative concurrence from CDFW, a coordinated control of flows and other, non-flow factors that would achieve benefits comparable to the unimpaired flow requirements.

Other issues, such as the continued decline of some fish populations in the Bay-Delta and surrounding regions and certain operational actions in the Bay-Delta, may significantly reduce Metropolitan's water supply from the Bay-Delta. Future new or revised Biological Opinions or incidental take authorizations under the Federal ESA and California ESA might further adversely affect SWP and CVP operations. Additionally, new litigation, listings of additional species under the ESAs, or new regulatory requirements imposed by the SWRCB could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage, or other operational changes impacting water supply operations. Metropolitan cannot predict the ultimate outcome of any of the litigation or regulatory processes described above, but believes they could have an adverse impact on the operation of the SWP pumps, Metropolitan's SWP supplies, and Metropolitan's water reserves.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. The Delta Vision process, established by Governor Schwarzenegger, was aimed at identifying long-term solutions to the conflicts in the Bay-Delta, including natural resource, infrastructure, land use, and governance issues. In addition, State resource agencies and various water user entities are currently engaged in the development of the Delta Conveyance Project, which is aimed at making physical and operational improvements to the SWP system in the Delta necessary to restore and protect access south-of-Delta SWP water supplies and restore and protect water quality by addressing anticipated sea-level rise, seismic risks, and by providing operational flexibility to improve aquatic conditions in the Delta and better manage risks of further regulatory constraints on SWP operations.

Water Supply Conditions

The water conditions that the region faced leading up to 2020 were characterized by alternating scarcity and abundance. Whereas the five years leading up to the prior UWMP were characterized by severe drought and depletion of Metropolitan's dry year storage reserves, conditions leading up to 2020 have included two very wet years and the rebuilding of Metropolitan's storage reserves to record high levels.

The five-year period began with 2016 reflecting average hydrologic conditions and a 60 percent SWP allocation. This level of supplies allowed for a modest recovery in storage reserves after the drought of 2014-2015. The wettest year on record followed in 2017, and with an 85 percent SWP allocation, Metropolitan was able to add over a million acre-feet to storage reserves by the end of 2017. As such, Metropolitan was well prepared to manage a future dry year, which arrived in 2018 with a 35 percent allocation. Wet conditions returned in 2019; with a 75 percent allocation, storage reserves increased by nearly 600 TAF, ending the year at a record high 3.1 MAF. With high volumes of water in storage, and healthy supplies on the Colorado River, Metropolitan was well prepared to meet the challenge of a dry 2020 and 20 percent SWP allocation.

Investments in storage and flexible operations have prepared Metropolitan to capitalize on available supplies in wet years and manage through drought years. During the wet years of 2017 and 2019, Metropolitan achieved the following milestones:

- In 2017, record deliveries of 395 TAF to exchange partners Desert Water Agency and Coachella Valley Water District from the Colorado River Aqueduct to accomplish the largest single year increase in the Advance Delivery Account;
- In 2017 and 2019, record creation of Intentionally Created Surplus storage in Lake Mead of 351 TAF and 410 TAF, respectively; and
- In 2019, a record low diversion of Colorado River water of approximately 540 TAF, a level not seen since the 1950s.

While recent wet conditions along with flexible adaptive management have brought great successes in building storage reserves, water supply challenges remain. These include:

- Analysis of historical records suggest a potential change in the relationship between precipitation and runoff in the Colorado River Basin and has contributed to a drying trend over the last 21 years. With Lake Mead and Lake Powell at 40 and 42 percent of capacity, respectively, there is practically no buffer to avoid a shortage from any future period of reduced precipitation and runoff.
- Groundwater basins and local reservoirs dropped to very low operating levels due to record-dry hydrology in Southern California in 2016. Due to wetter hydrology in 2017 and 2019, the groundwater basins started to recover. However, levels in groundwater basins throughout

the service area remained below healthy storage levels. In addition, groundwater production in the service area has remained at low levels even after the drought;

- Supply availability in the Los Angeles Aqueduct system continues to be affected by both drought and environmental mitigation efforts related to Owens Lake and the Lower Owens River.

In addition, water quality challenges such as algae toxins, PFAS, and the identification of constituents of emerging concern, have a significant impact on the region's water supply conditions and underscore the importance of flexible and adaptive regional planning strategies.

Current Available Resources

Metropolitan's primary purpose is to provide a supplemental supply of water for domestic and municipal uses at wholesale rates to its member public agencies. Metropolitan's principal sources of water are the SWP and the Colorado River. Metropolitan's robust planning strategy continues to balance available local and imported water resources and member agencies' demands within Metropolitan's service area.

A. Imported Supplies

Metropolitan receives water from the Colorado River through the Colorado River Aqueduct (CRA) and from the SWP through the California Aqueduct. Figure 1-6 shows the historic annual deliveries from the SWP and the Colorado River.

Colorado River

The Colorado River was Metropolitan's original source of water after Metropolitan's establishment in 1928. Metropolitan has a legal entitlement to receive water from the Colorado River under a permanent service contract with the Secretary of the Interior. The CRA, which has a capacity of 1.25 MAF a year, is owned and operated by Metropolitan. It transports water from Lake Havasu, at the border of the state of California with Arizona, approximately 242 miles to its terminus at Lake Mathews in Riverside County.

Over the years, Metropolitan increased reliable supply through the CRA through programs that it helped fund and implement including: farm and irrigation district conservation programs, improved reservoir system operations, land management programs, and water transfers and exchanges through arrangements with agricultural water districts in southern California, entities in Arizona and Nevada that use Colorado River water, and the U.S. Department of the Interior, Bureau of Reclamation (USBR). A detailed discussion of availability of Colorado River water for delivery to Metropolitan is included in Section 3.1.

Metropolitan also receives approximately 277,700 AF per year of additional Colorado River supplies pursuant to an exchange agreement with its member agency, San Diego County Water Authority (SDCWA) (the Exchange Agreement). Pursuant to several agreements, SDCWA receives transfers of Colorado River water from Imperial Irrigation District (IID) and water resulting from the Coachella Canal Lining Project and All-American Canal Lining Project. Pursuant to the Exchange Agreement with Metropolitan, SDCWA makes that water available to Metropolitan at Lake Havasu, which Metropolitan then adds to its supplies. In exchange, Metropolitan delivers a like-amount of its own blended water to SDCWA at the Metropolitan-SDCWA connections.[1]

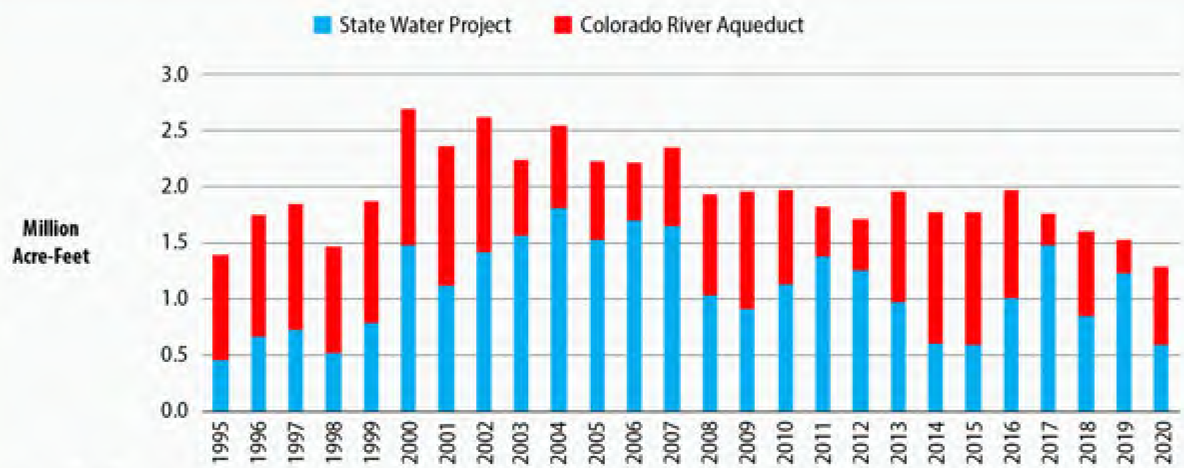
<u>State Water Project</u>

Metropolitan imports water from the SWP, owned by the state of California and operated by DWR. This project transports Feather River water stored in and released from Oroville Dam and conveyed through the Bay-Delta, as well as unregulated flows diverted directly from the Bay-Delta south via the California Aqueduct to four delivery points – one from the Aqueduct's West Branch at the northwestern and three from the East Branch at the northeastern portion of Metropolitan's service area.

In 1960, Metropolitan signed a water supply contract with DWR for participation in the SWP (State Water Contracts). Metropolitan is one of 29 agencies that have long-term contracts with DWR (State Water Contractors) that are participants in the SWP through State Water Contracts, and is the largest agency in terms of the number of people it serves (19.2 million), the share of SWP water that it is allocated pursuant to the State Water Contract (approximately 46 percent), and the percentage of total annual payments made to DWR by agencies with State Water Contracts (approximately 53 percent in 2020). A more detailed discussion of the SWP supplies is provided in Section 3.2.

[1] Prior UWMPs reported these exchanges as SDCWA's local supplies and not as Colorado River water made available to Metropolitan at Lake Havasu with Metropolitan's other Colorado River supplies. This was because Metropolitan reported information in the UWMP as reported by each member agency and SDCWA reported the exchanges as local supplies. Metropolitan has determined that it is most appropriate to report the exchanges here consistently with the transaction, pursuant to Water Code Section 10615. Section 10615 requires that Metropolitan describe and evaluate all sources of supply made available to the district. SDCWA has independently acquired the IID transfer water pursuant to its transfer agreement with IID, and Metropolitan assigned to SDCWA its rights to the canal lining water for 110 years. Under the Colorado River Water Delivery Agreement, the Secretary of the Interior has agreed to deliver this conserved Colorado River water to the Colorado River Aqueduct Intake at Lake Havasu for diversion by Metropolitan. Metropolitan and SDCWA executed the 2003 Exchange Agreement providing for Metropolitan to take possession of the water at Lake Havasu. Metropolitan owns and manages this water at its complete discretion for the benefit of its member agencies. In exchange for the volume made available to Metropolitan at Lake Havasu (at uneven intervals), Metropolitan delivers annually an equal volume to SDCWA (in even monthly deliveries) from whatever source or sources available to Metropolitan. Accordingly, other Metropolitan reports, including the Integrated Water Resources Plan (IRP) and the Annual Report, have accurately not categorized that water as "local supplies." To reflect the transfer of the Colorado River water to Metropolitan at Lake Havasu for its ownership and management, the exchange water is categorized here as water imported from the Colorado River pursuant to the Exchange Agreement and not as a local supply. This is consistent with Section 10615's requirement, and is also consistent with Metropolitan's prior report of the SDCWA exchange water at Section 3.1 of the UWMP and its exclusion from the local supplies at Figure 1-7 of prior UWMP reports.

Figure 1-6 Imported Water Supplies in Metropolitan's Service Area



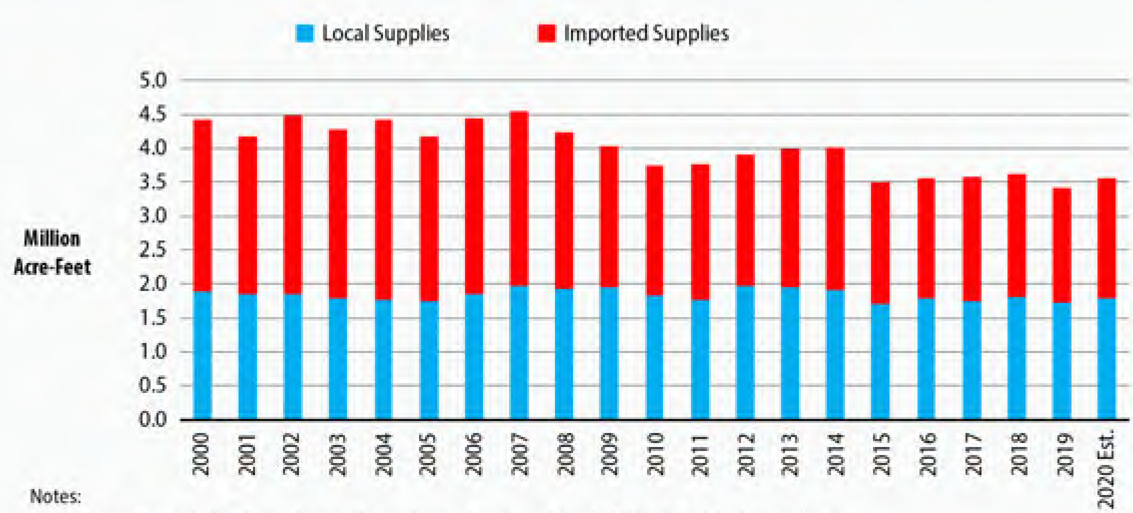
Notes:

1. State Water Project Supplies include Table A, Art. 21, Art. 14(b), Art. 12(d), Art. 12(e), Art. 55, draws from storage & carryover, DWCV & other exchanges, transfers, Drought Water Bank and Dry Year Pool Purchases, Pools A&B, Flood Water, wheeling, Port Hueneme lease, and SBVMWD Purchases.
2. Colorado River Aqueduct supplies are gross Havasu diversions less return flows, deliveries to USBR, Mexico, and storage.

B. *Local Supplies*

Approximately 50 percent of the region's water supplies come from resources separately controlled or operated by local water agencies. These resources include water extracted from local groundwater basins, catchment of local surface water, and non-Metropolitan imported water supplied through the Los Angeles Aqueduct. Figure 1-7 shows the historic annual use of local and imported water supplies within Metropolitan's service area.

Figure 1-7 Annual Regional Water Supplies in Metropolitan's Service Area



Notes:

1. Local supplies include: Groundwater, Groundwater Recovery, Recycled Water, and Surface water
2. Imported supplies include: Full-service, IAWP, Replenishment and LAA
3. Data not available for 2020. Estimate for 2020 is based on historical data.

Groundwater

The groundwater basins that underlie the region provide an annual average supply of approximately 1.2 MAF (2011-2020 average). Natural recharge of the groundwater basins is supplemented by active recharge of captured stormwater, recycled water, and imported water to support this level of annual production.

Estimates indicate that available storage space in the region's groundwater basins in mid-2020 is approximately 4.7 MAF. Successive dry years have resulted in groundwater depletions that will need to be replaced with natural recharge during wet years and active spreading of captured stormwater, recycled water, and imported water. Groundwater basin managers and water suppliers have taken steps to store water in advance of dry years to soften the potential impact on groundwater aquifers and to maintain reliable local water supplies during dry years.

Recycling, Groundwater Recovery, and Seawater Desalination

Recycling and groundwater recovery are local resources that add balance to Southern California's diverse water portfolio. In addition to replenishment of groundwater basins as described above, water recycling provides extensive treated wastewater for applicable municipal and industrial uses. Common uses of recycled water include landscape irrigation, agricultural irrigation, and commercial and industrial applications. Groundwater recovery employs additional treatment techniques to effectively use degraded groundwater supplies that were previously not considered viable due to high salinity or other contamination.

While water recycling and groundwater recovery projects in the Southern California region are primarily developed by local water agencies, many newer projects have been developed with financial incentives provided through Metropolitan's Local Resources Program (LRP). The LRP is a performance-based program that provides incentives to expand water recycling and support recovery of degraded groundwater, among other types of projects. In 2020, the regional water production from water recycling and groundwater recovery totaled approximately 552 TAF, of which 120 TAF was developed with Metropolitan funding assistance. A detailed discussion of recycling and groundwater recovery is presented in Section 3.5.

Seawater desalination represents a significant opportunity to diversify the region's water resource mix with a new, locally controlled, reliable potable supply. Metropolitan supports seawater desalination to its member agencies by providing technical assistance, regional facilitation of research and information exchanges, and financial incentives through the LRP.

In December 2015, pursuant to its Water Purchase Agreement with the San Diego County Water Authority (SDCWA), Poseidon Resources began operation of the 56 TAF Claude "Bud" Lewis Seawater Desalination Plant in the City of Carlsbad. During fiscal years 2017 through 2019, the facility produced an annual average of 42.1 TAF, meeting nearly 9 percent of SDCWA's service area demands. The Carlsbad facility does not receive funding through Metropolitan's LRP. Seawater desalination is discussed in more detail in Section 3.5

Surface Water

In addition to the groundwater basins, local agencies maintain surface reservoir capacity to capture local runoff. The average yield captured from local watersheds is estimated at approximately 90 TAF per year (2011-2020 average). The majority of this supply comes from reservoirs within the service area of the SDCWA.

Los Angeles Aqueduct

Although the Los Angeles Aqueduct (LAA) imports water from outside the region, Metropolitan classifies water provided by the LAA as a local resource because it is developed and imported by a local agency (the Los Angeles Department of Water and Power). This resource provided approximately 200 TAF per year on average over the last ten years from 2011 to 2020 but was reduced to approximately 33 TAF during a historic dry period of 2015.

Table 1-5 shows the projected local supplies estimated for a normal water year and under five consecutive years of drought for 2025, 2035, and 2045.

Table 1-5
Local Supplies for Normal and Dry Years
(Acre-Feet)

	2025		2035		2045	
	Normal Year[1]	Dry Year[2]	Normal Year	Dry Year	Normal Year	Dry Year
Local Groundwater						
From Natural Recharge[3]	939,000	985,000	964,000	988,000	991,000	1,011,000
Replenishment	316,000	255,000	332,000	327,000	335,000	334,000
Local Projects						
Groundwater Recovery	143,000	139,000	158,000	158,000	159,000	159,000
Recycling	550,000	491,000	687,000	658,000	706,000	703,000
Seawater Desalination	51,000	56,000	51,000	56,000	51,000	56,000
Local Runoff Stored	80,000	77,000	82,000	77,000	82,000	77,000
Los Angeles Aqueduct	257,000	118,000	258,000	118,000	258,000	118,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000	278,000
Total	**2,613,000**	**2,400,000**	**2,809,000**	**2,660,000**	**2,860,000**	**2,736,000**

[1] Normal Water Year is based on 1922 through 2017.

[2] Dry Year is based on five consecutive years of drought (1988-92).

[3] Estimate of natural recharge is based on basin balance considering projected local groundwater production and replenishment deliveries to the groundwater basins.

Metropolitan's Actions to Address Supply Challenges

Metropolitan progressively addressed the challenges of water shortages caused by the dramatic swings in annual hydrologic conditions that have characterized the past decade on the SWP. Metropolitan took actions that include: (1) Increasing water conservation by expanding outreach, adding devices, and increasing incentives to residents, (2) Increasing local resources by providing incentives for on-site recycled water hook-up and increasing incentives for the LRP, (3) Augmenting water supplies through water transfers and exchanges, (4) Improving return capability of storage programs, (5) Modifying Metropolitan's distribution system to enhance the use of Colorado River water, and (6) Implementing the Water Supply Allocation Plan to distribute the limited imported supplies and preserve storage reserves.

Continuing Water Conservation

By 2040, conservation and water recycling will account for one-third of Southern California's water supply portfolio in Metropolitan's service area. Metropolitan supports financial incentives, education, outreach programs and appliance/plumbing standards at both the regional and local level to ensure water conservation meets this goal.

On April 1, 2015, Governor Brown issued an Executive Order (Order) calling for a 25 percent reduction in consumer water use in response to the historically dry conditions throughout the State of California. The next month, Metropolitan increased funding for its conservation program to a record amount of $450 million over the next two fiscal years due to strong response to the incentive program and to assist retail agencies in the service area to meet their mandatory water reduction targets. Since the drought ended, Metropolitan has been working hard these past five years to ensure that water demand in its service area continues to remain low. Gallons per capita measurement is the major conservation indicator of residential water demand, and for the last five years, Metropolitan's service area has remained below the theoretical standard set to meet a 20 percent reduction goal by 2020. While Metropolitan is not subject to meeting the requirements of California's 20X2020 Water Conservation Plan, its conservation efforts are designed to help its member agencies and their retailers to meet their requirements.

Metropolitan's conservation program has seen numerous changes from the previous years of record high conservation activity during the last drought, as focus shifted from relying heavily on providing incentives to developing additional training and research programs to supplement conservation activity. This new focus was designed to reach a broader audience in order to maintain water demand levels achieved during the recent drought. The educational courses teach students the numerous benefits of water efficient landscaping and how to convert their traditional landscaped yards to something more appealing and sustainable, while greatly reducing their outdoor water usage. Ongoing educational efforts include turf removal, California Friendly native plants and landscaper training classes. Additionally, Metropolitan is searching for other water saving opportunities by researching the potential of water saving processes in cooling tower water use, the effects on household water pressure reduction on residential water use, and a household water demand pilot study to determine residential end use from water using fixtures.

Recent conservation highlights include the launching of a revised Turf Replacement Program, establishing additional water efficiency incentives with energy utilities, and a new program for increasing conservation in disadvantaged communities. The disadvantaged community program is comprised of three parts: (1) a regional pilot program; (2) increased flexibility for member agencies to use Metropolitan funds for member agency-administered programs; and, (3) grant funding support. The $3 million regional pilot program provides $250 for installation of premium high-efficiency toilets within multi-family housing constructed prior to 1994. Analyzing program data may better explain how regional approaches could increase conservation within disadvantaged communities. Under the second component, 100 percent of the Metropolitan funds given to member agencies for their locally administered conservation programs could be targeted toward supporting disadvantaged communities or income-qualified consumers. Metropolitan also works with member and local agencies to help identify opportunities and procure grant funding for such conservation programs

Increasing Local Resources

Since 1982, Metropolitan has assisted local agencies in the development of water recycling and groundwater recovery under the Local Resources Program (LRP). The LRP has evolved over time in an effort to help support the development of local supply projects including the methodology for providing the incentives to the Member Agencies. In October 2014, Metropolitan's Board approved additional LRP refinements to support further development of local resources, which included increasing the maximum incentive amount, offering three incentive payment structures, including on-site recycled water retrofit costs, including other water resources (such as seawater desalination and stormwater), and providing reimbursable services for Metropolitan's technical assistance.

On-site Retrofit Program

In February 2014, Metropolitan's Board approved the On-site Retrofit Pilot Program to offer incentives to modify existing water users' potable water or industrial water systems to utilize recycled water.

Stormwater Pilot Programs

In September 2019, Metropolitan's Board approved the Stormwater for Direct-use Pilot Program to offer incentives for development and monitoring of new and existing direct-use stormwater projects. The primary purpose of the Pilot Program is to collect data from several region-wide stormwater projects. The data collected will provide a better understanding of actual stormwater runoff capture volumes, costs, and project performance. The Pilot Program will help evaluate the potential water supply benefits delivered by stormwater capture projects and provide a basis for potential future funding approaches.

In November 2019, Metropolitan's Board approved the Stormwater for Recharge Pilot Study. The purpose of this study is to evaluate the relationship between stormwater capture and yield to define the water supply benefits of stormwater. Yield for purposes of this study is defined as either increased groundwater production or decrease in imported water needs relative to baseline. The study also requires a minimum of 3 years of monitoring, both of the amount of stormwater captured and the impact to the groundwater basins via groundwater modeling and monitoring wells or sensors. This study will help evaluate the potential water supply benefits delivered by stormwater capture projects and provide a basis for potential future funding approaches.

Augmenting Water Supplies

Augmenting water supplies through water transfers and exchanges is an element of Metropolitan's IRP to mitigate water shortages during dry periods.

The Colorado River System has experienced a drying trend since 2000, leading to substantially decreased water levels in both Lakes Mead and Powell. In March 2014, Metropolitan's Board approved entering into an agreement with the Central Arizona Water Conservation District, Denver Water, Southern Nevada Water Authority (SNWA), and the United States to establish a two-year pilot program to compensate entitled users of the Colorado River water for voluntary reductions in water use, including fallowing of agricultural lands. The water savings from this program became system water and supported lake elevations.

Metropolitan also entered into several agreements to improve Metropolitan's operational flexibility on both a short-term and mid-term basis:

- In January 2015, Metropolitan's Board authorized an exchange of up to 50 TAF with Westside Mutual Water Company and Kern County Water Agency. This one-for-one exchange provides water at a time in the year when SWP supplies are expected to be low and provides flexibility on timing of returning water.
- In September 2015, Metropolitan's Board authorized an amendment to the operational storage agreement with SNWA and the Colorado River Commission of Nevada allowing

Metropolitan access to additional Colorado River water during 2015. Metropolitan paid SNWA $44.375 million for 150 TAF of water apportioned to but not used by SNWA during 2015. When SNWA requests return of water stored under this amendment, SNWA would reimburse Metropolitan for the costs paid for the initial delivery of water.

- In November 2015, Metropolitan's Board authorized entering into agreements with Antelope Valley-East Kern Water Agency (AVEK) to develop exchange and storage programs for SWP supplies. This would be an uneven exchange: for every two acre-feet provided to Metropolitan, AVEK would receive back one acre-foot in the future. Metropolitan may also store at least 30 TAF of its SWP supplies in wet years in the Antelope Valley groundwater basin.
- In September 2020, Metropolitan's Board authorized new price terms for the purchase of transfer supplies under the Yuba Accord. The price terms will be fixed for the next five years. Metropolitan has received around 200 TAF of new supplies before losses under the program.
- In March 2021, Metropolitan's Board authorized entering into an agreement with San Bernardino Valley Municipal Water District to obtain surplus SWP supplies. The program provides improved water supply reliability to Metropolitan and Metropolitan's member agencies within the Santa Ana River Watershed. The program is estimated to provide a long term average of around 13 TAFY to the region.

Improving Return Capabilities of Storage Programs

Metropolitan has a number of storage programs with water agencies along the California Aqueduct that would allow it to store SWP supplies during surplus conditions and to have stored water returned when needed. In 2015, Metropolitan provided up-front capital costs to its water management program partners to build infrastructure to improve the return capabilities of several storage programs.

- In September 2014, Metropolitan's Board authorized providing capital funds to Semitropic Water Storage District to enhance the pumpback capacity of the Semitropic Groundwater Storage Program by 13,200 AFY. The capital costs would be reimbursed to Metropolitan should Semitropic market the added capacity to another party after Metropolitan has at least one year of recovery capability.
- In March 2015, Metropolitan's Board authorized entering into agreement with Arvin Edison Water Storage District to restore 2,500 AFY of return capability by replacing groundwater wells of the Arvin Edison/Metropolitan Water Management Program. The capital costs will be reimbursed as credits to future Program costs.
- Also, in March 2015, Metropolitan's Board authorized entering into agreement with Kern-Delta Water District to improve the return reliability of the Kern-Delta Water District Water Management Program. The improvement includes a pipeline that would reduce losses when Kern River supplies are delivered for exchange. Metropolitan's upfront costs will be more than offset through an elimination of put regulation fees on the next 20,000 AF delivered into the Program.
- In April 2019, Metropolitan's Board authorized entering into an agreement with AVEK for the High Desert Water Bank. Under the Water Bank, Metropolitan could store up to 280,000 acre-feet (AF) of its State Water Project (SWP) Table A or other supplies in the Antelope Valley groundwater basin. Metropolitan will have first priority to 70,000 AF per year of both put and take capacity. Metropolitan will pay AVEK for the capital costs for construction of monitoring and production wells, turnouts from the California Aqueduct, underground and aboveground pipelines, recharge basins, water storage, and booster pump facilities. In

addition, Metropolitan would subsequently pay actual operation and maintenance, energy, and recovery usage fees to recover the water in storage.

Modifying Metropolitan's Distribution System

As a result of ongoing extraordinary dry conditions throughout the state of California, the SWP allocation for calendar year 2014 was five percent, which represents about 96,000 acre-feet of SWP Table A water allocation for Metropolitan. Although Metropolitan had been utilizing storage reserves to help bridge the gap between the low SWP supplies and its demand for SWP water, a number of extraordinary operational actions were taken in 2014 to use available Colorado River water and DVL storage supplies to deliver water service to areas where Metropolitan ordinarily uses SWP supplies to provide its service.

Metropolitan modified its normal operations in several areas of the system to use Colorado River water to provide service to areas as far west as the cities of Thousand Oaks and Calabasas, as well as other locations within Metropolitan's system, some of which had not received Metropolitan water from the Colorado River for extended periods since the completion of the SWP in the early 1970s. System modifications have also been implemented to increase system flexibility to use Colorado River water and DVL water for service to new areas of the system.

- In April 2014, Metropolitan's Board authorized a project that would allow Metropolitan to serve water from multiple sources, such as DVL, to the Mills Treatment Plant in Riverside. The initial phase, construction of an interconnect between the Inland Feeder and the Lakeview Pipeline, near San Jacinto, California, was completed in October 2014, which allowed for an initial flow of water. The second phase of the project, lining of the Bernasconi Tunnel No. 2 was completed in March of 2015 and allowed for increased flows from DVL. The final phase of the project, installation of 3 large valves to improve flow control was completed in 2018.
- In May 2014, Metropolitan's Board authorized the design of improvements to the Greg Avenue Pump Station to enhance water supply reliability in the West Valley area and construct flow control modifications to the outlet of the Jensen Water Treatment Plant. These projects currently allow the West Valley area and Ventura County, which is served normally with SWP water only, to receive blended supplies from the SWP and the Colorado River. Construction of the Greg Avenue Pump station improvements to enhance the long term reliability of the pumps was authorized in February 2019 and is scheduled to be completed in April 2021.

Additionally, several Metropolitan member agencies made modifications within their own local systems to maximize the use of more readily available Colorado River water and DVL supplies and to further reduce the use of scarce SWP supplies.

In the face of another five percent SWP Table A allocation in 2021, Metropolitan is applying the lessons learned in 2014 and able to reap the benefits of the distribution system modifications that help minimize the use of limited SWP supplies

Implementing the Shortage Response Actions, when needed

Recent legislative changes to the California Water Code (CWC) introduced a new Section 10632, which requires that every urban water supplier prepare and adopt a Water Shortage Continency Plan (WSCP). The WSCP is a guide for a supplier's intended actions during water shortage conditions. It is meant to improve preparedness for droughts and other impacts on water supplies by describing the process used to address varying degrees of water shortages. While intended to be a stand-alone plan that may be revised outside of the UWMP process, the CWC requires suppliers to initially include the WSCP as part of their 2020 UWMP.

Metropolitan developed a WSCP to be consistent with its existing Water Surplus and Drought Management (WSDM) Plan and Water Supply Allocation Plan (WSAP). Metropolitan's WSDM Plan, approved in 1999, provides policy guidance for managing regional water supplies during surplus and shortage conditions. It provides an overall vision for operational supply management and characterizes a flexible sequence of actions to minimize the probability of severe shortages and reduce the likelihood of extreme shortages. Thus, the WSDM Plan principles guide the specific actions to be taken under WSCP shortage stages. Metropolitan's WSAP, developed in 2008, is integral to the WSCP's shortage response strategy. In the event that Metropolitan determines that shortage response actions through supply augmentation and demand reduction measures are insufficient to meet a projected shortage, the WSAP may be implemented to fairly distribute a limited amount of water supply using a detailed methodology that reflects the range of local conditions and needs of the region's retail water consumers.

Metropolitan's Board authorized the implementation of the WSAP for the period of July 2009 through April 2011 in response to the drought and low storage reserves. During the dry period of 2012 through 2016, Metropolitan managed its operations through significant use of regional storage reserves. It was anticipated that at end of year 2014, total dry year storage reserves would approach levels similar to those when the WSAP was first implemented in 2009. On December 9, 2014, Metropolitan's Board approved adjustments to the formula for calculating member agency supply allocations for future implementation of the WSAP. On April 14, 2015, Metropolitan's Board approved implementation of the WSAP at a Level 3 Regional Shortage Level, effective July 1, 2015 through June 30, 2016. The WSAP allows member agencies the flexibility to choose among various local supply and conservation strategies to help ensure that demands on Metropolitan stay in balance with limited supplies.

Over the last three years, favorable supply conditions notably in 2017 and 2019, allowed Metropolitan to rebuild its storage reserves. Metropolitan's regional dry year storage is estimated to be at approximately 3.2 MAF by the end of 2020. In addition, Metropolitan also has 750 TAF of stored supplies reserved to meet service area demands during emergency conditions. Metropolitan's comprehensive shortage response planning, combined with improved storage reserves, puts the region in a better position to withstand future dry conditions. Metropolitan's WSCP, WSDM Plan, and WSAP are described in detail in Section 2 and Appendix 4.

Planning for the Future 2

The purpose of this section is to show the approach and extent to which Metropolitan plans to meet Southern California's water supply needs in the future. In its role as supplemental supplier to its 26 member agencies in the Southern California water community, Metropolitan faces ongoing challenges in meeting its member agencies' needs for water supply reliability and quality in the region. Increased environmental regulations and competition for water from outside the region have resulted in changes in delivery patterns and timing of imported water supply availability. At the same time, the Colorado River has experienced a drying trend over the past 21 years, resulting in reservoir levels that are reduced from historical levels.

As described in the previous chapter, the water used in Southern California comes from a number of sources. From 2010 through 2019, Metropolitan has provided 40 percent to 50 percent of the water needs in its service area from the Colorado River via the CRA, and from the Sacramento-San Joaquin River Watershed via the SWP. As Metropolitan continues to face various water supply challenges, development of adaptable resource management strategies to meet a range of possible future demands is ongoing.

Metropolitan's continued progress in developing a diverse resource mix enables the region to meet its water supply needs. The investments that Metropolitan has made and its ongoing efforts in many different areas coalesce toward its goal of long-term regional water supply reliability. Metropolitan's actions have been focused on the following:

- Continuing water conservation
- Developing water supply management programs outside of the region
- Developing storage programs related to the SWP and the Colorado River
- Developing storage and groundwater management programs within the Southern California region
- Increasing water recycling, groundwater recovery, stormwater, and seawater desalination
- Pursuing long-term solutions for the ecosystem, regulatory and water supply issues in the California Bay-Delta

Metropolitan has undertaken a number of planning initiatives over the years. This section summarizes past and current efforts, which include the 1996 Integrated Water Resources Plan (IRP) and its three updates in 2004, 2010, and 2015; the 2020 IRP; the Water Shortage Contingency Plan; the Water Surplus and Drought Management Plan; the Water Supply Allocation Plan; Metropolitan's Emergency Storage Objective; and Seismic Resiliency Studies. Collectively, they provide policy framework guidelines and resource targets for Metropolitan to achieve its goals towards regional water supply reliability.

While Metropolitan coordinates regional supply planning through its inclusive IRP process, Metropolitan's member agencies also conduct their own planning analyses – including their own urban water management plans – and may develop projects independently of Metropolitan.

Appendix 5 shows a list of potential local projects provided to Metropolitan by its member agencies.

2.1 Integrated Water Resource Planning

In 1993, Metropolitan commenced an Integrated Water Resources Planning process as the beginning of a new era of regional reliability planning for its Southern California service area. As this planning process began, Metropolitan held a series of three regional assemblies from 1993 through 1995 addressing strategic planning issues. Attendance at these regional assemblies included Metropolitan's Board, Metropolitan's senior management, member agency managers, local retail water providers, groundwater basin managers, and invited public representatives. The purpose of these regional assemblies was to gain consensus on resource policy issues, provide direction for future work, and to endorse regional objectives, principles, and strategies.

A key outcome of the regional assemblies was the establishment and adoption of water supply principles which provided critical policy guidance for the development and adoption of future Metropolitan IRPs. In summary, these principles state:

- No water supplier in Southern California is an isolated, independent entity unto itself, and all, to varying degrees, are dependent upon a regional system of water importation, storage, and distribution.
- Metropolitan plays a leading role in Southern California's regional water management, having the responsibility for importing water from outside the region and convening dialogues on regional water issues, encouraging local water development and conservation, advocating the region's interests to the state and federal governments, and leading the region's water community.
- Water suppliers at all levels have a responsibility to promote a strong water ethic both within the water community and among the public, developing plans through open processes, committing to achieving adopted regional goals and strategies, and committing to a policy of equity and fairness in development and implementation of water management programs.

These regional assemblies laid the foundation for Metropolitan's integrated regional planning path from 1996 to the present. This path has guided Metropolitan's water resources strategy from the initial adoption of the Metropolitan's IRP in 1996 to successive IRP updates in 2004, 2010, and 2015.

The 1996 IRP

Metropolitan's inaugural IRP established a long-term, comprehensive water resources strategy to provide the region with a reliable and affordable water supply. One of the fundamental outcomes of the 1996 IRP was the identification and subsequent implementation of a diverse portfolio of resource investments in both imported and in--region supplies, and in water conservation measures. The 1996 IRP further emphasized the construction and creation of a network of water storage facilities, both below and above ground. It also set a regional water supply reliability goal of providing full capability to meet all retail-level water demands under all foreseeable hydrologic events.

The 1996 IRP process identified cost-effective solutions that offered long-term reliability to the region. Having identified the need for a portfolio of diversified supplies to meet its demands, the 1996 IRP analyzed numerous resource portfolios seeking to find a "Preferred Resource Mix" that would provide the region with reliable and affordable water supplies through 2020. The analysis determined the preferred mix of resources based on cost-effectiveness, diversification, and reliability. Establishing the "Preferred Resource Mix" was an integral part of the 1996 IRP, and subsequent updates have continued to focus on how best to diversify Metropolitan's water portfolio and establish the broad resource targets for the region that helped to meet IRP objectives.

The 2004 IRP Update

The 2004 IRP Update was the first major review and update in the IRP process. The 2004 IRP Update reviewed the goals and achievements of the 1996 IRP, identified the changed conditions for water resource development, and updated resource development targets through 2025. These targets included increased conservation savings and planned increases in local supplies. The 2004 IRP Update also explicitly recognized the need to handle uncertainties inherent in any planning process. Some of these uncertainties include:

- Fluctuations in population and economic growth
- Changes in water quality regulations
- Discovery of new chemical contaminants
- Regulation of endangered species affecting sources of supplies
- Changes in climate and hydrology

As a result, a key component of the 2004 IRP Update was the addition of a 10 percent "planning buffer." The planning buffer identified additional supplies, both imported and locally developed, that could be implemented to address uncertainty in future supplies and demands.

The 2010 IRP Update

In keeping with the reliability goal established under the original 1996 IRP of meeting full-service demands at the retail level under all foreseeable hydrologic conditions, the 2010 IRP Update sought to stabilize Metropolitan's traditional imported water supplies and establish additional water resources to withstand California's inevitable dry cycles and growth in water demand. The 2010 IRP Update marked the first time that Metropolitan and its member agencies explicitly acknowledged the increasing impact that emerging challenges and uncertainties such as environmental regulations, threats to water quality, climate change, and economic unknowns would have on planning for a reliable, high quality, and affordable water supply. By 2010, the Colorado River had experienced below-average precipitation conditions for most of the previous decade, and the SWP was facing historic regulatory cutbacks that significantly reduced its supplies that pass through the Sacramento-San Joaquin Delta in Northern California. Recognizing that the conditions for developing and maintaining water supply reliability had changed, Metropolitan set out not only to update the IRP, but also to examine how best to adapt to the new water supply paradigm.

Adaptive Management Strategy

The 2010 IRP Update specifically planned for uncertainty with a range of adaptive management strategies that both meets demands under observed hydrologic conditions and responds to future uncertainty. The plan provided solutions by developing diverse and flexible resources that perform adequately under a wide range of future conditions. Specifically, the adaptive management strategy was a three-component plan that included the following:

- Core Resources Strategy – Designed to maintain reliable water supplies under known conditions. The Core Resources Strategy represented baseline efforts to manage water supply and demand conditions. This strategy was based on "what we know today," including detailed planning assumptions about future demographic scenarios, water supply yields, and a range of observed historical weather patterns. Under this strategy, Metropolitan and its member agencies would advance water use efficiency through conservation and recycled water, along with further local supply development such as groundwater recovery and seawater desalination. Metropolitan would also stabilize traditional imported supplies from the Colorado River and Northern California.

- Uncertainty Buffer – A suite of actions which help to mitigate short-term changes. The 2010 IRP Update set goals for a range of potential buffer supplies to protect the region from possible shortages in a cost-effective manner, starting with a further expansion of water use efficiency on a region-wide basis. The buffer would enable the region to adapt to future circumstances and foreseeable challenges that were not assumed under the Core Resources Strategy, such as short-term loss of local supplies or regulatory restrictions.
- Foundational Actions – Strategies for additional water resources to augment the core or buffer supplies. Foundational Actions were designed to prepare the region by determining viable alternative supply options for long-range planning. These preparatory actions, including feasibility studies, technological research and regulatory review, were designed to lay the foundation for potential alternative resource development.

The 2015 IRP Update

Following the 2010 IRP, drought in California and across the southwestern United States has put the IRP adaptive management strategy to the ultimate stress test. Dry conditions in California persisted into 2015, resulting in a fourth consecutive year of drought. The year 2015 began with the driest January on record, resulting in the earliest and lowest snowpack peak in recorded history at only 17 percent of the traditional snowpack peak on April 1st. In the ten years since 2006, there were only two wet years, with the other eight years having been below normal, dry, or critically dry. Within Southern California, continuing dry conditions impacted the region's local supplies, including its groundwater basins.

Throughout 2015, Metropolitan engaged in a comprehensive process with its Board of Directors and member agencies to review how conditions had changed since the 2010 IRP Update and to establish targets for achieving regional reliability, taking into account known opportunities and risks. Areas reviewed in the 2015 IRP Update include demographics, hydrologic scenarios, water supplies from existing and new projects, water supply reliability analyses, and potential resource and conservation targets. Metropolitan's Board of Directors adopted the 2015 IRP Update on January 12, 2016.[1]

The 2015 IRP Update approach explicitly recognizes that there are remaining policy discussions that will be essential to guiding the development and maintenance of local supplies and conservation. Since the adoption of the 2015 IRP Update and its targets for water supply reliability, Metropolitan has begun a process to address questions such as how to meet the targets for regional reliability, what are local and what are regional responsibilities, how to finance regional projects, etc. This discussion will involve extensive interaction with Metropolitan's Board of Directors and member agencies, with input from the public.

[1] http://www.mwdh2o.com/PDF_About_Your_Water/2015_IRP_Update_Report.pdf

Findings and Conclusions

The findings and conclusions of the 2015 IRP Update are:

- Action is needed – Without the investments in conservation, local supplies, and the California WaterFix targeted in the 2015 IRP Update, Metropolitan's service area would experience unacceptable level of shortage allocation frequency in the future.
- Maintain Colorado River supplies – The plan to stabilize deliveries at 900,000 AF in a typical year will require more than 900,000 AF of planned actions.
- Stabilize SWP supplies – A collaborative approach with state and federal agencies to pursue better science for resolving questions about SWP operations and advancing coequal goals of Delta restoration and statewide water supply reliability in the near term. Also work collaboratively with state and federal agencies in the California WaterFix and EcoRestore efforts.
- Develop and protect local supplies and water conservation – The 2015 IRP Update embraces and advances the regional self-sufficiency ethics by increasing the targets for additional local supplies and conservation. These targets are discussed in detail in Section 3 of this UWMP.
- Maximize the effectiveness of storage and transfers – Rebuilding Metropolitan's supply of water reserves is imperative when the drought is over. A comprehensive water transfer approach that takes advantage of water when it is available will help to stabilize and build storage reserves, increasing Metropolitan's ability to meet water demands in dry years.
- Continue with the adaptive management approach – The IRP is updated periodically to incorporate changed conditions, and an implementation report is prepared annually to monitor the progress in resources development. The 2015 IRP Update also includes Future Supply Actions (renaming the Foundational Actions component of the 2010 IRP Update to better reflect the attention on developing future supplies) that would advance a new generation of local supplies through public outreach; development of legislation and regulation; technical studies and support; and land and resource acquisitions.

The 2020 IRP

The 2020 IRP provides a broader look and concept than the previous IRP updates. The 2020 IRP strengthens the adaptive management approaches employed in prior updates through the incorporation of an explicit scenario planning step. Coming on the completion of a full "planning cycle" with reaching the end of the planning horizon of the 1996 IRP, the 2020 IRP has the benefit of a fuller understanding of the lessons learned from the previous 25 years. The key lesson is that the future is not predictable and is a function of many diverse drivers that are out of the control of the water community. The purpose of scenario planning is to broaden the understanding of plausible, but uncertain, future conditions affecting both supplies and demands. On the demand side, uncertainties surrounding future economic conditions, the extent to which local supplies are developed, and water use behavior will guide member agency dependence on Metropolitan in meeting their retail demands. On the supply side, factors like climate change impacts and regulatory uncertainty are expected to affect future supply availability in unpredictable ways.

With these uncertainties in mind, scenario planning will allow for the evaluation of investments and actions needed to achieve desired reliability under a diverse range of future conditions. It will also reinforce the adaptive capabilities of the IRP by identifying and enabling the development of future "sign-posts" indicating emerging conditions that may require the redirection of future investments and actions.

While prior IRP updates have addressed uncertainty, adaptation, and preparedness, the addition of a scenario planning element to the process further explores the plausible futures that Metropolitan may confront. Since retaining the ability to adapt through investments in preparedness can be expensive, the scenario planning element should support informed decisions regarding affordable levels of preparedness, as well as identify unacceptable consequences of inaction.

The process of developing scenarios is built on a comprehensive identification of those drivers of change that affect supply stability and demands on Metropolitan. Building on input received from the Board, member agencies, and the public, four scenarios were developed within a framework that examined the drivers of change over a range of future demands on Metropolitan and imported supply stability. This exercise provides four sets of logical, quantified assumptions resulting in unique supply demands gaps against which various investment options can be tested.

The UWMP, along with the original IRP and its subsequent updates, used a single set of assumptions for the uncertainties that drive supply and demands. In the 2020 IRP, Metropolitan explicitly acknowledges that the future is unpredictable and that a scenario planning approach can expand our thinking by examining multiple plausible futures. This approach will better prepare Metropolitan's service area for the uncertainties that lie ahead. Metropolitan believes this is an improvement over the single outcome approach taken in past IRPs and the UWMP requirements. It is important to emphasize that the scenario planning element of the 2020 IRP complements the IRP planning approach that has evolved since 1996. It is also important to note that the UWMP assumptions fall within the plausible futures contemplated in the IRP. This means that, while the reliability assessments in the UWMP comply with the Act, Metropolitan and its member agencies are contemplating and comparing future conditions that are beyond the requirements of the Act and thus will be prepared for a wider range of conditions than shown in the UWMP assessments. The following sections describe the methodology and IRP assumptions being applied for the purposes of the UWMP.

2.2 Estimating Demands on Metropolitan

The Urban Water Management Planning Act requires suppliers to conduct three key basic planning analyses to evaluate supply reliability. The first is a water service reliability assessment that compares the total water supply sources available to the water supplier with the long-term projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The second is a drought risk assessment (DRA) that evaluates a drought period that lasts five consecutive water years starting from the year following when the assessment is conducted. And third, a Water Shortage Contingency Plan (WSCP) that includes a detailed proposal for how the supplier intends to act during actual water shortage conditions. As one of the recent additions to the Act's requirements, suppliers need to present the WSCP as part of their UWMP. However, the WSCP is its own independent plan that shall be adopted and provided to customers, cities, and counties within the supplier's service area, and may be amended independent of a supplier's UWMP. These required assessments and planning are included in Sections 2.3, 2.4, and 2.5.

The 2020 UWMP presents Metropolitan's water reliability assessments from 2025 through 2045. As specified in the Act, there are three year types that must be included in the water service reliability assessment for the UWMP. To simulate hydrologic conditions for the required reliability assessments, Metropolitan assumed the following:

- <u>Normal Year</u>. The average of historic years 1922 to 2017 most closely represents the water supply conditions that Metropolitan considers available during normal water year.
- <u>Single Dry Year</u>. The conditions for the year 1977 represent the lowest water supply available to Metropolitan.
- <u>Five-Consecutive-Year Drought</u>. The five consecutive years of 1988 to 1992 represent the driest five-consecutive year historical sequence for Metropolitan's water supply. This five-year sequence is used to complete both Metropolitan's water service reliability and drought risk assessments.

Metropolitan developed estimates of future demands and supplies from local sources and from Metropolitan sources based on 96 years (1922-2017) of historic hydrologic conditions. The 96-year period starting in 1922 was chosen because the CalSim 2 model used in the 2019 SWP Delivery Capability Report began in 1922. Supply and demand analyses for the single-dry year and 5-year drought cases were based on conditions affecting the SWP as this supply availability fluctuates the most among Metropolitan's sources of supply. Using the same 96-year period of the SWP supply availability, 1977 is the single driest year, and 1988 through 1992 are the 5 consecutive driest years for SWP supplies to Metropolitan. In addition, staff analysis of the 8-river index indicated that 1977 is the single driest year and 1988 through 1992 are the lowest 5 consecutive dry years from 1922 through 2017. The 8-river index is used widely by DWR and other water agencies as an estimate of the unimpaired runoff (or natural water production) of the Sacramento and San Joaquin River basins, which are sources of water for the SWP.

Demand Projection for the UWMP

Metropolitan developed its demand projections for the UWMP by first estimating total retail demands for its service area and then factoring out water savings attributed to conservation.[2] Projections of local supplies were then derived using data from current and expected local supply programs. The resulting difference between total demands net of savings from conservation and local supplies is the expected regional demands on Metropolitan supplies.

[2] Information generated as part of this analysis is contained in Appendix 1.

These various estimates are shown in Tables 2-1 through 2-3. Major categories used in these tables are defined below.

Total Demands

Total demands are the sum of retail demand for M&I and agricultural, seawater barrier demand, and replenishment demand. Total demands represent the total amount of water needed by the member agencies. Total demands include:

- Retail Municipal and Industrial (M&I) Demand – Retail M&I demands represent the full spectrum of urban water use within the region. These include residential, commercial, industrial, institutional, and un-metered water uses. Demographic and economic factors are the major drivers behind M&I water demands. The demographic and economic data used in developing these projections for the UWMP were taken from the Southern California Association of Governments' (SCAG) 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy from the Connect SoCal Complete Report (as adopted on May 7, 2020) and from the San Diego County Association of Governments' (SANDAG) San Diego Forward: The 2019 Federal Regional Transportation Plan (October 2019, Version 17). The SCAG and SANDAG regional growth forecasts are the core assumptions that drive the estimating equations in Metropolitan's Econometric Demand Model (MWD-EDM)**.**

  SCAG's and SANDAG's projections undergo extensive local review, incorporate zoning information from city and county general plans, and are backed by Environmental Impact Reports. Both SCAG and SANDAG prepare demographic forecasts based on land use data for their respective regions through extensive processes that emphasize input from local planners and are done in coordination with local or regional land use authorities, incorporating essential information to reflect anticipated future populations and land uses. These growth forecasts are used to guide development of regional plans and strategies mandated by federal and state governments. Metropolitan's use of SCAG and SANDAG projections is consistent with CWC Section 10631's requirement for suppliers to include current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning.

  Impacts of potential annexation are not included in the demand projections for the 2020 UWMP. However, Metropolitan's Review of Annexation Procedures concluded that the impacts of annexation within the service area beyond 2020 would not exceed two percent of overall demands.

- Retail Agricultural Demand – Retail agricultural demands consist of water use for irrigating crops. Member agencies estimate agricultural water use based on many factors, including farm acreage, crop types, historical water use, and land use conversion. Each member agency estimates its agricultural demand differently, depending on the availability of information. Metropolitan relies on member agencies' estimates of agricultural demands for the 2020 UWMP.

- Seawater Barrier Demand – Seawater barrier demands represent the amount of water needed to hold back seawater intrusion into the coastal groundwater basins. Groundwater management agencies determine the barrier requirements based on groundwater levels, injection wells, and regulatory permits.

- Storage Replenishment Demand – Storage replenishment demands represent the amount of water member agencies plan to use to replenish their groundwater basins or surface reservoirs in order to maintain sustainable basin/reservoir heath and production. For the 2020 UWMP, replenishment deliveries are not included as part of consumptive demands**.**

Climate impacts to M&I and Agricultural demands are captured using climate adjustment factors. These factors were estimated using observed range of weather variables, precipitation and temperature, on historical consumptive demands. Metropolitan updated these factors to include the most recent weather and climate outcomes and recent changes in water use and irrigation demands. By incorporating these factors, Metropolitan's demand projections are calibrated to the more recent water use behaviors and better reflect current climate change impacts.

Conservation Adjustment

Water savings from conservation reduces total retail demand. Conservation savings consists of the following:

- Code-Based Conservation – Water savings resulting from plumbing codes and other institutionalized water efficiency measures. Sometimes referred to as "passive conservation," this form of conservation would occur as a matter of course without any additional financial incentives from water agencies. In addition, water savings from Model Water Efficiency Ordinance (MWELO) is assumed for 50 percent of new home construction since the ordinance does not have a uniform effective enforcement mechanism for compliance. MWELO is also assumed not to affect water use projections for existing homes and businesses. Water savings from codes, standards, and ordinances are discussed in Appendix 6.
- Active Conservation – Water saved as a direct result of programs and practices directly funded by a water utility. Active conservation is unlikely to occur without agency action.
- Price Effect Conservation – Reductions in customer use attributable to changes in the real (inflation adjusted) cost of water. Because water has a positive price elasticity of demand, increases in water price will decrease the quantity of water demanded by the end use consumer.
- Pre-1990 Savings – Conservation savings are commonly estimated from a base-year water-use profile. Beginning with the 1996 IRP, Metropolitan identified 1980 as the base year for estimating conservation because it marked the effective date of a new plumbing code in California requiring toilets in new construction to be rated at 3.5 gallons per flush or less. Between 1980 and 1990, Metropolitan's service area saved an estimated 250 TAF per year as the result of this 1980 plumbing code and unrelated water rate increases. Within Metropolitan's planning framework, these savings are referred to as "pre-1990 savings."

Metropolitan's conservation savings projection includes savings from Metropolitan's Conservation Credits Program, code-based conservation, price effect conservation, and pre-1990 device retrofits. The projection does not include savings from the implementation of future active conservation programs.

Local Supplies

Local supplies represent water produced or imported independently by the member agencies and other local water agencies within Metropolitan's service area. Local supplies are a key component in determining how much Metropolitan supply is needed. Projections of local supplies relied on information gathered from several sources including past urban water management plans, Metropolitan's annual local supply survey, and communications between Metropolitan and member agency staff. Local supplies include:

- Groundwater and Surface Water – Groundwater production consists of extractions from local groundwater basins. Groundwater production is supported by the active recharge of stormwater, recycled water, and imported water. Passive recharge (or native yield) also supports groundwater production. Surface water comes from stream diversions and rainwater captured in reservoirs.

- The Los Angeles Aqueduct – A major source of imported water is conveyed from the Owens Valley via the Los Angeles Aqueduct (LAA) by the Los Angeles Department of Water and Power (LADWP). Although LADWP imports water from outside of Metropolitan's service area, Metropolitan classifies water provided by the LAA as a local resource because it is developed and controlled independently by a local agency.
- Seawater Desalination – Highly treated seawater suitable for municipal and industrial potable use.
- Groundwater Recovery and Recycled Water – Developed and operated by local water agencies, groundwater recovery projects treat degraded groundwater to meet potable use standards. Recycled water projects recycle wastewater for municipal, industrial, and agricultural consumptive uses as well as for groundwater replenishment and local seawater intrusion barriers.

The local supply projections presented in the demand tables are consistent with the local supply projections that the Metropolitan member agencies are including in their respective UWMPs.[3][4] Information regarding the member agencies' local supply projections was compiled through the extensive coordination process between Metropolitan and its member agencies. Additionally, Metropolitan maintains an inventory of member agency local supply projects that have been identified within Metropolitan's service area. Appendix 5 contains the inventory of local supply projects by type of supply and includes a classification that shows the current stage of development for each supply in the inventory. The stages of development included in Appendix 5 are: Existing, Under Construction, CEQA, and Conceptual projects. The project inventory in Appendix 5 was updated and completed as part of the 2020 IRP Update survey completed by Metropolitan's member agencies in June 2019 and October 2020.

Determining Demands on Metropolitan

Metropolitan serves imported water to its 26 member agencies. For most member agencies, they have other sources of water produced locally from groundwater basins, surface reservoirs, the LAA, recycled water projects, groundwater recovery projects, and seawater desalination projects. When local supplies are not enough to meet retail demands, member agencies purchase supplemental water from Metropolitan.

In determining demands for imported water, Metropolitan developed its Sales Model to calculate the difference between total forecasted retail demands and local supply projections

[3] One variation from the member agency local supply reporting is the Colorado River water SDCWA secured from Coachella Canal Lining Project and All-American Canal Lining Project that it exchanges with Metropolitan pursuant to the parties' Exchange Agreement, since that water is provided to Metropolitan at Lake Havasu where Metropolitan receives other Colorado River water, used by Metropolitan like other Colorado River supplies, and Metropolitan delivers a like-amount of Metropolitan blended water to SDCWA in exchange. (See Section 1 at p. 22.)

[4] Another variation from the member agency local supply reporting is the hydrology used for projecting future Los Angeles Aqueduct supply. LADWP in its UWMP uses a 30-year median hydrology from FY 1985/86 to 2014/15 while Metropolitan uses the 1922 to 2017 hydrology provided by LADWP, consistent with Metropolitan's modeling framework. The discrepancies between LADWP's 30-year median hydrology and Metropolitan's 96 hydrology resulted in Metropolitan's projection being approximately 70,000 acre-feet higher in average conditions. In a single dry-year, LADWP uses the FY 1989/1990 hydrology while Metropolitan uses 1977 hydrology, resulting in Metropolitan's projection being approximately 50,000 acre-feet higher. Both Metropolitan and LADWP use the 1988-1992 hydrology for five consecutive dry-year conditions.

on a per member agency basis. The balance is the demand on Metropolitan's imported water supply. The Sales Model calculates the difference between forecasted demands and projected local supplies after factoring in climate impacts to both demand and local supply. The Sales Model employs a modeling method using historical hydrologic conditions from 1922 to 2017 to simulate the expected demands on Metropolitan supplies based on hydrologic conditions. Each hydrologic condition results in one possible outcome for the forecast year in the planning horizon. For example, each forecast year, such as 2025, has 96 possible outcomes, one for each historical hydrology year during the period 1922 to 2017. This method of modeling produces a distribution of outcomes ranging from the driest to the wettest years within this historical period.

The Sales Model forecasts three types of demands on Metropolitan:

1. Consumptive Use – Metropolitan's supplies that are used to meet retail M&I demand.
2. Seawater Barrier – Imported water needed to hold back seawater intrusion into the coastal groundwater basins.
3. Replenishment – Water for groundwater or reservoir replenishment, when available, to meet replenishment demands.

Due to differences in data and modeling methodology, the results of Metropolitan's forecast are not directly comparable to member agencies' forecasts. Differences from the member agencies forecasts are not cumulative and can offset each other on the regional level. The overall impact is within the range of Metropolitan's supply capability under all year types.

For additional information on Metropolitan's demand forecast, see Appendix 1.

Table 2-1
Metropolitan Regional Water Demands
Single Dry-Year
(Acre-Feet)

		2025	2030	2035	2040	2045
A.	**Total Demands[1]**	**4,929,000**	**5,037,000**	**5,160,000**	**5,265,000**	**5,378,000**
	Retail Municipal and Industrial	4,397,000	4,507,000	4,626,000	4,737,000	4,848,000
	Retail Agricultural	144,000	134,000	130,000	122,000	123,000
	Seawater Barrier	61,000	61,000	61,000	61,000	61,000
	Storage Replenishment	327,000	334,000	343,000	345,000	346,000
B.	**Total Conservation**	**1,162,000**	**1,211,000**	**1,263,000**	**1,325,000**	**1,389,000**
	Existing Active (through 2020)[2]	93,000	55,000	35,000	25,000	17,000
	Code-based	560,000	623,000	665,000	701,000	731,000
	Price-Effect[3]	259,000	283,000	313,000	349,000	391,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**Total Local and Other Imported Supplies**	**2,501,000**	**2,604,000**	**2,702,000**	**2,722,000**	**2,743,000**
	Groundwater	1,278,000	1,300,000	1,324,000	1,333,000	1,344,000
	Surface Water	78,000	80,000	80,000	80,000	80,000
	Los Angeles Aqueduct[4]	119,000	119,000	119,000	119,000	119,000
	Seawater Desalination	56,000	56,000	56,000	56,000	56,000
	Groundwater Recovery	143,000	157,000	158,000	158,000	159,000
	Recycling[5]	550,000	613,000	687,000	698,000	706,000
	Other Imported Supplies[6]	278,000	278,000	278,000	278,000	278,000
D.	**Total Metropolitan Demands**	**1,266,000**	**1,222,000**	**1,195,000**	**1,218,000**	**1,247,000**
	Consumptive Use	1,125,000	1,081,000	1,055,000	1,078,000	1,107,000
	Seawater Barrier	4,000	4,000	4,000	4,000	4,000
	Replenishment	136,000	136,000	136,000	136,000	136,000

Notes:
All units are acre-feet unless specified, rounded to the nearest thousand.
Totals may not sum due to rounding.
[1] Growth projections are based on SCAG 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy and SANDAG San Diego Forward: The 2019 Federal Regional Transportation Plan.
[2] Does not include future active conservation savings. 1990 is base year.
[3] Includes un-metered water use savings.
[4] Los Angeles Aqueduct Projection uses 1977 hydrology.
[5] Excludes Santa Ana River base flow, which is used for recharge of Orange County groundwater basin and reflected in the Groundwater production numbers.
[6] Exchange with SDCWA.

Table 2-2
Metropolitan Regional Water Demands
Drought Lasting Five Consecutive Water Years
(Acre-Feet)

		2025	2030	2035	2040	2045
A.	**Total Demands[1]**	**4,877,000**	**5,064,000**	**5,182,000**	**5,299,000**	**5,410,000**
	Retail Municipal and Industrial	4,414,000	4,540,000	4,658,000	4,777,000	4,889,000
	Retail Agricultural	147,000	143,000	135,000	129,000	126,000
	Seawater Barrier	61,000	61,000	61,000	61,000	61,000
	Storage Replenishment	255,000	319,000	327,000	332,000	334,000
B.	**Total Conservation**	**1,162,000**	**1,211,000**	**1,263,000**	**1,325,000**	**1,389,000**
	Existing Active (through 2020)[2]	93,000	55,000	35,000	25,000	17,000
	Code-based	560,000	623,000	665,000	701,000	731,000
	Price-Effect[3]	259,000	283,000	313,000	349,000	391,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**Total Local and Other Imported Supplies**	**2,400,000**	**2,561,000**	**2,660,000**	**2,713,000**	**2,736,000**
	Groundwater	1,240,000	1,293,000	1,316,000	1,333,000	1,345,000
	Surface Water	77,000	76,000	77,000	77,000	77,000
	Los Angeles Aqueduct[4]	118,000	118,000	118,000	118,000	118,000
	Seawater Desalination	56,000	56,000	56,000	56,000	56,000
	Groundwater Recovery	139,000	152,000	158,000	158,000	159,000
	Recycling[5]	491,000	588,000	658,000	694,000	703,000
	Other Imported Supplies[6]	278,000	278,000	278,000	278,000	278,000
D.	**Total Metropolitan Demands**	**1,314,000**	**1,292,000**	**1,259,000**	**1,261,000**	**1,286,000**
	Consumptive Use	1,221,000	1,164,000	1,130,000	1,132,000	1,158,000
	Seawater Barrier	8,000	4,000	4,000	4,000	4,000
	Replenishment	85,000	124,000	124,000	124,000	124,000

Notes:
All units are acre-feet unless specified, rounded to the nearest thousand.
Totals may not sum due to rounding.
1 Growth projections are based on SCAG 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy and SANDAG San Diego Forward: The 2019 Federal Regional Transportation Plan.
2 Does not include future active conservation savings. 1990 is base year.
3 Includes un-metered water use savings.
4 Los Angeles Aqueduct Projection uses 1988-1992 hydrology.
5 Excludes Santa Ana River base flow, which is used for recharge of Orange County groundwater basin and reflected in the Groundwater production numbers.
6 Exchange with SDCWA.

Table 2-3
Metropolitan Regional Water Demands
Normal Water Year
(Acre-Feet)

		2025	2030	2035	2040	2045
A.	**Total Demands[1]**	**4,925,000**	**5,032,000**	**5,156,000**	**5,261,000**	**5,374,000**
	Retail Municipal and Industrial	4,403,000	4,514,000	4,632,000	4,743,000	4,854,000
	Retail Agricultural	144,000	134,000	130,000	123,000	123,000
	Seawater Barrier	61,000	61,000	61,000	61,000	61,000
	Storage Replenishment	316,000	323,000	332,000	334,000	335,000
B.	**Total Conservation**	**1,162,000**	**1,211,000**	**1,263,000**	**1,325,000**	**1,389,000**
	Existing Active (through 2020)[2]	93,000	55,000	35,000	25,000	17,000
	Code-based	560,000	623,000	665,000	701,000	731,000
	Price-Effect[3]	259,000	283,000	313,000	349,000	391,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**Total Local and Other Imported Supplies**	**2,613,000**	**2,712,000**	**2,809,000**	**2,836,000**	**2,860,000**
	Groundwater	1,255,000	1,273,000	1,296,000	1,311,000	1,326,000
	Surface Water	80,000	82,000	82,000	82,000	82,000
	Los Angeles Aqueduct[4]	257,000	257,000	258,000	258,000	258,000
	Seawater Desalination	51,000	51,000	51,000	51,000	51,000
	Groundwater Recovery	143,000	157,000	158,000	158,000	159,000
	Recycling[5]	550,000	613,000	687,000	698,000	706,000
	Other Imported Supplies[6]	278,000	278,000	278,000	278,000	278,000
D.	**Total Metropolitan Demands**	**1,149,000**	**1,110,000**	**1,084,000**	**1,100,000**	**1,125,000**
	Consumptive Use	1,020,000	981,000	954,000	971,000	996,000
	Seawater Barrier	4,000	4,000	4,000	4,000	4,000
	Replenishment	125,000	125,000	125,000	125,000	125,000

Notes:
All units are acre-feet unless specified, rounded to the nearest thousand.
Totals may not sum due to rounding.
[1] Growth projections are based on SCAG 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy and SANDAG San Diego Forward: The 2019 Federal Regional Transportation Plan.
[2] Does not include future active conservation savings. 1990 is base year.
[3] Includes un-metered water use savings.
[4] Los Angeles Aqueduct Projection uses 1922-2017 hydrology.
[5] Excludes Santa Ana River base flow, which is used for recharge of Orange County groundwater basin and reflected in the Groundwater production numbers.
[6] Exchange with SDCWA.

2.3 Water Reliability Assessment

After estimating demands for normal water year, single dry year, and droughts lasting at least five years, the water reliability assessment for the UWMP requires urban water suppliers to identify projected supplies to meet these demands. Table 2-4 summarizes the sources of supply for the single dry year (1977 hydrology), while Table 2-5 shows the region's ability to respond in future years under a repeat of the 1988-92 drought period lasting five consecutive water years. Table 2-5 provides results for the average of the five consecutive dry-year period rather than a year-by-year detail. Over the years, Metropolitan has developed numerous programs to increase its water supply capabilities, dry year supplies, and regional storage. These programs may be exercised in conjunction with effective demand management measures during drought years. Under this reliability planning, if a five consecutive year drought sequence was to repeat, Metropolitan could exercise similar supply augmentation and demand management options for each of the five drought years at the appropriate level to meet demands. This methodology best captures Metropolitan's complex demand and supply planning with appropriate flexibility. Table 2-6 reports assessment under a normal water year represented by the average of the 96 historic hydrologies from 1922 to 2017. Appendix 2 provides a detailed description of the existing regional water supplies and Appendix 3 contains detailed justifications for the sources of supply used for this analysis.

Metropolitan's supply capabilities are evaluated using the following assumptions:

Colorado River Supplies

Colorado River supplies include Metropolitan's basic Colorado River apportionment, as well as supplies that result from existing and committed programs, including those from the IID-MWD Conservation Program, the implementation of the Quantification Settlement Agreement (QSA), related agreements, and the exchange agreement with SDCWA. The QSA established the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. Since the QSA, additional programs have been implemented to increase Metropolitan's supplies. These include the PVID Land Management, Crop Rotation, and Water Supply Program, as well as the Lower Colorado River Water Supply Project. The 2007 Interim Guidelines provided for the coordinated operation of Lake Powell and Lake Mead, as well as the Intentionally Created Surplus (ICS) program that allows Metropolitan to store water in Lake Mead. These stored supplies can be used to supply additional water to ensure that, when needed, Metropolitan can deliver up to the CRA capacity of 1.25 MAF. A detailed discussion of the QSA is included in Section 3.1 and Appendix 3.1.

In light of declining reservoir levels, the Lower Basin Drought Contingency Plan (DCP) was signed in 2019. This agreement incentivizes storage in Lake Mead and requires certain volumes of water be stored in Lake Mead under certain Lake Mead elevation levels through 2026. Metropolitan is to store certain volumes of water in Lake Mead as DCP ICS once Lake Mead is below elevation 1,045 feet. This agreement also increases Metropolitan's flexibility to take delivery of water stored as ICS at Lake Mead elevations below 1,075 feet. The goal of this agreement is to keep Lake Mead above critical elevations, and overall, it increases Metropolitan's flexibility to store water in Lake Mead in greater volumes and to take delivery of stored water to fill the CRA as needed.

Projections for the Colorado River supplies for the 2020 UWMP are based on the United States Bureau of Reclamation's (USBR) Colorado River Simulation System (CRSS) modeling developed in January 2021, which is the latest available at the time of production of this plan. USBR modeling is used to estimate Metropolitan's basic apportionment and the availability of QSA and other related programs. While the official January 2021 CRSS run uses a full historical hydrology set, USBR also examines a stress test hydrology set as a proxy to show climate change impacts. The stress test hydrology includes the latest 30 years which has lower inflows as compared to the full hydrology. The reliability assessments are inclusive of the sequence of hydrology found within the stress test hydrology set and is by proxy an estimate of lower inflows resulting from climate change. USBR is currently developing a climate change hydrology set that utilizes a suite of global climate models but it was unavailable at this time. For this reliability assessment, Metropolitan used the current methodologies USBR employs in its official CRSS run.

State Water Project Supplies

SWP supplies are estimated using the 2019 SWP Delivery Capability Report distributed by DWR in August 2020 and the Early Long-Term (ELT) Alternative described in the 2015 SWP Delivery Capability Report. The 2019 SWP Delivery Capability Report presents current DWR estimates of the amount of water deliveries for current (2020) conditions and conditions 20 years in the future, assuming currently existing SWP facilities. Since this UWMP uses DWR's 2019 SWP Delivery Capability Report to estimate future SWP supplies, any changes in supply reliability that would result from new facilities proposed under the Delta Conveyance Project and Sites Reservoir are not included in the following tables. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with water quality objectives established by the State Water Resources Control Board, the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fisheries Service issued on October 21, 2019, and the Incidental Take Permit issued by the California Department of Fish and Wildlife on March 31, 2020. In addition, these estimates incorporate amendments to the Coordinated Operations Agreement between the Central Valley Project and the State Water Project made in 2018. Under the 2019 SWP Delivery Capability Report - existing condition scenario, the delivery estimates for the SWP for 2020 conditions as a percentage of Table A amounts are 58 percent, equivalent to 1,109 TAF for Metropolitan, under a single dry-year (1977) condition and 7 percent, equivalent to 134 TAF for Metropolitan, under a long-term average condition. Detailed description of SWP supply programs are included in Section 3.2 and Appendix 3.2. To include consideration of climate change impacts, the ELT alternative as described in the 2015 Delivery Capability Report was also utilized in the analysis. DWR included climate change impacts to deliveries at a 2025 emission level and 15 cm of sea level rise in this alternative. DWR also considers the current impacts to State Water Project deliveries from existing subsidence in the Delivery Capability Report. In the 2019 Delivery Capability Report, they found that subsidence has reduced the flow capacity in the aqueduct at locations in San Luis and San Joaquin Field Divisions but has not yet resulted in a reduction in deliveries. DWR may address any potential future impacts of subsidence based on the efficacy of Sustainable Groundwater Management Act and Groundwater Management Plans in future analyses.

In dry, below-normal conditions, Metropolitan has increased the supplies received from the California Aqueduct by developing flexible Central Valley/SWP storage and transfer programs. Over the years, under the pumping restrictions of the SWP, Metropolitan has collaborated with the other contractors to develop numerous voluntary Central Valley/SWP storage and transfer programs. The goal of these storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the California Aqueduct during dry hydrologic conditions and regulatory restrictions. Descriptions of these storage and transfer programs are included in Section 3.3 and Appendix 3.2.

Storage

A key component of Metropolitan's water supply capability is the amount of water in Metropolitan's storage facilities. Over the past two decades, Metropolitan has developed a large regional storage portfolio that includes both dry-year and emergency storage capacity. Storage is a key component of water management. Storage enables the capture of surplus amounts of water in normal and wet climate and hydrologic conditions when it is plentiful for supply and environmental uses. Stored water can then be used in dry years and in conditions where augmented water supplies are needed to meet demands. Metropolitan's resource analysis model considers all the capacities and constraints of its storage facilities and programs and simulates the fill and withdrawal of these facilities through the 96 hydrologic conditions from 1922 to 2017. In-region storage and supply programs are discussed in detail in Section 3.6 and Appendix 3.3.

Interpreting Metropolitan's Reliability Assessment and Supply Capabilities in the UWMP

Metropolitan's long-term water service reliability assessment performed for the UWMP shows that, under required and stated assumptions and the conditions required by the Act, there would be supply and storage capabilities, and projected surplus supplies, sufficient to meet projected demands from 2025 through 2045. This assessment applies under a normal water year, a single dry year, and five consecutive drought year conditions as specified by the Act. However, this assessment should be considered as addressing the specific conditions and assumptions stated in the UWMP and is not inclusive of a fuller range of assumptions and conditions that are considered in the 2020 IRP, which is Metropolitan's primary long-term water supply reliability planning process. To address the uncertainties and planning parameters in the IRP, additional supply and demand management measures may be identified and developed and implemented that are outside of the needs and capabilities indicated by the UWMP reliability assessments. A write up on the impact of alternative forecasts and projections of local supplies on Demand on Metropolitan is included in the 2020 Reference Materials page posted on Metropolitan's website (www.mwdh2o.com). This write up provides supplemental information on alternative forecasts and projections for estimating local supply development and production in the service area that may be appropriate for different planning applications and its impact on estimates of Demand on Metropolitan.

Table 2-4
Single Dry-Year
Supply Capability[1] and Projected Demands
Repeat of 1977 Hydrology
(Acre-feet per year)

Forecast Year	2025	2030	2035	2040	2045
Current Programs					
In-Region Supplies and Programs	875,000	877,000	876,000	876,000	874,000
California Aqueduct[2]	647,000	634,000	634,000	634,000	633,000
Colorado River Aqueduct					
Total Supply Available[3]	1,424,000	1,403,500	1,352,500	1,352,500	1,380,750
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,772,000**	**2,761,000**	**2,760,000**	**2,760,000**	**2,757,000**
Demands					
Total Demands on Metropolitan	1,266,000	1,222,000	1,195,000	1,218,000	1,247,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000
Total Metropolitan Deliveries[5]	**1,544,000**	**1,500,000**	**1,473,000**	**1,496,000**	**1,525,000**
Surplus	**1,228,000**	**1,261,000**	**1,287,000**	**1,264,000**	**1,232,000**
Programs Under Development					
In-Region Supplies and Programs	0	0	0	0	0
California Aqueduct	0	0	0	0	0
Colorado River Aqueduct					
Total Supply Available[3]	0	0	0	0	0
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**0**	**0**	**0**	**0**	**0**
Potential Surplus	**1,228,000**	**1,261,000**	**1,287,000**	**1,264,000**	**1,232,000**

[1] Represents Supply Capability for resource programs under listed year type.
[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.
[3] Colorado River Aqueduct includes programs and Exchange with SDCWA conveyed by the aqueduct.
[4] Maximum CRA deliveries limited to 1.25 MAF including Exchange with SDCWA.
[5] Total demands are adjusted to include Exchange with SDCWA.

Table 2-5
Drought Lasting Five Consecutive Water Years
Supply Capability[1] and Projected Demands
Repeat of 1988-1992 Hydrology
(Acre-feet per year)

Forecast Year	2025	2030	2035	2040	2045
Current Programs					
In-Region Supplies and Programs	194,000	197,000	197,000	197,000	197,000
California Aqueduct[2]	734,800	772,000	794,000	816,000	792,000
Colorado River Aqueduct					
Total Supply Available[3]	1,410,000	1,403,500	1,403,500	1,365,000	1,380,750
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,178,800**	**2,219,000**	**2,241,000**	**2,263,000**	**2,239,000**
Demands					
Total Demands on Metropolitan	1,314,000	1,292,000	1,259,000	1,261,000	1,286,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000
Total Metropolitan Deliveries[5]	**1,592,000**	**1,570,000**	**1,537,000**	**1,539,000**	**1,564,000**
Surplus	**586,800**	**649,000**	**704,000**	**724,000**	**675,000**
Programs Under Development					
In-Region Supplies and Programs	0	0	0	0	0
California Aqueduct	0	0	0	0	0
Colorado River Aqueduct					
Total Supply Available[3]	0	0	0	0	0
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	*0*	*0*	*0*	*0*	*0*
Capability of Proposed Programs	**0**	**0**	**0**	**0**	**0**
Potential Surplus	**586,800**	**649,000**	**704,000**	**724,000**	**675,000**

[1] Represents Supply Capability for resource programs under listed year type.
[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.
[3] Colorado River Aqueduct includes programs and Exchange with SDCWA conveyed by the aqueduct.
[4] Maximum CRA deliveries limited to 1.25 MAF including Exchange with SDCWA.
[5] Total demands are adjusted to include Exchange with SDCWA.

Table 2-6
Normal Water Year
Supply Capability[1] and Projected Demands
Average of 1922-2017 Hydrologies
(Acre-feet per year)

Forecast Year	2025	2030	2035	2040	2045
Current Programs					
In-Region Supplies and Programs	875,000	877,000	876,000	876,000	874,000
California Aqueduct[2]	1,774,000	1,766,000	1,764,000	1,762,000	1,761,000
Colorado River Aqueduct					
Total Supply Available[3]	1,453,000	1,390,500	1,390,500	1,339,500	1,367,750
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**3,899,000**	**3,893,000**	**3,890,000**	**3,888,000**	**3,885,000**
Demands					
Total Demands on Metropolitan	1,149,000	1,110,000	1,084,000	1,100,000	1,125,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000
Total Metropolitan Deliveries[5]	**1,427,000**	**1,388,000**	**1,362,000**	**1,378,000**	**1,403,000**
Surplus	**2,472,000**	**2,505,000**	**2,528,000**	**2,510,000**	**2,482,000**
Programs Under Development					
In-Region Supplies and Programs	0	0	0	0	0
California Aqueduct	13,000	13,000	13,000	13,000	13,000
Colorado River Aqueduct					
Total Supply Available[3]	0	0	0	0	0
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**13,000**	**13,000**	**13,000**	**13,000**	**13,000**
Potential Surplus	**2,485,000**	**2,518,000**	**2,541,000**	**2,523,000**	**2,495,000**

[1] Represents Supply Capability for resource programs under listed year type.
[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.
[3] Colorado River Aqueduct includes programs and Exchange with SDCWA conveyed by the aqueduct.
[4] Maximum CRA deliveries limited to 1.25 MAF including Exchange with SDCWA.
[5] Total demands are adjusted to include Exchange with SDCWA.

2.4 Drought Risk Assessment

CWC Section 10635(b) requires every urban water supplier to include, as part of its urban water management plan, a drought risk assessment (DRA) for its water service as part of information considered in developing its demand management measures and water supply projects and programs. The DRA analysis allows suppliers to consider how to manage their water supplies during stressed hydrologic conditions in relation to variations in demand. The DRA helps a supplier to evaluate the functionality of its WSCP shortage response actions and understand the type and degree of response that is appropriate for managing water supplies. This evaluation can help the supplier to identify risks and take proactive steps before the next actual drought lasting at least five consecutive years.

CWC Section 10612 requires the DRA to be based on the driest five-year historic sequence for the agency's water supply. Furthermore, CWC Section 10635 also requires that the analysis consider plausible changes on projected supplies and demands due to climate change, anticipated regulatory changes, and other locally applicable criteria, and that the DRA start from the year following when the assessment is conducted. For the 2020 UWMP, DRA is developed for years 2021 through 2025. Accordingly, the 2020 UWMP Guidebook suggests that the historic five driest consecutive years on record may be considered a starting point in the analysis which is informed by other factors. Suppliers may then use these estimated supply conditions to prepare the DRA analysis, assuming they occur over the next five years.

For Metropolitan, the five-consecutive years of 1988 to 1992 represent the driest five-consecutive year historic sequence for Metropolitan's water supply. Thus, Metropolitan used this five-year historic sequence to complete its DRA. Metropolitan developed estimates of future demands and supplies from local sources and from Metropolitan sources based on 96 years (1922-2017) of historic hydrology. Supply and demand analyses for droughts lasting at least five consecutive water years were based on conditions affecting the SWP, as this supply availability fluctuates the most among Metropolitan's sources of supply. Using the same 96-year period of the SWP supply availability, 1988 to 1992 is the driest 5-year historical sequence that represents the lowest water supply available for SWP supplies to Metropolitan. In addition, staff analysis of the 8-river index indicates that the period 1988 to 1992 represents the lowest five consecutive dry years from 1922 through 2017. The 8-river index is used by DWR and other water agencies as an estimate of the unimpaired runoff (or natural water production) of the Sacramento and San Joaquin River basins, which are sources of water for the SWP.

Water Use Characterization

Metropolitan developed its demand forecast by first estimating total retail demands for its service area and then factoring out water savings attributed to conservation.[5] Projections of local supplies then were derived using data from current and expected local supply programs. The resulting difference between total demands net of savings from conservation and local supplies is the expected regional demands on Metropolitan supplies. As explained in detail in Section 2.2, Metropolitan used its Sales Model to calculate the difference between total forecasted retail demands and local supply projections. The balance is the demand on Metropolitan that will be met by supplies from Colorado River, SWP, and in-region storage.

Based on the 96 years of historic hydrologic condition (1922 to 2017), the five consecutive years of 1988 to 1992 represent the driest five-consecutive year historical sequence for Metropolitan's water supply and the five consecutive driest years for SWP supplies. Thus, Metropolitan used a repeat of the historic condition of 1988 to 1992 to assess the near-term drought risk for years 2021

[5] Information generated as part of this analysis is contained in Appendix 1.

to 2025. Under this assessment, the historic condition for 1988 is used to forecast the water use for the first year 2021, the historic condition for 1989 is used to forecast the water use for the second year 2022, and so on up to year 2025. Metropolitan's projected water use is presented annually for the next five years in Table 2-7, including the year-by-year change in projected use. In addition, estimated actual water use for 2020 and the historic water use for 2016 through 2019 are presented in Table 2-7.

Climate impacts to M&I and Agricultural demands are captured using climate adjustment factors. These factors were estimated using observed range of weather variables, precipitation and temperature, on historical consumptive demands. Metropolitan updated these factors to include the most recent weather and climate outcomes and recent changes in water use and irrigation demands. By incorporating these factors, Metropolitan's demand projections are calibrated to the more recent water use behaviors and better reflect current climate change impacts.

Supply Characterization

Metropolitan's assumptions for its supply capabilities are discussed and presented in 5-year increments under its water reliability assessment in Section 2.3. For Metropolitan's DRA, these supply capabilities are further refined and presented annually for the years 2021 to 2025 by assuming a repeat of historic conditions from 1988 to1992. This historic five-year sequence represents the lowest water supply available for SWP supplies to Metropolitan.

For its DRA, Metropolitan assessed the reliability of each individual water supply source over the five consecutive year drought through a modeling method using the same historical hydrologic conditions from 1922 to 2017. Also, as part of this DRA, the expected quantity of each water supply source for each year of the five-year drought was evaluated and included within the tabulated capability of each supply category. Metropolitan's supply sources under the CR, SWP, and in-region supply categories are individually listed and discussed in detail in Section 3. Future supply capabilities for each of these supply sources are also individually tabulated in Appendix 3, with consideration for plausible changes on projected supplies under climate change conditions, anticipated regulatory changes, and other factors. as explained in Section 2.6.

Metropolitan used DWR's analyses of SWP delivery capability which includes climate change impacts to deliveries at a 2025 emission level and 15 cm of sea level rise. This resulted in adjusted delivery capability. The DWR analyses also incorporates restrictions on SWP and Central Valley Project (CVP) operations in accordance with water quality objectives established by the State Water Resources Control Board, the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fisheries Service issued on October 21, 2019, and the Incidental Take Permit issued by the California Department of Fish and Wildlife on March 31, 2020. In addition, these estimates incorporate amendments to the Coordinated Operations Agreement between the Central Valley Project and the State Water Project made in 2018. In the 2019 Delivery Capability Report, they found that subsidence has reduced the flow capacity in the aqueduct at locations in San Luis and San Joaquin Field Divisions but has not yet resulted in a reduction in deliveries.

For the Colorado River, Metropolitan used the official January 2021 CRSS run which utilized a full hydrology set. USBR also examines a stress test hydrology set as a proxy to show climate change impacts. The stress test hydrology includes the latest 30 years and has lower inflows as compared to the full hydrology. The driest five-year period 1988-1992 falls within this stress test hydrology. USBR acknowledges that climate change impacts are demonstrated in the stress test hydrology. The five-year dry period used by Metropolitan in the DRA is within this stress test hydrology period, incorporating the decreased inflows associated with climate impacts.

The supply capabilities presented in Table 2-7 are based on Metropolitan's core supplies of programs within the Colorado River and SWP. Metropolitan's core water supplies are listed in Appendix 4 WSCP Table A.4-3. In addition, Metropolitan has numerous flexible supplies and storage programs within the Colorado River, SWP, and in-region that may be exercised as supply augmentation actions, if needed, consistent with the shortage response actions identified in Metropolitan's WSCP. The supply capabilities of Metropolitan's core, flexible, and storage programs for 2021 to 2025 are presented in detail in Appendix 3 Table A.3-8.

Total Water Supply and Use Comparison

Metropolitan's DRA is presented in Table 2-7 and provides a comparison of Metropolitan's total water supply and use for the next five years. This table is based on and is an abridged version of DWR's optional Planning Tool. Table 2-7 also includes DWR Submittal Table 7-5, Five-Year Drought Risk Assessment Table to Address Water Code Section 10635(b). Metropolitan's DRA uses annual total comparisons of its water supply and use. Developing the DRA using annual totals versus monthly values is most practicable for large wholesale suppliers, like Metropolitan, with core supply sources that are annually assessed and depend on unpredictable hydrology, such as the SWP, Colorado River, and availability of water transfers, among others.

Metropolitan's near-term assessment reveals that there could be a potential shortfall of core supplies in four of the next five years. This shortfall is largely triggered by the assumed low supply conditions from the SWP under a repeat of the historical condition of 1988 to 1992, which is modeled at 12% for 2021, 15% for 2023, 23% for 2024, and 18% for 2025. Actual supply conditions for the next five years may prove different from these historic supply conditions. This DRA illustrates Metropolitan's potential shortage response actions, if such a shortfall were to happen.

As detailed in Section 2.5 and Appendix 4, Metropolitan has a robust Water Shortage Contingency Plan and comprehensive shortage response planning that include demand reduction measures and supply augmentation actions. For years 2021, 2023, 2024, and 2025, the estimated shortfalls from the Colorado River and SWP core supplies are 432 TAF (Level 3), 388 TAF (Level 3), 23 TAF (Level 1) and 223 TAF (Level 2), respectively, with the corresponding WSCP shortage levels indicated in parentheses. Appendix 4 Table A.4-5 presents Metropolitan's response actions for the different shortage levels, which include take from Storage, execute Flexible Supplies, implement Voluntary Demand Reduction, and implement Water Supply Allocation Plan. Appendix 4 Table A.4-6 further identifies Metropolitan's supply augmentation actions that may be exercised to mitigate any potential shortage, including withdrawal from available flexible supplies and storage programs.

As detailed in Section 3 and Appendix 3, Metropolitan has built its dry-year and emergency storage through partnerships with various entities and investments in infrastructure. As of January 1, 2021, Metropolitan has 3.2 MAF in storage that may be used for dry-year needs, with estimated supply capacity to withdraw and deliver over 1 MAF to 1.4 MAF per year for the next five years. Because dry-year storage is at a record high, Metropolitan may only need to implement supply augmentation actions to meet the potential core supply shortfall. Supply augmentation actions may include exercising Metropolitan's flexible supplies and storage from the Colorado River, SWP, and in-region. In addition to supply augmentation, Metropolitan may also implement demand reduction and operational flexibility as part of its shortage response actions, to preserve storage or under scenarios where dry-year storage levels are not high. The factual shortage response actions, combination of actions selected, and volume of take from supply programs exercised all depend on the shortage that needs to be met, storage balance of the supply programs, program constraints, and other supply management considerations. With a potential core supply surplus estimated for year 2022, no water service reliability concern is anticipated, and no shortage response actions are expected to be exercised.

This DRA shows, under the assumptions described in this UWMP, that Metropolitan's total core, flexible, and storage supplies exceed the projected demand on Metropolitan for 2021 to 2025. This demonstrates Metropolitan's water service reliability for each year of the next five years under a repeat of the driest five-year historic sequence of Metropolitan's water supply. A graphical representation of the DRA is presented in Figure ES-2, as part of the Executive Summary. Metropolitan will periodically revisit its representation of both individual supply sources and of the gross water use estimated for each year and will revise its DRA if needed. A portion of Table 2-7 is also presented in Appendix 12 as new DWR Submittal Table 7-5.

Table 2-7
Metropolitan's Drought Risk Assessment
Water Use, Supply, and Risk Assessment for 2021 – 2025
(also included as Appendix 12 DWR Submittal Table 7-5)

Based on DWR DRA Optional Planning Tool (Annual totals in AF)

Water Use Worksheet	
Historict and Actual	
2016	1,663,599
2017	1,449,015
2018	1,560,487
2019	1,327,928
Customer Water Use Subtotal	1,394,261
Losses[1]	48,520
2020 Total Gross Water Use	**1,442,781**
Five Consecutive Water Years	
Change from 2020	153,219
2021 Gross Water Use	**1,596,000**
Change from 2021	73,000
2022 Gross Water Use	**1,669,000**
Change from 2022	19,000
2023 Gross Water Use	**1,688,000**
Change from 2023	(197,000)
2024 Gross Water Use	**1,491,000**
Change from 2024	101,000
2025 Gross Water Use	**1,592,000**

[1] Losses include treated system losses and surface reservoir evaporation.

Supply Worksheet[1]	
2021 (1st year)	**1,164,000**
2022 (2nd year)	**1,903,000**
2023 (3rd year)	**1,300,000**
2024 (4th year)	**1,468,000**
2025 (5th year)	**1,369,000**
Supply 1 - Colorado River Aqueduct supplies[2]	
2021 (1st year)	919,000
2022 (2nd year)	866,000
2023 (3rd year)	996,000
2024 (4th year)	979,000
2025 (5th year)	987,000
Supply 2 - State Water Project supplies	
2021 (1st year)	245,000
2022 (2nd year)	1,037,000
2023 (3rd year)	304,000
2024 (4th year)	489,000
2025 (5th year)	382,000
Supply 3 - In-Region supplies	
2021 (1st year)	0
2022 (2nd year)	0
2023 (3rd year)	0
2024 (4th year)	0
2025 (5th year)	0

DRAFT Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Gross Water Use	**1,596,000**
Total Supplies	**1,164,000**
Surplus/Shortfall w/o WSCP Action	**(432,000)**
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	432,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	**0%**

2022	Total
Gross Water Use [Use Worksheet]	**1,669,000**
Total Supplies [Supply Worksheet]	**1,903,000**
Surplus/Shortfall w/o WSCP Action	**234,000**
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	234,000
Resulting % Use Reduction from WSCP action	**0%**

2023	Total
Gross Water Use [Use Worksheet]	**1,688,000**
Total Supplies [Supply Worksheet]	**1,300,000**
Surplus/Shortfall w/o WSCP Action	**(388,000)**
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	388,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	**0%**

2024	Total
Gross Water Use [Use Worksheet]	**1,491,000**
Total Supplies [Supply Worksheet]	**1,468,000**
Surplus/Shortfall w/o WSCP Action	**(23,000)**
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	23,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	**0%**

2025	Total
Gross Water Use [Use Worksheet]	**1,592,000**
Total Supplies [Supply Worksheet]	**1,369,000**
Surplus/Shortfall w/o WSCP Action	**(223,000)**
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	223,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	**0%**

1. Includes Metropolitan's core supplies as defined in WSCP in Appendix 4. Detailed Supply Worksheets are included in Appendix 3 Table A.3-8. Metropolitan may exercise supply augmentation actions from flexible and storage programs as response to any potential core supply shortfall using the 3.2 MAF of dry-year supplies currently in storage. In addition, Metropolitan may also implement demand reduction actions, if needed.
2. Maximum CRA deliveries limited to 1.25 MAF, including Exchange with SDCWA and US.

2.5 Water Shortage Contingency Plan

In addition to the water supply reliability analysis addressing normal, dry, and multiple dry water years, CWC Section 10632 requires urban suppliers to prepare and adopt a water shortage contingency plan which includes the shortage response actions that they would take in response to six standard water shortage levels. The Water Shortage Contingency Plan (WSCP) is Metropolitan's plan in the case of an actual water shortage condition. As illustrated in the preceding section's service reliability assessment, Metropolitan has the supply capabilities to meet projected demands during various hydrologic conditions. With such service reliability, Metropolitan's WSCP is part of its resiliency strategy to improve preparedness for droughts and other impacts on water supplies. In fulfillment of the Act's requirements, described below are the WSCP reporting elements which show how Metropolitan will manage and mitigate a water shortage. A copy of Metropolitan's WSCP is provided in Appendix 4.

Water Supply Reliability Analysis

CWC Section 10632(a)(1) directs the WSCP to include an "analysis of water supply reliability conducted pursuant to Section 10635." As shown in the water reliability assessment in Section 2.3, Metropolitan anticipates being able to meet water demands with adequate supplies across the single driest year and droughts lasting five consecutive water years scenarios through the year 2045. Metropolitan's DRA in Section 2.4. anticipates no water service reliability concerns or shortfall mitigation measures will be needed over the next five years, under a repeat of the historic driest five-year sequence of Metropolitan's water supply.

Annual Water Supply and Demand Assessment Procedures

Pursuant to CWC Section 10632(a)(2), Metropolitan must include in its WSCP the procedures used for conducting an annual Water Supply and Demand Assessment (Annual Assessment). The Annual Assessment is a determination of Metropolitan's annual outlook for water supply reliability, and how a perceived shortage may relate to WSCP shortage stage response actions in the current calendar year. This determination will be based on information available to Metropolitan at the time of the analysis. Starting in 2022, the Annual Assessment will be due by July 1 of every year. CWC Section 10632.1 states: "An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later." The Annual Assessment and related reporting are to be conducted based on the procedures described in the WSCP.

The Annual Assessment determination will be based on considerations of available core water supplies, unconstrained water demand, planned water use, and infrastructure conditions. The difference between projected core water supplies and anticipated unconstrained demand will be used to determine what, if any, shortage stage is expected under the WSCP framework. CWC Section10632(a)(2)(B)(ii) requires the Annual Assessment to determine "current year available supply, considering hydrological and regulatory conditions in the current year and one dry year." The Annual Assessment will include two separate estimations of Metropolitan's annual water supply and unconstrained demand using: 1) current year conditions and 2) assumed dry year conditions. Accordingly, the Annual Assessment's shortage analysis will present separate sets of findings for the current year and dry year scenarios. The CWC does not specify the characteristics of a dry year, allowing discretion to the Supplier. Metropolitan will use this discretion to refine and update its assumptions for a dry year scenario in each Annual Assessment as information becomes available.

By the month of June, Metropolitan staff will present a completed Annual Assessment for approval by Metropolitan's Board of Directors or by the Board's authorized designee with expressly delegated authority for approval of Annual Assessment determinations. This presentation to the decision-making body will include a request that the approval of the Annual Assessment determination also appropriately triggers any recommended specific shortage response actions resulting from the assessment. Upon approval, Metropolitan staff will then formally submit the Annual Assessment to the California Department of Water Resources by July 1.

Six Standard Water Shortage Levels

As required by CWC 10632(a)(3)(A), the WSCP is framed around six standard shortage levels that correspond to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortages. Each of the six shortage levels represents an increasing gap between Metropolitan's estimated core supplies and unconstrained demand as determined in the Annual Assessment. Shortage levels also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other emergency events.

Shortage Response Actions

CWC 10632(a)(4) directs the WSCP to contain shortage response actions that align with the defined shortage levels, and include:

- Supply Augmentation Actions
- Demand Reduction Actions
- Operational Changes
- Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions (Not applicable to Metropolitan as a wholesaler with no retail customers)
- An estimate of the extent to which the gap between supplies and demand will be reduced by implementation of each action.

Metropolitan has invested extensively in a diverse portfolio of supply sources and system resiliency to prepare for a wide range of possible challenging conditions. Metropolitan follows the principles of its Water Surplus and Demand Management (WSDM) Plan, which was adopted in 1999 and provides policy guidance for managing regional water supplies to achieve reliability.

Shortage responses will be customized to meet the circumstances for the particular shortage. Because circumstances can change at any time, Metropolitan's shortage responses actions will be adjusted accordingly throughout the year. To determine specific actions that would be taken at each standard shortage level, Metropolitan will evaluate conditions specific to cost, timing, distribution needs and capabilities, and other variables that include SWP allocation, Colorado River conditions, preexisting demand reduction measures, supply program take capacities, and storage balances.

Supply augmentation actions are comprised of Metropolitan's portfolio of water storage reserves and flexible supply sources that are available on an as-needed basis, such as water from its storage facilities and from transfer and exchange programs. Demand reduction actions are temporary measures that can constrain demand in the current year, such as public information campaigns and mandatory allocations. Operational flexibility actions are an acknowledgement that Metropolitan will adjust its operations as needed during shortages. These adjustments may include temporarily deferring or accelerating scheduled maintenance and planned shutdowns or adjusting the distribution system to compensate for limitations in Colorado River or State Water Project water.

Shortages are characterized not merely by shortfalls in annual core water supplies, but also by the water balances in Metropolitan's storage programs. Thus, a 10 percent or even a 50 percent shortfall in core supplies could be met entirely with stored water if storage levels are sufficient to meet demand. If storage levels are already depleted, the same shortfall in core supplies could potentially require a more complex mix of supply augmentation and demand reduction actions. During most years, Metropolitan anticipates that it can meet all or most shortages with supply augmentation actions. Depending on intensity, voluntary demand reduction measures are estimated to reduce retail water usage by up to 20 percent. In the most severe situations, allocating shortages to member agencies through the Water Supply Allocation Plan (WSAP) would address any remaining shortages not already mitigated by supply augmentation and lesser demand reduction actions.

Communication Protocols

Metropolitan's WSCP Communication Plan details Metropolitan's action-oriented strategy for education, outreach, and coordination during each WSCP standard shortage stage and in response to a catastrophic loss of supply. The WSCP Communications Plan provides messaging strategies that would be implemented at each level, leading up to more focused crisis communication strategies. It emphasizes the need for plans to be adaptable and that Metropolitan management and/or Board of Directors could also call for specific messaging strategies that address unique shortage scenarios.

Compliance and Enforcement

This WSCP reporting element is required for urban retail suppliers only.

Legal Authorities

Metropolitan is a wholesale water provider organized as a cooperative of 26 voluntary members. Metropolitan was formed pursuant to the Metropolitan Water District Act, Statutes 1969, chapter 209, codified at California Water Code, Appendix Section 109 (the "MWD Act"). Pursuant to the MWD Act, Metropolitan has the express and implied statutory authority to "[p]rovide, sell, and deliver water at wholesale for municipal and domestic uses and purposes," among other powers. (MWD Act, §§ 120, 130.) To accomplish the provision of water, Metropolitan is also expressly authorized to promote and implement conservation programs, including during times of water shortage. (MWD Act, § 130.5.)

Metropolitan also has authority under the California Water Code to implement supply shortage programs. (Cal. Water Code, §§ 350-359, 375-378.) For example, Section 375(a) of the Water Code provides:

Notwithstanding any other provision of the law, any public entity which supplies water at retail or wholesale for the benefit of persons within the service area or area of jurisdiction of the public entity may, by ordinance or resolution adopted by a majority of the members of the governing body after holding a public hearing upon notice and making appropriate findings of necessity for the adoption of a water conservation program, adopt and enforce a water conservation program to reduce the quantity of water used by those persons for the purpose of conserving the water supplies of the public entity.

Cal. Water Code, § 375(a). Water Code Section 375(b) also provides the authority for pricing to encourage water conservation.

Metropolitan's Board of Directors has approved many policies and rules, codified in Metropolitan's own Administrative Code, which further provide Metropolitan the authority to ensure the availability of its water during times of shortages. For example, Administrative Code Section 3107 requires that any territory annexed to Metropolitan comply with Metropolitan's water use efficiency guidelines.

The Board has also ratified various policies and rules to implement a Water Supply Allocation Plan (WSAP) to address shortage conditions. Metropolitan's WSAP provides a standardized methodology for allocating supplies during times of shortage. The WSAP is authorized pursuant to the following Board actions:

- By Minute Item 43514, dated April 13, 1999, the Board adopted the Water Surplus and Drought Management Plan.
- By Minute Item 44005, dated June 17, 2000, the General Manager has the authority to reduce Interim Agriculture Water Program deliveries up to 30 percent prior to imposing any mandatory allocation under the Water Surplus and Drought Management Plan.
- By Minute Item 47393, dated February 12, 2008, the Board adopted the Water Supply Allocation Plan.
- By Minute Item 48376, dated August 17, 2010, the Board approved adjustments to the Water Supply Allocation Plan.
- By Minute Item 48803, dated September 12, 2011, the Board approved adjustments to the Water Supply Allocation Plan.
- By Minute Item 74526, dated February 11, 2014, the Board adopted the Water Supply Alert Resolution.
- By Minute Item 49979, dated December 9, 2014, the Board approved adjustments to the Water Supply Allocation Plan.

In addition to the statutes and other legal authorities set forth above, Metropolitan is empowered to implement and enforce its shortage response actions pursuant to various resolutions. For example, on April 11, 2016, Metropolitan's Board voted to adopt Metropolitan's 2015 UWMP and authorized its submittal to the State of California as stated in Resolution 9209. Metropolitan's 2015 UWMP contains Metropolitan's December 2014 Water Supply Allocation Plan in Appendix 4. Metropolitan's 2015 UWMP also describes in Section 2.4 Metropolitan's WSAP and Water Surplus and Drought Management (WSDM) Plan, which guide Metropolitan's planning and operations during both shortage and surplus conditions. Similarly, on May 11, 2021, Metropolitan's Board voted to adopt Metropolitan's UWMP and WSCP as stated in Resolutions 9279 and 9281, respectively. These two Resolutions authorize Metropolitan to implement and enforce its shortage response actions contained in the WSCP, which is attached as Appendix 4 to the UWMP.

Additionally, numerous agreements allow Metropolitan to take its shortage response actions. Supply augmentation actions are authorized by the agreements shown in Appendix 3 of the 2020 UWMP: Justifications for Supply Projections.

If necessary, Metropolitan shall declare a water shortage emergency in accordance with CWC Chapter 3 (commencing with Section 350) of Division 1. In addition, Metropolitan shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Government Code Section 8558.

Financial Consequences of WSCP

A water shortage may be created by either a reduction in water supply, or an increase in water demand, or a combination of both. Metropolitan's shortage response actions include supply augmentation, demand management, and operational flexibility, all of which could impact Metropolitan financially. From these financial effects, there is a potential for expenditures exceeding revenues more than budgeted, thereby requiring unanticipated draws from reserves.

Variation in the amount of revenues is already part of Metropolitan's financial planning. Revenues vary according to regional weather and the availability of statewide water supplies. In dry years, local demands increase, and Metropolitan may receive higher than anticipated revenues due to increased sales volumes. In contrast, in wet years, demands decrease, and revenues drop due to lower sales volumes. In addition, statewide supply shortages such as those in 2009 and 2015 also affect Metropolitan's revenues. Such revenue surpluses and shortages could cause instability in water rates. To mitigate this risk, Metropolitan maintains financial reserves, with a minimum and target balance, to stabilize water rates during times of reduced water sales. The reserves hold revenues collected during times of high water sales and are used to offset the need for revenues during times of low sales. Metropolitan's practice of using reserves to buffer unexpected increases or decreases in budgeted revenue also applies to unexpected expenditure increases or decreases resulting from shortage responses.

Metropolitan uses its financial reserves to mitigate the impacts of water shortages. This policy applies to each of the six shortage levels described in the WSCP. Financial reserves create a buffer to reduce the financial impact of the water shortage. Other mitigation actions such as reducing O&M expenses, deferring Capital Improvement Projects, and rates/charges increases are part of Metropolitan's biennial budget and rate design cycle and are not used routinely to mitigate financial impacts of water shortage response actions.

Metropolitan's reserve policy provides for a minimum reserve requirement and target amount of unrestricted reserves at June 30 of each year. Funds in excess of the target amount are to be utilized for capital expenditures in lieu of the issuance of additional debt, or for the redemption, defeasance or purchase of outstanding bonds or commercial paper as determined by the Board. However, if the fixed charge coverage ratio (the amount necessary to cover all fixed costs) is at or above 1.2, amounts over the minimum may be expended for any lawful purpose of Metropolitan, as determined by the Board. Therefore, unrestricted reserves are available to address Metropolitan's shortage response actions, as well as the consequences of those actions, so long as its fixed charge coverage ratio is at or above 1.2.

Monitoring and Reporting

This WSCP reporting element is required for urban retail suppliers only.

WSCP Reevaluation and Improvement

The WSCP will be periodically re-evaluated to ensure that its shortage response actions are effective and up to date based on lessons learned from implementing the WSCP. The WSCP will be revised and updated during the UWMP update cycle to incorporate updated and new information. For example, new supply augmentation actions will be added, and actions that are no longer applicable for reasons such as program expiration will be removed. However, if significant revisions are warranted, the WSCP will be updated outside of the UWMP update cycle. In the course of preparing the Annual Assessment each year, Metropolitan staff will routinely consider the functionality of the overall WSCP and will prepare recommendations for Metropolitan's Board of Directors if changes are found to be needed.

Relationship with other Metropolitan Shortage Planning

The WSCP is designed to be consistent with the Water Shortage and Demand Management (WSDM) Plan, Water Supply Allocation Plan (WSAP), and other emergency planning efforts as described below. WSDM Plan principles guide the specific actions to be taken under WSCP shortage stages. Data collection, continual analysis, and monthly reporting processes of WSDM Plan implementation will form the basis for Metropolitan's Annual Water Supply Demand Assessment that will be provided annually to the state beginning in July 2022. The WSAP is integral to the WSCP's shortage response strategy in the event that Metropolitan determines that supply augmentation (including storage) and lesser demand reduction measures would not be sufficient to meet a projected shortage.

Water Surplus and Drought Management Plan

Metropolitan's Board adopted the WSDM Plan in April 1999, which provides policy guidance for managing regional water supplies to achieve the reliability goals of the IRP and identifies the expected sequence of resource management actions that Metropolitan will execute during surpluses and shortages to minimize the probability of severe shortages and reduce the possibility of extreme shortages and shortage allocations. Unlike Metropolitan's previous shortage management plans, the WSDM Plan recognizes the link between surpluses and shortages, and it integrates planned operational actions with respect to both conditions.

WSDM Plan Development

Metropolitan and its member agencies jointly developed the WSDM Plan during 1998 and 1999. This planning effort included more than a dozen half-day and full-day workshops and more than three dozen meetings between Metropolitan and member agency staff. The result of the planning effort is a consensus plan that addresses a broad range of regional water management actions and strategies.

WSDM Plan Principles and Goals

The guiding principle of the WSDM Plan is to manage Metropolitan's water resources and management programs to maximize management of wet year supplies and minimize adverse impacts of water shortages to retail customers. From this guiding principle came the following supporting principles:

- Encourage efficient water use and economical local resource programs
- Coordinate operations with member agencies to make available as much surplus water as possible for use in dry years
- Pursue innovative transfer and banking programs to secure more imported water for use in dry years
- Increase public awareness about water supply issues

The WSDM Plan also declared that if mandatory import water allocations become necessary, they would be calculated on the basis of need, as opposed to any type of historical purchases. The WSDM Plan contains the following considerations that would go into an allocation of imported water:

- Impact on retail consumers and regional economy
- Investments in local resources, including recycling and conservation
- Population growth

- Changes and/or losses in local supplies
- Participation in Metropolitan's non-firm (interruptible) programs
- Investment in Metropolitan's facilities

WSDM Plan Implementation

Each year, Metropolitan evaluates the level of supplies available and existing levels of water in storage to determine the appropriate management stage. Each stage is associated with specific resource management actions designed to: (1) avoid an Extreme Shortage to the maximum extent possible; and (2) minimize adverse impacts to retail customers if an Extreme Shortage occurs. The current sequencing outlined in the WSDM Plan reflects anticipated responses based on detailed modeling of Metropolitan's existing and expected resource mix.

Surplus Stages

Metropolitan's supply situation is considered to be in surplus as long as net annual deliveries can be made to water storage programs. The WSDM Plan further defines four surplus management stages that guide the storage of surplus supplies in Metropolitan's storage portfolio. Deliveries for storage in DVL and in SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from DVL for regulatory purposes or to meet seasonal demands may occur in any stage. Deliveries to other storage facilities may be interrupted, depending on the amount of the surplus.

Shortage Stages

The WSDM Plan distinguishes between Shortages, Severe Shortages, and Extreme Shortages. Within the WSDM Plan, these terms have specific meanings relating to Metropolitan's ability to deliver water to its member agency customers.

Shortage: Metropolitan can meet full-service demands and partially meet or fully meet interruptible demands, using stored water or water transfers as necessary.

Severe Shortage: Metropolitan can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation.

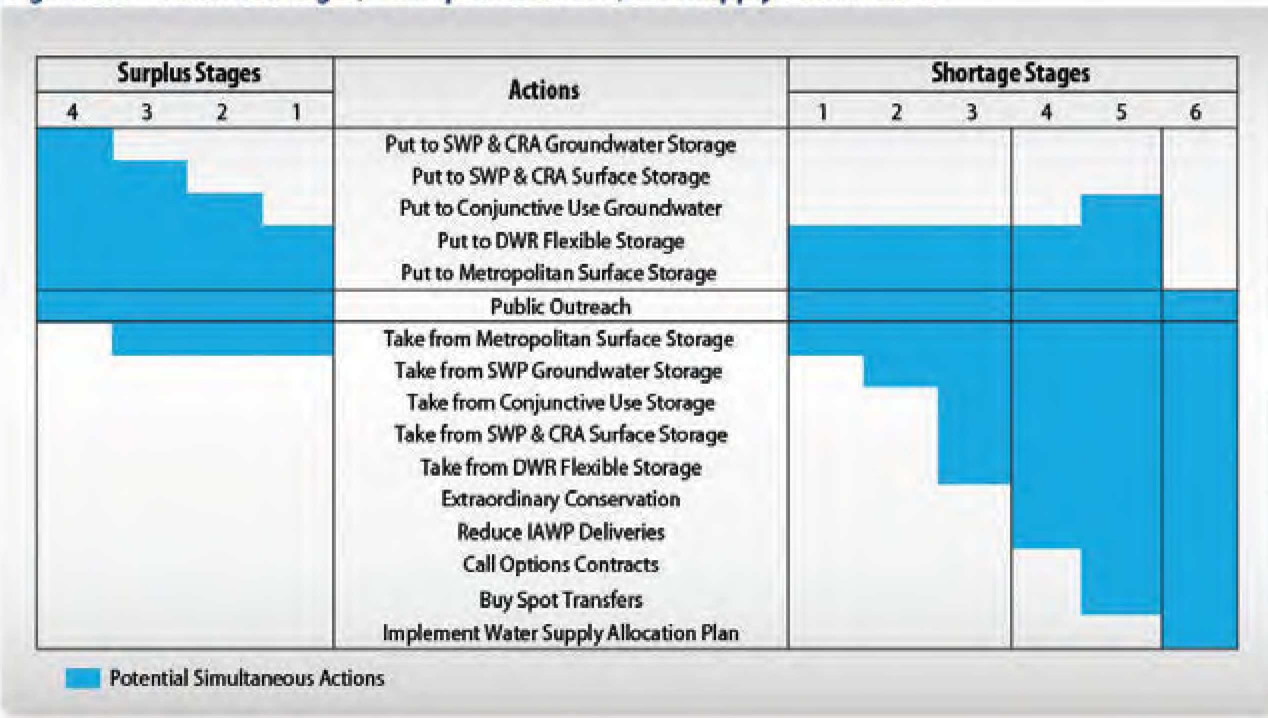
Extreme Shortage: Metropolitan allocates available supply to full-service customers.

The WSDM Plan also defines six shortage management stages to guide resource management activities. These stages are not defined merely by shortfalls in imported water supply, but also by the water balances in Metropolitan's storage programs. Thus, a 10 percent shortfall in imported supplies could be a stage one shortage if storage levels are high. If storage levels are already depleted, the same shortfall in imported supplies could potentially be defined as a more severe shortage.

When Metropolitan must make net withdrawals from storage to meet demands, it is considered to be in a shortage condition. Under most of these stages, Metropolitan is still able to meet all end-use demands for water. For shortage stages 1 through 3, Metropolitan will meet demands by withdrawing water from storage. At shortage stages 4 and 5, Metropolitan may undertake additional shortage management steps, including issuing public calls for extraordinary conservation and exercising water transfer options, or purchasing water on the open market.

Figure 2-1 shows the actions under surplus and shortage stages and when an allocation plan would be necessary to enforce mandatory cutbacks. The overriding goal of the WSDM Plan is to avoid reaching Shortage Stage 6, an Extreme Shortage.

Figure 2-1 Resource Stages, Anticipated Actions, And Supply Declarations



Water Supply Allocation Plan

The WSAP provides a formula for allocating available water supplies to the member agencies in case of extreme water shortages within Metropolitan's service area. The WSAP was approved by Metropolitan's Board in February 2008 and has since been implemented three times, most recently in April 2015. The WSAP was developed in consideration of the principles and guidelines described in the WSDM Plan, with the objective of creating an equitable needs-based allocation. The WSAP formula seeks to balance the impacts of a shortage at the retail level for shortages of Metropolitan supplies of up to 50 percent. The formula takes into account growth, local investments, changes in supply conditions, and the demand hardening aspects of non-potable recycled water use and the implementation of conservation savings programs.

<u>Water Supply Allocation Plan Development</u>

Between July 2007 and February 2008, Metropolitan staff worked jointly with Metropolitan's member agencies to develop the WSAP. Throughout the development process, Metropolitan's Board was provided with regular progress reports on the status of the WSAP. The WSAP was adopted at the February 12, 2008 Board meeting. Since the WSAP's adoption in 2008, Metropolitan has worked extensively with the member agencies to periodically review the WSAP formula. Following Board-directed formal review of the WSAP at 12 months after initial implementation and at 3 years after initial adoption, the Board approved adjustments to the WSAP formula on August 17, 2010, and September 13, 2011. In light of drought conditions, Metropolitan staff convened a member agency working group between July and November 2014 to revisit the WSAP before possible implementation in 2015. On December 9, 2014, the Board approved additional adjustments to the formula.

The WSAP Formula

The WSAP formula is calculated in three steps: base period calculations, allocation year calculations, and supply allocation calculations. The first two steps involve standard computations, while the third step contains specific methodology developed for the WSAP.

Step 1: Base Period Calculations

The first step in calculating a water supply allocation is to estimate water supply and demand using a historical base period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from fiscal years (July through June) ending 2013 and 2014.

Step 2: Allocation Year Calculations

The next step in calculating the water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population growth and changes in local supplies.

Step 3: Supply Allocation Calculations

The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2. There are a number of adjustments that go into a member agency's water supply allocation. Each element and its application in the allocation formula are discussed in detail in Metropolitan's WSAP.

Annual Reporting Schedule on Supply/Demand Conditions

Managing Metropolitan's water supply resources to minimize the risk of shortages requires timely and accurate information on changing supply and demand conditions throughout the year. To facilitate effective resource management decisions, the WSDM Plan includes a monthly schedule for providing supply/demand information to Metropolitan's senior management and Board, and for making resource allocation decisions. Table 2-8 shows this schedule.

Table 2-8
Schedule of Reporting and Water Supply Allocation Decision-Making

Month	Information Report/Management Decision
January	Initial supply/demand forecasts for year
February - March	Update supply/demand forecasts for year
April - May	Finalize supply/demand forecasts Management decisions re: Contractual Groundwater and Option Transfer Programs Board decision re: Need for Extraordinary Conservation
October - December	Report on Supply and Carryover Storage

Catastrophic and Emergency Planning

As part of the WSCP, the CWC requires urban suppliers to plan for catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events. In addition, CWC Section 10632.5 further requires urban water suppliers to develop a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. For Metropolitan, these required planning elements are captured in the analyses that went into developing its Emergency Storage Objective, Seismic Resiliency Reports, and Emergency Response Plans. Elements of these Metropolitan analyses are summarized below.

Emergency Storage Objective

Metropolitan established its original criteria for determining emergency storage requirements in the October 1991 Final Environmental Impact Report for the Eastside Reservoir, which is now named Diamond Valley Lake. These criteria were again discussed in the 1996 IRP. Metropolitan's Board approved both of these documents. Emergency storage requirements are based on the potential of a major earthquake that would damage all supply aqueducts isolating Southern California from its imported water sources.

In 2019, Metropolitan and its member agencies completed a collaborative process to update the regional planning estimate of Metropolitan's Emergency Storage Objective. This emergency storage represents the amount of water that Metropolitan would store for the region in preparation for a catastrophic earthquake that would damage the aqueducts that transport imported water supplies to Southern California, including: the Colorado River Aqueduct, both the East and West branches of the California Aqueduct, and the Los Angeles Aqueduct.

The emergency storage allows Metropolitan to deliver reserve supplies to the member agencies to supplement local production. This helps avoid severe water shortages during periods when the imported water aqueducts may be out of service. The Emergency Storage Objective considers a six- and twelve-month outage period for the imported supply aqueducts incorporating latest seismic information and operational flexibility of Metropolitan's system, a retail water demand cutback ranging from 25 to 35 percent considering the level of conservation that the region achieved during the recent drought, and an aggregated loss of 10 to 20 percent of local supplies accounting for factors that could affect local production during emergency conditions.

Under this update, Metropolitan's Emergency Storage Objective was set to 750 TAF, as this level of storage would prevent severe water shortages to the region given new information on expected recovery durations. The emergency storage volume represents a planning estimate for the amount of water that Metropolitan would store for the region in preparation for a catastrophic earthquake or other disaster. It is not intended to set a basis or a policy for allocating or apportioning storage for any individual member agency. The detailed description of Metropolitan's Emergency Storage Objective is included in Appendix 8.

Emergency Freshwater Pathway (Sacramento-San Joaquin Delta)

It has been estimated by the California Department of Water Resources (DWR) that in the event of a major earthquake in or near the Delta, water supplies could be interrupted for up to three years, posing a significant and unacceptable risk to the California business economy. A post-event strategy would provide necessary water supply protections to avert this catastrophe. Such a plan has been coordinated through DWR, Corps of Engineers (Corps), Bureau of Reclamation (Reclamation), California Office of Emergency Services (Cal OES), Metropolitan, and the State Water Contractors.

<u>DWR Delta Flood Emergency Management Plan</u>

The Delta Flood Emergency Management Plan (DWR, 2018) provides strategies for response to Delta levee failures, up to and including earthquake-induced multiple island failures during dry conditions when the volume of flooded islands and saltwater intrusion are large, resulting in curtailment of export operations. Under these severe conditions, the plan includes a strategy to establish an emergency freshwater pathway from the central Delta along Middle River and Victoria Canal to the export pumps in the south Delta. The plan includes the prepositioning of emergency construction materials at existing and new stockpile and warehouse sites in the Delta, and development of tactical modeling tools (DWR Emergency Response Tool) to predict levee repair logistics, timelines of levee repair and suitable water quality to restore exports. The Delta Flood Emergency Management Plan has been extensively coordinated with state, federal and local emergency response agencies. DWR, in conjunction with local agencies, the Corps and Cal OES, conduct tabletop and field exercises to test and revise the plan under real time conditions.

DWR and the Corps provide vital Delta region response to flood and earthquake emergencies, complementary to Cal OES operations. These agencies perform under a unified command structure and response and recovery framework. The Northern California Catastrophic Flood Response Plan (Cal OES, 2018) incorporates the DWR Delta Flood Emergency Management Plan. The Delta Emergency Operations Integration Plan (DWR and USACE, 2019) integrates personnel and resources during emergency operations.

Pathway Implementation Timeline

The Delta Flood Emergency Management Plan has found that using pre-positioned stockpiles of rock, sheet pile and other materials, multiple earthquake-generated levee breaches and levee slumping along the freshwater pathway can be repaired in less than six months. A supplemental report (Levee Repair, Channel Barrier and Transfer Facility Concept Analyses to Support Emergency Preparedness Planning, M&N, August 2007) evaluated among other options, the placement of sheet pile to close levee breaches, as a redundant method if availability of rock is limited by possible competing uses. The stockpiling of sheet pile is vital should more extreme emergencies warrant parallel and multiple repair techniques for deep levee breaches. Stockpiles of sheet pile and rock to repair deep breaches and an array of levee slumping restoration materials are stored at DWR and Corps stockpile sites and warehouses in the Delta.

Emergency Stockpile Sites and Materials

DWR has acquired lands at Rio Vista and Stockton as major emergency stockpile sites, which are located and designed for rapid response to levee emergencies. The sites provide large loading facilities, open storage areas and new and existing warehousing for emergency flood fight materials, which augment existing warehousing facilities throughout the Delta. The Corps maintains large warehousing facilities in the Delta to store materials for levee freeboard restoration, which can be augmented upon request of other stockpiles in the United States. Pre-positioned rock and sheet pile are used for closure of deep levee breaches. Warehoused materials for rapid restoration of slumped levees include muscle (k-rail) walls, super sacks, caged rock containers, sandbags, stakes and plastic tarp. Stockpiles will be augmented as materials are used.

Emergency Response Drills

Earthquake-initiated multiple island failures will mobilize DWR and Corps resources to perform Delta region flood fight activities within an overall Cal OES framework. In these events, DWR and the Corps integrate personnel and resources to execute flood fight plans through the Delta Emergency Operations Integration Plan (DWR and USACE, 2019). DWR, the Corps and local agencies perform emergency exercises focusing on communication readiness and the testing of mobile apps for information collection and dissemination. The exercises train personnel and test the readiness of emergency preparedness and response capabilities under unified command, and provide information to help to revise and improve plans.

Levee Improvements and Prioritization

The DWR Delta Levees Subventions and Special Projects Programs have prioritized, funded and implemented levee improvements along the emergency freshwater pathway and other water supply corridors in the central and south Delta. These efforts are complementary to the Delta Flood Emergency Management Plan, which along with pre-positioned emergency flood fight materials, ensures reasonable seismic performance of levees and timely pathway restoration after a severe earthquake. These programs have been successful in implementing a coordinated strategy of emergency preparedness to the benefit of SWP and CVP export systems.

Significant improvements to the central and south Delta levees systems along Old and Middle Rivers began in 2010 and are continuing to the present time. This complements substantially improved levees at Mandeville and McDonald Islands and portions of Victoria and Union Islands. Levee improvements along the Middle River emergency freshwater pathway and Old River consist of crest raising, crest widening, landside slope fill and toe berms, which improve seismic stability, reduce levee slumping and create a more robust flood-fighting platform. Urban agencies, including Metropolitan, Contra Costa Water District, East Bay Municipal Utility District, and others have participated in levee improvement projects along or near the Old and Middle River corridors.

SWP Seismic Improvement

DWR's recent SWP seismic resiliency efforts have focused heavily on SWP Dam Safety. The most prominent is the joint USBR/DWR corrective action study of Sisk Dam which will result in a massive seismic stability alteration project - to begin next year. Similarly, Perris Dam had a major foundation modification and stability berm added to the downstream face which has resulted in the removal of the DSOD imposed storage restriction. Several analyses have been conducted on SWP dam outlet towers/access bridges which has resulted in seismic upgrades (some completed/some on-going). Updated dam seismic safety evaluations are being performed on the Oroville Dam embankment and the radial gate control structure on the flood control spillway.

In addition to the dam safety elements, DWR has procured and stockpiled spare pipe sections for the SBA to increase recovery times following seismic induced damage (as part of the 2015 South Bay Aqueduct Reliability Improvement Project). Seismic retrofits have also been completed on 23 SWP bridges located in four Field Divisions with additional retrofits in various development stages. DWR has also updated the earthquake notification procedures and has replaced and expanded instrumentation for the SWP's seismic network.

Electrical Outages

Metropolitan has also developed contingency plans that enable it to deal with both planned and unplanned electrical outages. These plans include the following key points:

- In event of power outages, water supply can be maintained by gravity feed from regional reservoirs such as DVL, Lake Mathews, Castaic Lake, and Silverwood Lake.
- Maintaining water treatment operations is a key concern. As a result, all Metropolitan treatment plants have at least two emergency generators capable of operating the treatment plant in the event of supply failure on the main electrical grid. These generators will automatically operate when power from the grid is interrupted, and annual testing is conducted to ensure they are operational and reliable. In addition, within the water treatment plants there are also dual electrical systems for all critical facilities (e.g., chemical feed systems) to provide redundancy and resiliency.

- Valves at Lake Skinner can be operated by the backup generation at the Lake Skinner treatment plant.
- Metropolitan owns mobile generators that can be transported quickly to key locations, such as reservoir Intake/outtake structures, if necessary.
- The CRA electric transmission system can supply power to the five CRA pumping plants from three independent power sources: Mead 230kV substation located near Hoover Dam; Parker Dam 230kV substation near Gene; and from interconnections with Southern California Edison. These multiple locations where Metropolitan's 230 kV transmission system interconnects to the regional transmission grid provide a redundant path to bring 230 kV power to Hinds, Eagle Mountain, Iron Mountain and Gene Pumping Plants. In addition to redundant paths of power to each CRA pumping plant, the CRA electric transmission system has dual lines from the 230 kV Mead substation and multiple disconnect switches and circuit breakers. This improves the flexibility of the CRA electric transmission system to isolate portions of the system for maintenance or repairs and re-route power from the three independent power sources to the pumping plants while repairs are executed.

Seismic Risk Assessment and Mitigation Plan

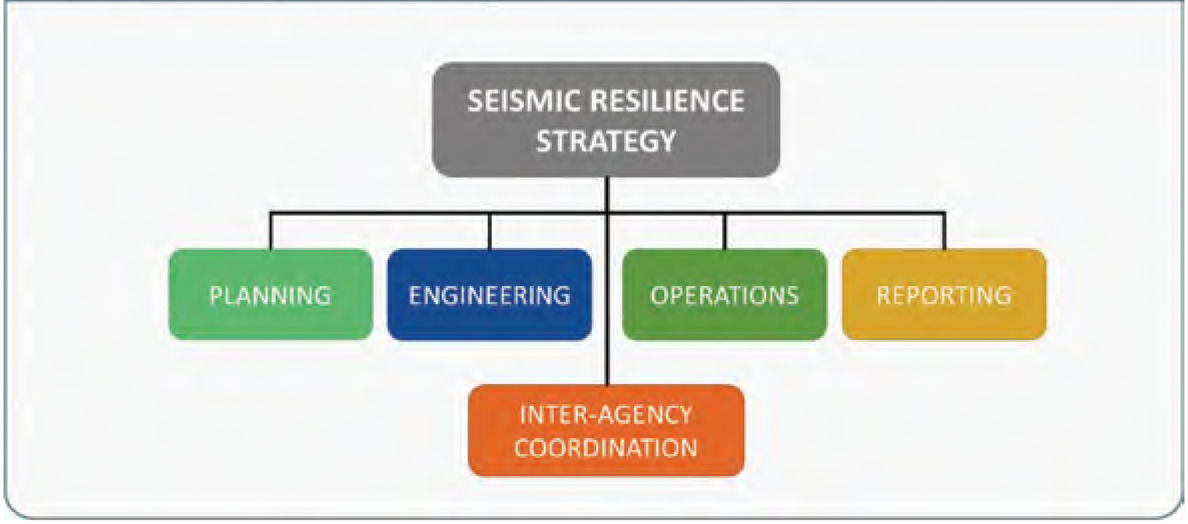
Beginning January 2020, CWC Section 10632.5 mandates UWMPs to include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. For Metropolitan, the required assessment and plan are accomplished as part of developing its resilience strategy and are presented in detail in its seismic resiliency reports. This section provides a summary of the various components of Metropolitan's resilience strategy. These components are described in detail in Metropolitan's Seismic Resilience Report First Biennial Report (February 2018) and Seismic Resilience Report 2020 Update (February 2020) presented as part of Appendix 9.

Over its nearly 90-year history, Metropolitan has been proactive in mitigating seismic risks posed to its expansive infrastructure, as well as improving its ability to maintain (or quickly restore) water deliveries following a major earthquake. This ability to mitigate seismic risks and maintain (or quickly restore) water deliveries following a seismic event is referred to as "seismic resilience." Metropolitan's holistic strategy for seismic resilience follows a "defense in depth" multi-layered approach for managing risk. Metropolitan's Seismic Resilience Strategy has three primary objectives:

1. Provide a diversified water supply portfolio, system flexibility, and emergency storage
2. Prevent damage to water delivery infrastructure in probable seismic events and limit damage in extreme events
3. Minimize water delivery interruptions through a dedicated emergency response and recovery organization

Metropolitan's Seismic Resilience Strategy is implemented through four components that encompass the various internal functions that promote Metropolitan's seismic resilience objectives. These components are supplemented by Metropolitan's commitment to inter-agency coordination when preparing and responding to a seismic event and other emergencies. The strategy is shown below in Figure 2-2.

Figure 2-2 Seismic Resilience Strategy



A brief description of the components of Metropolitan's Seismic Resilience Strategy and examples of their implementation are provided below.

Planning

The goals of the planning component are to develop and maintain a diversified water resource portfolio; provide a flexible system that allows for operational changes to handle variations in water supply, planned or unplanned system outages; and to maintain adequate emergency storage supplies. Metropolitan has developed a diverse water resource portfolio through the enactment of various exchange and water banking programs. These water supply programs are described in detail in Section 3 and Appendix 3. In addition to existing supply programs, development of the Regional Recycled Water Program would provide Metropolitan with an additional water resource and would be strategically located on the coastal side of the San Andreas Fault. Metropolitan also strives for regional seismic resilience by incentivizing local agencies to develop increased conservation, recycling, storage, and other water management programs.

As Metropolitan expanded its system over the years, it has continually improved the flexibility of the system to handle changes in water supply or pipeline or facility outages. One example of Metropolitan's system flexibility is the Common Pool service area, which can be supplied by the Jensen, Weymouth, or Diemer water treatment plants. Additionally, Metropolitan has constructed its system such that most of the service area can be supplied by either Colorado River or State Water Project supplies.

Metropolitan's imported water supplies from the CRA and SWP East and West Branches cross the San Andreas Fault (SAF) Zone prior to reaching Metropolitan's service area. A major earthquake on the SAF has the potential of damaging all three aqueducts and disrupting imported supplies for up to six months. Metropolitan constructed Diamond Valley Lake (DVL) on the coastal side of the fault to mitigate the potential impacts of a major SAF earthquake to its service area. Completion of DVL nearly doubled Metropolitan's available surface water storage in the region and, along with other local reservoirs, is used to maintain 6 to 12 months of emergency water storage supply. Water from DVL can supply 4 of Metropolitan's 5 regional water treatment plants.

Engineering

The goal of the engineering component is to assess and mitigate seismic risk to individual facilities and the system. This is accomplished through Metropolitan's Seismic Resilience of Structures Program, the Seismic Resilience of Pipelines Program, the Dam Safety Program, and through special seismic assessments.

Seismic Resilience of Structures

Metropolitan's program to increase the seismic resilience of structures is an ongoing program with the goal of protecting life safety and critical infrastructure to minimize water delivery interruptions following a seismic event. The initial program focused on evaluating the seismic risk of above ground structures (e.g. water treatment plants) constructed prior to 1990 and upgrading structures to mitigate the risk when found to be seismically deficient. The program has recently expanded to include post-1990 structures due to the progress made on the initial list of structures. Examples of seismically upgraded facilities include the Colorado River Aqueduct pump plant buildings, the Weymouth East and West Wash Water Tanks, and the Diemer and Jensen Administration Buildings.

Seismic Resilience of Pipelines

Metropolitan's conveyance and distribution system has been built in conformance with standards and practice at the time of design. In keeping with the goals of the Seismic Resilience Strategy, Metropolitan is developing seismic design criteria for new pipelines based on current state of practice, geotechnical and seismicity criteria, operating conditions, and asset management strategies. The planned design approach for new pipelines will be to establish performance criteria, identify seismicity and ground conditions along the alignment, and design the pipeline to resist damage from ground shaking and deformation. Specialized pipe joints and sections can be designed to accommodate ground deformation from fault displacement or liquefaction. For existing pipelines, seismic resilience will be incorporated as a component of pipeline rehabilitation projects. Metropolitan will evaluate each upgrade individually to balance risk, performance, and cost. Metropolitan's Casa Loma Siphon Barrel No. 1 Seismic Upgrade Project is an example of Metropolitan incorporating seismic design in the rehabilitation of existing pipelines. The existing siphon, which crosses a segment of the San Jacinto Fault Zone and is subject to long-term subsidence, will be replaced with earthquake-resistant ductile iron pipe. The pipe joints are designed to accommodate ground displacement without failure to allow for continued service following an earthquake.

Dam Safety Program

Metropolitan has an ongoing Dam Safety Initiatives Program that has initiated several plans to improve Metropolitan's dam seismic safety and earthquake readiness. These initiatives are being coordinated with the California Division of Safety of Dams (DSOD) and Office of Emergency Services and include the following:

- Ongoing preparation of Emergency Action Plans, including inundation maps
- Performing training exercises at the dam site to test processes during a seismic event
- Providing training and guidance on overall dam safety
- Reviewing operation and maintenance methods for reservoir drawdown and operations after a seismic event
- Updating guidelines and procedures on protection against seismic risk
- Establishing a strong communications system on seismic information

- Performing structural strengthening of dams, including rehabilitation and improvement of spillways and inlet/outlet towers such as Lake Skinner Outlet Tower
- Improving dam safety instrumentation, monitoring, and reporting capabilities

Special Seismic Assessments

Metropolitan conducts special seismic assessments to increase understanding of the vulnerability of Metropolitan's assets and operations to various seismic hazards. The studies focus on hazards specific to individual facilities or the system as a whole and identify options to mitigate the risks posed by the hazards. In addition, the studies support emergency response training and planning for future earthquake events by estimating the magnitude of damage that may occur from various seismic events. The following is a list of some of the reports that Metropolitan has completed.

- Liquefaction Susceptibility Mapping for the Metropolitan Water District of Southern California's Feeder System (Report No. 1625), Carollo Engineers, Inc., 2019.
- Colorado River Aqueduct – San Gorgonio Pass Seismic Event Vulnerability Study (Report No. 1484), GeoPentech, July 2014.
- Potential Effects of Southern California Seismic Events on Metropolitan Water Deliveries (Report No. 1335), Metropolitan Facility Planning staff, January 2009.

Operations

The goal of the operations component is to maintain effective emergency planning and response capabilities. This is accomplished through maintaining an effective Emergency Response Organization, conducting routine emergency response training exercises and maintaining emergency construction capabilities.

Metropolitan's Emergency Response Organization (ERO) is comprised of over 200 predesignated employees who work in the Emergency Operations Center (EOC), the Incident Command Posts, or in the field during emergencies. ERO staff has completed specialized training that meets state and federal requirements. Metropolitan's emergency response structure follows the National Incident Management System (NIMS) and the State of California's Standardized Emergency Management System (SEMS).

In addition to specialized NIMS training, Metropolitan staff routinely participate in emergency response training exercises that are often based on a postulated seismic event. In 2019, Metropolitan started a new five-year emergency exercise plan that will allow all member agencies to participate in at least one of Metropolitan's annual emergency exercises. The first of these exercises was a tabletop exercise for the Orange County member agencies on August 29, 2019, which focused on a hypothetical incident at the Diemer Water Treatment Plant.

Metropolitan has conducted over 100 exercises since February 2018. This included two large functional emergency exercises for the EOC and multiple tabletop exercises, workshops, and seminars for the 12 Incident Command Posts located at the water treatment plants, conveyance and distribution facilities, and other strategic locations in Metropolitan's service area.

Metropolitan maintains the necessary staffing, materials, and equipment to respond to two simultaneous pipeline breaks. The Machine Shop and Coating Shop at La Verne are available to fabricate pipe sizes up to 12 feet in diameter, and Metropolitan's construction forces have the necessary equipment and expertise to make the repairs in-house. In addition, Metropolitan has upgraded its satellite phones to ensure communication ability following a seismic event and is in the process of installing high frequency radios at all Incident Command Posts and the Emergency Operations Center.

Reporting

Metropolitan has committed to providing annual updates to its Board of Directors on its seismic resilience strategy and its progress toward identified short-term and long-term goals. Metropolitan has also committed to providing a formal report on a five-year interval summarizing accomplishments related to seismic resilience and changes in directives to the Seismic Resilience Strategy.

Inter-Agency Coordination

Improving the region's seismic resilience requires that member agencies understand the seismic risks to the imported water supplies so that they may appropriately plan on the local level. Opportunities for inter-agency coordination are provided through the Local Resources Program, where Metropolitan incentivizes the development of local groundwater, recycling, and other supply resources to offset imported demands. As stated previously, Metropolitan provides member agencies the opportunity to participate in emergency response exercises. As part of a recent study, Metropolitan developed maps that define the relative liquefaction susceptibility of the region inclusive of the conveyance and distribution system and has made these maps available to member agencies. Recently, Metropolitan updated the emergency storage goals through several workshops in coordination with member agencies.

Metropolitan is also a member of the Seismic Resilience Water Supply Task Force, along with the California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP). As the owners of the three conveyance facilities that provide imported water to the region, Metropolitan, DWR, and LADWP recognize the importance of coordinating responses following a major seismic event that disrupts the imported water supplies. Each agency has provided an overview of the seismic risk to their respective systems and are in the process of developing a Water Mutual Assistance Agreement to formalize the coordination efforts following a major earthquake that disrupts service to the imported water supplies.

Emergency Response Plans

Metropolitan also has two Emergency Response Plans: one dated March 2019 that has been in place long-term and is updated periodically; and a second dated September 2020, prepared pursuant to the requirements of the recently-enacted America's Water Infrastructure Act of 2018. The two plans work in conjunction. Together, Metropolitan's Emergency Response Plans present Metropolitan's organization and strategy for response to emergencies caused by natural hazards, malevolent acts, or other unavoidable circumstances. Metropolitan operates in accordance with the California Standardized Emergency Management System, the Incident Command System, and the National Incident Management System. The Emergency Response Plans provide guidelines for evaluating an emergency situation, responding to an emergency, and activating Incident Command Posts and the Emergency Operations Center. They also describe the Emergency Response Organization. Although the plans provide a framework for emergency response, they do not attempt to identify and discuss every potential situation or problem that may occur during an emergency. The plans will be exercised and updated regularly.

2.6 Other Supply Reliability Risks

Metropolitan provides water to a broad and heterogeneous service area with water supplies from a variety of sources and geographic regions. Each of these demand areas and supplies has its own unique set of benefits and challenges. Among the challenges Metropolitan's region faces are the following:

Supplies

- The Colorado River Basin experienced a severe 5-year drought from 2000-2004 with both precipitation and runoff significantly below average. Since that time, precipitation has been, on average, near normal while runoff has been less than average in two out of every three years. Overall, a potential change in the precipitation to runoff relationship may be resulting in conditions in which less runoff is generated from a given level of precipitation, pushing the system toward a drying trend that is often characterized as a long-term drought.
- Endangered species protection and conveyance needs in the Sacramento-San Joaquin River Delta System have resulted in operational constraints that are particularly important because pumping restrictions impact many water resources programs – SWP supplies and additional voluntary transfers, Central Valley storage and transfers, in-region groundwater storage, and in-region surface water storage.
- Changing climate patterns are predicted to shift precipitation patterns and possibly affect water supply.
- Difficulty and implications of environmental review, documentation, and permitting for multi-year transfer agreements, recycled water projects, and seawater desalination plants.
- Public perception of recycled water use.
- Opposition to local seawater desalination projects from environmental groups and community organizations. New regulations and permitting uncertainty are also barriers to seawater desalination supplies.

Operations and Water Quality

- The cost and use of energy and greenhouse gas emissions.
- Water quality regulations and issues, such as algae toxins, PFAS, and the identification of constituents of emerging concern, have a significant impact on the region's water supply conditions and underscore the importance of flexible and adaptive regional planning strategies.
- Salt and concentrate balance from a variety of sources.

Demand

- Fluctuations in population and economic growth.
- Uncertain location of growth.
- Uncertain housing stock and density.
- Changes in outdoor water use patterns.
- Potential COVID-19 impacts

The challenges posed by continued population growth, environmental constraints on the reliability of imported supplies, and new uncertainties imposed by climate change demand that Metropolitan assert the same level of leadership and commitment to taking on large-scale regional solutions to providing water supply reliability. New solutions are potentially available in the form of dramatically improved water-use efficiency, indirect and direct potable use of recycled water, and large-scale application of ocean desalinization.

Distribution System Water Losses

California Water Code Section 10631(d)(3) requires that urban retail suppliers quantify distribution system water loss for each of the five years preceding the plan update based on water system balance methodology developed by the American Water Works Association (AWWA). For the 2020 UWMP, Metropolitan is voluntarily reporting its treated distribution water loss. Metropolitan followed the AWWA Water Audit methodology to track all sources of water and uses of water within its system. The AWWA Water Audit methodology quantifies real and apparent water system losses in an agency's distribution system.

For its voluntary distribution system water losses assessment, Metropolitan included its water balance audit for the treated water portion of its system for calendar years 2015 through 2019. The results of Metropolitan's audit showed that the average total amount of treated distribution system water losses over the last five years from 2015 to 2019 is approximately 7.8 TAF. A detailed discussion of Metropolitan's treated distribution system water losses is included in Appendix 7 and summarized in Tables A.7-1 through A.7-5. In addition to the treated distribution system losses described in the AWWA tables, Metropolitan estimates that 41.6 TAF was lost from reservoir evaporation occurring in Lake Mathews, Lake Skinner, and DVL during calendar year 2019.

Climate Change

Climate change adds its own uncertainties to the challenges of planning. Metropolitan's water supply planning has been fortunate in having almost one hundred years of hydrological data regarding weather and water supply. This history of rainfall data has provided a sound foundation for forecasting both the frequency and the severity of future drought conditions, as well as the frequency and abundance of above-normal rainfall. But weather patterns can be expected to shift dramatically and unpredictably in a climate driven by increased concentrations of carbon dioxide in the atmosphere. These changes in weather significantly affect water supply planning, irrespective of the debate associated with the sources and cause of increasing concentrations of greenhouse gases. As a major steward of the region's water supply resources, Metropolitan is committed to performing its due diligence with respect to climate change.

Potential Impacts

While uncertainties remain regarding the exact timing, magnitude, and regional impacts of these temperature and precipitation changes, researchers have identified several areas of concern for California water planners. These include:

- Reduction in Sierra Nevada snowpack;
- Increased intensity and frequency of extreme weather events;
- Prolonged drought periods;
- Water quality issues associated with increase in wildfires;
- Changes in runoff pattern and amount; and
- Rising sea levels resulting in
    - Impacts to coastal groundwater basins due to seawater intrusion;
    - Increased risk of damage from storms, high-tide events, and the erosion of levees; and
    - Potential pumping cutbacks on the SWP and Central Valley Project (CVP)

Other important issues of concern due to global climate change include:

- Effects on local supplies such as groundwater;
- Changes in urban and agricultural demand levels and patterns;
- Increased evapotranspiration from higher temperatures;
- Impacts to human health from water-borne pathogens and water quality degradation;
- Declines in ecosystem health and function;
- Alterations to power generation and pumping regimes; and
- Increases in ocean algal blooms affected seawater desalination supplies.

Metropolitan's Activities Related to Climate Change Concerns

Resource Planning

Under the 2020 IRP, Metropolitan recognizes additional risks and uncertainties from a variety of sources:

- Water quality
- Climate change
- Regulatory and operational changes
- Project construction and implementation issues
- Infrastructure reliability and maintenance
- Demographic and growth uncertainty

Any of these risks and uncertainties, should they occur individually or collectively, may result in a negative impact to water supply reliability. While it is impossible to know how much risk and uncertainty to guard against, the region's reliability will be more secure with a long-term plan that recognizes risk and provides resource development to offset that risk.

Metropolitan has established an intensive, comprehensive technical process to identify key vulnerabilities to regional reliability. This Robust Decision Making (RDM) approach was used with both the 2015 and 2010 IRP Updates. The 2015 RDM approach utilized the Delta Method to examine climate change impacts to Metropolitans water supplies across its three basins. The Delta Method is a technique that downscales data from a suite of global climate models and creates climate perturbation factors, in this case temperature and precipitation changes, and applies them to Metropolitan's baseline Integrated Water Resources Plan Simulation Model (IRPSIM) assumptions. This methodology can show how vulnerable the region's reliability is to longer-term risks such as climate change and can also establish "signposts" that can be monitored to see when critical changes may be happening. For example, if observed climate data shows we are trending toward more severe change and the results of the RDM analysis show an unacceptable level of reliability in this future, Metropolitan can use this as a signpost to take action. Signposts include monitoring the direction of ever-changing impacts from improved Global Climate Models, and housing and population growth patterns.

The RDM analysis was not only valuable in identifying vulnerabilities to Metropolitan's 2015 IRP approach to long-term reliability, it was also pivotal in understanding how climate change would best be incorporated into the 2020 IRP and IRPSIM modeling. On the Colorado River Aqueduct, the RDM analysis helped determine that the most appropriate way to look at climate change impacts would be to alter the inflow hydrologies within the CRSS model, which would then serve as inputs to Metropolitan's IRPSIM model. On the SWP side, climate change impacts were included by altering SWP water deliveries provided in the 2019 Delivery Capability report and derived by CalSim 2. Metropolitan assembled a panel of climate change experts to translate how specific climate change impacts, such as changes to runoff timing, would be quantified and to what degree in the IRP scenario approach.

Knowledge Sharing and Research Support

Metropolitan is an active and founding member of the Water Utility Climate Alliance (WUCA). WUCA consists of twelve nationwide water providers collaborating on climate change adaptation. As a part of this effort, WUCA pursues a variety of activities on multiple fronts.

Member agencies of WUCA annually share individual agency actions on climate change adaptation and greenhouse gas mitigation strategies and collaborate on projects aimed at advancing adaptation in the water sector. WUCA also monitors development of climate change-related research, technology, programs, and federal legislation.

In addition to supporting federal and regional efforts, WUCA has released numerous white papers and reports. In 2019, WUCA co-produced with the Water Research Foundation the report "Mapping Climate Exposure and Climate Information Needs to Water Utility Business Functions." The purpose of this paper was to develop a comprehensive, enterprise-level framework for understanding the exposure and sensitivities of water utility business functions to a changing climate and for accelerating the mainstreaming of climate considerations into utility management.

In 2016, WUCA published "Co-producing Actionable Science for Water Utilities." The paper explores the efforts of four water utilities to co-produce actionable science by forging partnerships with scientific institutions to explore integrating climate considerations into their specific management context. The experiences of these four utilities and their scientific partners, as part of the Piloting Utility Modeling Applications project of the Water Utility Climate Alliance, provide a wealth of empirical evidence to illustrate some of the core concepts formulated to explain how to produce usable information and how to link research to decision making.

In recent years, WUCA has created a training that rotates around the country and aims to build a community of smart consumers of climate information proactively pursuing climate adaptation in the water sector. The training sessions include learning different methods for incorporating climate change information into water resource planning, guiding principles for resilience planning, communication strategies, tactics for decision making under conditions of uncertainty, and more.

WUCA continues to pursue opportunities and partnerships with water providers, climate scientists, federal agencies, research centers, academia and key stakeholders. Metropolitan also continues to pursue knowledge sharing and research support activities outside of WUCA. Metropolitan regularly provides input and direction on California legislation related to climate change issues. Metropolitan is active in collaborating with other state and federal agencies, as well as non-governmental organizations, on climate change related planning issues. The following list provides a sampling of entities that Metropolitan has recently worked with on a collaborative basis:

- RAND Corporation
- USBR
- U.S. Army Corps of Engineers
- AWWA Research Foundation

- National Center for Atmospheric Research
- California Energy Commission
- California Department of Water Resources

Quantification of Current Research

Metropolitan continues to incorporate current climate change science into its planning efforts. A major component of the current IRP effort is to explicitly reflect uncertainty in Metropolitan's future water management environment. This involves evaluating a wider range of water management strategies and seeking robust and adaptive plans that respond to uncertain conditions as they evolve over time, and that ultimately will perform adequately under a wide range of future conditions. The potential impacts and risks associated with climate change, as well as other major uncertainties and vulnerabilities, have been incorporated into the current IRP process. Overall, Metropolitan's planning activities strive to support the Board adopted policy principles on climate change by:

- Supporting reasonable, economically viable, and technologically feasible management strategies for reducing impacts on water supply,
- Supporting flexible "no regret" solutions that provide water supply and quality benefits while increasing the ability to manage future climate change impacts, and
- Evaluating staff recommendations regarding climate change and water resources under the California Environmental Quality Act (CEQA) to avoid adverse effects on the environment.

Implementation of Programs and Policies

Metropolitan has made great efforts to implement greenhouse gas mitigation programs and policies for its facilities and operations. Similar to Metropolitan's approach to managing water resources, effectively reducing greenhouse gas emissions requires a portfolio approach that looks at all sources and implements strategies to reduce emissions over time. To date, these programs and policies have focused on:

- Developing Metropolitan's Climate Action Plan, which sets the target and guides future actions to reduce emission levels, pursuant to CEQA guidelines, and complements Metropolitan's IRP;
- Developing Metropolitan's Energy Sustainability Plan, which identifies ways to contain energy costs, move toward energy independence, and reduce price volatility through cost-effective alternative energy projects;
- Exploring water supply/energy relationships and opportunities to increase efficiencies;
- Participating in The Climate Registry, a nonprofit greenhouse gas emissions registry for North America that provides organizations with the tools and resources to help them calculate, verify, report, and manage their greenhouse gas emissions in a publicly transparent and credible way;
- Acquiring "green" fleet vehicles, and supporting an employee Rideshare program;
- Designing retail battery energy storage systems at the Weymouth, Skinner, and Jensen treatment plants, as well as the OC-88 (Orange County) pump station;
- Developing solar power at the Skinner water treatment plant, the Weymouth water treatment plant, the Jensen water treatment plant, and the Diamond Valley Lake Visitor Center; and

- Identifying and pursuing development of “green” renewable water and energy programs that support the efficient and sustainable use of water.

Metropolitan also continues to be a leader in efforts to increase regional water use efficiency. Metropolitan has worked to increase the availability of incentives for local conservation and recycling projects, as well as supporting conservation Best Management Practices for industry and commercial businesses. Many of Metropolitan’s water use efficiency incentives also reduce customer electricity and natural gas use. In recognition of this fact, Metropolitan has MOUs with regional energy utilities to jointly implement water use efficiency programs that save energy and reduce greenhouse gas emissions.

2.7 Pricing and Rate Structures

Revenue Sources and Management

A high proportion of Metropolitan's revenues come from volumetric water rates. Water sales revenues are approximately 80 percent of Metropolitan's total revenues. As a result, Metropolitan's revenues vary according to regional weather, the availability of statewide water supplies, the availability of local supplies to its member agencies, the economy, and other factors. For example, in dry years, local demands tend to increase, and Metropolitan may receive higher than anticipated revenues due to increased sales volumes. In contrast, in wet years, demands tend to decrease, and revenues drop due to lower sales volumes. In addition, statewide supply shortages such as those in 2009 and 2015 also affect Metropolitan's revenues. Such revenue surpluses and shortages could cause instability in water rates. To mitigate this risk, Metropolitan maintains financial reserves, with a minimum and target balance, to help stabilize water rates during times of reduced water sales. The reserves hold revenues collected during times of high water sales and are used to offset the need for revenues during times of low sales.

Another way in which Metropolitan helps to mitigate rate volatility is by generating a portion of revenues from fixed sources. Metropolitan currently has two fixed charges: the Readiness-to-Serve Charge (RTS) and the Capacity Charge. Metropolitan also collects tax revenue from taxable property within its boundaries. The revenues from fixed charges generate approximately 18 percent of all Metropolitan revenues. RTS revenues have been decreasing gradually, from $155.5 million in fiscal year 2015-16, to $135 million in fiscal year 2021-22.

Finally, Metropolitan generates revenue from interest income, hydroelectric power sales, and miscellaneous income such as rents and leases. For the last five fiscal years, these averaged approximately three percent of all Metropolitan revenues. These internally generated revenues are referred to as revenue offsets and reduce the amount of revenue that needs to be collected from rates and charges.

Elements of Rate Structure

This section provides an overview of Metropolitan's rate structure. The different elements of the rate structure are discussed below and summarized in Table 2-9.

System Access Rate (SAR)

The SAR recovers the costs of Conveyance, Distribution, and Storage that is used on an average annual basis through a uniform, volumetric rate. All member agencies pay the SAR for access to conveyance and distribution capacity in the Metropolitan system.

Water Stewardship Rate (WSR)

The WSR provides a dedicated source of funding for Metropolitan's demand management function through a uniform, volumetric rate recovered through the end of calendar year 2020. Metropolitan's demand management operations functions include past and future conservation and local resources projects. Because of the uniform benefits conferred on all system users by investments in conservation and local resources, all users of Metropolitan's conveyance and distribution system paid the WSR except for exchange deliveries to SDCWA in calendar years 2018 through 2020.

Metropolitan's Board suspended the billing and collection of the WSR for calendar years 2018, 2019, and 2020 on exchange deliveries to SDCWA pending Metropolitan's completion of a cost allocation study of its demand management costs. Having completed the demand management cost allocation process, in December 2019 Metropolitan's Board directed staff: (1) to incorporate the use of the 2019/20 fiscal-year-end balance of the Water Stewardship Fund to fund all demand management costs in the proposed FY 2020/21 and 2021/22 biennial budget; and (2) to not incorporate the WSR, or any other rates or charges to recover demand management costs, with the proposed rates and charges for CYs 2021 and 2022. As a result, the WSR is not collected from any member agency as of January 1, 2021. This decision provided the Board additional time to consider a rate design alternative for recovery of future demand management costs.

Therefore, as a result of this Board decision, the WSR is not incorporated in the rate structure during calendar years 2021 and 2022.

System Power Rate (SPR)

The SPR recovers the costs of energy required to pump water to Southern California through the SWP and CRA. The cost of power is recovered through a uniform, volumetric rate.

Treatment Surcharge

The Treatment Surcharge recovers all of the costs of providing treatment capacity and operations through a uniform, volumetric rate per acre-foot of treated water transactions.

Capacity Charge

The Capacity Charge recovers the costs incurred to provide peak capacity within the Distribution System. The Capacity Charge also provides a price signal to encourage agencies to reduce peak demands on the Distribution System and to shift demands that occur during the May 1 through September 30 period into the October 1 through April 30 period, resulting in more efficient utilization of Metropolitan's existing infrastructure and deferring capacity expansion costs.

Readiness-To-Serve Charge (RTS)

The RTS recovers the cost of the portion of system that is available to provide emergency service and available capacity during outages and hydrologic variability.

The RTS is a fixed charge that is allocated among the member agencies based on a ten-fiscal-year rolling average of firm demands. Water transfers and exchanges are included for purposes of calculating the ten-year rolling average. The Standby Charge is collected at the request of some member agencies that have elected to use the charge as a direct offset to the member agency's RTS obligation.

Tier 1 Supply Rate

The Tier 1 Supply Rate is a volumetric rate charged on Metropolitan's water sales that are within a member agency's Tier 1 maximum. The Tier 1 Supply Rate supports a regional integrated approach through the uniform, postage stamp rate. The Tier 1 Supply Rate is calculated as the amount of the total revenue requirement functionalized as supply divided by the estimated amount of Tier 1 water sales.

Tier 2 Supply Rate

The Tier 2 Supply Rate is a volumetric rate that reflects Metropolitan's cost of purchasing water transfers north of the Delta. The Tier 2 Supply Rate is charged on Metropolitan water sales that exceed a member agency's Tier 1 maximum. The Tier 2 Supply Rate encourages the member agencies and their customers to maintain existing local supplies and develop cost-effective local supply resources and conservation.

Table 2-9
Rate Structure Components

Rate Design Elements	Service Provided/ Costs Recovered	Type of Charge
System Access Rate	Conveyance/Distribution/Storage (Average Capacity)	Volumetric ($/AF)
System Power Rate	Power	Volumetric ($/AF)
Treatment Surcharge	Treatment	Volumetric ($/AF)
Capacity Charge	Peak Distribution System Capacity	Fixed ($/cfs)
Readiness-To-Serve Charge	Available capacity for Conveyance/Distribution and Emergency Storage	Fixed ($Million)
Tier 1 Supply Rate	Supply	Volumetric ($/AF)
Tier 2 Supply Rate	Reflects cost of water transfers from North of the Delta	Volumetric ($/AF)

The following tables provide further information regarding Metropolitan's rates. Table 2-10 summarizes the rates and charges effective January 1, 2020, January 1, 2021, and January 1, 2022. Average costs of Metropolitan's service by member agency will vary depending upon an agency's RTS allocation, Capacity Charge, and relative proportions of treated and untreated Tier 1, and Tier 2 water purchases. Table 2-11 provides the details of the Capacity Charge, calculated for calendar year 2021.

Table 2-12 provides the details of the RTS calculation for calendar year 2021 by member agency. Table 2-13 provides the current Purchase Order commitment quantities that member agencies will purchase from Metropolitan over the 10-year period starting January 2015 through December 2024. Tier 1 annual average limits for each member agency are also shown in this table.

Table 2-10
Metropolitan Water Rates and Charges

Effective	Jan 1, 2020	Jan 1, 2021	Jan 1, 2022
Tier 1 Supply Rate ($/AF)	$208	$243	$243
Tier 2 Supply Rate ($/AF)	$295	$285	$285
System Access Rate ($/AF)	$346	$373	$389
Water Stewardship Rate ($/AF)	$65	-	-
System Power Rate ($/AF)	$136	$161	$167
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$755	$777	$799
Tier 2	$842	$819	$841
Treatment Surcharge ($/AF)	$323	$327	$344
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$1,078	$1,104	$1,143
Tier 2	$1,165	$1,146	$1,185
Readiness-to-Serve Charge ($M)	$136	$130	$140
Capacity Charge ($/cfs)	$8,800	$10,700	$12,200

Table 2-11
Capacity Charge Detail Calendar Year 2021

	Peak Day Demand (cfs) (May 1 through September 30) Calendar Year				
Agency	**2017**	**2018**	**2019**	**3-Year Peak**	**Calendar Year 2021 Capacity Charge ($10,7000/cfs)**
Anaheim	33.0	37.2	37.1	37.2	$398,040
Beverly Hills	25.7	27.8	23.5	27.8	$297,460
Burbank	14.0	17.1	17.3	17.3	$185,110
Calleguas	186.5	184.7	168.9	186.5	$1,995,550
Central Basin	36.7	39.2	48.6	48.6	$520,020
Compton	0.1	6.9	2.9	6.9	$73,830
Eastern	216.6	225.1	223.3	225.1	$2,408,570
Foothill	18.6	19.9	16.0	19.9	$212,930
Fullerton	13.0	13.3	13.1	13.3	$142,310
Glendale	41.4	33.5	32.2	41.4	$442,980
Inland Empire	140.5	147.8	118.7	147.8	$1,581,460
Las Virgenes	44.6	45.9	39.4	45.9	$491,130
Long Beach	55.2	80.4	51.8	80.4	$860,280
Los Angeles	250.4	284.6	283.2	284.6	$3,045,220
MWDOC	418.6	442.3	263.2	442.3	$4,732,610
Pasadena	39.9	43.0	40.0	43.0	$460,100
San Diego	749.7	855.5	672.0	855.5	$9,153,850
San Fernando	0.0	0.0	0.0	0.0	$0.0
San Marino	7.5	4.5	2.3	7.5	$80, 250
Santa Ana	19.9	19.3	19.4	19.9	$212,930
Santa Monica	16.6	16.7	20.7	20.7	$221,930
Three Valleys	126.4	142.9	128.1	142.9	$1,529,030
Torrance	34.0	32.6	27.8	34.0	$363,800
Upper San Gabriel	12.1	23.3	29.1	29.1	$311,370
West Basin	201.7	202.4	211.8	211.8	$2,266,260
Western	175,2	194.7	170.5	194.7	$2,083,290
Total	**2,877.9**	**3,140.6**	**2,660.9**	**3,184.1**	**$34,069,870**

Totals may not foot due to rounding

Table 2-12
Readiness-to-Serve Charge (by Member Agency)
Calendar Year 2021

Member Agency	Rolling Ten-Year Average Firm Deliveries (Acre-Feet) FY2009-10 to FY2018-19	RTS Share	12 months @ $130 million per year (1/21-12/21)
Anaheim	17,327	1.17%	1,526,562
Beverly Hills	10,447	0.71%	920,439
Burbank	12,324	0.84%	1,085,747
Calleguas MWD	97,188	6.59%	8,562,554
Central Basin MWD	42,103	2.85%	3,709,422
Compton	779	0.05%	68,659
Eastern MWD	94,363	6.40%	8,313,628
Foothill MWD	8,395	0.57%	739,661
Fullerton	8,126	0.55%	715,882
Glendale	16,548	1.12%	1,457,930
Inland Empire Utilities Agency	56,561	3.83%	4,983,172
Las Virgenes MWD	20,449	1.39%	1,801,585
Long Beach	30,374	2.06%	2,676,061
Los Angeles	269,780	18.28%	23,768,407
Municipal Water District of Orange County	207,818	14.04%	18,309,363
Pasadena	18,840	1.28%	1,659,827
San Diego County Water Authority	258,318	17.51%	22,758,613
San Fernando	36	0.00%	3,136
San Marino	838	0.06%	73,804
Santa Ana	10,780	0.73%	949,787
Santa Monica	5,511	0.37%	485,554
Three Valleys MWD	62,229	4.22%	5,482,576
Torrance	15,990	1.08%	1,408,786
Upper San Gabriel Valley MWD	26,406	1.79%	2,326,450
West Basin MWD	115,328	7.82%	10,160,744
Western MWD	68,688	4.66%	6,051,651
Metropolitan Total	**1,475,544**	**100.00%**	**$130,000,000**

Totals may not foot due to rounding

Table 2-13
Purchase Order Commitments and Tier 1 Limits
(by Member Agency)
January 2015 through December 2024

Member Agency	**Annual Average Tier 1 Maximum**	**Purchase Order Commitments** (acre-feet)
Anaheim	24,439	148,270
Beverly Hills	13,380	89,200
Burbank	16,776	108,910
Calleguas MWD	118,228	788,180
Central Basin MWD[1]	71,770	-
Compton[1]	3,372	-
Eastern MWD	117,585	783,900
Foothill MWD	11,773	73,310
Fullerton	11,299	75,320
Glendale	26,222	174,810
Inland Empire Utilities Agency	93,283	398,350
Las Virgenes MWD	24,358	162,390
Long Beach	51,804	263,140
Los Angeles	373,623	2,033,130
Municipal Water District of Orange County	321,635	2,144,230
Pasadena	22,965	153,100
San Diego County Water Authority[1]	393,542	-
San Fernando[1]	629	-
San Marino	1,442	9,610
Santa Ana	19,617	80,860
Santa Monica[1]	7,406	-
Three Valleys MWD	80,688	537,920
Torrance	19,204	128,030
Upper San Gabriel Valley MWD	67,228	110,080
West Basin MWD	135,418	902,780
Western MWD	105,783	705,220
Total	**2,133,470**	**9,870,740**

[1] No Purchase Order; Tier 1 maximum is annual, not cumulative.
Totals may not foot due to rounding.

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Implementing the Plan 3

This section summarizes Metropolitan's implementation plans and continued progress in developing a diversified resource mix that enables the region to meet its water demands under a wide range of possible future conditions. The investments that Metropolitan has made and its ongoing efforts in many different areas coalesce toward its goal of long-term regional water supply reliability. Many of the resource programs discussed are already successfully implemented. Others will take more time to execute. Considerations are also in place for emerging integrated supplies, which could augment sources of regional water supply from non-traditional sources. In addition, water demand reductions brought about by legislative mandates could affect the landscape of future supply planning and implementation. The following sections discuss each of these programs, presenting both successes to date and the programs that are still underway.

Metropolitan's IRP implementation approach is consistent with the California Water Resilience Portfolio that was released in July 2020. The California Water Resilience Portfolio is discussed briefly below.

California Water Resilience Portfolio

On April 29, 2019, Governor Newsom issued Executive Order N-10-19 that directed the California Natural Resources Agency, the California Environmental Protection Agency, and the California Department of Food and Agriculture to prepare a water resilience portfolio that meets the needs of California's communities, economy and environment through the 21st century.

The agencies were directed to first inventory and assess:

a. Existing demand for water on a statewide and regional basis and available water supply to address this demand.

b. Existing water quality of aquifers, rivers, lakes and beaches.

c. Projected water needs in the coming decades for communities, economy and environment.

d. Anticipated impacts of climate change to our water systems including growing drought and flood risks, and other challenges to water supply reliability.

e. Work underway to complete voluntary agreements for the Sacramento and San Joaquin river system regarding flows and habitat.

f. Current planning to modernize conveyance through the Bay Delta with a new single tunnel project.

g. Expansion of the state's drinking water program to ensure all communities have access to clean, safe and affordable drinking water.

h. Existing water policies, programs and investments within state government.

The California Water Resilience Portfolio outlines goals and actions to help address the state's water challenges through a broad and diversified approach. The goals and actions are meant to be achieved region by region based on the unique challenges and opportunities in each area and are organized into four categories:

1. Maintain and diversify water supplies – the state will continue to help regions reduce reliance on any one source of water supply and diversify water supplies to enable flexibility in the face of changing conditions.
2. Protect and enhance natural ecosystems – the state will provide leadership in restoring the environmental health of our river systems through effective standard setting, continued investments and more adaptive and holistic environmental management.
3. Build connections – the state aims to improve infrastructure to store, move and share water more effectively, and to integrate water management through shared use of science, data and technology.
4. Be prepared – the state will provide guidance to support preparation, protective actions and adaptive management of regions in the face of new threats and stresses due to climate change.

3.1 Colorado River

Metropolitan's goal for the Colorado River is to maintain current supplies and programs, while also maintaining flexibility through dry-year programs and storage. This goal involves protecting existing supply and storage programs in the face of risks that could impact Colorado River supplies in the future.

Background

Metropolitan was established to obtain an allotment of Colorado River water, and its first mission was to construct and operate the Colorado River Aqueduct (CRA). Under its contracts with the federal government, Metropolitan has a basic fourth priority entitlement of 550 TAF per year of Colorado River water. Metropolitan also holds a fifth priority for an additional 662 TAF per year that exceeds California's 4.4 MAF per year basic apportionment, and another 180 TAF per year when surplus flows are available. Metropolitan can obtain water under the fifth priority from:

- Water unused by the California holders of priorities 1 through 3
- Water saved by the Palo Verde land management, crop rotation, and water supply program, or
- When the U.S. Secretary of the Interior makes available either or both:
    - Surplus water, and
    - Water apportioned to, but unused by, Arizona and/or Nevada.

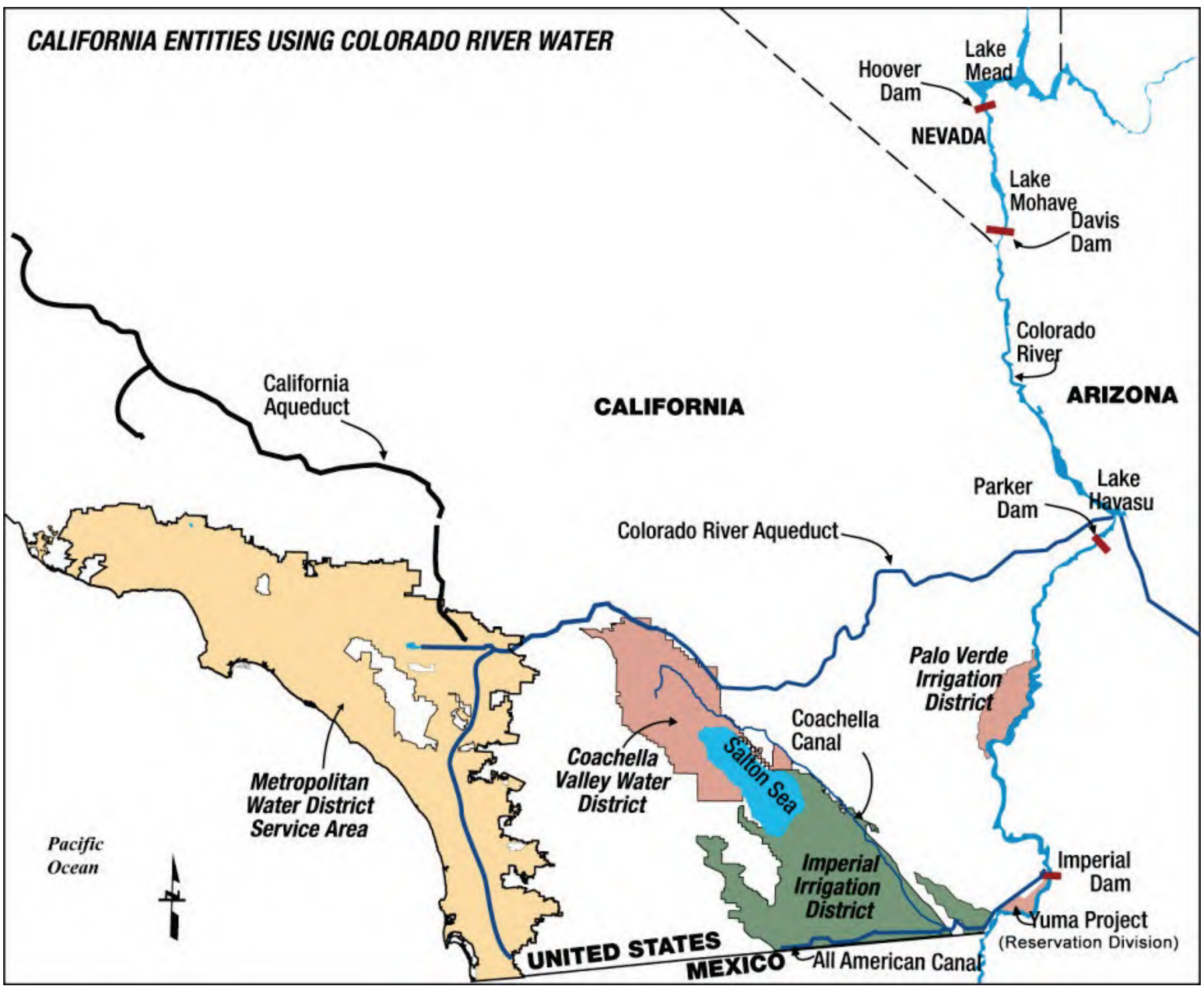
To satisfy a condition imposed by Congress in the Boulder Canyon Project Act, California's legislature enacted the Limitation Act in 1929, agreeing to limit consumptive use of Colorado River water to 4.4 MAF per year, plus not more than one-half of any excess or surplus waters unapportioned by the Colorado River Compact. The 1931 Seven Party Agreement provides the basis for the priorities among California contractors' use of Colorado River water available to California. Palo Verde Irrigation District (PVID), the Yuma Project (Reservation Division), Imperial Irrigation District (IID), and Coachella Valley Water District (CVWD), collectively the "agricultural entities," and Metropolitan are the entities that currently hold the priorities. These priorities are included in the contracts that the Department of the Interior executed with the California agencies in the 1930s for delivery of water from Lake Mead. The first four priorities total 4.4 MAF per year. As noted above, Metropolitan has the fourth priority of 550 TAF to California's basic apportionment and the fifth priority to 662 TAF per year. Under priorities 1 through 3, an amount not to exceed 3.85 MAF was apportioned to the agricultural entities for beneficial consumptive use. The Seven Party Agreement did not specify individual quantities for each of the first three priorities; rather, the amount of water available under the third priority was limited to the amount unused by the holders of priorities 1 and 2 on designated areas of land. This lack of quantification among the agricultural priorities posed an obstacle to the acquisition of water from the agricultural entities for use in Metropolitan's service area.

The Consolidated Decree issued in 2006 by the U.S. Supreme Court in *Arizona v. California*, consolidated into one decree the initial 1964 decree, the 1979 supplemental decree, the 1984 second supplemental decree, the 2000 third supplemental decree, and the 2006 approval settlements reached on the water rights claim of the Fort Yuma Indian Reservation. The Consolidated Decree confirmed the normal year allocation of 4.4 MAF per year to California. This limit effectively reduced Metropolitan's dependable supply of Colorado River water to its fourth priority amount of 550 TAF per year. The Consolidated Decree quantified present perfected rights (PPRs) to the use of Colorado River water by certain Indian reservations, federal wildlife refuges, and other users. Within California some, but not all, of these PPRs are encompassed by the Seven Party Agreement. Consumptive use under these non-encompassed PPRs, known as "Miscellaneous and Indian PPRs," could reach as much as 61 TAF annually. Since 1985, these PPR holders have used less than 20 TAF annually. Because over 5.362 MAF of Colorado River water were already allocated by California's Seven Party Agreement, it was not clear which rights would be affected by the use of these non-encompassed PPRs.

For a period following the Court's 1964 decree, Metropolitan's fifth priority rights were satisfied with water unused under California's first three agricultural priorities and water allocated to, but unused by, Arizona and Nevada. With the commencement of Colorado River water deliveries to the Central Arizona Project in 1985, the availability of Colorado River water to meet Metropolitan's needs was determined on a year-by-year basis. Through 2002, Metropolitan's diversion requests were fully satisfied with unused supplies and surplus waters.

Figure 3-1 shows the major aqueducts within southern California including those from the Colorado River, and entities within the state having rights to use water from the Colorado River.

Figure 3-1



Changed Conditions

California's Colorado River Water Use Plan and the Quantification Settlement Agreement

Metropolitan and the State of California acknowledged that Metropolitan would obtain less water from the Colorado River in the future than Metropolitan had in the past, but the lack of clearly quantified water rights hindered efforts to promote water management projects. The Secretary of the Interior asserted that California's users of Colorado River water had to limit their use to a total of 4.4 MAF per year, plus any available surplus water. Under the auspices of the state's Colorado River Board, these users developed a draft plan to resolve the problem, which was known as "California's Colorado River Water Use Plan" or the "California Plan." It characterized how California would develop a combination of programs to allow the state to limit its annual use of Colorado River water to 4.4 MAF per year plus any available surplus water. The 2003 Quantification Settlement Agreement (QSA) among IID, CVWD, and Metropolitan is a critical component of the California Plan. It establishes the baseline water use for each of the agencies, facilitates the transfer of water from agricultural agencies to urban uses, and specifies that IID, CVWD, and Metropolitan would forbear use of water to permit the Secretary of the Interior to satisfy the uses of the PPRs not covered by the Seven Party Agreement.

On November 5, 2003, IID filed a validation action in Imperial County Superior Court, seeking a judicial determination that thirteen agreements associated with the QSA are valid, legal, and binding. Other lawsuits also were filed challenging the execution, approval, and subsequent implementation of the QSA on various grounds. All of the QSA cases were coordinated in Sacramento County Superior Court. After more than a decade of litigation, the final challenges to the QSA were dismissed, and the agreements were upheld.

San Diego County Water Authority (SDCWA) is participating in three QSA-related projects that are providing additional water supplies that the agency exchanges with Metropolitan for receipt of Metropolitan deliveries.[1] First, the water conserved by these projects is made available to Metropolitan. In exchange, Metropolitan is delivering an amount of Metropolitan water equal to the amount of Colorado River water conserved by IID for SDCWA. Second, federal law allocates a portion of the water available as a result of the Coachella Canal Lining Project and the All-American Canal Lining Project for the benefit of parties, including five Indian Bands, and two non-Indian municipal water purveyors (San Luis Rey Settlement Parties) involved in litigation over water rights to the San Luis Rey River in San Diego County. Metropolitan has agreed to exchange that water and provide an equal amount of water to the United States for use by the San Luis Rey Settlement Parties, and SDCWA has agreed to convey the water when capacity is available for use within the Settlement Parties' service areas. The remainder of the water available as a result of the canal lining projects, up to the cap specified in the Metropolitan-SDCWA exchange agreement, is exchanged with SDCWA.

In 2005, Metropolitan entered into a settlement agreement in Arizona v. California with the Quechan Indian Tribe and other parties. The Tribe uses Colorado River water on the Fort Yuma Indian Reservation. Under the settlement agreement, the Tribe, in addition to the amounts of water decreed for the benefit of the Reservation in the 1964 decree in Arizona v. California, is entitled to (a) 20 TAF of diversions from the Colorado River, or (b) the amount necessary to supply the consumptive use required for irrigation of a specified number of acres, and for the satisfaction of related uses, whichever is less. Of the additional diversions, 13 TAF became available to the Tribe in 2006. An additional 7 TAF becomes available to the Tribe in 2035. Metropolitan agreed

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[1] These projects, the SDCWA/IID transfer and the Coachella and All-American canal lining projects, will be discussed in SDCWA's Urban Water Management Plan.

to provide annual incentive payments to the Tribe if the Tribe forbore diversion of the additional water, thereby allowing Metropolitan to divert it.

Current Dry Condition

The Colorado River Basin experienced a severe 5-year drought from 2000 to 2004 with both precipitation and runoff significantly below average. Since that time precipitation has been, on average, near normal, while runoff has been less than average in two out of every three years. Overall, a potential change in the precipitation to runoff relationship may be resulting in conditions in which less runoff is generated from a given level of precipitation, pushing the system toward a drying trend that is often characterized as a long-term drought. For example, in 2020, the Upper Colorado River Basin snowpack peaked in April at 107 percent of median. However, April through July runoff was observed at just 52 percent of average due to hot and dry conditions in the late spring and early summer. The overall 21-year drying trend has resulted in Lake Mead and Lake Powell storage at 40 and 42 percent of capacity, respectively, leaving less of a buffer for a future period of reduced precipitation.

Quagga Mussels

Quagga mussels were discovered in January of 2007 in Lake Mead and rapidly spread downstream to the Lower Colorado River. The presence and spawning of quagga mussels in the Lower Colorado River and in reservoirs located in southern California pose an immediate threat to water and power systems serving more than 25 million people in the southwestern United States. Quagga mussels (*Dreissena bugensis*) are a related species to the better-known zebra mussels (*Dreissena polymorpha*) and are indigenous to Ukraine. They were introduced to the Great Lakes in the 1980s from fresh-water ballast of a transoceanic ship traveling from Eastern Europe. Although the introduction of these two species into drinking water supplies does not typically result in violation of drinking water standards, invasive mussel infestations can adversely impact aquatic environments and infrastructure. If unmanaged, invasive mussel infestations have been known to severely impact the aquatic ecology of lakes and rivers; clog intakes and raw water conveyance systems; reduce the recreational and aesthetic value of lakes and beaches; alter or destroy fish habitats; and render lakes more susceptible to deleterious algae blooms.

Implementation Approach

Metropolitan's planning strategy recognized explicitly that program development would play an important part in reaching the target level of deliveries from the Colorado River. The implementation approach explored a number of water conservation programs with water agencies that receive water from the Colorado River or are located in proximity to the CRA. Negotiating the QSA was a necessary first step for all of these programs. On October 10, 2003, after lengthy negotiations, representatives from Metropolitan, IID, and CVWD executed the QSA and other related agreements. Parties involved also included SDCWA, the California Department of Water Resources (DWR), the California DFW, the U.S. Department of the Interior, and the San Luis Rey Settlement Parties. One of those related agreements was the Colorado River Water Delivery Agreement: Federal Quantification Settlement Agreement, which specifies to which agencies water will be delivered under priorities 3a and 6a of the Seven Party Agreement during its term.

Metropolitan has identified several programs that could be used to achieve the regional long-term development targets for the Colorado River, as shown in Table 3-1. Metropolitan has entered into or is exploring agreements with agencies as described in this section. In addition,

Appendix 3 provides a detailed discussion of these programs and describes whether the programs are being implemented, are deferred, or are under investigation.

Colorado River Water Management Programs

Imperial Irrigation District/Metropolitan Water District Conservation Program

Under agreements executed in 1988 and 1989, Metropolitan has funded water efficiency improvements within IID's service area in return for the right to divert the water conserved by those investments. Under this program, IID implemented a number of structural and non-structural measures, including the lining of existing earthen canals with concrete, constructing local reservoirs and spill-interceptor canals, installing non-leak gates, and automating the distribution system. Other implemented programs include the delivery of water to farmers on a 12-hour rather than a 24-hour basis and improvements in on-farm water management through irrigation management improvements. Through this program, IID has conserved an additional 105 TAF per year on average upon completion of program implementation. Execution of the QSA and amendments to the 1988 and 1989 agreements resulted in changes in the availability of water under the program, extending the term to 2078 if the term of the QSA extends through 2077, which guaranteed Metropolitan at least 85 TAF per year with the remainder of the conserved water available to CVWD when needed. In a 2019 agreement, Metropolitan and CVWD agreed to increase the amount of water guaranteed to Metropolitan to 90 TAF per year from 2020 to 2026, with the remainder of the conserved water available for Metropolitan's delivery to CVWD at Whitewater.

Palo Verde Land Management, Crop Rotation, and Water Supply Program

In May 2004, Metropolitan's Board authorized a 35-year land management, crop rotation, and water supply program with PVID. Under the program, participating farmers in PVID are paid to reduce their water use by not irrigating a portion of their land. A maximum of 29 percent of the lands within the Palo Verde Valley can be fallowed in any given year. Under the terms of the QSA, water savings within the PVID service area are made available to Metropolitan. This program provides up to 133 TAF of water to be available to Metropolitan in certain years. Over the life of the program, an average of 84.5 TAF per year has been saved and made available to Metropolitan. Additionally, in March 2009, Metropolitan and PVID entered into a one-year supplemental fallowing program within PVID that provided for the fallowing of additional acreage, with savings of 24.1 TAF in 2009 and 32.3 TAF in 2010.

Bard Seasonal Fallowing Program

In December 2019, Metropolitan's Board authorized a seven-year seasonal fallowing program with the Bard Water District. Under the program, participating farmers in Bard are paid to reduce their water use by not irrigating their land between the late spring and summer months. A maximum of 3,000 acres will be fallowed in the Bard Unit. Estimated water savings are between 1.5 and 2.0 AF per irrigable acre. Bard is part of the Yuma Project Reservation Division. Bard therefore holds a higher priority than Metropolitan, and any reductions in their water consumption increases supplies available to Metropolitan. Metropolitan has the option to make a fallowing call every year. The fallowing call notifies Bard and the farmers if Metropolitan needs fallowing the following year. This program provides up to 6 TAF of water to be available to Metropolitan in certain years.

Management of Metropolitan-Owned Land in Palo Verde

In 2001, Metropolitan acquired 8,946 acres of irrigable farmland within the Palo Verde Irrigation District (PVID). These lands were leased to growers and were eventually enrolled in the PVID Land

Management, Crop Rotation and Water Supply Program when it began in 2005. In 2015, Metropolitan acquired an additional 12,049 irrigable acres from Verbena LLC, bringing Metropolitan's ownership in the Palo Verde Valley to approximately 20,995 acres of irrigated farmland. The lands have historically been leased to growers who produced high water-using crops such as alfalfa.

In 2017 and 2018, Metropolitan entered into new leases on the lands with the goal of reducing consumptive water use while maintaining the lands as productive farmland. Strategies for reducing water use include incentivizing lessees to grow lower water-using crops, experimenting with different crop rotation cycles, and studying alternative irrigation practices. To assist in these studies, Metropolitan has deployed technologies for measuring crop water use via remote sensing imagery and ground-based sensors.

If long-term water savings from these farm leases is realized, Metropolitan may explore ways to have them formally accounted for in Metropolitan's Colorado River supplies in the future.

<u>Southern Nevada Water Authority and Metropolitan Storage and Interstate Release Agreement</u>

SNWA has undertaken extraordinary water conservation measures to maintain its consumptive use within Nevada's basic apportionment of 300 TAF. The success of the conservation program has resulted in unused basic apportionment for Nevada. As SNWA expressed interest in storing a portion of the water with Metropolitan, the agencies, along with the United States and the Colorado River Commission of Nevada, entered into a storage and interstate release agreement in October 2004. Under the agreement, additional Colorado River water supplies are made available to Metropolitan when there is space available in the CRA to receive the water. SNWA stored approximately 422 TAF with Metropolitan through 2019, 330 TAF of which is available for return to SNWA. In addition to providing capacity for SNWA to store unused water, the program has been beneficial to Metropolitan, providing additional water during dry years, especially during the recent California drought (2011 to 2016). SNWA is not expected to call upon Metropolitan to return water until after 2026.

<u>Lower Colorado Water Supply Project</u>

The Lower Colorado Water Supply Project was authorized by Congress in the 1980s to provide up to 10 TAF of water per year to the City of Needles and other entities adjacent to the river in California that do not have rights or have insufficient rights to use Colorado River water. In March 2007, Metropolitan, the City of Needles, and the United States Bureau of Reclamation (USBR) executed a Lower Colorado Water Supply Project contract. Under the contract, Metropolitan receives, on an annual basis, project water left unused by the project contractors along the River. The water supply for the project comes from groundwater wells located along the All-American Canal. A portion of the payments made by Metropolitan to the City of Needles is placed in a trust fund for potentially acquiring a new water supply for the project should the groundwater pumped from the project's wells become too saline for use. Metropolitan received 9.5 TAF from this project in 2019 and will receive an estimated 8.8 TAF in 2020 based on the amount of water pumped and used by other project water users.

<u>Exchange with SDCWA</u>

SDCWA has acquired conserved Colorado River water reaching an annual volume of 277.7 TAF by 2023. SDCWA makes this water available at Lake Havasu for Metropolitan diversion, where Metropolitan takes possession of the water and provides a matching volume from Metropolitan's blended supplies to SDCWA by exchange in equal monthly amounts. The conserved water is acquired by SDCWA through its transfer agreement with the Imperial Irrigation District (IID) and from the lining of the All-American and Coachella canals.

Under the transfer agreement with IID, 192.5 TAF was transferred and exchanged with Metropolitan in 2020. In 2021, the transfer reaches 205 TAF, reduces to 202.5 TAF in 2022, then stabilizes at 200 TAF per year in 2023. The water is being conserved through on-farm efficiency conservation arrangements made by IID with its customers and other system efficiency measures.

The Coachella Canal Lining Project consists of a 35-mile concrete-lined canal, including siphons, which replaced an earthen canal. The project was completed in December 2006 and conserves 30,850 AF annually. The All-American Canal Lining Project consists of a concrete-lined canal constructed parallel to 23 miles of earthen canal. The project was completed in 2009 and conserves 67,700 AF annually.

Pursuant to the QSA and related agreements, the 98,550 AF of water resulting from these projects annually is allocated as follows: 16,000 AF to the San Luis Rey Settlement Parties in San Diego County, 77,700 AF to SDCWA, and 4,850 AF for Coachella Canal Lining Project mitigation. Any portion of the latter volume not used for mitigation is allocated to SDCWA; however, whether SDCWA can actually receive such water is subject to other laws, agreements, and factors.

The combined volume IID transferred water and canal lining water that Metropolitan will exchange with SDCWA is limited to 282.7 TAF in 2021, 280.2 TAF in 2022, and 277.7 TAF each year thereafter.

Exchange with the United States

Of the 16,000 AF allocated to the San Luis Rey Settlement Parties from the water conserved from the All-American Canal Lining Project and Coachella Canal Lining Project, the United States furnishes this water at Metropolitan's Colorado River Intake on Lake Havasu. Metropolitan takes possession of the water and by exchange delivers an equal volume of Metropolitan's blended supplies to SDCWA. By separate agreement, SDCWA conveys the water to the San Luis Rey Settlement Parties.

Lake Mead Storage Program

In May 2006, Metropolitan and the USBR executed an agreement for a demonstration program that allowed Metropolitan to leave conserved water in Lake Mead, for exclusive use by Metropolitan in later years, that Metropolitan would otherwise have used in 2006 and 2007. The program required that such water left in Lake Mead must be through reduced use resulting from implementation of extraordinary conservation measures and not simply be water that was not needed by Metropolitan in the year it was stored. This extraordinary conservation was accomplished through savings realized under the Palo Verde Land Management, Crop Rotation, and Water Supply Program. Through the two-year demonstration program, Metropolitan created 44.8 TAF of "Intentionally Created Surplus" (ICS) water.

In December 2007, Metropolitan entered into agreements to set forth the rules under which ICS water is developed, stored in, and delivered from Lake Mead. According to these rules, the amount of water stored in Lake Mead, created through extraordinary conservation, that is available for delivery in a subsequent year was reduced by a one-time deduction of five percent, resulting in additional system water in storage in the lake, and an annual evaporation loss of three percent, beginning in the year following the year the water is stored. The 2019 Lower Basin Drought Contingency Plan (Lower Basin DCP; see below) changed these rules such that, for ICS creators party to the DCP (including Metropolitan), a one-time10 percent deduction is assessed on ICS in the year it is created, without additional future evaporation losses. Metropolitan created ICS water in 2009, 2010, 2011, 2012, 2016, 2017, 2018, and 2019 and withdrew ICS water in 2008, 2013, 2014, and 2015. As of January 1, 2020, Metropolitan had a total of 866 TAF of Extraordinary Conservation ICS water in Lake Mead.

Under these agreements, Metropolitan also agreed to store excess conservation by IID, up to 25 TAF per year with a cumulative cap of 50 TAF, with return upon the request of IID, subject to the conditions of the agreement. This was later amended in 2015 to temporarily increase the amount of excess conservation that Metropolitan would store, to account for the success of IID's conservation programs and the extreme drought conditions within the State of California. Metropolitan stored water for IID in 2014, 2015, 2016, and 2017. As of January 1, 2020, Metropolitan has stored approximately 168 TAF of IID's excess conservation either through application of the California ICS Agreement and its amendment, or through application of 3.B.8 of the 2007 Interim Guidelines (aka Lake Mead Storage Program)

The December 2007 federal guidelines concerning the operation of the Colorado River system reservoirs provided the ability for agencies to create "System Efficiency ICS" through the development and funding of system efficiency projects that save water that would otherwise be lost from the Colorado River. To that end, in 2008 the Central Arizona Water Conservation District (CAWCD), SNWA, and Metropolitan contributed funds for the construction of the Drop 2 (Brock) Reservoir by the USBR. The purpose of the Drop 2 (Brock) Reservoir is to increase the capacity to regulate deliveries of Colorado River water at Imperial Dam, reducing the amount of lost storage in Lake Mead due to excess flow downstream of Imperial Dam by approximately 70 TAF annually. In return for its $25 million net contribution toward construction, operation, and maintenance, 100 TAF of water that was stored in Lake Mead was assigned to Metropolitan as System Efficiency ICS. Through 2019, Metropolitan has diverted 35 TAF of this amount, with 65 TAF remaining in storage.

In 2009, Metropolitan entered into an agreement with the United States, SNWA, the Colorado River Commission of Nevada, and CAWCD to have USBR conduct a one-year pilot operation of the Yuma Desalting Plant at one-third capacity. The pilot project operated between May 2010 and March 2011 and provided data for future decision-making regarding long-term operation of the Plant and developing a near-term water supply. Metropolitan's contribution toward plant operating costs secured 24.4 TAF of System Efficiency ICS which is still stored in Lake Mead as of January 1, 2020.

<u>Quagga Mussel Control Program</u>

The presence and spawning of quagga mussels in the lower Colorado River from Lake Mead through Lake Havasu pose a threat to Metropolitan's Colorado River Aqueduct (CRA) system and other Colorado River water users due to the potential to continuously seed water conveyance systems with mussel larvae.

Metropolitan developed the Quagga Mussel Control Program (QMCP) in 2007 to address the long-term introduction of mussel larvae into the CRA from the lower Colorado River. The QMCP consists of surveillance activities and control measures. Inspections for adult mussel infestation of submerged infrastructure are conducted during annual CRA shutdowns (usually three to four weeks). Microscopic larvae are routinely monitored throughout the year in infested lakes and at non-infested locations.

Control activities consist of continuous chlorination of the CRA system (target residual = 0.1 – 0.5 mg/L) at the outlets of Copper Basin (5 miles downstream of the intake from the Colorado River), Lake Skinner, and Lake Mathews at the western terminus of the CRA. The outlet towers at Lakes Skinner and Mathews are also chlorinated for two weeks every quarter when operations allow (0.6 mg/L target residual). Attached mussels are removed during routine cleaning of the trash racks at the Whitsett Intake Pumping Plant at the start of the CRA. The annual CRA shutdowns desiccate exposed quagga mussels, thus providing an additional control measure.

Recent shutdown inspections have demonstrated that the combined use of chlorine and regularly scheduled shutdowns effectively control mussel infestation along the length of the CRA since only few and small mussels are usually found during these inspections.

Lower Basin Drought Contingency Plan

In April 2019, the President signed legislation directing the Secretary of the Interior to sign and implement four DCP agreements related to the Upper and Lower Basin DCPs without delay. The agreements were executed, and the Upper and Lower Basin DCPs became effective on May 20, 2019 and will continue to be effective through 2026. The Lower Basin Drought Contingency Plan Agreement requires California, Arizona, and Nevada to store defined volumes of water ("DCP Contributions") in Lake Mead at specified lake levels. California would begin making contributions if Lake Mead's elevation is projected to be at or below 1,045 feet above sea level on January 1. Depending on the lake's elevation, California's contributions would range from 200 to 350 TAF a year. Pursuant to intrastate implementation agreements that terminate in 2026, Metropolitan is responsible for 93 percent of any California DCP Contribution that may be required under the Lower Basin DCP. CVWD is responsible for 7 percent of California's required DCP Contributions. In January 2020, the Lake Mead elevation was 1,090 feet; thus, no California DCP Contributions are necessary at this time. As noted above, under the Lower Basin DCP, the one-time deduction on new ICS was increased to 10 percent while the annual evaporation loss was removed.

Implementation of the Lower Basin DCP enhances Metropolitan's ability to store water in Lake Mead and to ensure that water in storage can be delivered at a later date. The Lower Basin DCP increases the total volume of water that California may store in Lake Mead by 200 TAF, which Metropolitan will have the right to use. Water stored as ICS will be available for delivery as long as Lake Mead's elevation remains above 1,025 feet. Previously, that water would likely have become inaccessible below a Lake Mead elevation of 1,075 feet. Rules are set for delivery of DCP ICS through 2026 and between 2027 and 2057.

Achievements to Date

Metropolitan has developed a number of supply and conservation programs to increase the amount of supply available from the Colorado River. The Colorado River faces long-term challenges of water demands exceeding available supply with additional uncertainties due to climate change. Metropolitan's supply and conservation programs, as well as planned additional water management programs for 2035, are shown in Table 3-1.

Table 3-1
Colorado River Program Capabilities
Year 2035
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
DCP Contribution Reduction[1]	0	0	0
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	0
PVID Land Management, Crop Rotation, and Water Supply Program	130,000	130,000	117,000
Bard Seasonal Fallowing Program	6,000	6,000	6,000
Lower Colorado Water Supply Project	9,000	9,000	9,000
Lake Mead ICS Storage Program	337,500	337,500	337,500
Binational ICS	51,000	0	51,000
Forbearance for Present Perfected Rights	(2,000)	(2,000)	(2,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(51,000)	(12,000)	(113,000)
DWCV Advance Delivery Account	51,000	12,000	113,000
IID Payback	0	0	0
SNWA Agreement Payback	(22,000)	(22,000)	(22,000)
Subtotal of Current Programs	***1,109,500***	***1,058,500***	***1,096,500***
Programs Under Development			
Additional Transfer Programs	0	0	0
Subtotal of Proposed Programs	***0***	***0***	***0***
Additional Colorado River Exchange Supplies			
Exchange with SDCWA	278,000	278,000	278,000
Exchange with United States	16,000	16,000	16,000
Subtotal of Additional Colorado River Supplies	***294,000***	***294,000***	***294,000***
Maximum CR Supply Capability[2]	**1,403,500**	**1,352,500**	**1,390,500**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(153,500)*	*(102,500)*	*(140,500)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**

[1] DCP contribution beyond capacity of ICS accounts.
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The CRA delivery capacity is 1.25 MAF annually.

3.2 State Water Project

Much of the SWP water supply passes through the San Francisco-San Joaquin Bay-Delta (Bay-Delta). The SWP consists of a series of pump stations, reservoirs, aqueducts, tunnels, and power plants operated by DWR. Figure 3-2 shows SWP facilities. This statewide water infrastructure provides water to 29 urban and agricultural agencies throughout California. More than two-thirds of California's residents receive some of their drinking water from the Bay-Delta.

The original State Water Contract called for an ultimate delivery capacity of 4.2 MAF, with 1,911 TAF allocated to Metropolitan pursuant to its participation in the SWP. For decades, the Bay-Delta has experienced water quality and supply reliability challenges and conflicts due to variable hydrology and environmental standards that limit pumping operations. SWP deliveries in the most recent critically dry years lagged these projections and were 5 percent of contractual amounts in 2014 and 20 percent of contractual amounts in 2015. Dry conditions in 2020 also supported a supply allocation of only 20 percent. Consequently, Metropolitan's key concern is the continual deterioration of water supply reliability.

Another important concern for Metropolitan is sustained improvement in SWP water quality. Metropolitan must be able to meet the increasingly stringent drinking water regulations that are expected for disinfection by-products and pathogens in order to protect public health. Meeting these regulations will require improving the Bay-Delta water supply by cost effectively combining alternative source waters, source improvement, and treatment facilities. Additionally, Metropolitan requires water quality improvements of Bay-Delta water supplies to meet its 500 mg/L salinity blending objective in a cost-effective manner, while minimizing resource losses and helping to ensure the viability of regional recycling and groundwater management programs.

Background

Endangered Species Act Permits - The listing of several fish species as threatened or endangered under the federal or California Endangered Species Acts (respectively, the "Federal ESA" and the "California ESA" and, collectively, the "ESAs") has adversely impacted operations and limited the flexibility of the SWP. Currently, five species (the winter-run and spring-run Chinook salmon, Delta smelt, North American green sturgeon, and Central Valley steelhead) are listed under the ESAs. In addition, on June 25, 2009, the California Fish and Game Commission declared the longfin smelt a threatened species under the California ESA. Because of the listing of the various species, the federal Central Valley Project (CVP) and SWP are prohibited from "taking" the fish in their operations and must consult with federal fisheries agencies to determine whether their operations will jeopardize the existence of the species. If so, CVP and SWP must establish "reasonable and prudent alternatives" (RPAs) to normal project operations to minimize their impacts on the smelt and salmon.

In 2004 and 2005, the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) issued biological opinions and incidental take statements that governed operations of the SWP and the CVP with respect to the Delta smelt, the winter-run and spring-run Chinook salmon, and the Central Valley steelhead. In July 2006, the USBR reinitiated consultation with the USFWS and NMFS with respect to the 2004 and 2005 biological opinions (with the addition of the North American green sturgeon, which was listed in April 2006) following the filing of legal challenges to those biological opinions and incidental take statements.

Figure 3-2
Current and Projected Facilities of the State Water Project

In 2008, USFWS issued a Biological Opinion with RPAs including criteria for operation of the CVP and SWP in a manner not likely to jeopardize the continued existence of the Delta smelt or adversely modify designated critical habitat. NMFS made a similar finding with respect to project operation effects on the listed salmon and steelhead in its revised Biological Opinion in 2009. Coordinated CVP/SWP operations were required to incorporate RPAs suggested by the agencies in the 2008 and 2009 Biological Opinions to ensure they are exempt from the otherwise applicable prohibition on "take" of Federal ESA-listed species.

To comply with the California ESA, DWR obtained consistency determinations for species listed under both ESAs and a separate Fish & Game Code Section 2081 Incidental Take Permit that authorized the incidental take of the state-listed Longfin smelt from SWP operations.

2019 Biological Opinions - In August 2016, USBR and DWR reinitiated consultation with NMFS and USFWS on the Coordinated Long-term Operations of the CVP and SWP due to new information and science on declining listed fish species populations. USBR submitted the initial biological assessment to USFWS and NMFS. The biological assessment contains a description of USBR's and DWR's proposed long-term coordinated operations plan (the "2019 Long-Term Operations Plan"). On October 21, 2019, USFWS and NMFS released their Biological Opinions. On February 18, 2020, USBR signed a Record of Decision, pursuant to the National Environmental Policy Act, completing its environmental review and adopting the 2019 Long-Term Operations Plan.

The 2019 Long-Term Operations Plan incorporates and updates many of the requirements contained in the previous 2008 and 2009 Biological Opinions. It also includes over $1 billion over a ten-year period in conservation, monitoring and new science, some of which is in the form of commitments carried forward from the previous 2008/2009 Biological Opinions. Those costs are shared by the SWP and CVP. The prior 2008 and 2009 Biological Opinions resulted in an estimated reduction in SWP deliveries of 0.3 million acre-feet during critically dry years to 1.3 million acre-feet in above normal water years as compared to the previous baseline. The 2019 Long-Term Operations Plan and 2019 Biological Opinions are expected to increase SWP deliveries by an annual average of 200,000 acre-feet as compared to the previous Biological Opinions. However, as explained further below, DWR committed to forego the anticipated improvement in the California ESA permitting process.

On December 2, 2019, a group of non-governmental organizations, including commercial fishing groups and the Natural Resources Defense Council (the "NGOs"), sued the Department of Interior, Department of Commerce, USFWS, NMFS, and USBR alleging the 2019 Biological Opinions are arbitrary and capricious, later amending the lawsuit to include claims alleged against USBR under the federal ESA and the National Environmental Policy Act. On February 20, 2020, the California Natural Resources Agency (Natural Resources), the California Environmental Protection Agency, and the Attorney General (collectively, the "State Plaintiffs") sued the federal agencies, making allegations similar to the NGOs, but also alleging that USBR must obtain a California ESA permit for CVP operations that cause incidental take of the state-listed Longfin smelt. The State Water Contractors intervened in both cases to defend the 2019 Biological Opinions. In May 2020, the court granted, in part, a preliminary injunction that affected CVP operations only for a short time in May. The federal defendants are nearing completion of the administrative records that will form the evidentiary basis for briefing the merits of the cases, and the court has issued a briefing schedule for any objections to the administrative records. Once the administrative records are finalized, the parties anticipate filing cross-motions for summary judgment. The outcome of those cross-motions may obviate the need for a trial.

California ESA Incidental Take Permit - DWR described and analyzed its proposed SWP long-term operations plan for purposes of obtaining a new California ESA permit in its November 2019 Draft EIR under CEQA. Its 2019 Draft EIR proposed essentially the same operations plan as for the federal 2019 Biological Opinions, with the addition of operations for the California ESA-listed Longfin smelt. The proposed project included an estimated $540 million in conservation, monitoring and science, much of which overlapped with DWR's share of the estimated $1 billion under the federal 2019 Biological Opinions. In December 2019, DWR submitted its application for an incidental take permit under the California ESA to the California Department of Fish and Wildlife (CDFW), with a modified State operations plan that added new outflow and environmental commitments. On March 27, 2020, DWR released its final EIR and Notice of Determination, describing and adopting a State operations plan with additional operational restrictions and additional conservation commitments. On March 31, 2020, CDFW issued a California ESA incidental take permit for the SWP that included further operational restrictions and outflow. The final approved project and incidental take permit reduce long-term average SWP deliveries by more than 200 TAF, which more than erased any potential improvement in SWP water supplies that were anticipated to result from the 2019 Biological Opinions. In addition, the approved project and incidental take permit add another estimated $218 million over a ten-year period in environmental commitments for the SWP beyond the SWP's share of the $1 billion required to comply with the 2019 Biological Opinions.

On April 28, 2020, Metropolitan and Mojave Water Agency (Mojave) jointly sued CDFW, DWR and Natural Resources, alleging that the new California ESA permit and Final EIR violate CEQA and the California ESA. Metropolitan and Mojave also allege that DWR breached their respective State Water Contracts and the implied covenant of good faith and fair dealing by, among other things, accepting an incidental take permit containing mitigation or other measures in excess of that required by law. The State Water Contractors and the Kern County Water Agency also filed CEQA and CESA actions, and a CEQA challenge was filed by several federal contractors. In addition, San Bernardino Valley Municipal Water District sued CDFW and DWR, alleging CEQA and CESA violations, breach of its State Water Contract and the implied covenant, as well as unconstitutional takings and anticipatory repudiation of contract claims. Four other lawsuits also have been filed by certain commercial fishing groups and a tribe, several environmental groups, and two in-Delta water agencies challenging the Final EIR as inadequate under CEQA and, in some of the cases, alleging violations of the California ESA, Delta Reform Act, public trust doctrine and, in one of the cases, certain water right statutes. Since the initial filings, Coachella Valley Water District, San Gorgonio Pass Water Agency and the Municipal Water District of Orange County have joined Metropolitan's case; and nine individual State Water Contractors joined the SWC and Kern County Water Agency in their case, adding breach of contract and implied covenant claims. All eight cases have been ordered coordinated, and a stay has been imposed on any discovery until modified or lifted by the coordination trial judge. At this time, Metropolitan is unable to assess the likelihood of success of any litigation relating to the California ESA permit, including any future litigation or any future claims that may be filed, or any potential effect on Metropolitan's SWP water supplies.

Bay-Delta Water Quality Control Plan Update/Voluntary Agreements – The State Water Resources Control Board (SWRCB) is the agency responsible for setting water quality standards and administering water rights throughout California. The SWRCB exercises its regulatory authority over the Bay-Delta and its tributaries by means of public proceedings leading to regulations and decisions that can affect the availability of water to Metropolitan and other users of SWP water. These include the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan), which establishes the water quality objectives and proposed flow regime of the estuary, and water rights decisions, which assign responsibility for implementing the objectives of the Bay-Delta Plan to users throughout the system by adjusting their respective water rights permits.

Since 2000, SWRCB's Water Rights Decision 1641 (D-1641) has governed the SWP's ability to export water from the Bay-Delta for delivery to Metropolitan and other agencies receiving water from the SWP. D-1641 allocated responsibility for meeting flow requirements and salinity and other water quality objectives established earlier by the Bay-Delta Plan.

The Bay-Delta Plan gets reviewed periodically, and new standards and allocations of responsibility can be imposed on the SWP as a result. The last review was completed in 2006, and the current review has been ongoing since approximately 2010 in a phased approach.

Phase 1 focuses on the southern Delta salinity objectives for the protection of agriculture, San Joaquin River flow objectives for the protection of fish and wildlife, and a program of implementation for achieving those objectives. Phase 2 considers the comprehensive review of the other elements of the Bay-Delta Plan, including but not limited to Sacramento River and Delta outflow objectives.

The SWRCB has also encouraged all stakeholders to work together to reach one or more voluntary agreements for consideration by the SWRCB that could implement the proposed amendments to the Bay-Delta Plan through a variety of tools, while seeking to protect water supply reliability. Metropolitan is participating in the Phase 2 proceedings and voluntary agreement negotiations. In March of 2019, DWR and CDFW put forward a project description and planning agreement that would allow the SWRCB to analyze the environmental impacts and benefits of the voluntary agreement alternative to the percentage of unimpaired flow framework.

In December 2018, the SWRCB adopted the Phase 1 Bay-Delta Plan amendments and Final Substitute Environmental Document. Among other things, the Phase 1 updates established new Lower San Joaquin River (LSJR) flow objectives and revised southern Delta salinity objectives. The LSJR flow objectives for February through June require 40 percent of unimpaired flow, based on a minimum 7-day running average, from each of the Stanislaus, Tuolumne, and Merced Rivers, with the ability to adjust between 30 and 50 percent through adaptive management, and with certain minimum base flows. The SWRCB estimates that the new LSJR flow objectives will reduce water available for human consumptive use by between 7 and 23 percent, on average, and 38 percent in critically dry years.

On February 25, 2019, the Office of Administrative Law approved the Phase 1 amendments, which are now in effect. The SWRCB plans to fully implement the new LSJR flow objectives through adjudicatory (water rights) and regulatory (water quality) processes by 2022. The SWRCB has stated that it encourages voluntary agreements that will assist in implementing the LSJR flow objectives through a combination of flow and non-flow habitat restoration measures, and will consider such agreements as part of its proceedings to implement the Phase 1 Bay-Delta Plan update, consistent with its obligations under applicable law.

In July of 2018, the SWRCB released a framework that describes the draft proposal for Phase 2, which will update the flow requirements for the Delta and its contributing watersheds, including the Sacramento River and its tributaries. The framework provides additional details about the flow requirements staff is likely to propose, how these new requirements could be implemented, and preliminary information on their potential environmental benefits and water supply effects. Among other things, SWRCB staff anticipate proposing an inflow level of 45-65 percent of unimpaired flow, with a starting point of 55 percent. The proposed program of implementation would allow voluntary agreements with nonflow measures to be lower in the range – so long as the measures provide the same level of resource protection as 55 percent, and that the agreement is still within the range of 45-65 percent. The framework states that the SWRCB is interested in receiving potential Bay-Delta Plan amendment language developed through the voluntary agreement process that would authorize, with the affirmative concurrence from CDFW, a coordinated control of flows and other, non-flow factors that would achieve benefits comparable to the unimpaired flow requirements.

Other issues, such as the recent decline of some fish populations in the Bay-Delta and surrounding regions and certain operational actions in the Bay-Delta, may significantly reduce Metropolitan's water supply from the Bay-Delta. Future new or revised Biological Opinions or incidental take authorizations under the Federal ESA and California ESA might further adversely affect SWP and CVP operations. Additionally, new litigation, listings of additional species under the ESAs, or new regulatory requirements imposed by the SWRCB could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage, or other operational changes impacting water supply operations. Metropolitan cannot predict the ultimate outcome of any of the litigation or regulatory processes described above, but believes they could have an adverse impact on the operation of the SWP pumps, Metropolitan's SWP supplies, and Metropolitan's water reserves.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. The Delta Vision process, established by Governor Schwarzenegger, was aimed at identifying long-term solutions to the conflicts in the Bay-Delta, including natural resource, infrastructure, land use, and governance issues. In addition, State resource agencies and various water user entities are currently engaged in the development of the Delta Conveyance Project, which is aimed at making physical and operational improvements to the SWP system in the Delta necessary to access south-of-Delta SWP water supplies and restore and protect water quality by addressing anticipated sea-level rise, seismic risks, and by providing operational flexibility to improve aquatic conditions in the Delta and better manage risks of further regulatory constraints on SWP operations.

Changed Conditions

In August 2020, DWR released the 2019 State Water Project Delivery Capability Report. The 2019 Delivery Capability Report presents the current DWR estimate of the amount of water deliveries for current (2019) conditions and conditions 20 years in the future for each SWP contractor under a range of hydrologic conditions. These estimates incorporate regulatory requirements in accordance with the SWRCB Water Quality Control Plan, the USFWS and NMFS Biological Opinions and the CDFW Incidental Take Permit. In addition, these estimates incorporate 2018 amendments to the Coordinated Operations Agreement between the SWP and CVP. Future capability estimates also reflect the potential impacts of climate change and sea level rise. Under the 2019 Delivery Capability report, the delivery estimates for the SWP for 2019 conditions as a percentage of Table A amounts are 7 percent, equivalent to 134 TAF for Metropolitan, under a single dry year (1977) condition and 58 percent, equivalent to 1.1 MAF for Metropolitan, under long-term average conditions.

Implementation Approach

Metropolitan's implementation approach for the SWP depends on the full use of the current State Water Contract provisions, including its basic contractual amounts and Article 21 interruptible supplies. In addition, it requires successful negotiation and implementation of a number of agreements. Each of these stakeholder processes or agreements involves substantial Metropolitan and member agency staff involvement to represent regional interests. Metropolitan is committed to working collaboratively with DWR, SWP contractors, and other stakeholders to ensure the success of these extended negotiations and programs.

SWP Reliability

This discussion provides details of the major actions Metropolitan is undertaking to improve SWP reliability.

Delta Conveyance Project – Planning for a Delta conveyance project to address declining populations of sensitive fish species and the increasingly restrictive permit conditions began decades ago. In the mid-1990s, a consortium of federal, state, and local agencies including Metropolitan entered the Bay-Delta Accord, which included hundreds of millions of dollars for ecosystem restoration in the Delta and its salmon-bearing tributaries. In 2000, a similar consortium completed the CALFED analysis of a program of ecosystem restoration and improvements to Delta conveyance and issued a Record of Decision that included dual conveyance as an alternative. In April 2006, the CALFED Program issued a 10-year Action Plan to refocus the program based on new scientific and policy information. The scientific information indicated that the current physical configuration of the Delta did not lead to a sustainable condition due to increasing risk of seismic events and sea level rise; and that population levels for Delta pelagic (open water) organisms were at record low levels and were appearing to continue to decline.

The 10-year Action Plan also indicated that several water users were considering the development of a habitat conservation plan for the Delta. This effort was the initiation of the Bay Delta Conservation Plan (BDCP), which began with the support and participation of water suppliers, including Metropolitan. One of the conservation measures included new points of diversion on the Sacramento River in the north Delta connected by a canal or two tunnels to Clifton Court Forebay (part of the SWP) in the south Delta.

In September 2006, Governor Schwarzenegger signed Executive Order S-17-06, which launched the Delta Vision process by establishing a Blue-Ribbon Task Force, a cabinet-level Delta Vision Committee, Delta Science Advisors, and a Stakeholder Coordination Group. The executive order charged the Blue-Ribbon Task Force with developing both a long-term vision for a sustainable Delta and a plan to implement that vision. The Delta Vision Committee recommended, among other things, creation of a state plan for the Delta and Suisun Marsh aimed at landscape-scale ecosystem restoration and a new Delta conveyance infrastructure to create a dual system of conveyance. On February 28, 2008, Governor Schwarzenegger, in a letter to state Senators Perata, Machado, and Steinberg, stated his intention to direct DWR to proceed with preparation of environmental review and permitting activities for the BDCP.

In 2009, in light of the Delta Vision reports and recommendations, the Legislature enacted the Sacramento-San Joaquin Delta Reform Act of 2009, which established the coequal goals for the Delta of ecosystem restoration and restoration of reliable SWP and CVP supplies, created the Delta Stewardship Council, and charged the new agency with development of a Delta Plan to further the coequal goals in a manner that protects and enhances the Delta as an evolving place. The Delta Reform Act and the first Delta Plan, adopted in 2013, called for incorporation of the BDCP into the Delta Plan if it met state and federal requirements for a habitat conservation plan and natural communities' conservation plan.

The BDCP planning process continued under Governor Brown, but in light of comments on the BDCP, DWR began analyzing three new sub-alternatives to the BDCP that involved new conveyance independent of any landscape-scale habitat restoration called the California WaterFix. At the same time, Governor Brown initiated California EcoRestore, which was aimed at restoration of 30,000 acres of fish habitat in the Delta. In July 2017, DWR approved California WaterFix. Metropolitan's Board authorized participation in California WaterFix in October 2017, and again in April and July of 2018.

In his State of the State address delivered February 12, 2019, Governor Newsom announced that he did not "support WaterFix as currently configured," but does "support a single tunnel." On April 29, 2019, Governor Newsom issued Executive Order N-10-19, directing several agencies to (among other things) "inventory and assess… [c]urrent planning to modernize conveyance through the Bay Delta with a new single tunnel project." The Governor's announcement and Executive Order led to DWR's withdrawal of all approvals and environmental compliance documentation associated with California WaterFix. The CEQA process identified in this notice for the proposed Delta Conveyance Project will, as appropriate, utilize relevant information from the past environmental planning process for California WaterFix, but the proposed project will undergo a new stand-alone environmental analysis leading to issuance of a new EIR.

On January 15, 2020, DWR issued a Notice of Preparation of an Environmental Impact Report for the DCP, stating:

> *DWR's underlying, or fundamental, purpose in proposing the project is to develop new diversion and conveyance facilities in the Delta necessary to restore and protect the reliability of State Water Project (SWP) water deliveries and, potentially, Central Valley Project (CVP) water deliveries south of the Delta, consistent with the State's Water Resilience Portfolio.*
>
> *The above stated purpose, in turn, gives rise to several project objectives. In proposing to make physical improvements to the SWP Delta conveyance system, the project objectives are:*

- *To address anticipated rising sea levels and other reasonably foreseeable consequences of climate change and extreme weather events.*
- *To minimize the potential for public health and safety impacts from reduced quantity and quality of SWP water deliveries, and potentially CVP water deliveries, south of the Delta resulting from a major earthquake that causes breaching of Delta levees and the inundation of brackish water into the areas in which the existing SWP and CVP pumping plants operate in the southern Delta.*
- *To protect the ability of the SWP, and potentially the CVP, to deliver water when hydrologic conditions result in the availability of sufficient amounts, consistent with the requirements of state and federal law, including the California and federal Endangered Species Acts and Delta Reform Act, as well as the terms and conditions of water delivery contracts and other existing applicable agreements.*
- *To provide operational flexibility to improve aquatic conditions in the Delta and better manage risks of further regulatory constraints on project operations*

The proposed project would construct and operate new conveyance facilities in the Delta that would add to the existing SWP infrastructure. New intake facilities as points of diversion would be located in the north Delta along the Sacramento River between Freeport and the confluence with Sutter Slough. The new conveyance facilities would include a single main tunnel to convey water from the new intakes to the existing Banks Pumping Plant and potentially the federal Jones Pumping Plant in the south Delta. The new facilities would provide an alternate location for diversion of water from the Delta and would be operated in coordination with the existing south Delta pumping facilities. The new north Delta facilities would be sized to convey up to 6,000 cfs of water from the Sacramento River to the SWP facilities in the south Delta. DWR would operate the dual conveyance system in compliance with all state and federal regulatory requirements and would not reduce DWR's current ability to meet standards in the Delta to protect biological resources and water quality for beneficial uses.

Contract Amendments – Metropolitan and other State Water Contractors have undertaken negotiations with DWR to extend their State Water Contracts. In June 2014, DWR and the State Water Contractors reached an Agreement in Principle (the "Agreement in Principle") on an amendment to the State Water Contracts to extend the contracts and to make certain changes related to financial management of the SWP in the future. DWR and 25 of the State Water Contractors, including Metropolitan, have signed the Agreement in Principle. Under the Agreement in Principle, the term of the State Water Contract for each Contractor that signs an amendment would be extended until December 31, 2085. The Agreement in Principle served as the "proposed project" for purposes of environmental review under CEQA. DWR issued a Notice of Availability of the Draft Environmental Impact Report ("EIR") for the proposed project on August 17, 2016. DWR released the Final EIR on November 16, 2018 and certified the final EIR and issued a Notice of Determination on December 11, 2018. Concurrently, Metropolitan considered the certified final EIR and approved the water supply contract extension amendment at its December 11, 2018 Board meeting. That same day, DWR filed a lawsuit seeking to validate the contract extension. In January of 2019, two groups of plaintiffs filed lawsuits challenging DWR's Final EIR and approval of the Contract Extension under CEQA, the Delta Reform Act, and public trust doctrine. Those cases have been related to the validation action and are pending before the same judge. To date, 21 of the 29 State Water Contractors have executed the amendment, achieving the DWR established threshold needed for it to be fully executed. DWR is awaiting a decision from the trial court on the validation litigation described above before moving forward with execution of the amendments with individual State Water Contractors.

In a process separate from the State Water Contract extension amendment described above, Metropolitan and other State Water Contractors undertook public negotiations with DWR to amend their State Water Contracts to clarify how costs would be allocated for the California WaterFix, as well as to clarify the criteria applicable to certain water management tools including single and multi-year water transfers and exchanges between State Water Contractors. DWR and the State Water Contractors reached an Agreement in Principle in 2018 (the "2018 AIP"), and DWR issued a Draft EIR. On April 29, 2019, Governor Newsom issued the executive order directing State agencies to develop a comprehensive statewide strategy to build a climate-resilient water system that included consideration of a single-tunnel Delta conveyance facility instead of the approved California WaterFix project. DWR removed the WaterFix cost provisions from the 2018 AIP and, on February 28, 2020, recirculated the Draft EIR for only the 2018 AIP's water management provisions. DWR certified a Final EIR for the water management tools AIP in August 2020 and finalized contract language in October 2020. Since then, all but three of the SWP contractors have approved and signed the amendments, including Metropolitan, which approved the amendments on February 9, 2021. As a result, the amendments became effective on February 28, 2021. The water management provisions allow for greater flexibility for transfers and exchanges among those public agencies with State Water Contracts. Specifically, it would confirm existing practices for exchanges, allow more flexibility for non-permanent water transfers, and allow for the transfer and exchange of certain portions of Article 56 carry over water.

In light of the shift from California WaterFix to the Delta Conveyance Project, Metropolitan and other State Water Contractors embarked on a third public process to further negotiate proposed amendments related to cost allocation for a potential new Delta Conveyance Project. In March of 2020, DWR and the State Water Contractors reached an Agreement in Principle ("Delta Conveyance AIP") for the allocation of costs and benefits for a Delta Conveyance project based on an allocation of proportionate shares. The Delta Conveyance AIP provides a mechanism that would allow for the costs related to any Delta Conveyance project to be allocated for and collected by DWR. The Delta Conveyance AIP also provides for the allocation of benefits for any Delta Conveyance project. Additionally, the Delta Conveyance AIP includes a white paper that describes how DWR would account for and administer any Delta Conveyance project benefits and costs if a project were implemented today. Contract language is under development, and any contract approval would follow DWR completing the Delta Conveyance Project environmental review.

COA Addendum – DWR operates the SWP in coordination with the federal CVP, which is operated by USBR. Since 1986, the coordinated operations have been undertaken pursuant to a Coordinated Operations Agreement for the Central Valley Project and State Water Project (the "COA"). The COA defines how the State and federal water projects share water quality and environmental flow obligations imposed by regulatory agencies. The agreement calls for periodic review to determine whether updates are needed in light of changed conditions. After completing a joint review process, DWR and USBR agreed to amend the COA to reflect water quality regulations, Biological Opinions, and hydrology updated since the 1986 agreement was signed. On December 13, 2018, DWR and USBR executed an Addendum to the COA (the "COA Addendum"). Through the COA Addendum, DWR will adjust current SWP operations to modify pumping operations, as well as project storage withdrawals to meet in-basin uses, pursuant to revised calculations based on water year types. The COA Addendum will shift responsibilities for meeting obligations between the CVP and the SWP, resulting in a shift of approximately 120 TAF in long-term average annual exports from the SWP to the CVP. In executing the COA Addendum, DWR found the agreement to be exempt from environmental review under the California Environmental Quality Act ("CEQA") as an ongoing project and that the adjustments in operations are within the original scope of the project. On January 16, 2019, commercial fishing groups and a tribe ("petitioners") filed a lawsuit against DWR alleging that entering into the COA Addendum violated CEQA, the Delta Reform Act, and the public trust doctrine. The parties are in the process of completing the administrative record, which will form the evidentiary basis at trial, which has not been set at this time.

Ecosystem Restoration – The main objective under the EcoRestore Program is the restoration of at least 30,000 acres of Delta habitat, with the near-term goal of making significant strides toward that objective by 2020. These restoration programs include projects and actions that comply with pre-existing regulatory requirements designed to improve the overall health of the Delta. Other priority restoration projects would also be identified by the Sacramento-San Joaquin Delta Conservancy and other agencies and local governments. Funding is provided through multiple sources, including various local and federal partners, state bonds, and other state-mandated funds. SWP/CVP contractors have provided funds as part of existing regulatory obligations imposed on the SWP and CVP.

Delta Science Initiatives – Metropolitan's Bay-Delta science program supports water supply reliability and ecosystem restoration by protecting the Bay-Delta environment, driving better management decisions, and fostering effective regulations. Metropolitan is conducting a science program to ensure that regulations effectively protect aquatic species while ensuring a reliable water supply. The key elements of the science program include: (1) staff with scientific expertise to design, manage and participate in scientific investigations addressing Metropolitan's priorities; (2) funding science studies through direct funding, collaborations, staff in-kind contributions, and by pursuing external grant funding sources to leverage Metropolitan's science investments; (3) collaborations with external organizations to conduct science studies, including the State Water Contractors, Collaborative Science and Adaptive Management Program (CSAMP), Interagency Ecological Program agencies, Delta Stewardship Council Delta Science Program, and university scientists; and (4) participation in the Bay-Delta science community through communication of science study findings, participation in science conferences and publishing results of scientific studies in peer reviewed journals.

Metropolitan's Bay-Delta science efforts focus on three priority areas of water operations to protect Delta fish, Delta stressors and habitat needs of listed fish species.

- Water Operations to Protect Delta Fish. A priority focus for the science program is to develop a better understanding of the effect of water project operations on the health, abundance, and distribution of listed fish species, including Delta smelt, longfin smelt and Chinook salmon. The science program includes investigation of the mechanisms behind flow-abundance relationships observed in analysis of fish survey data for Delta smelt and longfin smelt, factors that affect adult Delta smelt, salmon and steelhead entrainment risk at the CVP and SWP export facilities, potential bias in fish survey data, and development of effective methods to study Delta smelt without collecting or harming the fish.
- Delta Stressors. Multiple stressors in the Bay-Delta ecosystem affect the health, abundance, and distribution of listed fish species; however, we have limited understanding of the impacts of various stressors and their specific role in the decline of listed species. The science program includes investigation into key stressors to develop information that can support development of effective management actions. These studies include investigation into predation impacts on salmon, toxic contaminant effects on Delta smelt and juvenile salmon, and the effects of nutrients on the food web.
- Habitat Needs for Delta Fish. Compared to the historical Delta, the modern Delta is highly altered and has a small fraction of tidal marsh habitat remaining and greatly reduced levels of primary production. Food and habitat limitation have been identified as important stressors for listed species. The science program includes investigation of salmon habitat needs, pilot studies to enhance the food web, longfin smelt habitat studies, pilot projects to benefit Delta smelt, monitoring the effectiveness of habitat improvement actions, and evaluation of land use and habitat opportunities on Metropolitan's Delta Island properties.

SWP Terminal Storage

Metropolitan has contractual rights to 65 TAF of flexible storage at Lake Perris (East Branch terminal reservoir) and 154 TAF of flexible storage at Castaic Lake (West Branch terminal reservoir). This storage provides Metropolitan with additional options for managing SWP deliveries to maximize yield from the project. Over multiple dry years, it can provide Metropolitan with 44 TAF of additional supply. In a single dry year like 1977, it can provide up to 219 TAF of additional supply to Southern California.

Yuba Dry Year Water Purchase Program

In December 2007, Metropolitan entered into an agreement with DWR providing for Metropolitan's participation in the Yuba Dry Year Water Purchase Program between Yuba Water Agency and DWR. This program provides for transfers of water from the Yuba Water Agency during dry years through 2025.

Desert Water Agency/Coachella Valley WD SWP Table A Transfer

Under the transfer agreement, Metropolitan transferred 100 TAF of its SWP Table A contractual amount to Desert Water Agency/CVWD (DWCV). Under the terms of the agreement, DWCV pays all SWP charges for this water, including capital costs associated with capacity in the California Aqueduct to transport this water to Perris Reservoir, as well as the associated variable costs. The amount of water actually delivered in any given year depends on that year's SWP allocation. Water is delivered through the existing exchange agreements between Metropolitan and DWCV, under which Metropolitan delivers Colorado River supplies to DWVC equal to the SWP supplies delivered to Metropolitan. While Metropolitan transferred 100 TAF of its Table A amount, it retained other rights, including interruptible water service; its full carryover amounts in

San Luis Reservoir; its full use of flexible storage in Castaic and Perris Reservoirs; and any rate management credits associated with the 100 TAF.

Desert Water Agency/Coachella Valley WD Exchange and Advance Delivery Program

Under this program, Metropolitan delivers Colorado River water to the Desert Water Agency and CVWD in advance of the exchange for their SWP Contract Table A allocations. In addition to their Table A supplies, Desert Water Agency and CVWD may take delivery of other SWP supplies available to SWP Contractors. By delivering enough water in advance to cover Metropolitan's future exchange obligations, Metropolitan is able to receive Desert Water Agency and CVWD's available SWP supplies without having to deliver an equivalent amount of Colorado River water. This program allows Metropolitan to maximize delivery of SWP water in wet years by enabling delivery of Colorado River supplies to storage in the Advance Delivery Program instead of to the service area. These Table A deliveries are incorporated into the estimate of SWP Deliveries under Current Programs shown in Table 3-2.

Desert Water Agency/Coachella Valley WD Other SWP Deliveries

Since 2008, Metropolitan has provided Desert Water Agency and CVWD written consent to take delivery of non-SWP supplies separately acquired by each agency from the SWP facilities. These deliveries include water acquired from the Yuba Dry Year Water Purchase Program, the Multi-Year Water Pool, the 2009 Drought Water Bank, and long-term water supplies purchased by CVWD from Rosedale Rio-Bravo Water Storage District. Metropolitan has also consented to:

- 10 TAF of exchange deliveries to CVWD for non-SWP water acquired from the San Joaquin Valley from 2008 through 2010,
- 36 TAF of exchange deliveries to Desert Water Agency for non-SWP water acquired from the San Joaquin Valley from 2008 through 2015, and
- 16.5 TAF of exchange deliveries to CVWD from groundwater storage of Kern River flood flows or SWP water delivered from Kern County Water Agency provided by Rosedale Rio Bravo Water Storage District from 2012 through 2035.

Effective in 2020, Metropolitan, Desert Water Agency and CVWD executed an amendment to the Advance Delivery Program and exchange of water. Among its provisions is the termination of Metropolitan's right to an annual option to call-back the 100,000 acre-feet Table A transfer. It also provides that Metropolitan will deliver Article 21 and non-SWP water supplies for Desert and CVWD to the extent that Metropolitan has available capacity. This agreement also includes an additional exchange of 15 TAF per year from 2020 to 2026. However, as the source of the exchange is water CVWD can call from the ID/MWD Conservation Program, which is Colorado River water, this exchange is discussed in more detail in the IID/MWD Conservation Program section.

Table 3-2 summarizes Metropolitan's SWP supply range for 2035. Appendix 3 provides a detailed discussion of the current SWP programs and programs that are under development.

Table 3-2
California Aqueduct
Program Capabilities
Year 2035
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
MWD Table A [1]	499,000	122,000	1,108,000
DWCV Table A	51,000	12,000	113,000
San Luis Carryover [2]	57,000	283,000	283,000
Article 21 Supplies	0	0	20,000
Yuba River Accord Purchase	0	0	0
Subtotal of Current Programs	***607,000***	***417,000***	***1,524,000***
Programs Under Development			
Subtotal of Proposed Programs	***0***	***0***	***0***
Maximum Supply Capability	**607,000**	**417,000**	**1,524,000**

[1] Includes Port Hueneme lease.
[2] Includes DWCV carryover.

SWP Water Quality

Metropolitan requires a safe drinking water supply from the Bay-Delta to meet current and future regulatory requirements for public health protection. Finding cost-effective ways to reduce total organic carbon (TOC), bromide concentrations, pathogenic microbes, and other unknown contaminants from the Bay-Delta water supply is one of Metropolitan's top priorities. Metropolitan also requires a SWP supply that is consistently low in salinity - Total Dissolved Solids (TDS) - so it can blend SWP water with higher-salinity Colorado River water to achieve salinity goals for its member agencies. In addition, Metropolitan needs consistently low-salinity SWP water to increase in-basin water recycling and groundwater management programs. These programs require that blended water supplied to the member agencies meets the TDS goal adopted by Metropolitan's Board, which specifies a salinity objective of 500 mg/L for blended imported water.

Metropolitan is actively involved in DWR's Municipal Water Quality Investigations (MWQI) Program. The highly variable quality of SWP water influences the operation of Metropolitan's system and its water treatment process. Increasingly restrictive State and Federal drinking water standards, concerns over emerging contaminants such as personal care products and pharmaceuticals, algal taste and odors, and Delta ecosystem fisheries issues are critical variables. DWR's MWQI Program strives to monitor, protect, and improve drinking water quality of Delta water deliveries to the urban State Water Contractors and other users of Delta water. The program focuses on issues related to drinking water quality through regular water quality monitoring, special field and laboratory studies, the use of forecasting tools such as computer models and data management systems, and reporting. While the program has developed extensive monitoring in the Delta including real-time monitoring, increased monitoring along the California Aqueduct is the next major step.

Levee modifications at Franks Tract and other source control actions may significantly reduce ocean salinity concentrations in Delta water, which would benefit Delta water users and export interests alike. Franks Tract is an island located in the central Delta that was actively farmed until levee breaches in 1936 and 1938. Since 1938, the tract has remained a flooded island, and its levees remain in disrepair. Tidal flows in the Delta entrap saline ocean water in the flooded tract, resulting in degraded water quality for both in-Delta and export users. Computer modeling analyses by Metropolitan, DWR, and the US Geological Survey indicate that reducing this salinity intrusion by partially closing existing levee breach openings and/or building radial gate flow control structures will significantly reduce TDS and bromide [2] concentrations in water from the Delta during the summer and fall months and in drought years.

In 2016, the California Department of Fish and Wildlife (CDFW), as part of the 2016 Delta Smelt Resiliency Strategy, began a process of working with the local community, local agencies, and interested stakeholders in developing a habitat enhancement plan for Franks Tract called the Franks Tract Restoration Feasibility Study. The objective was to assess the feasibility of restoring components of the historic tidal marsh form and function to create habitat suitable for Delta Smelt, reduce the extent of aquatic weeds, decrease predation on Delta Smelt and other native fishes by lowering habitat suitability for non-native species, modify hydrology to something more similar to historical conditions, improve food webs, and improve water quality in the interior Delta, which would benefit both in-Delta diverters and SWP and CVP supplies. In its current state of shallow open water, Franks Tract facilitates salinity intrusion into the mid-Delta as a result of tidal pumping through False River. Restoration designs focus on minimizing tidal pumping from False River. In 2018, CDFW determined that it is feasible to achieve the project objectives. In response to community concerns, in July 2019, CDFW, in cooperation with the Department of Parks and Recreation, launched a second round of planning that lasted from August 2019 through September 2020. Stakeholders, advisors, and the public chose the Central Landmass as the preferred design concept as documented in the Franks Tract Futures 2020 Reimagined report published in September 2020.

The state has adopted an "equivalent level of public health protection" (ELPH) program that targets water quality actions outside the Delta. The Bay-Delta Program is coordinating a feasibility study on water quality improvement in the California Aqueduct.

Metropolitan and the Friant Water Users Authority (FWUA) have entered into a partnership to investigate the potential of enhancing the quantity and affordability of the eastern San Joaquin Valley's water supply while improving Southern California's water quality. The FWUA and Metropolitan studied projects that benefited both regions. Using Proposition 13 funds, an existing canal belonging to the Arvin-Edison Water Storage District was enlarged, enabling greater volumes of water to be exchanged between their groundwater and the California Aqueduct.

SWP System Outage and Capacity Constraints

The California Aqueduct is experiencing reduction in flow capacity in certain areas due to ongoing land subsidence. Subsidence has been observed in the San Joaquin Valley since the 1920s, and subsidence was included in the planning and design of the California Aqueduct. The DWR published a detailed study in 2017 describing the impacts of subsidence in the reduction of concrete liner freeboard and the ability to store water in certain pools, reducing operational flexibility and increasing power costs. Through 2016, no contracted deliveries had been curtailed due to subsidence, but DWR has a subsidence program aimed to proposed improvements to the California Aqueduct and restore capacity, as well as work with the Groundwater

[2] The importance of managing bromides is discussed in the Water Quality chapter.

Sustainability Agencies that cover the extension of the California Aqueduct to minimize future subsidence.

In 2015, Metropolitan, DWR, and the Los Angeles Department of Water and Power formed the Seismic Resilience Water Supply Task Force (SRWSTF). The goal of the SRWSTF is to collaborate on studies and mitigation measures aimed at improving the reliability of imported water supplies to Southern California. The SRWSTF aims to identify options to accelerate initial repairs acting as one agency and establish consensus on regional priorities for aqueduct repairs.

Because of the risk of a prolonged shutdown of the SWP caused by seismic or hydrologic events either within the Delta or along the California Aqueduct, Metropolitan has acted to ensure that Southern California has adequate emergency storage. Diamond Valley Lake (DVL) and SWP terminal reservoir storage, combined with member-agency emergency storage, are jointly capable of providing the region with a six-month supply of water if combined with a temporary 25 percent reduction in demand. Metropolitan engineering studies indicate this would provide sufficient time to repair the SWP and resume delivery.

Following the February 2017 Oroville spillways incident, DWR initiated a Comprehensive Needs Assessment (CNA). The CNA is led by DWR and technically reviewed by an Independent Review Board (IRB) composed of dam safety experts. The CNA is not investigating the causes of the February 2017 incident, but rather aims to identify actions to be taken by DWR to improve the resilience of the Oroville Dam complex. The report was released in November 2020 with a determination that Oroville is safe to operate, and no urgent repairs are needed. Several risk-reduction projects are currently being implemented and more projects are anticipated into the near future.

DWR is also investing to reduce seismic and hydrologic risk of aging SWP infrastructure critical in Southern California. A major retrofit to Perris Dam (Riverside County) was completed in April 2018, and other two major projects to improve seismic stability are currently under development with planned construction to start in a few years. Pyramid Dam and Castaic Dam (Los Angeles County) are also being studied with the planned assessment work estimated to be completed by 2022 and complete modernization work to take about 10 years to complete.

Achievements to Date

SWP Reliability

Metropolitan's Long-Term Action Plan

Besides the short- and mid-term actions described earlier in Section 1.4, Metropolitan's adopted Delta action plan in June 2007 includes a long-term Delta Plan. The long-term action plan recognizes the need for a global, comprehensive approach to the fundamental issues and conflicts in the Delta to result in a truly sustainable Delta. A piecemeal approach cannot satisfy the many stakeholders that have an interest in the Delta and will fail; there must be a holistic approach that deals with all issues simultaneously. In dealing with the basic issues of the Delta, solutions must address the physical changes required, as well as the financing and governance. There are three basic elements that must be addressed: Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development. In addition, the state needs to establish governance structures and financing approaches to implement and manage the three identified elements.

Governor's Delta Vision Process

Through this enduring Delta crisis, the Legislature and the Governor initiated in 2006 a process to develop a new long-term vision for the Delta. SB 1574 (Kuehl/2006) required a cabinet committee to present recommendations for a Delta strategic vision. The governor created a Delta Vision Blue-Ribbon Task Force to advise the Cabinet Committee. The Task Force produced an October 2008 Strategic Plan, which the Cabinet Committee largely adopted and submitted, with its recommendations, to the Legislature on January 3, 2009. Metropolitan, as a stakeholder in the process, provided input to the Task Force.

The 2009 Delta Legislation

After delivery of the Delta Vision recommendations, the Legislature held informational hearings from Delta experts, Task Force members, and the Schwarzenegger Administration, as well as the public at large, and engaged in vigorous water policy discussions. Following the informational hearings, several legislators began developing detailed legislation which culminated in pre-print proposals being issued in early August of 2009 for public review and discussion over the summer recess. The Assembly Water, Parks and Wildlife Committee and the Senate Natural Resources and Water Committee then held joint informational hearings on the pre-print proposals and received extensive public comment. Thereafter, legislative leadership appointed a conference committee, which convened and held additional public hearings, with further legislator discussions on key issues. That work continued into the 7th Extraordinary Session, which was called by the governor specifically to address the pending Delta and water issues, and culminated in the signing of a historic package of bills. One of the keystones of that package was SB X7-1, which reformed Delta policy and governance. Specifically, SB X7-1:

- Established a new legal framework for Delta management, emphasizing the coequal goals of "providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem" as foundation for state decisions as to Delta management.
- Reconstituted and redefined the role of the Delta Protection Commission (DPC) to narrow membership to focus on local representation and to expand the DPC's role in economic sustainability.
- Created a new Sacramento-San Joaquin Delta Conservancy (Conservancy) to support efforts that advance environmental protection and the economic well-being of Delta residents.
- Created the Delta Stewardship Council (Council) as an independent state agency to guide actions in the Delta which furthers the coequal goals of Delta restoration and water supply reliability.
- Repealed the CALFED Bay-Delta Authority Act and transfers existing staff, contracts, etc. to the Council.
- Created the Delta Independent Science Board (Science Board) and Delta Science Program.
- Required the State Water Resources Control Board (SWRCB) to develop by August 12, 2010, new flow criteria for the Delta ecosystem necessary to protect public trust resources.
- Required the Department of Fish and Game (DFG), now the Department of Fish and Wildlife (DFW), by December 31, 2010, to develop and recommend to the SWRCB flow criteria and quantifiable biological objectives for aquatic and terrestrial species.
- Created a Delta Watermaster as the enforcement officer for the SWRCB Division of Water Rights in the Delta.
- Required the Council to develop, adopt, and commence implementation of the "Delta Plan" by January 1, 2012, with a report to the Legislature by March 31, 2012.

- Required the DPC to develop a proposal to protect, enhance, and sustain the unique cultural, historical, recreational, agricultural, and economic values of the Delta as an evolving place.
- Required the Delta Plan to further the coequal goals of Delta ecosystem restoration and a reliable water supply.
- Required the Delta Plan to promote statewide water conservation, water use efficiency, and sustainable use of water, as well as improvements to water conveyance/storage and operation of both to achieve the coequal goals.
- Required the Delta Plan to attempt to reduce risks to people, property, and state interests in the Delta by promoting effective emergency preparedness, appropriate land uses, and strategic levee investments.
- Announced a statewide policy to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.
- Required the Council to include the Bay Delta Conservation Plan (BDCP) in the Delta Plan and made the BDCP eligible for state funding if:
  - The BDCP complies with Natural Community Conservation Planning Act (NCCPA) and is approved as a Habitat Conservation Plan under the Federal ESA.
  - The BDCP complies with the California Environmental Quality Act and includes a full range of alternatives, including a reasonable range of flow criteria, rates of diversion, and other operational criteria.
  - DWR consults with the Council and Science Board during development of the BDCP.
  - DFW approves the BDCP as a Natural Community Conservation Plan and determines that it meets the requirements for incorporation into the Delta Plan.

SWP Water Quality

The most significant achievement for SWP water quality has been continued definition and advancement of the Delta Improvement Package. Most notably, the Franks Tract studies identified cost-effective ways to achieve significant improvements in the quality of Delta export water.

SWP System Reliability

The completion and filling of DVL marked the most important achievement with respect to protecting Southern California against an SWP system outage. Water deliveries to the reservoir commenced in November 1999, and the lake was filled by early 2003. The lake can hold up to 810 TAF which provides Southern California with emergency water supply, as well as carryover and regulatory storage. As of December 2020, the DVL storage is at 704 TAF.

<u>Inland Feeder</u>

The Inland Feeder is a 44-mile-long conveyance system that connects the SWP to DVL and the CRA. The Inland Feeder provides greater flexibility in managing Metropolitan's major water supplies and allows greater amounts of SWP water to be accepted during wet seasons for storage in DVL. In addition, the Inland Feeder increases the conveyance capacity from the East Branch of the SWP by up to 1,000 cubic feet per second, allowing the East Branch to operate up to its full capacity. The project also improves the quality of the Southland's drinking water by allowing more uniform blending of lower salinity water from the SWP with Colorado River supplies, which have a higher mineral content. Construction of the Inland Feeder was completed in September 2009.

Inland Feeder-Lakeview Pipeline Intertie

The Inland Feeder-Lakeview Pipeline Intertie connects the two conveyance pipelines at the PC-1 control structure on the Inland Feeder. The project allows for delivery of water from Diamond Valley Lake to the Mills Water Treatment Plant. Completed in 2016, the project was a direct response to the extreme drought period in 2014, which saw a 5 percent allocation of Metropolitan's SWP supplies. The intertie enables the Mills Plant to withstand an extended interruption of supplies from the California Aqueduct East Branch. The intertie also provides delivery flexibility to handle any required repairs by DWR to the Santa Ana Valley Pipeline north segment.

3.3 Central Valley/State Water Project Storage and Transfer Programs

Metropolitan endeavors to increase the reliability of supplies received from the California Aqueduct by developing flexible SWP storage and transfer programs. Over the years, Metropolitan has developed numerous voluntary SWP storage and transfer programs to secure additional dry-year water supplies.

Background

Metropolitan has a long history of managing the wide fluctuations of SWP supplies from year to year by forming partnerships with Central Valley agricultural districts along the California Aqueduct, as well as with other Southern California SWP Contractors. These partnerships allow Metropolitan to store its SWP supplies during wetter years for return in future drier years. Some programs also allow Metropolitan to purchase water in drier years for delivery via the California Aqueduct to Metropolitan's service area.

Because yields from individual programs can vary widely depending on hydrologic conditions and CVP/SWP operations, the dry-year yields for the various programs reported in this section are expected values only. In any given year, actual yields could depart from the expected values. Despite that uncertainty, Metropolitan's models of these programs indicate that in the aggregate, they can meet the resource target under a wide range of hydrologic conditions and CVP/SWP operations.

In addition, the SWP storage and transfer programs have served to demonstrate the value of partnering, and, increasingly, Central Valley agricultural interests see partnering with Metropolitan as a sensible business practice beneficial to their local district and regional economy.

Implementation Approach

Metropolitan is currently operating several SWP storage programs that serve to increase the reliability of supplies delivered through the California Aqueduct. Metropolitan pursues SWP water transfers on an as-needed basis. Table 3-3 lists the expected yields from these storage and transfer programs. Figure 3-3 shows the location of Metropolitan's statewide groundwater banking programs.

Storage and Transfer Programs

Semitropic Storage Program

Metropolitan has a groundwater storage program with Semitropic Water Storage District located in the southern part of the San Joaquin Valley. The maximum storage capacity of the program is 350 TAF. The specific amount of water Metropolitan can store in and subsequently expect to receive from the program depends upon hydrologic conditions, any regulatory requirements restricting Metropolitan's ability to export water for storage, and the demands placed on the Semitropic Program by other program participants. In 2014, Metropolitan amended the program to increase the return yield by an additional 13.2 TAF per year. The minimum annual yield available to Metropolitan from the program is currently 34.7 TAF, and the maximum annual yield is 236.2 TAF, depending on the available unused capacity and the SWP allocation. During wet years, Metropolitan has the discretion to use the program to store portions of its SWP water that are in excess of the amounts needed to meet Metropolitan's service area demand. In Semitropic, the water is delivered to district farmers who use the water in lieu of pumping groundwater. During dry years, the district returns Metropolitan's previously stored water to Metropolitan by direct groundwater pump-in return and the exchange of SWP supplies.

Arvin-Edison Storage Program

Metropolitan amended the groundwater storage program with Arvin-Edison Water Storage District in 2008 to include the South Canal Improvement Project. The project increases the reliability of Arvin-Edison returning higher water quality to the California Aqueduct. In addition, Metropolitan and Arvin-Edison often enter into annual operational agreements to optimize program operations in any given year. The program storage capacity is 350 TAF. The specific amount of water Metropolitan can expect to store in and subsequently receive from the program depends upon hydrologic conditions and any regulatory requirements restricting Metropolitan's ability to export water for storage. The storage program is estimated to deliver 75 TAF. During wet years, Metropolitan has the discretion to use the program to store portions of its SWP supplies which are in excess of the amounts needed to meet Metropolitan's service area demand. The water can be either directly recharged into the groundwater basin or delivered to district farmers who use the water in lieu of pumping groundwater. During dry years, the district returns Metropolitan's previously stored water to Metropolitan by direct groundwater pump-in return or by exchange of surface water supplies. In 2015, Metropolitan funded the installation of three new wells at a cost of $3 million that will restore the return reliability by 2.5 TAF per year. The funding will ultimately be recovered through credits against future program costs. As a result of recent detection of 1,2,3-trichloropropane in Arvin-Edison wells, Metropolitan has temporarily suspended operation of the program until the water quality concerns can be further evaluated and managed.

Table 3-3 summarizes Metropolitan's Central Valley/SWP transfer programs supply range for 2035. The supply capabilities shown reflect actual storage program conveyance constraints. In addition, SWP supplies are estimated using DWR's 2019 SWP Delivery Capability Report released in August 2019. Appendix 3 provides a detailed discussion of the current Central Valley and SWP storage and transfers programs and programs that are under development.

Table 3-3
Central Valley/State Water Project Storage and Transfer Programs
Supply Projection
Year 2035
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
San Gabriel Valley MWD Exchange and Purchase	2,000	2,000	2,000
Central Valley Storage and Transfers			
Semitropic Program	50,000	45,000	68,000
Arvin Edison Program[1]	0	0	0
Mojave Storage Program	0	0	0
Antelope Valley/East Kern Acquisition and Storage	43,000	70,000	70,000
Kern Delta Program	42,000	50,000	50,000
Transfers and Exchanges	50,000	50,000	50,000
Subtotal of Current Programs	***187,000***	***217,000***	***240,000***
Programs Under Development			
San Bernardino Valley Water District Program	0	0	13,000
Subtotal of Proposed Programs	***0***	***0***	***13,000***
Maximum Supply Capability	**187,000**	**217,000**	**253,000**

[1] Take and put amounts limited due to water quality considerations.

San Bernardino Valley MWD Transfer Program

The San Bernardino Valley MWD Transfer Program allows for the purchase of a portion of San Bernardino Valley MWD's SWP supply under surplus conditions. Each calendar year, a determination will be made on how much surplus supplies are available, and Metropolitan will then decide how much will be purchased. The agreement term is until December 31, 2035 and can be extended with a State Water Contract extension.

San Gabriel Valley MWD Exchange Program

The San Gabriel Valley MWD program allows for the exchange of up to 5 TAF each year. For each acre-foot Metropolitan delivers to the City of Sierra Madre, a San Gabriel Valley MWD member agency, San Gabriel Valley MWD provides two acre-feet to Metropolitan in the Main San Gabriel Basin, up to 5 TAF. The program provides increased reliability to Metropolitan by allowing additional water to be delivered to Metropolitan's member agencies Three Valleys MWD and Upper San Gabriel Valley MWD.

Antelope Valley-East Kern Water Agency Exchange and Storage Program

The Antelope Valley-East Kern Water Agency (AVEK) exchange and storage program provides Metropolitan with additional supplies and increased reliability. Under the exchange program, for every two acre-feet Metropolitan receives, Metropolitan returns one acre-foot to AVEK to improve its reliability. The exchange program is expected to deliver 30 TAF over ten years, with 10 TAF available in dry years. Under the program, Metropolitan will also be able to store up to 30 TAF in the AVEK's groundwater basin, with a dry year return capability of 10 TAF.

High Desert Water Bank Program

In December 2019, Metropolitan entered into an agreement with AVEK for the High Desert Water Bank Program to improve water supply reliability during dry years or emergencies and provide greater operational flexibility to balance supplies and demands. Under the Program, Metropolitan will have the ability to store up to 280 TAF of its SWP Table A or other supplies in the Antelope Valley groundwater basin. Metropolitan will provide up to $131 million for the construction of monitoring and production wells, turnouts from the California Aqueduct, underground and aboveground pipelines, recharge basins, water storage, and booster pump facilities. Metropolitan will have first priority to 70 TAF per year of both put and take capacity. The project is anticipated to be in operation by 2024.

Kern-Delta Water District Storage Program

This groundwater storage program has 250 TAF of storage capacity. The program is capable of providing up to 50 TAF of dry-year supply. In 2015, Metropolitan agreed to fund the cross-river pipeline that, when completed, will help improve Metropolitan's return reliability by reducing losses during exchanges. Metropolitan has not incurred any cost to date, as the pipeline has not been constructed. Environmental and regulatory issues have delayed implementation of the pipeline. Water for storage can be either directly recharged into the groundwater basin or delivered to district farmers who use the water in lieu of pumping groundwater. During dry years, the district returns Metropolitan's previously stored water to Metropolitan by direct groundwater pump-in return or by exchange of surface water supplies.

Mojave Storage Program

Metropolitan entered into a groundwater banking and exchange transfer agreement with Mojave Water Agency on October 29, 2003. This agreement was amended in 2011 to extend the term of the program through 2035 and to allow for the cumulative storage of up to 390 TAF. The agreement allows for Metropolitan to store water in an exchange account for later return. Through 2021, Metropolitan can annually withdraw the Mojave Water Agency's SWP contractual amounts in excess of 10%. After 2021, the withdraw rate lowers, reserving 20% of Mojave Water Agency's SWP contractual amounts. Under a 100% allocation, the State Water Contract provides Mojave Water Agency 82.8 TAF of water.

Presently, the Mojave Water Agency is not accepting additional water from Metropolitan. As of January 2021, Metropolitan has approximately 19 TAF remaining in storage. Without additional deliveries to the exchange account, the program may not be able to provide return supplies beyond 2025.

Central Valley Transfer Programs

Metropolitan secures Central Valley water transfer supplies via spot markets and option contracts to meet its service area demands when necessary. Hydrologic and market conditions, and regulatory measures governing Delta pumping plant operations, will determine the amount of water transfer activity occurring in any year. Transfer market activity, described below, provides examples of how Metropolitan has secured water transfer supplies as a resource to fill anticipated supply shortfalls needed to meet Metropolitan's service area demands.

In 2003, Metropolitan secured options to purchase approximately 145 TAF of water from willing sellers in the Sacramento Valley during the irrigation season. These options protected against potential shortages of up to 650 TAF within Metropolitan's service area that might have arisen from a decrease in Colorado River supply or as a result of drier-than-expected hydrologic conditions. Using these options, Metropolitan purchased approximately 125 TAF of water for delivery to the California Aqueduct.

In 2005, Metropolitan, in partnership with seven other State Water Contractors, secured options to purchase approximately 130 TAF of water from willing sellers in the Sacramento Valley, of which Metropolitan's share was 113 TAF. Metropolitan also had the right to assume the options of the other State Water Contractors if they chose not to purchase the transfer water. Due to improved hydrologic conditions, Metropolitan and the other State Water Contractors did not exercise these options.

In 2008, Metropolitan, in partnership with seven other State Water Contractors, secured approximately 40 TAF of water from willing sellers in the Sacramento Valley, of which Metropolitan's share was approximately 27 TAF.

In 2009, Metropolitan, in partnership with 8 other buyers and 21 sellers, participated in a statewide Drought Water Bank, which secured approximately 74 TAF, of which Metropolitan's share was approximately 37 TAF.

In 2010, Metropolitan, in partnership with three other State Water Contractors, secured approximately 100 TAF of water from willing sellers in the Sacramento Valley, of which Metropolitan's share was approximately 88 TAF. Metropolitan also purchased approximately 18 TAF of water from Central Valley Project Contractors located in the San Joaquin Valley. In addition, Metropolitan entered into an unbalanced exchange agreement that resulted in Metropolitan receiving approximately 37 TAF.

In 2015, Metropolitan, in partnership with eight other State Water Contractors, secured approximately 20 TAF of water from willing sellers in the Sacramento Valley, of which Metropolitan's share was approximately 13 TAF.

In addition, Metropolitan has secured water transfer supplies under the Yuba Accord, which is a long-term transfer agreement. To date, Metropolitan has purchased approximately 200 TAF.

Finally, Metropolitan has secured water transfer supplies under the Multi-Year Water Pool Demonstration Program. In 2013, 2015, and 2016 Metropolitan secured 30 TAF, 1.3 TAF, and 7 TAF respectively.

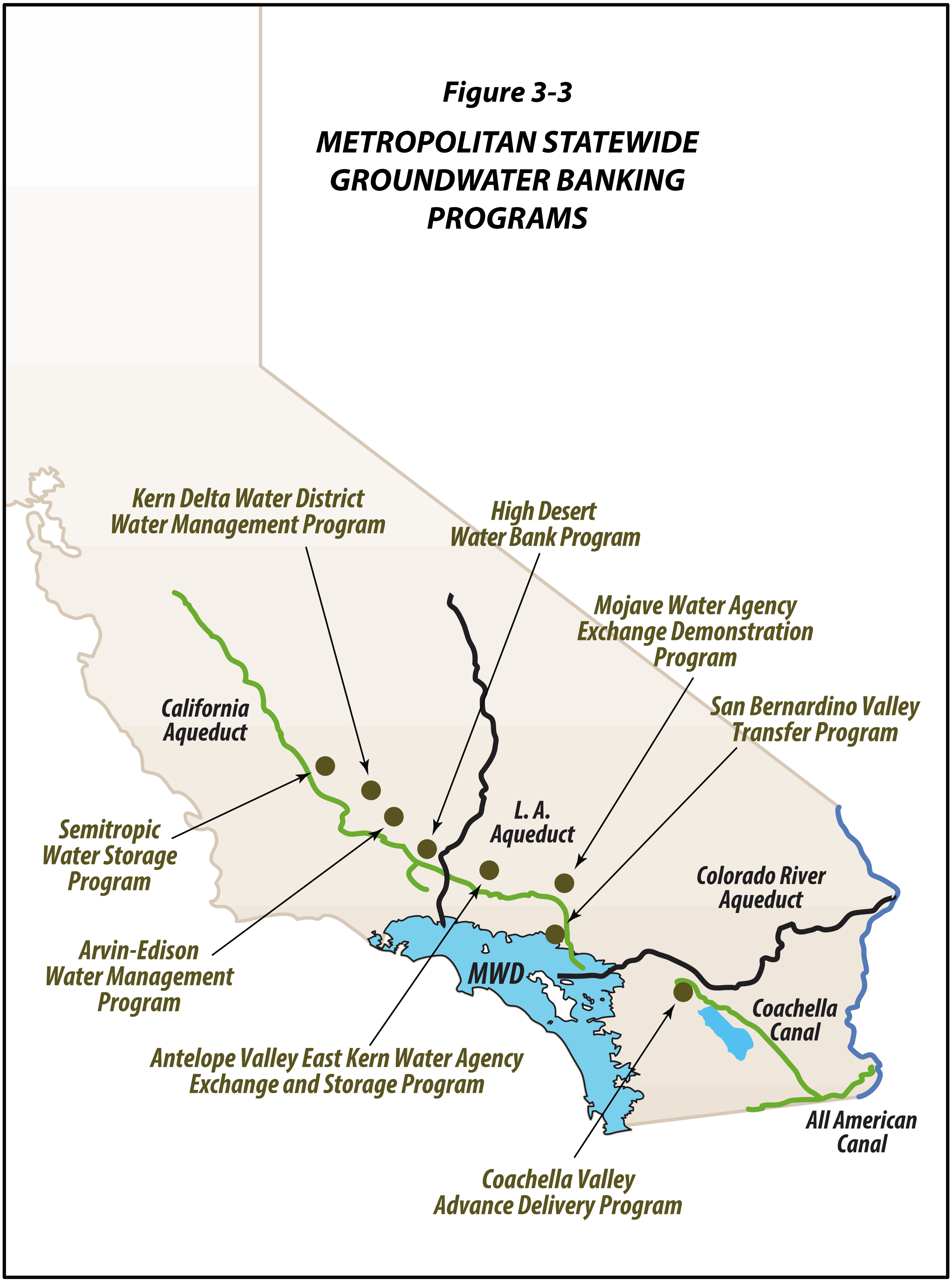
Metropolitan's recent water transfer activities demonstrate Metropolitan's ability to develop and negotiate water transfer agreements either working directly with the agricultural districts who are selling the water or through a statewide Drought Water Bank. Because of the complexity of cross-Delta transfers and the need to optimize the use of both CVP and SWP facilities, DWR and USBR are critical players in the water transfer process, especially when shortage conditions increase the general level of demand for transfers and amplify ecosystem and water quality issues associated with through-Delta conveyance of water. Therefore, Metropolitan views state and federal cooperation to facilitate voluntary, market-based exchanges and sales of water as a critical component of its overall water transfer strategy.

Achievements to Date

Metropolitan has made rapid progress to date developing SWP storage and transfer programs. Most notably, Metropolitan has utilized approximately 122 TAF to supplement its SWP supplies during the recent 2016-2020 period. Of this total, approximately 90 TAF are from SWP storage program extractions in Semitropic, Arvin, Kern Delta, and Mojave; 13 TAF are from the San Gabriel Valley MWD program; and 19 TAF of SWP transfer supplies were purchased from the Yuba water purchase programs.

Figure 3-3

METROPOLITAN STATEWIDE GROUNDWATER BANKING PROGRAMS



3.4 Demand Management and Conservation

Demand management through conservation is a core element of Metropolitan's long-term water management strategy. Metropolitan continues to build on a 30-year investment in conservation of more than $823 million, reflecting a long-term commitment to water conservation. Among other measures, this investment has resulted in the replacement of more than 3.8 million toilets with more water efficient models, rebates of more than 620,000 high-efficiency clothes washers (HECWs), and removal of approximately 195 million square-feet of grass from both commercial and residential properties. Collectively, Metropolitan's conservation programs and other conservation in the region will reduce Southern California's reliance on delivery of imported water by almost 1.2 MAF per year by 2030.

Metropolitan's continued approach to conservation has put its service area on target to achieve California's 20x2020 Water Conservation Plan per capita goal of less than 145 gallons per capita per day (GPCD). Continuous conservation messaging, along with active conservation programs, have contributed to Metropolitan maintaining its water demand to sustainable levels, while also meeting its regional target.

Background

Metropolitan's conservation policies and programs are designed to maintain a sustainable water demand level and meet the conservation savings target adopted in the IRP. These policies and programs directly relate to the demand management measures for wholesale water agencies in the Urban Water Management Planning Act.

Water conservation savings result from active, code-based, and price-effect conservation efforts. Active conservation consists of water-agency funded programs such as rebates and incentives for water efficient fixtures and equipment and turf removal. Code-based and price-based conservation consists of demand reductions attributable to conservation-oriented plumbing codes and usage reductions resulting from increases in the price of water. Metropolitan does not currently assign a savings value for public awareness campaigns and conservation education because any initial effect on demand reduction and the longevity of the effect are difficult to measure. It is generally accepted that these outreach programs prompt consumers to install water saving fixtures and change water-use behavior, thereby creating a residual benefit of increasing the effectiveness of complementary conservation programs.

Distinguishing between active, code-based, and price-effect conservation can be analytically complex when, for example, active programs for fixtures are concurrent with conservation-related plumbing codes. Metropolitan uses specially designed estimating models to quantify and project conservation savings. This plan combines active, code-based, and price-effect conservation savings using methods that avoid double counting.

Conservation savings are commonly estimated from a base-year water-use profile. Metropolitan uses 1980 as the base year because it marked the effective date of a new plumbing code in California requiring toilets in new construction to be rated at 3.5 gallons per flush or less. Between 1980 and 1990, the region saved an estimated 250 TAF per year as the result of this 1980 plumbing code and unrelated water rate increases. These savings are referred to as "pre-1990 savings." Metropolitan's resource planning target combines pre-1990 savings and estimates of more recently achieved savings.

Including regional pre-1990 conservation savings, Metropolitan anticipates savings of 1.19 MAF by 2030. A large share of the savings has already been achieved through existing Metropolitan and member agency programs, pre-1990 savings, price-effects, and continued savings that accrue from plumbing codes. The remainder is expected to be achieved through additional agency-sponsored active conservation programs, code changes, and price-effects.

Implementation Approach

Metropolitan's approach to achieving the conservation target depends on implementing a suite of demand management measures, including public education and outreach, a variety of conservation programs, metering, research and development, and asset management. These programs include cost-effective active conservation programs and new, innovative programs that address regional water uses. Metropolitan also provides support to member agencies for local programs that assist with implementing local conservation programs while reducing per capita water use. Metropolitan continues to seek state and federal grant funding for conservation in coordination with its member agencies.

As the California Urban Water Conservation Council (CUWCC) disbanded, Metropolitan worked with other California water agencies to form the California Water Efficiency Partnership (CALWEP). CALWEP's mission is to maximize urban water efficiency and conservation throughout California by supporting and integrating innovative technologies and practices; encouraging effective public policies; advancing research, training, and public education; and building collaborative approaches and partnerships. Metropolitan is an active participant on the CALWEP Board, the Program Committee, and Research Committee.

Metropolitan also participates in national water efficiency efforts. Metropolitan is a USEPA WaterSense partner, helping to promote water efficient products and practices in Southern California. Metropolitan is also a member of the Alliance for Water Efficiency, participating on its Board and in the committees on research, WaterSense and water efficient products, and education and outreach.

The following sections describe Metropolitan's demand management measures and conservation programs, including education and outreach.

Public Education and Outreach

Since 1983, Metropolitan's Education Unit has provided award-winning water education programs, supplemental materials, teacher in-services and classroom presentations for K-12 teachers and students in Southern California. Since that time, materials and outreach programs have expanded to the pre-K and college education levels. In 2015, Metropolitan implemented an education strategic plan which sought to:

1. Expand working programs
2. Develop an "Educational Pipeline" to jobs in the water industry
3. Leverage collaborations
4. Invest in educational technology

These initiatives, as well as Metropolitan's curricula and materials, have impacted a generation of students, expanded their understanding of California's water supply and distribution systems, water sources, water use and conservation, the science of water, public policies, and the importance and responsibility of stewardship. All Metropolitan programs correlate to California Content Standards including Common Core and Next Generation Science Standards (NGSS). These programs are continually evaluated for effectiveness and improved upon. Metropolitan's most recent online education programs are summarized in Table 3-4.

Public Education Programs

Metropolitan has continued to update and expand its comprehensive K-12 water education curriculum that meets all California education standards for each grade level in the areas of science, math, language arts and social studies classroom materials. Metropolitan worked with its member agencies to annually hold more than 700 outreach events which directly interact with more than 170,000 students, teachers, parents, and participants through its water education programs, curricular materials, and engagements. More than 12,000 public visitors and students annually tour the Diamond Valley Lake Visitor Center to learn more about Metropolitan's water systems and programs. These efforts led to Metropolitan's Education Unit being awarded the 2015 Governor's Environmental and Economic Leadership Award (GEELA), California's highest environmental honor.

In 2015, Metropolitan redesigned its museum-quality exhibit at the Vista del Lago visitor's center at Pyramid Lake, part of the State Water Project.

Throughout 2016, Metropolitan worked to develop virtual reality tours of the Colorado River Aqueduct and augmented reality watershed exhibits to encourage students to think critically about water issues in Southern California. This work led to a collaboration with the Department of Water Resources to create a virtual reality tour of the State Water Project which received first-place recognition from the National Association of Government Communicators.

In 2017, Solar Cup, the nation's largest high school solar boat race, celebrated its 15-year anniversary. This program engages 40 teams and more than 750 high school students annually in STEAM (science, technology, engineering, art and math) topics associated with water stewardship and renewable energy.

In 2018, Metropolitan's "Water is Life" Student Art Exhibit and Calendar celebrated its 30-year anniversary. This program annually compiles more than 12,000 pieces of art generated by K-12 students throughout Metropolitan's service area.

In 2019, Metropolitan's World Water College Grant Program increased solicited proposals from $10,000 to $20,000 grants to conduct research and development on improving water quality, environmental science of watersheds, and the implementation of water-use efficiency technologies. Since 2004, Metropolitan's World Water College Grant Program has disbursed approximately $800,000 in grants to 26 colleges, benefitting more than 800 students.

Outreach

Since late 2013, the primary focus of Metropolitan's conservation and education outreach programs has been on the drought response and the need for additional conservation in order to maintain the region's water supply reserves. That message has evolved to emphasize conservation and stewardship as a sustainable way of life, rather than only a response to dry conditions.

Each year, Metropolitan implements a variety of conservation and education outreach programs. The "Let's All Take a Turn" campaign launched July 1, 2015 and continued in 2016, but added additional messaging around a new trademarked logo of H2Love, and the tagline, "Love Water. Save Water." This message emphasized the value of water conservation not only during the drought, but every day. Working with Metropolitan's 26 member agencies, the research-based advertising campaign includes several months of media coverage through radio live reads, 53 community newspapers, digital and online advertising, other customized materials and special outreach events throughout Southern California. The entire campaign was produced in five languages: English, Spanish, Mandarin, Korean, and Vietnamese, and Print advertising included Tagalog language materials.

The campaign's design was informed by extensive research through focus groups, telephone interviews, and web surveys conducted in two languages throughout Metropolitan's service area. The media strategy was developed to effectively target the diverse communities, age groups, socioeconomic factors, and languages spoken in the region. The "Let's All Take A Turn" campaign supplements Metropolitan's strong program of outreach activities, social and traditional media, and business outreach efforts to spread the word to residents, businesses, community leaders and elected officials about the importance of water conservation.

A new component of the conservation campaign was an official sponsorship with Major League Soccer's LA Galaxy. This partnership provided digital signage at the StubHub Center in Carson, water-awareness exhibit booths at four home games, public service announcements and social media videos featuring LA Galaxy goalie Brian Rowe, cross-promotion of water-saving messages on Metropolitan and LA Galaxy social media platforms, Facebook Live events with actor Johnny Rey Diaz, and outreach activities with the LA Galaxy community foundation organization.

As part of the campaign, Metropolitan also conducted several television interviews and placed a series of advertorial news stories in the online editions of the Los Angeles Times and Nativo for added value news stories. Metropolitan placed advertorials on digital media focusing on the seriousness of the drought, what people can do to save water, and offering landscape and gardening advice including a Facebook Live broadcast by Sunset Magazine which was viewed by more than 7,000 people. In addition, Metropolitan used social and digital media to reach large audiences in cost effective and optimized strategies, including setting up playlists on Pandora and its Spanish-language equivalent, Uforia. The playlists promote shorter showers by listening to five-minute-long songs about water or rain. These elements promoted the ongoing need for conservation in Southern California, describing long-term benefits of investments in water storage and local water resources, and the availability of rebates and incentives for turf removal and water-saving devices and appliances.

The H2Love advertising campaign continued to support sustainable, lifelong water conservation. The campaign included digital ads, billboards, bus wraps and transit shelters, as well as a continued partnership with the Major League Soccer's LA Galaxy, its own Pandora song list, and a takeover of the Santa Monica Pier Ferris wheel.

Metropolitan's online conservation portal, bewaterwise.com®, was redesigned with a more user- and mobile-friendly navigation and translated into Chinese and Spanish. A Garden of the Month video series was launched on bewaterwise.com® and multiple social media platforms featuring California Friendly® inspiration gardens.

Metropolitan's multilingual H2Love campaign concluded in spring 2018 with a successful 12-week media strategy featuring outdoor billboards, radio ads, community newspapers and a sponsorship with Major League Soccer's LA Galaxy. With nearly two billion media impressions delivered and a toolkit of informational resources and files, the campaign successfully reached its target audiences as demonstrated in a post-campaign public survey. Outreach efforts increased traffic to the district's bewaterwise.com® conservation website by more than 300 percent, and social media growth in views increased more than one-hundred-fold.

While social media and search engine optimization maintained message consistency and visibility, Metropolitan initiated a request for proposal process for a new three-year water conservation outreach media campaign. Metropolitan's Board of Directors awarded a \$14.7 million contract to the Los Angeles-based firm Quigley-Simpson & Heppelwhite, which produced Metropolitan's award-winning Take a Turn and H2Love campaigns. The new "Save

Water 365" campaign launched in July 2018. The campaign encouraged Southern Californians to save water every day. It also reminded residents to take advantage of rebate programs – including incentives for indoor and outdoor water-saving devices, as well as rebates for landscape transformation that requires more efficient irrigation systems, design and plants. The campaign also reached very diverse audiences in English, Spanish, Mandarin, Korean, Vietnamese, and Tagalog through traditional and grassroots marketing efforts. Creative messaging included signs on food trucks, local convenience and hardware stores, and a sponsorship with the LA Dodgers.

The "Save Water 365" campaign delivered more than 1 billion media impressions. Working with Metropolitan's 26 member agencies, the research-based advertising campaign included:

- Digital and online advertising
- Total of 1,475 billboards and television commercials
- Radio messages on more than 50 stations
- Animated digital ads with general rebate and landscape transformation program messaging
- Print ads in community newspapers
- English and Spanish language Pandora radio stations and other customized materials and special outreach events throughout Southern California

The campaign also included a grass-roots outreach effort in multiple languages through advertising at convenience and hardware stores and on food trucks, as well as a presence on a popular Chinese game show. The media strategy was designed to effectively target diverse communities, age groups, socioeconomic factors and languages spoken in the region.

In August 2018, Metropolitan began an official sponsorship with Major League Baseball's Los Angeles Dodgers. This sponsorship included a title night event before more than 40,000 fans featuring former Metropolitan Board Chairman Randy Record throwing the opening pitch. The evening highlighted a Dodger groundskeeper and the many ways in which the Dodger organization conserves water. Public service announcements were displayed on LED boards throughout the stadium, as well as cross promotions on conservation on Metropolitan's and the Dodgers' social media platforms.

Growth in social media activity was dramatic. In 2018, Metropolitan's Facebook page received more than 55 million impressions, with more than 27,000 followers. On Twitter, Metropolitan received strong engagement for its water efficiency posts, including short videos and animated gifs to reach a broader audience during its conservation campaign and for Delta Conveyance initiatives. Metropolitan used Facebook Live and Snapchat geo-filters to reach a broader audience throughout 2017-18.

The success of Metropolitan's outreach activities was recognized with several prestigious awards including the best in show for the National Association of Government Communicators in 2018. This organization is a national association of communication officials from local, state and federal public agencies. Metropolitan was a finalist in 13 of 40 award categories.

In April 2019, the general conservation message of the "Save Water 365" campaign became more targeted and focused on promoting the incentive under Metropolitan's revamped turf replacement program. The incentive provides Southern Californians $2 for every square-foot of grass replaced with more water efficient sustainable landscaping. The campaign continued to reach diverse audiences on multi-media platforms: digital billboards featured in shopping malls, grocery stores and movie theaters encouraged residents to "ditch their grass and claim their rebate." Radio spots promoting the "ditch your grass" message in English and Spanish were featured on nearly 40 radio stations, and creative digital display ads generated nearly 120 million impressions on digital media and nearly 300,000 ad clicks.

Local community outreach also played an important role in this campaign through strengthened partnerships between Metropolitan and its member agencies. Turf Replacement Program advertisements in English, Spanish, and Chinese ran in 25 publications from May to June 2019, and together, these advertisements reached 1.7 million readers across the district's area.

Metropolitan also partnered with Los Angeles- and San Diego-based news shows to develop water conservation programming in English and Spanish. On-air talent spoke about the benefits of replacing your lawn with California Friendly® and native landscaping and promoted Metropolitan's turf rebate.

In fall 2019, Metropolitan launched a multilingual digital campaign that continued to promote the turf rebate incentive. Digital display banners on home improvement and lifestyle websites encouraged viewers to save money by converting their lawns to sustainable landscapes. Together with search advertising, these display ads generated 151 million impressions and thousands of turf rebate applications. The Hispanic market saw a significant increase in online engagement and drove the most landing page visits with 200k link clicks. Part of the fall campaign's communications strategy was to collaborate with Los Angeles- and San Diego-based news shows to develop water conservation programming in English and Spanish. On-air talent spoke about the benefits of replacing your lawn with California Friendly® and native landscaping and promoted Metropolitan's turf rebate.

To supplement digital outreach, Metropolitan partnered with Los Angeles Dodgers, Angels, Rams, Chargers, Lakers, Clippers and Kings sports organizations to promote advertisements with water use efficiency messaging. The ads appeared in game-day programs and annual yearbooks, reaching millions of fans across Southern California. These creative assets also received more than half a million impressions on Metropolitan's social media channels.

Additionally, Metropolitan initiated in-house design and advertising campaigns to reach new online demographics. Staff designed an award-winning social media campaign called Patch Match in the format of a dating app that 'matches' consumers with the perfect California Friendly® plants and promotes water conservation. The social media campaign was significantly more efficient than other digital and online advertising, reaching more than 200,000 people with nearly 400,000 impressions, resulting in nearly 3,000 page views to bewaterwise.com. The National Association of Government Communicators honored Patch Match with a first-place award in the social media category.

In late 2019, staff brought their creative concepts to fruition with the "Wasting Water Is…" campaign. This three-part digital commercial series was produced entirely in-house and featured scenarios where water wasters learn how scary, tragic and offensive wasting water really is. Production costs for all three commercials totaled less than $50,000 compared to typical advertising agency costs of $300,000 to $500,000 per video. Movie posters and animated GIFs promoted on Metropolitan social media channels resulted in more than 5.5 million impressions with more than 79,000 link clicks. Staff also advertised the videos on YouTube and connected TV devices such as Apple TV, Chromecast and Roku, targeting entertainment, lifestyle and sports themed content that outperformed targeted goals at an average 44 percent view through rate.

Throughout these years, Metropolitan officials conducted hundreds of interviews with news reporters from major TV and print media outlets, ethnic media and community publications to discuss a wide range of water-related issues. Topics included the effect of climate change and drought on Colorado River resources, water supply reliability and conservation, and raising awareness about Metropolitan's new turf replacement program. As part of this public outreach, Metropolitan's General Manager Jeffrey Kightlinger blogged on Metropolitan's webpage mwdh2o.com and wrote guest blogs and op-eds encouraging conservation in 2019. Metropolitan continues to provide outreach to Southern California's businesses and industry.

Metropolitan is an active member in many chambers of commerce and other business organizations and provides regular updates to members on water policy issues and programs. Water use efficiency programs that help reduce demand for potable water are a key focus of these partnerships. In addition, Metropolitan hosts hundreds of community and business leaders on inspection trips of the State Water Project and Colorado River Aqueduct to help them better understand the challenges of providing reliable water to Southern California and how the Colorado River is managed to provide water for urban areas and agriculture.

Community Partnering Program

Over the past five fiscal years, Metropolitan has engaged in approximately 270 sponsorship programs and projects through its Community Partnering Program. Investments totaling $540,000 were provided to non-profit organizations, member agencies, other public resource agencies and educational institutions for programs including California native plant gardens and outdoor classrooms, Earth day events, water quality laboratory test kits, and multi-lingual educational publications addressing conservation, water-use efficiency, recycling, watersheds and more regional issues.

California Friendly Landscape Education and Training Program

Metropolitan provides education and training on ways to conserve water in homes and landscapes. Offerings include in-person and online classes, surveys, and audits.

Landscape Classes

Metropolitan offers in-person and online courses in irrigation efficiency and water-wise garden design through its California Friendly Landscape and Native Plant Training Program. Metropolitan also offers Turf Removal Classes. In FY 2019-20 Metropolitan conducted 45 classes for 1,200 students throughout Metropolitan's service area. After COVID-19 forced the temporary cancellation of in-person classes, Metropolitan created online Zoom courses with its vendors to continue offering Southern California residents valuable water saving landscape education.

Landscape Irrigation Surveys

Metropolitan provides irrigation surveys for large landscape customers. These surveys are performed by a certified Landscape Irrigation Auditor and provide the customer with specific recommendations on how to improve irrigation efficiency at the site. The survey report generated by the auditor also provides information on incentives to help the customer fund the needed improvements. In fiscal year 2019-20, 21 surveys were conducted.

Irrigation Evaluations and Residential Surveys

Metropolitan provides funding to its member agencies that choose to implement irrigation evaluations and indoor surveys for residents. Irrigation evaluations provide customers with a recommended irrigation schedule and suggested improvements for irrigation systems. Indoor residential surveys provide customers with information on identifying leaks and making changes to water-using devices in the home.

Water Conservation Programs

Metropolitan's water conservation programs focus on two main areas: (1) residential water use, and (2) commercial, industrial, and institutional water use. Metropolitan directly manages regional programs and provides financial support for local programs that are implemented by the member agencies. Metropolitan's Water Use Efficiency team provides program development, implementation, administration, monitoring, evaluation, and research.

Metropolitan's Conservation Credits Program (CCP) provides the basis for financial incentives and funding for the conservation programs and other demand management related activities. Established in 1988, this funding mechanism supports Metropolitan's commitment to conservation as a long-term water management strategy.

The basis of Metropolitan's financial support to member agency conservation efforts is estimated at $195 per acre-foot of water saved up to the device cost. In general, CCP-funded water conservation project proposals must:

- Have demonstrable water savings;
- Reduce water demands on Metropolitan's system; and
- Be technically sound and require Metropolitan's participation to make the project financially and economically feasible.

Metropolitan introduced two new funding options for member agency conservation efforts. Member agencies may use a portion of their funding for projects that provide value to the region, but the water savings may be difficult to measure. In addition, member agencies can use funding to target disadvantaged communities.

Table 3-5 summarizes CCP savings and investments. Additional funding for conservation programs has been made available through federal and state government agencies. Metropolitan has worked to obtain a share of this funding to enhance the region's water conservation investments. Table 3-6 describes past sources and uses of these funds.

Table 3-7 summarizes the types and numbers of efficient devices that have been installed through Metropolitan's conservation programs since they began in fiscal year 1990-91.

Regional Conservation Programs

As mentioned above, Metropolitan's conservation programs focus on two main sectors: (1) residential water use, and (2) commercial, industrial and institutional water use.

Residential Programs

Metropolitan's residential conservation activities consist of two major programs:

- SoCal Water$mart – Metropolitan provides a region-wide residential rebate program named SoCal Water$mart. Since its inception in 2008, rebate activity has increased dramatically as many residential customers became increasingly aware of the financial incentives available to them to help offset the purchase of water-efficient devices. To date, this program helped to replace over 277,000 toilets, 319,000 washing machines, 50,000 smart irrigation controllers, 459,000 rotating nozzles, and hundreds of thousands of other devices and appliances.
- Metropolitan-Funded Residential Programs Administered by Member Agencies – Metropolitan's member and retail agencies also implement local residential water conservation programs within their respective service areas and receive Metropolitan incentives for qualified retrofits and other water-saving actions. Typical projects include

premium high-efficiency toilet (HET) distributions, locally administered clothes washer direct-installation programs, turf removal programs, and residential water audits.

Residential Rebate Items

Metropolitan provides incentives on a variety of water efficient devices for the residential sector. The following is a brief description of current and past devices that contribute to projected conservation savings:

- Turf Removal (Residential) – About 50 percent of residential household water demand is used for outside irrigation where opportunities to conserve water are substantial. Southern California residents have turned the turf removal program into Metropolitan's most popular conservation measure. To encourage market transformation, Metropolitan has paid over $198 million in the regional turf removal program for residential properties since program inception.
- High-Efficiency Clothes Washers – HECWs continue to be a major component of indoor water conservation. The water efficiency of clothes washers is represented by the "integrated water factor," which is a measure of the amount of water used to wash a standard load of laundry. Washers with a lower integrated water factor will save more water per wash cycle. Metropolitan has continued to move the water conservation rebate standards by requiring lower integrated water factors for eligible washers. The program eligibility requirement is currently set at an integrated water factor 3.2, which saves over 10,700 gallons per year per washer over a conventional top loading washer. Metropolitan has also partnered with Southern California Gas on a direct-installation program for high-efficiency clothes washers in low-income households.
- High-Efficiency Toilets – Metropolitan has provided incentives for water efficient toilets since 1988. Metropolitan changed its rebate program to provide funding for toilets that flush at 1.1 gallons or less. Metropolitan uses the Maximum Performance of Premium Toilet Models testing list to distinguish qualifying models.
- High Efficiency Sprinkler Nozzles – Pop-up, high efficiency spray heads provide significant outdoor water savings over conventional nozzles. Field tests and studies have demonstrated these nozzles apply water more evenly than traditional nozzles with fixed fan spray patterns, creating the potential for water savings. Low precipitation rates associated with these nozzles can also reduce run-off, thereby offering a significant value-added benefit when irrigating sloping landscapes.
- Irrigation Controllers – Smart irrigation controllers and soil moisture sensors adjust irrigation schedules based on water needs, temperature, sunlight, soil moisture, soil conditions, plant types, slope or some combination of indicators. Metropolitan uses the USEPA WaterSense list for eligible controllers.

Commercial, Industrial and Institutional Programs

Metropolitan's commercial industrial and institutional (CII) conservation consists of three major rebate and incentive programs:

- SoCal Water$mart Program – The majority of the commercial conservation activity comes from Metropolitan's regional SoCal Water$mart program, which also issues rebates to multi-family properties.
- Water Savings Incentive Program – The Water Savings Incentive Program provides financial incentives for customized landscape irrigation and industrial process improvements. This program allows large-scale water users to create their own conservation projects and receive

incentives for up to 10 years of water savings for measured water-use efficiency improvements.

- Metropolitan-Funded Commercial Programs Administered by Member Agencies – Member and retail agencies also implement local commercial water conservation programs using Metropolitan incentives. Projects target specific commercial sectors, with some programs also receiving assistance from state or federal grant programs. Metropolitan incentives are also used as the basis for meeting cost-share requirements for the grants.

Commercial Rebate Items

Metropolitan's CII programs provide rebates for water-saving plumbing fixtures, landscaping equipment, food-service equipment, cleaning equipment, HVAC (heating, ventilation, air conditioning) equipment, and medical equipment.

- Turf Removal (Commercial) – Similar to the residential sector, water demand for landscape irrigation on commercial, industrial, and institutional properties is significant. Opportunities to conserve water are substantial, particularly in areas with ornamental turf. With an increased incentive rate ($2 per square foot of turf removed), approximately 92 million square feet of grass has been removed from commercial, industrial, and institutional properties since program inception through the regional rebate program, and member agency turf programs. To encourage market transformation, Metropolitan has paid over $138 million for the regional turf removal program for commercial properties since inception.
- Commercial Devices – Following is a list of current and past devices that contribute to projected conservation savings:
  - Connectionless Food Steamers
  - Cooling Tower Conductivity Meters
  - Dry Vacuum Pumps
  - High-Efficiency Clothes Washers
  - High-Efficiency Toilets
  - High-Efficiency Urinals
  - Ice Machines
  - In-Stem Flow Regulators
  - Large Rotors - High Efficiency Nozzles
  - Laminar Flow Restrictors
  - High Efficiency Nozzles
  - pH Cooling Tower Controllers
  - Plumbing Flow Control Valves
  - Premium High Efficiency Toilets
  - Pre-rinse Spray Heads
  - Soil Moisture Sensors
  - Steam Sterilizers
  - Ultra-Low-Flush Toilets
  - Ultra-Low-Flush Urinals
  - Water Brooms
  - Weather-Based Irrigation Controllers
  - X-ray Processors
  - Zero/Ultra Low Water Urinals

Disadvantaged Communities Program Initiative

Metropolitan initiated an effort to increase water efficiency within disadvantaged communities (DACs) in Metropolitan's service area through the Disadvantaged Communities Program. This program has been executed in three parts. First, a Regional Pilot Program for Multi Family/Apartments Pre-1994 offering an enhanced incentive for Premium High-Efficiency Toilets, targeting pre-1994 structures for retrofits combined with rigorous data collection and analysis. Part two is an effort to help Metropolitan's member agencies implement local DAC projects by providing intensive member agency local support and technical assistance with program design and administration. And finally, Metropolitan looks for grant support to fund regional and local DAC projects.

Metering

Metropolitan's water distribution system is metered. Metropolitan has over 400 service connections that meter water deliveries to our member agencies. Meters at these service connections are checked every six months or sooner to verify that they are measuring correctly. More extensive maintenance is done on a yearly basis to ensure the meter systems continue to operate reliably.

Research and Development Programs

Metropolitan is committed to conservation research as a way to advance technology, improve program results, and help transform markets. Self-funded studies include determining water savings from municipal leak detection programs, effectiveness of single-family home pressure relief valves on lowering water demand, quantifying residential water use and water fixture inventory, and analyzing savings attributed from landscape irrigation system improvements.

Metropolitan's Innovative Conservation Program (ICP) is a competitive grant program that evaluates water savings and reliability of new water saving devices, technologies, and strategies. With funding provided by USBR, Southern Nevada Water Authority, Central Arizona Project, Southern California Gas, Western Resource Advocates, and Metropolitan, approximately $570,000 of funding was available for research for the 2018 ICP. After evaluating over 60 project proposals, twelve were selected. The projects focused on landscape, commercial, industrial, and residential water use applications. The next round of grants will be implemented in fiscal year 2021.

Metropolitan has partnered with the Alliance for Water Efficiency (AWE) for water conservation research. The current research project involves exploring the water efficiency potential of cooling towers through process improvements and operational management. Past projects have included: lessons learned through a drought management study of Australia, a water neutral development ordinance, a study on commercial kitchen efficiency, a study on outdoor impacts of the drought, and reasons and rationale for landscape choices.

Measurement and Evaluation

Measurement and evaluation are important components of Metropolitan's conservation programs. These serve four primary functions:

- Providing a means to measure and evaluate the effectiveness of current and potential conservation programs
- Developing reliable estimates of various conservation programs and assessing the relative benefits and costs of these interventions
- Providing technical assistance and support to member agencies in the areas of research methods, statistics, and program evaluation
- Documenting the results and the effectiveness of Metropolitan-assisted conservation efforts

Metropolitan's staff has served as technical advisors for a number of state and national studies involving the quantification and valuation of water savings.

Recognition for Conservation Achievements

Conservation is an integral part of water supply planning at Metropolitan. Metropolitan works to improve the understanding of the costs and benefits of conservation so investment decisions are both efficient and effective at meeting program goals. As a cooperative member of California's water conservation community, Metropolitan has made significant contributions to the development and coordination of conservation activities throughout the state. These contributions have been recognized in the form of "Gold Star" certification from the Association of California Water Agencies and awards from the USBR and California Municipal Utilities Association.

Table 3-4
Online School Education Programs

Online Education Offerings	Grades	Notes
Water Journeys	Grades 4 – College	In partnership with Los Angeles County Sanitation Districts, Water Journeys begins with a presentation on water awareness, aqueducts, conservation and recycling followed by a walking tour of the Regional Recycled Water Purification Center.
DVL Online Fieldtrip	Grades 4-8	Diamond Valley Lake, the largest reservoir in Southern California, located in Riverside County near Hemet. Students experience a variety of standards-based, water-related, hands-on science activities.
Girl Scout Programs	K - 12 Daisies, Brownies & Juniors, Cadettes, Seniors and Ambassadors	Metropolitan is offering a FREE online patch program about Southern California's water sources and conveyance systems.
Scout Programs	K - 12	Metropolitan is offering a FREE online patch program about Southern California's water sources and conveyance systems aligned with Environmental Science Merit Badge Requirements
On-line class presentations	PreK - College	Metropolitan staff will create a customized water-education presentation or "H2O Show" for students from pre-K to college.
Online Story Time	PreK – 3rd	Bring story times to life with our engaging educators and colorful stories about water.
All About Water Curriculum	K - 2nd	New video experiments and interdisciplinary activities about water conservation, water quality and distribution, the water cycle, and fresh and saltwater.
VR Trip SWP	Grades 4 – College	Immerse your students in the State Water Project system and discover the 444-mile journey that water makes to Southern California. Students will virtually visit the Bay Delta, Banks Pumping Plant, the California Aqueduct, Chrisman Pumping Plant, and Lake Perris.
VR Trip CRA	Grades 4 – College	Follow the journey of water to Southern California via Metropolitan's Colorado River Aqueduct. The tour is available as a virtual reality app for Apple and Android mobile devices.

Table 3-5
Metropolitan's Conservation Credits Program

Fiscal Year	Annual Water Savings (AF)	Lifetime Water Savings (AF)	Investment
2019 – 2020	212,000	55,719	$25.7 million
2018 – 2019	208,000	55,263	$16.4 million
2017 – 2018	213,000	82,435	$12.6 million
2016 - 2017	206,000	137,065	$41.4 million
2015 - 2016	203,000	731,093	$229 million

Table 3-6
Grant Program Funding

Funding Source	Program/Project	Funding Amount ($1,000s)	Description	Status
CALFED				
	Residential HECW	$925	Increase rebate amount	Completed
	Protector del Agua	$100	Course development	Completed
Prop 13 Grants				
	HECW	$2,500	Increase rebate amount	Completed
	ET Controllers	$1,800	Initiate rebates	Completed
CPUC (w/CUWCC)				
2003	Pre-Rinse Spray Valves: Phase 1	$1,600[1]	12,000 direct installations[1]	Completed
2004	Pre-Rinse Spray Valves: Phase 2	$2,200[1]	17,000 direct installations[1]	Completed
USBR				
2003	CA-Friendly Landscapes	$182	New home landscapes	Completed
2003	Data Loggers	$50	Software error analysis	Deferred
2004	CA-Friendly Landscapes	$60	New home landscapes	Completed
2004	Synthetic Turf pilot	$220	Provide incentives	Completed
2004	World Forum	$50	College/university grants	Completed
2004	CII Region wide	$250	Additional dollars to rebate amounts and for administration	Completed
2005	Protector del Agua	$50	Develop web classes	Completed
2005	Landscape Market Analysis	$50	Analyze landscape conservation opportunities	Completed
2005	City Makeover	$50	Public landscapes	Completed
2006	Innovative Conservation Program	$300	Support research projects	Completed
2008	Innovative Conservation Program	$300	Support research projects	Completed
2012	Sprinkler Nozzle Incentive Program	$1,501	Provide incentives	Completed
2013	High Efficiency Clothes Washer Program Innovative Conservation Program	$500 $100	Provide incentives Support research projects	Completed Completed
2014 2015 2017	California Friendly Turf Replacement – Phase 2 Incentive Program Innovative Conservation Program Innovative Conservation Program	$300 $100 $100	Provide incentives Support research projects Support research projects	Completed Completed Completed
Water for the West				
	Protector del Agua	$25	Develop web classes	Completed
Prop 50				
	Residential HECW	$1,660	Increase rebate amount	Completed
	CA-Friendly Landscapes	$423	Common area landscapes	Completed
	High Efficiency Toilets	$1,000	Increase rebate amount	Completed
	Protector del Agua	$78	Develop on-line classes	Completed
2008	Residential HECW	$2,000	Increase rebate amount	Completed

[1] This is the funding amount and number of installations that represent Metropolitan's share of the project.

Table 3-7
Conservation Achievements in Metropolitan's Service Area

	Quantity	Units
Commercial Rebated Devices (FY 1990-91 to FY 2019-20)		
Audits/Surveys	14,419	ea
Connectionless Food Steamers	219	ea
Cooling Tower Conductivity Controllers	1,232	ea
Dry Vacuum Pump	40	ea
Toilets	241,015	ea
Urinals	40,849	ea
Ice Machines	145	ea
In-stem Flow Regulators	35,265	ea
High-Efficiency Washers	36,545	ea
pH Conductivity Controllers	398	ea
Plumbing Flow Control Valves	56,148	ea
Pre-Rinse Spray Heads	17,192	ea
Laminar Flow Restrictors	27,627	ea
High-Efficiency Nozzles	1,730,313	ea
Soil Moisture Sensors	790	ea
Steam Sterilizers	28	ea
Water Brooms	6,931	ea
Weather-Based Irrigation Controllers	13,106	acres
Weather-Based Irrigation Controllers	573,226	stations
X-Ray Processors	185	ea
Large Rotors - High-Efficiency Nozzles	86,870	ea
Synthetic Turf	7,455,647	sq. ft.
Turf Removal	85,350,839	sq. ft.
Residential Rebated Devices (FY 1990-91 to FY 2019-20)		
Aerators	158,817	ea
Audits/Surveys	152,544	ea
Cisterns High-Efficiency Clothes Washers	2,010 585,607	 ea
Toilets	3,596,694	ea
High-Efficiency Rotating Nozzles	1,274,686	ea
Rain Barrels	176,552	ea
Soil Moisture Sensors	15	ea
Showerheads	1,735,436	ea
Turf Removal	101,786,618	sq. ft.
Weather-Based Irrigation Controllers	69,493	ea
Weather-Based Irrigation Controllers	28,527	stations

Asset Management Program

In compliance with California Water Code § 10631(e)(2), below is a description of Metropolitan's distribution system asset management program.

Metropolitan's approach to asset management is contained within its Infrastructure Reliability Strategy. The goal of Metropolitan's Infrastructure Reliability Strategy is to ensure long-term reliable performance of the system in an efficient and cost-effective manner. Infrastructure reliability is addressed through three programs: the Maintenance Management Program, the Infrastructure Protection Plan, and the Dam Safety Program. The activities performed under these programs allow for Metropolitan to extend the life span of its facilities and equipment and improve the overall reliability of the entire conveyance, treatment, and distribution system. Metropolitan is also completing a Strategic Asset Management Plan that will further expand the use of asset data for improved planning, maximizing the value of infrastructure assets and enhancing the longer-term visibility for its Capital Investment Plan.

Maintenance Management Program

Metropolitan manages the maintenance on approximately 135,000 pieces of equipment located at its five treatment plants, sixteen hydro-electric power plants, five desert pumping plants, 242 miles of canals, and over 5,000 structures on 830 miles of pipeline.

Computerized Maintenance Management System**:** A Computerized Maintenance Management System (CMMS) is used to track, plan, and schedule the required activities. The system currently has over 28,000 preventative maintenance cycles scheduled with approximately 96 percent of these performed at fixed intervals (Time Based). The remaining four percent are performed based on the condition or use of the equipment (Condition Based).

Routine Maintenance, Inspection, and Monitoring

Monitoring, inspection, and maintenance of equipment and facilities are a proactive effort to assess the overall condition of the assets. This effort encompasses identifying needed repairs and performing routine maintenance.

Time-Based Maintenance

Metropolitan currently uses time-based maintenance as the primary means of maintaining equipment reliability. Time-based maintenance for equipment is set at specific time intervals using manufacturer recommendations. These recommendations are used to develop Job Plans in the CMMS which detail the individual steps required for a particular maintenance operation.

Condition-Based Maintenance

Condition-based maintenance (CBM) relies on an understanding of how a piece of equipment degrades or fails to meet its intended function. It requires a greater depth of understanding of the manufacturer's recommended maintenance, industry standards, or practices. This knowledge is used in conjunction with field experience to develop a technique to gauge the equipment's condition. Through trending or analysis, a determination can then be made as to when the equipment may reach a point where corrective maintenance will be required including rehabilitation or replacement. A regular inspection cycle is set in the CMMS software to evaluate current equipment condition. High and low condition alarms are also set that trigger a corrective maintenance activity when equipment is starting to degrade or its use has reached a servicing checkpoint.

Predictive maintenance is a subcategory of CBM that uses diagnostic equipment or testing to determine the equipment condition. Predictive maintenance is also used to detect impending problems before the equipment malfunctions. In some cases, Metropolitan has automated the inspections such as through online vibration monitoring systems that trend the performance of critical and large equipment. A fundamental characteristic of this type of maintenance is that it provides the capability to anticipate potential problems while the equipment is still operating. This provides several key benefits when compared to time-based maintenance or allowing equipment to reach a point where corrective maintenance is required. These benefits include: improved availability or uptime, enhanced reliability, and reduced cost.

Corrective Maintenance

Corrective maintenance is performed on equipment that either has already failed or has had a problem detected during routine (time or condition based) maintenance. Corrective maintenance needs to be scheduled, requires replacing equipment components, or involves a shutdown of the impacted system. Corrective maintenance is also tracked, planned, and scheduled in the CMMS.

Major Scheduled Outages/Shutdowns

In addition to the general maintenance described above, Metropolitan may take major systems out of service, such as water treatment plants, large pipelines, conveyance systems, or other large facilities, typically for periods of seven to twenty-one days. This is done to perform major maintenance or repairs on several components or systems, upgrade or add new processes, or perform other important work.

Reports and Metrics

Metropolitan produces internal reports that track maintenance management activities including overall backlog and past due work orders (including any missed regulatory preventive maintenance). In addition, other CMMS reports are available that provide managers, planners/schedulers, and maintenance staff with the data needed to evaluate and track work.

Metropolitan utilizes best management practices and performance metrics from the Society of Maintenance & Reliability Professionals to ensure a reliable and cost-effective maintenance management program.

Infrastructure Protection Plan

Activities under the Infrastructure Protection Plan ensure long-term infrastructure reliability by conducting special condition assessments and vulnerability assessments of Metropolitan's facilities.

Special Condition Assessments

Special Condition Assessments are extensive inspections, investigations, and evaluations of Metropolitan facilities and equipment that go beyond routine maintenance and monitoring activities. The assessments are conducted to identify needed rehabilitation and replacement projects which can lead to long-term reliability programs. These assessments include: inspections of facilities during shutdowns when the facility may otherwise be non-accessible, investigations of systemic issues, and evaluations of Metropolitan's ability to maintain deliveries in the event of an unplanned facility outage or loss of water supply.

Special Condition Assessments may be initiated through requests from Water Systems Operations, in response to a specific event or concern within Metropolitan's system, or due to an issue identified within the water industry that could potentially affect Metropolitan. Through these activities, long-term infrastructure reliability programs are developed and executed to ensure that the reliability of Metropolitan's distribution system is unimpeded, and the overall life-expectancy of its assets is maintained to the most cost-effective standard possible.

Vulnerability Assessments

Vulnerability Assessments involve simulating hazards such as vehicle impact, flooding, fire, equipment failure, third-party impacts, and earthquakes in order to identify their potential impacts to Metropolitan's ability to deliver water. Like the condition assessments, Vulnerability Assessments utilize operator experience and event reviews to identify potential vulnerabilities and impacts. The assessments evaluate both the reliability of individual facilities, as well as the reliability of Metropolitan's system as a whole, if it is exposed to a potential hazard. It is through these assessments that mitigation options are identified to improve reliability.

Potential mitigation includes facility and equipment upgrades, and procedural changes for designing, operating, or maintaining facilities. In addition, mitigation options may include recommendations for Metropolitan's emergency response planning to improve the capability to respond to an unplanned outage and restore service as quickly as possible. The types of hazards assessed include: seismic activity, hydraulic surge, vehicle impact, equipment malfunction, erosion or flooding, fire, corrosion, wind-blown projectiles, third party construction, and vandalism.

As a part of the Vulnerability Assessments, a specific set of reliability design criteria for water treatment plants have been developed to ensure optimal reliability, starting in the design phase. These reliability design criteria establish design practices that ensure that reliability is designed into new facilities, and that the staff uses this criterion when reviewing each capital project.

Dam Safety Program

Metropolitan owns, operates, and maintains 20 facilities under the jurisdiction of the California Division of Safety of Dams (DSOD). In total, there are 24 individual dams/reservoir facilities, with some reservoirs having multiple dams. The Dam Safety Program is a robust and proactive comprehensive management program that includes daily or weekly observations and regularly scheduled detailed inspections in addition to mandatory annual inspections with DSOD personnel.

Metropolitan also ensures dam integrity by incorporating surveillance and monitoring instrumentation that measures specific parameters, including, but not limited to, seepage and structural movement. Staff also conducts cyclical facility assessment to identify potential vulnerabilities to dam embankments, dam structures, foundations, outlet structures and spillways. In addition, staff prepares Emergency Action Plans and regularly updates the associated inundation maps as required by the DSOD.

3.5 Recycling, Groundwater Recovery, and Desalination

Metropolitan continues to support local resources development through its Local Resources Program (LRP). The LRP provides financial incentives for local agencies to develop supplies including water recycling, groundwater recovery, and seawater desalination. In addition, for the first time, Metropolitan is planning for its own recycled water supply. The Regional Recycled Water Program would provide advanced treated water that could be used for both potable and non-potable reuse.

Metropolitan's involvement in local resources development started in 1982 as the Local Projects Program to provide financial incentives to its member agencies to develop recycled water projects. In 1991, Metropolitan established the Groundwater Recovery Program to provide financial assistance for the development of groundwater recovery projects. In 1995, these two programs combined into the LRP. Water recycling projects involve further treatment of treated wastewater that is currently discharged to the ocean, streams, or lands and use it instead for non-potable uses such as landscape and agricultural irrigation, commercial and industrial purposes, and for indirect potable uses such as groundwater replenishment, seawater intrusion barriers, and reservoir water augmentation. Currently, more than half of the water recycling in California occurs in Metropolitan's service area.

Groundwater recovery projects involve treatment of high salinity or contaminated groundwater for potable uses. Groundwater recovery projects use a variety of treatment technologies to remove undesirable constituents such as nitrates, volatile organic compounds (VOCs), perchlorate, color, and salt. Desalination of brackish groundwater and other local supplies enhances the continued supply reliability of the region by maximizing local groundwater resources.

Metropolitan's service area is also leading the development of seawater desalination in California. The 56 TAF Carlsbad Desalination Project in San Diego County started operations in 2015 and represents the largest seawater desalination project in the country. Several other local water agencies are considering seawater desalination projects. One of the largest of these is the Huntington Beach Seawater Desalination Project, currently being developed by Poseidon Resources LLC (a private company). These projects have the potential to help meet Metropolitan's current goals for new local supplies.

Metropolitan's Regional Recycled Water Program, a partnership with the Los Angeles County Sanitation Districts (Sanitation Districts), would purify treated wastewater from the Sanitation Districts' Joint Water Pollution Control Plant. The program could produce up to 168,000 acre-feet of purified water for groundwater replenishment, industrial use, and potentially raw water augmentation. The agencies have been working together for over 10 years on the program. They are currently operating a demonstration facility and seeking approval from their Boards of Directors to begin the environmental planning phase. At full-scale, the program could be one of the largest water reuse efforts of its kind in the world.

Background

Recycling

This section provides a description of the wastewater sources that potentially could be recycled. This section also discusses the existing and potential uses of recycled water, as well as the technical and economic issues associated with those uses. In general, Metropolitan supports:

- Increasing water recycling in California and the Colorado River Basin

- Advocating funding assistance by parties that benefit both directly and indirectly from the use of recycled water
- Expanding recycled water uses
- Reviewing recycled water regulations to ensure streamlined administration, and public health and environmental protection
- Planning efforts and voluntary cooperative partnerships at the local and statewide levels
- Conducting research and studies to address public acceptance, new technologies, and health effects assessments
- Increasing cooperation between agencies to serve recycled water in other agency service areas

Wastewater Disposal in the Service Area

As part of regional planning that encourages use of recycled water, a database has been developed that includes the name of each wastewater treatment facility, operating agency, location and elevation of the facility, extent of wastewater treatment, capacity and anticipated production, method of effluent disposal, and influent and effluent water qualities. Table 3-8 shows the existing and projected total effluent capacities of the wastewater treatment plants from a database of 89 plants identified within Metropolitan's service area.

Wastewater treatment capacity provides an indication of the amount of wastewater being generated and disposed in Metropolitan's service area. Most wastewater plants in the service area provide secondary treatment, a level of treatment that complies with the Clean Water Act. Inland wastewater plants generally provide treatment to tertiary levels so the effluent may be disposed of in a stream or other water body or for beneficial reuse. A growing percentage of tertiary treated effluent undergoes reverse osmosis or electrodialysis reversal processes, producing high-quality recycled water for groundwater replenishment, industrial uses, or, in some instances, municipal uses.

Within Metropolitan's service area, many local agencies collect and treat municipal wastewater. Some of the largest agencies include:

- Los Angeles County Sanitation Districts
- Orange County Sanitation District
- City of Los Angeles Bureau of Sanitation
- San Diego Metropolitan Wastewater Department
- Eastern Municipal Water District
- Western Municipal Water District
- Inland Empire Utilities Agency

Table 3-8
Existing and Projected Total Effluent Capacity
Wastewater Treatment Plants within Metropolitan's Service Area[1]

Treatment Level	Existing Capacity (MGD)	2040 Capacity (MGD)
Primary	1,770	3,139
Secondary	1,169	2,708
Tertiary	434	1,464
Advanced	104	229

[1] This data was compiled as part of the Southern California Comprehensive Water Reclamation and Reuse Study in 2002. As of the date of this UWMP, this reuse study has not been updated to reflect new information.

Many small special-purpose wastewater agencies, dual-purpose (water and wastewater) special districts, and municipal wastewater agencies also provide wastewater treatment and disposal services within Metropolitan's service area.

Wastewater is collected in a sewer collection system. From there, it flows to a wastewater treatment plant. Once treated, wastewater is disposed of through one of three mechanisms:

Ocean Outfalls

Treated wastewater is either disposed of directly through an ocean outfall or conveyed to the ocean outfall via a land outfall.

Reuse

Currently, about 441 TAF per year of recycled water is used for landscape irrigation, industrial processes, and groundwater replenishment applications in the region. A few inland treatment plants (in Riverside and San Bernardino counties) irrigate feed and fodder crops with recycled water. While this use is considered beneficial, it is not necessarily the highest and best use for recycled water. Higher value uses of recycled water include landscape or agricultural irrigation, commercial and industrial applications, groundwater replenishment, seawater intrusion barrier, and other uses such as street sweeping and dust control.

Stream Discharge

The majority of inland plants discharge treated effluent into local streams and rivers. That water is then used downstream for beneficial uses, eventually flowing to the ocean. Some of the affected rivers (or ephemeral streams) include:

- Los Angeles River
- Santa Ana River
- Calleguas Creek
- Rio Hondo & San Gabriel Rivers
- Santa Margarita River

Uses of Recycled Water

Water recycling is a reliable water supply, and it helps local agencies comply with environmental regulations. Uses of recycled water can generally be categorized as non-potable, indirect potable for groundwater replenishment or reservoir water augmentation, and direct potable.

Non-Potable Reuse

- *Industrial* – Industrial users represent a large potential market for recycled water, particularly in heavily industrialized areas, such as the cities of Vernon, Commerce, Industry, and the Wilmington area of Los Angeles. Additionally, refineries in West Basin MWD's service area and the city of Torrance use recycled water. Typical industrial uses include cooling tower makeup water, boiler feed water, paper manufacturing, carpet dying, and process water. Industrial users are high-demand, continuous-flow customers, which allows greater operational flexibility by allowing plants to base load operations rather than contend with seasonal and diurnal flow variations. Because of these operational benefits, industrial users reduce the need for storage and other peak demand facilities and management.
- *Irrigation* – Recycled water is used to irrigate golf courses, parks, schoolyards, cemeteries, greenbelts, roadway medians, and agricultural purposes throughout Southern California. Using recycled water for irrigation reduces the need for imported water during the critical summer months and in drought situations when water supplies are scarce. Unlike industrial uses, irrigation demands have large seasonal variations in reuse.

Indirect Potable Reuse

Indirect Potable Reuse (IPR) refers to the use of recycled water for groundwater replenishment, and reservoir water augmentation purposes. These types of uses require additional treatment levels beyond irrigation uses and use of an environmental buffer.

- Groundwater Replenishment – Metropolitan's service area overlies numerous groundwater basins, most of which rely on artificial recharge to sustain groundwater production, and some of which are threatened by seawater intrusion. Water agencies along the Los Angeles and Orange Counties coastline inject water into the underlying groundwater basins to create a barrier against this seawater intrusion and protect groundwater quality. The use of recycled water for seawater intrusion barrier projects is increasing and is replacing imported water used for this purpose. Increasing the proportion of recycled water can free imported water for direct consumption. For example, Metropolitan's Regional Recycled Water Program would provide purified recycled water instead of imported water to replenish multiple groundwater basins in the region, making imported water available for other purposes. Table 3-9 presents a summary of this recycled water use.
- Reservoir Water Augmentation – Reservoir Water Augmentation (previously identified as surface water augmentation) includes use of advanced treated recycled water to augment a surface water reservoir. The reservoir serves as an environmental buffer (similar to groundwater aquifer in the case of groundwater replenishment) prior to when recycled water is treated for potable uses. Blended water from the reservoir is then treated at a conventional water treatment plant for potable purposes. There is currently no reservoir water augmentation with recycled water in Metropolitan's service area. The State Water Resources Control Board (SWRCB) adopted the surface water augmentation regulations, required under SB 918, in 2018. The City of San Diego is currently operating a demonstration project to evaluate the feasibility and expected permitting requirements of a full-scale reservoir water augmentation project.

Table 3-9
2020[1] Recycled Water Use for
Groundwater Replenishment and Seawater Barrier Injection
(TAF per year)

Groundwater Basin	Recycled Water Use
Central Basin	56
Chino Basin	13
Orange County Basin	97
West Coast Basin	12
Other Basins	1
Total	**179**

[1] Data for 2020 not available at the time of publication, used average of 2017-2019.

Direct Potable Reuse

Direct Potable Reuse (DPR) refers to the use of advanced treated municipal recycled water as a direct supply before or after a conventional water treatment plant. DPR does not require an environmental buffer. There are two distinct forms of DPR: raw water augmentation, and treated drinking water augmentation. Currently, there are no permitted DPR projects in California. The report to the Legislature on DPR feasibility is complete (December 2016). In addition, SWRCB issued a framework for regulating DPR (1st edition April 2018, 2nd edition August 2019).

Raw Water Augmentation

Raw Water Augmentation (RWA) refers to the use of advanced treated wastewater as a direct supply before a conventional water treatment plant. Metropolitan is considering RWA as part of the Regional Recycled Water Program. This DPR option would involve delivery of advanced treated water upstream of the Weymouth and/or Diemer water treatment plants.

Treated Water Augmentation

Treated Water Augmentation means the planned placement of recycled water into the water distribution system of a public water system.

Technical and Economic Issues of Recycled Water

Recycled water use is growing rapidly in Metropolitan's service area. Further expansion depends on progress in research, regulatory change, public acceptance, water quality issues, cost, operational issues, and conflicting institutional objectives. Each of these challenges, as well as opportunities for recycled water use, lessons learned, and recommendations to enhance the development of recycled water, is discussed below.

Challenges

Lengthy and Variable Permitting Process

The SWRCB established the Recycled Water Policy (Policy). This Policy requires the SWRCB and the nine Regional Water Quality Control Boards (Regional Boards) to encourage the use of recycled water, consistent with state and federal water quality laws. The Policy provides additional direction to the Regional Boards on appropriate criteria to be used in regulating recycled water projects. The Division of Drinking Water (DDW) and the nine Regional Boards are responsible for setting the rules and permitting for recycled water projects. The timeline and roadmap for getting a permit are challenging and inconsistently implemented in different regions of the state. Limited history and technical information (e.g., on DPR) to inform regulations and limited staffing at DDW and other agencies have challenged the ability to propose, revise, and adopt new regulations in a timely manner. Agencies planning and designing DPR and IPR projects face delays because of regulatory uncertainty. In addition, many project proponents seeking grant or loan funding have identified lengthy CEQA review as a challenge.

IPR projects face regulatory constraints such as treatment, blend water, retention time, and Basin Plan Objectives, which are the designated uses assigned by the SWRCB and which may limit how much recycled water can feasibly be recharged into the groundwater basins. For example, the Basin Plan Objective for TDS of a particular basin may be lower than the quality of the tertiary water effluent available, resulting in the need for more blended water or advanced levels of treatment. These treatment requirements impact the economic feasibility of a project.

Public Perception/Conflicting Messaging

Public acceptance of recycled water is critical in implementing water reuse projects, especially potable reuse projects. In the past, public opposition halted a number of recycled water projects, citing concerns about the source of the water and resulting water quality.

The public does not have a clear understanding of the difference between non-potable reuse, IPR, and DPR. The public is most familiar with non-potable reuse as they see recycled water in use at parks, golf courses, schools, and other large landscapes. Signage for non-potable reuse projects at parks, schools, and golf courses that read, "Using recycled water; do not drink" can adversely affect the public's acceptance of DPR and IPR even though IPR has been used in some areas for over 50 years.

With effective outreach, public understanding and acceptance of potable reuse have improved. Projects such as Orange County's Groundwater Replenishment System conduct tours and presentations to thousands of people, raising awareness of the project, addressing water quality concerns that may be associated with recycling wastewater, and gaining support. Metropolitan's Regional Recycled Water Program also involves extensive outreach to the communities impacted by the program.

Education and public outreach are still needed. Any water reuse effort must include public engagement to build awareness of the project and acceptance of recycled water as a new supply.

Cost

Cost, including up-front capital and ongoing operation and maintenance, remains a concern to recycled water development for some agencies. The cost for expanding recycled water distribution systems remains a significant consideration to full implementation of non-potable reuse projects, as these projects require pipelines connecting the treatment plants and the individual users. Some non-potable reuse and IPR projects and all DPR projects require advanced treatment facilities, which are comparatively expensive. Advanced treatment may also require additional concentrate disposal facilities (e.g., a brine line) and extensive infrastructure for injection wells/spreading facilities, or for delivery of the product water to a spreading ground, surface reservoir, or water treatment plant for potable uses. Ultimately, end users play a very important role for recycled water advancement. Site conversion costs (borne by the customer) and additional conveyance infrastructure for new customers can also be significant considerations in reaching full non-potable reuse project capacity. Some agencies may be challenged with cash flow issues or inability to secure the funding needed to implement projects.

In addition, with the increasing prospect of statewide regulations, some agencies pursuing IPR may be hesitant to extend their existing distribution system for non-potable reuse projects for fear of stranded facilities. Similarly, some agencies pursuing DPR may delay their planned indirect potable reuse projects to prevent stranded distribution facilities.[3]

Source Control and Effluent Water Quality Needs

Source water quality and flow control is essential to help safeguard the water recycling treatment process and the end use of the water by placing controls on the type, timing, and amount of wastewater that comes into the plant. A good source control program limits wastewater treatment plant disruptions and ensures treatment processes are capable of handling spikes in volume, industrial influent, and high salinity influent. When it comes to the treatment process, recycled water policy requires that the effluent meets certain water quality standards. Salt and nutrient management plans protect groundwater beneficial uses and prevent excess degradation, which may limit expanded IPR applications if the agency does not have funds for advanced treatment to remove salts to meet the Basin Plan Objectives. In some cases, existing source control plans may need to be updated to deal with constituents of emerging concern and with more stringent needs of the users.

Source water quality for non-potable reuse can be affected by drought patterns in Southern California. Drought years with low State Water Project allocations will increase potable water salinity and, as a result, increases the salinity of source water for water reclamation plants. High salinity in wastewater decreases the viability of recycled water for irrigation uses and may also cause NPDES discharge violations for local agencies.

Water use efficiency helps conserve water, but also incidentally reduces wastewater volume resulting in an increase in the concentration of wastewater. As a result, additional treatment is needed, which increases operation and maintenance costs of the system. Source water quality is especially important for implementing IPR and DPR projects to protect potable water systems.

Operational Issues

While each agency is different, it is important to recognize the possible operational issues that may occur with the use of recycled water, including:

- Reduction in wastewater flows due to ongoing conservation and drought
- Lack of seasonal storage to address diurnal and seasonal demands; construction of storage facilities may be needed for flow equalization
- Concentrate disposal needs
- Environmental flow or stream discharge requirements may limit the ability to deliver recycled water during high demand periods
- Regulatory issues such as blend requirements and water quality objectives may impact the effectiveness of IPR
- Need for multiple barriers to ensure recycled water quality and for monitoring techniques that provide feedback in real-time to respond to plant disruptions, especially with DPR projects
- Need for additional operator training and certification

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[3] Indirect potable reuse projects usually require injection wells or a distribution system to a surface reservoir or recharge basin, and may also require improvements to a surface reservoir, recharge basin, or treatment facility.

Opportunities

Progress Towards New Regulatory Process

The State of California has made progress in developing permit standards that provide opportunities to expand recycled water use.

In December 2018, the State Recycled Water Policy was amended to further encourage use of recycled water from municipal wastewater, promote standardized state-wide implementation, and provide directions for Regional Boards, proponents, and the public when issuing permits. The amended policy included standardized annual reporting requirements and updated recycled water categories for better tracking. The Policy also included baseline monitoring requirements for emerging contaminants.

Non-potable reuse: The SWRCB adopted a general permit (Order WQ 2016-0068) for most non-potable beneficial reuse of treated municipal wastewater in June 2016. The permit provides an opportunity for non-potable reuse projects to come online sooner with standardized conditions and conditionally delegated authority for an Administrator to manage a local water recycling program. Revisions to the Recycled Water Policy in 2018 further standardized statewide implementation requiring most regional non-potable reuse permits be moved to the statewide general permit.

On-site treated non-potable water systems legislation (SB 996, Chaptered September 2018), requires the SWRCB to adopt risk-based water quality regulations by December 1, 2022. The legislation also requires local jurisdictions to adopt ordinances and requires treatment systems to comply with adopted water quality standards.

IPR and DPR: The SWRCB adopted uniform water recycling criteria for IPR for groundwater recharge in June 2014 and reservoir (surface water) water augmentation in March 2018. The SWRCB is facing a December 31, 2023 deadline from AB 574 to develop regulations for DPR through raw water augmentation. AB 574 also requires the establishment and administration of a science advisory panel to provide DPR guidance and assurance of protection of public health. Per the State's August 2019 DPR framework, the State will be developing a regulatory package for both treated and raw water augmentations concurrently.

Metropolitan continues to work with the WateReuse Association and other agencies on legislative and regulatory issues to streamline permitting processes and to provide needed funding and support for increased use of recycled water.

New Funding Opportunities

Proposition 1 provided $625 million for water recycling projects. Grants and loans for planning and construction are administered through the SWRCB's Water Recycling Funding Program. An additional $100 million was available through DWR for desalination.

Proposition 13, approved by voters is 2000, is also used to fund grants and loans for planning and construction of recycled water projects. Repayment of low-interest loans from previous projects allows limited funding from this program to continue.

Proposition 68, approved by the voters in 2018, provided $72 million in grants and loans for recycled water planning and construction activities. The remaining funding has been committed by the SWRCB for disadvantaged community projects. The SWRCB has committed to spend the remaining available Prop 1 and Prop 68 funding on approved projects on the FY 2020-21 Intended Use Plan.

The Clean Water State Revolving Fund (CWSRF) provides low-interest loans to public agencies for planning, design, and construction of water recycling projects. There is currently a substantial backlog of CWSRF projects on the FY20-21 Intended Use Plan (~$7 billion) that could limit the number of new projects approved over the next several years.

The Water Infrastructure Finance and Innovation Act (WIFIA) program was authorized by the Water Resources Development Act of 2014. The program is similar to the State Revolving Fund programs like the CWSRF program but is intended to provide federally subsidized low-interest loans for up to 49 percent of large regional projects.

Title XVI Water Reclamation and Reuse Program was established in 1992 and provides grant funding up to 25 percent of project costs or $20 million for selected projects in the western U.S. Title XVI requires projects be either congressionally authorized or competitively selected after USBR approval of a feasibility study.

In 2014, Metropolitan increased the financial incentives under its LRP for agencies to develop recycled water. Metropolitan also established the On-site Retrofit Pilot Program to provide rebates to customers that convert their irrigation and industrial system from potable water to recycled water. In addition, Metropolitan established the Reimbursable Services Program to provide technical and construction assistance to its member agencies for local project development. Under this program, Metropolitan advances funds and is reimbursed by the agency.

Improving Public Perception

Recent droughts have heightened water awareness in the region and have provided momentum for water conservation and reuse. The public is more willing to accept alternative supplies such as recycled water. Extensive public outreach and education have also helped improve the public's perception of recycled water. Public sharing of information, open door stakeholder meetings, and focus groups have been very effective at distributing information and addressing public concerns. Case studies and demonstration projects are used to educate and improve public acceptance of recycled water.

Agencies are working together to share best practices for public outreach, create consistent messaging, simplify water reuse terminology, and ensure effective communications with the public. One such group is the WateReuse California Communications Collaborative Group, which provides a forum to discuss and collaborate on water reuse communications. The group offers resources for communications professionals, including a terminology document to provide consistent and simple water reuse terminology, for use with the public.

New Technologies, Research, and Information Sharing

New technologies, research, and information sharing greatly enhance the development of recycled water. Programs such as Metropolitan's Future Supply Actions (FSA) Funding Program focus on technical studies and pilot projects that reduce barriers to future local production. Projects under this program include optimizing new treatment techniques for recycled water, exploring new monitoring methodologies, and testing innovative brine concentration technology. In addition to the technical portions of this program, the FSA Funding Program supports collaboration between agencies and regional sharing of information.

Metropolitan is also conducting cutting-edge research at the Regional Recycled Water Advanced Purification Center. The demonstration facility is testing the effectiveness of membrane bioreactors followed by reverse osmosis and ultraviolet disinfection/advanced oxidation in the advanced water treatment process. During testing, Metropolitan and the Sanitation Districts are analyzing water quality for removal of various contaminants, especially microorganisms. The agencies are also working closely with state regulators and an independent scientific advisory panel to oversee the work. Once regulators approve the process, it may be used throughout California. Additional research on membrane bioreactors and potential purification processes to address raw water augmentation are also planned at the demonstration facility. The studies will help further potable reuse in California and across the globe.

Research is especially critical in advancing new water supply options, such as DPR. WateReuse, in partnership with other agencies (including Metropolitan), is leading the California Direct Potable Reuse Initiative [4] to advance DPR as a water supply option in California and to address regulatory, utility, and community concerns. WateReuse's report *Direct Potable Reuse: A Path Forward* [5] provides an overview of DPR and identifies research needs.

Regional studies can also examine the needs of multi-jurisdictional areas and foster communication among agencies to promote the use of recycled water. For example, sharing regional information such as GIS data can identify areas of recycled water surpluses and needs.

Partnerships

Drinking water, wastewater, and groundwater management agencies share some common objectives, including access to source water, cost minimization, and protection of the environment. Many agencies are successfully cooperating and developing recycled water projects. These partnerships can allow sanitation districts to reduce the cost of disposing treated wastewater in the ocean, reduce impacts to the marine environment, and provide a source of reclaimed water to water agencies for recycling. At the same time, groundwater basin management agencies could be the recipients of final recycled water, helping maintain or increase groundwater levels.

Lessons Learned

There have been many success stories on recycled water development. Focusing on public outreach and education has improved public perception. Partnerships and joint efforts among water and wastewater agencies proved to be an effective way to remove barriers and make progress. Numerous studies and research funded by federal, state, and local agencies are benefitting local and regional efforts.

Public Outreach is Important

Public outreach and education have helped improve the public's perception of recycled water. Both experience and research have shown that when the public is informed and takes part in the decision-making process, they will likely accept and support recycled water as a new supply in their community.

Water shortages raise awareness for alternate ways to conserve. As a result, the public is more willing to accept alternative supplies such as recycled water, support the more expensive projects, and tolerate rate increases. Potable reuse projects throughout Southern California are advancing due to this increased public awareness and support. Non-potable reuse is also increasing. Some residential property owners are interested in using recycled water for watering plants to help with the drought. For example, residents have access to recycled water from "residential recycled water fill stations" in the Irvine Ranch Water District. Programs like these improve public acceptance of recycled water, increase recycled water use, and conserve potable supplies.

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[4] https://www.watereuse.org/foundation/research/direct potable reuse-Initiative
[5] https://www.watereuse.org/product/direct-potable-reuse-path-forward

Standard practice for water reuse projects now includes robust outreach. Many projects dedicate considerable resources towards public engagement. For example, Metropolitan's Regional Recycled Water Program features a learning center at its demonstration facility to provide a platform for public outreach. The facility and learning center are used to conduct tours, introducing the public to the program and potential new source of water.

Additional Funding is Needed

LRP incentives and onsite retrofit program funding have increased use of recycled water in the region by almost 200 percent. However, incentives alone may not be enough to spur project development - capital funding is also necessary because the LRP pays for project performance; in other words, it provides funding after a project begins operation. Metropolitan increased its LRP incentive rate in 2014, and also offers three options for an agency to receive funding. Agencies select the option that allows the project to receive incentives when they are needed, recognizing the higher costs borne by the agency and lower cost recovery at the start of operation. Although available construction funding for recycled water projects has increased under Proposition 1, projects generally still require a 50 percent local match. One source of funding is typically not enough to fund a recycled water project.

Partnerships Can Be Successful

History shows us that partnerships among agencies help advance use of recycled water and provide tangible benefits to each participating agency. A good example of partnerships working well is the agreement between Orange County Water District (OCWD) and the Orange County Sanitation District. This partnership began in the 1970s, when OCWD built the Water Factory 21 to produce recycled water to mitigate seawater intrusion in the Orange County Groundwater Basin. Twenty years later, the two agencies decided to jointly build the Groundwater Replenishment System (GWRS) recycled water project. The GWRS is the largest planned IPR facility in the world with a current capacity of 100 TAF per year and future expansion to 130 TAF per year.

Other examples of cooperation between agencies to further recycled water use include partnerships between the city of Los Angeles and West Basin Municipal Water District (West Basin Water Recycling Program), the City of Los Angeles and the City of Burbank (North Hollywood Water Recycling Project), City of Long Beach and the Water Replenishment District (Alamitos Barrier Water Recycling Project), and the Los Angeles County Sanitation Districts and Central Basin Municipal Water District (Century and Rio Hondo Water Recycling Project).

In addition, Metropolitan and the Sanitation Districts have been in partnership since 2009 to develop a regional recycled water project for groundwater replenishment and raw water augmentation. The Regional Recycled Water Program (RRWP) would produce up to 150 MGD of purified water from the Joint Water Pollution Control Plant in Carson. As a first step toward full implementation, Metropolitan and the Sanitation Districts cooperated to complete the Advanced Purification Center in 2019. The Advanced Purification Center is a 0.5 million gallon per day demonstration facility that will generate information needed for the potential future construction of a full-scale recycled water facility. It uses a unique application of membrane bioreactors designed to significantly increase efficiency in water recycling. Scientists and engineers will test the process, utilizing full-scale treatment modules, to ensure the resulting purified water meets the highest water quality standards. Once approved by regulators, this innovative process could be used throughout California and even applied around the globe. Metropolitan and the Sanitation Districts are continuing to move forward with the program, to enhance their partnership and begin the next phase of the program. Metropolitan's Board approved proceeding with the environmental planning phase of the project in November 2020.

Metropolitan is also in partnership with many other organizations to collaborate on this program. Potential recipients of the water, such as groundwater basin managers and member agencies, are partners. The Southern Nevada Water Authority, Central Arizona Project and Arizona Department of Water Resources are also partners, collaborating on how the project could support Colorado River water use. Metropolitan is also partnering with LADWP to work together to develop recycled water. LADWP's Operation Next Program to reuse wastewater from Hyperion is also a key project in development and could provide a potable supply for the region.

Water Industry Organizations and Regional Collaboration Help Advance Recycled Water

Recent advancements to recycled water development are due, in large part, to cooperation and collaboration among water and sanitation districts, as well as other water industry organizations. Historically, the WateReuse Association was one of the main advocates for recycled water development in the state. Their activities initially focused on permitting issues, public outreach/education, conferences for information sharing, and research related to recycled water. As recycled water became a core resource for water and wastewater agencies, they started to ramp up their activities to help advance recycled water and utilized partnerships with academia along with other trade organizations such as the Association of California Water Agencies, California Urban Water Agencies, WateReuse Association, and California Association of Sanitation Agencies. Professional organizations such as American Water Works Association are another vehicle to promote recycled water through research, technical seminars, and operator training and certification. These organizations have proven to be effective in promoting regional collaboration on research and leveraging resources. Recently, the Southern California Water Coalition (SCWC) has launched the Recycled Water Task Force with the goal of addressing barriers, gaining acceptance, and educating stakeholders on recycled water.

Recommendations

Explore Opportunities to Improve Permitting Process

- Streamline and simplify water recycling regulations with uniform administration consistent with operations, public health, and the environment
- Support legislation and regulation that expand the types of recycled water uses consistent with the protection of public health and help achieve the state's recycled water goal
- Convene a forum to discuss projects, permitting, and treatment technologies

Improve Public Education and Awareness of Water Recycling

- Continue to pursue unified, consistent messaging
- Consider updating signage for non-potable reuse, expanding residential fill stations, and other public outreach strategies to further advance public acceptance of recycled water
- Use demonstration facilities and learning centers like the Regional Recycled Water Advanced Purification Center to educate the public and key stakeholders about recycled water

Explore Various Investment Strategies, Such as Incentives, Ownership, and Partnerships

- Promote collaboration among stakeholders and agencies to facilitate implementation of recycled water projects in California

- Promote development of new financing to increase water recycling, advance research in science and technology, assess health effects, develop additional regional planning, and study innovative technologies
- Explore the development of recycled water partnerships or ownership
- Pursue the RRWP as a showcase of recycled water development
- Consider additional end user programs to replace potable water systems with recycled water
- Collaborate on pursuing grant funding

Consider Joint Technical Studies and Projects

- Explore integration approaches
- Investigate programs for the development of new technologies, such as comprehensive real-time monitoring devices and techniques that improve water quality and ensure public health, and maintain public confidence
- Study opportunities to protect or improve the quality of wastewater source supplies, as well as optimizing wastewater treatment for use in potable reuse applications
- Explore development of a regional study to help identify opportunities for seasonal storage
- Advance research that supports timely development of DPR regulations in California

Groundwater Recovery

All Southern California groundwater basins experience varying degrees of water quality challenges as a result of urban and agricultural uses. The accumulation of high-salinity water and degradation from volatile organics are two common constraints to the economic use of groundwater for urban applications. In some cases, the threat of increased salt buildup can also complicate conjunctive use of groundwater basins and imported supplies.

Use of degraded groundwater normally requires high levels of treatment. Membrane processes used to recover the majority of severely degraded water have a high capital cost and incur a high operational cost for power. Once treated, however, recovered groundwater may be integrated into potable water systems. Metropolitan initiated its Groundwater Recovery Program (GRP) in 1991 to encourage local agencies to treat and use degraded groundwater for municipal purposes. The GRP was open to all technologies that recovered and used degraded groundwater. The GRP was retired in 1998 and folded into Metropolitan's LRP.

Seawater Desalination

The constant availability of ocean water regardless of weather or climate is one of the key benefits of seawater desalination. Countries with arid or Mediterranean climates and/or growing populations with developing economies have embraced seawater desalination as a drought and climate resistant option for meeting water needs. In the past 20 years, water agencies in Australia, Spain, Singapore, Hong Kong, India, China, Israel, and other countries throughout the middle east have implemented large-scale seawater desalination plants in response to droughts and to meet growing demands. Within Southern California, San Diego County Water Authority, the City of Santa Barbara, and communities on Catalina Island have supplemented their water supplies with seawater desalination.

Seawater desalination projects provide unique benefits as part of a diversified water resource portfolio. In California, they also present unique development challenges compared to other alternative resources. Table 3-10 provides a summary of the primary benefits and challenges:

Table 3-10
Summary of Benefits and Challenges of Seawater Desalination Projects

Benefits	Challenges
• Highly reliable potable supply resistant to weather variations and climate change • Low salinity, high-quality resource improves supply blends and supports reuse • Locally controlled • Does not affect and is not affected by upstream or downstream water rights – truly a new supply • Located near coastal population centers • Supports Southern California's desalination industry cluster and innovation centers	• Expensive compared to many alternative existing supplies and some new alternative supplies • Potential marine life impacts • Local community and environmental opposition • Permitting uncertainty and development risk • Energy intensive and thus increased exposure to energy rate uncertainty • Demand risk in wet years

Metropolitan and its member agencies have been considering seawater desalination as a potential new supply source since the 1960s. Up until the 1990s, seawater desalination was considered expensive compared to other resource alternatives, especially imported water. Advances in membrane technology, energy recovery, and process design in the 1990s lowered desalination costs compared to other new supply alternatives.

By the early 2000s, several member agencies began pursuing local projects to diversify their resource portfolios. In 2001, Metropolitan created an incentive program, the Seawater Desalination Program (SDP), to support these projects. Soon after, the Board approved Metropolitan's role as a regional facilitator for seawater desalination with the purpose of assisting the member agencies with state and regional development issues. Metropolitan signed SDP agreements with Long Beach, MWDOC and West Basin in 2006. In 2014, Metropolitan merged seawater desalination projects into the LRP to promote development of additional local supplies in the region. Metropolitan's SDP agreements with the three member agencies expired in June 2020.

In order to protect California's coastal and marine resources, seawater desalination projects in the State must meet stringent environmental regulations. Relevant regulations include the California Ocean Plan and Marine Life Protected Area restrictions. Additionally, projects located near coastal generating stations are affected by the California's Once Through Cooling regulations. Each of these is discussed below:

<u>Ocean Plan Regulations</u>

In May 2015, the SWRCB updated California's Ocean Plan with regulations for new seawater desalination projects. The regulations include requirements for ocean water intakes, outfalls, brine discharges, mitigation, monitoring and permitting. Regional Water Quality Control Boards are responsible for implementing the regulations and have broad powers over project design elements.

Marine Life Protected Areas

In 2011, the California DFW adopted a system of 50 Marine Life Protected Areas (MLPAs) covering approximately 15 percent of Southern California's coastline[6]. MLPAs are defined zones along the coast where certain commercial and recreational activities are restricted. Most construction and operational activities associated with seawater desalination are prohibited in MLPAs with the exception of certain types of subsurface intakes. MLPAs are located along the Channel Islands, the mainland coast, and locations surrounding the Channel Islands. The MLPA network includes areas near planned seawater desalination projects. In October 2020, Governor Newsom announced a 30 percent by 2030 initiative. The initiative calls for preserving 30 percent of the California's lands and coastal waters by 2030. Implementation of the initiative may increase MLPAs within Southern California's coastal waters and could affect potential sites for seawater desalination projects. Additional MLPAs may also provide marine life mitigation opportunities for potential projects.

Once-Through Cooling Regulations

Prior to the revised Ocean Plan regulations, the SWRCB in 2010 adopted regulations requiring coastal power plants to phase out the use of once-through-cooling (the use of seawater to cool generators in a single-pass system) by 2030. As once-through-cooling is phased out, many of the environmental and operational benefits of co-locating seawater desalination projects with coastal power plants have been diminished. However, coastal power plants remain attractive sites for development due to the presence of coastal-dependent industrial zoned land, power infrastructure, and the potential to repurpose existing infrastructure.

Changed Conditions

The status of locally planned projects changes from year to year. Metropolitan periodically surveys its member agencies for planned projects to coordinate local supply projections and plans. Recent changes in long-term strategies, regulations, and funding priorities could provide new opportunities to develop these resources.

Recycled Water

Several recent state policies and adopted codes help recycled water development as described below.

SWRCB adopted the State Recycled Water Policy (Policy) in February 2009 after several years of negotiation and amended it in 2013 to include the monitoring and analytical requirements for constituents of emerging concern (CEC). The Policy supports the SWRCB Strategic Plan to promote sustainable local water supplies and establishes a mandate to increase the use of recycled water in California by 1 MAF per year over 2002 levels (approximately 525 TAF) by 2020 and by an additional 3 MAF per year by 2030. The Policy is organized into recycled water goals, roles of agencies, salt and nutrient management plans, landscape irrigation, groundwater replenishment, anti-degradation, emerging constituents, and recycled water incentives.

SWRCB's General Permit for Recycled Water Use was adopted June 4, 2014, in response to the Governor's drought declaration and to facilitate the use of recycled water to offset potable water demands. Coverage is available to most treated municipal wastewater for non-potable uses, but specifically excludes groundwater replenishment. Monitoring for CECs is not required for non-potable uses. Application of recycled water for irrigation sites is limited to agronomic rates.

[6] http://www.wildlife.ca.gov/Conservation/Marine/MPAs/Network/Southern-California

On November 18, 2009, the Building Standards Commission unanimously voted to approve the California Dual Plumbing Code that establishes statewide standards for installing both potable and recycled water plumbing systems in new commercial, retail, and office buildings, theaters, auditoriums, condominiums, schools, hotels, apartments, barracks, dormitories, jails, prisons, and reformatories. The code was adopted January 15, 2010, with an effective date of January 1, 2011.

Assembly Bill 2071 (Levine 2014) directed the SWRCB, in consultation with other agencies, to determine if the voluntary use of disinfected treated recycled water for watering animals would pose a significant risk to the public and animal health. Use of recycled water would be prohibited for dairy animals that are producing items for human consumption. An expert panel provided recommendations in 2018 including source control, ultraviolet light disinfection, and animal health surveys. The SWRCB will require these conditions in proposed projects and update the Title 22 Water Recycling Criteria. Permit conditions for a use of recycled water not addressed by the uniform statewide water recycling criteria shall be considered on a case-by-case basis.

The SWRCB shall update the uniform statewide criteria for non-potable recycled water uses by January 1, 2023.

Assembly Bill 2282 (Gatto 2014) directed the California Building Standards Commission to adopt mandatory building standards for the installation of recycled water systems for newly constructed commercial and residential buildings in areas where there is access to a water recycling facility. These standards became effective in July 2018 but were invalidated in 2019 for not complying with the Administrative Procedure Act. The California Building Standards Commission is expected to hold new workshops to address requirements.

Assembly Bill 574 (Quirk 2017) specifies that "direct potable reuse" includes "raw water augmentation" and "treated drinking water augmentation." The bill also changed the term "surface water augmentation" to "reservoir water augmentation" and redefined that term to mean the planned placement of recycled water into a raw surface water reservoir used as a source of domestic drinking water supply for a public water system or into a constructed system conveying water to such a reservoir. This bill mandates the following: 1) requires the SWRCB, on or before December 31, 2023, to adopt uniform water recycling criteria for DPR through raw water augmentation, 2) requires the SWRCB to establish and administer an expert review panel, and would require the SWRCB, before adopting the uniform water recycling criteria, to submit the proposed criteria to the expert review panel; 3) prohibits the SWRCB from adopting the uniform water recycling criteria until the expert review panel adopts a finding that the proposed criteria would adequately protect public health; 4) allows the SWRCB to extend the date by which the uniform water recycling criteria are to be adopted if certain criteria are met; and 5) authorizes the SWRCB, after it has adopted the initial uniform water recycling criteria, to reconvene or reestablish the expert review panel.

Groundwater Recovery Brine Disposal

The management of existing regional brine lines and the development of new brine line systems will be a critical factor in the continued growth in brackish groundwater desalination. Brine lines will also be applicable for disposing brine from advanced treatment of wastewater for recycled water use. All processes that recover degraded groundwater also produce concentrated waste flows for which disposal can be problematic. Most importantly, membrane processes such as reverse osmosis—the predominant desalting technology used in Southern California—produce significant volumes of brine that can account for about 15 percent of the treated water. In Southern California, brines generated from brackish water desalination are typically disposed through dedicated brine lines to ocean outfalls or sanitary sewers.

The region currently has two operating brine lines: the Santa Ana Regional Interceptor (SARI line) and the Calleguas Regional Salinity Management Pipeline. The SARI line collects brine from desalters in San Bernardino, Riverside, and Orange Counties and discharges to a treatment plant operated by the Orange County Sanitation Districts (OCSD), with final discharge through the OCSD ocean outfall. A key benefit of the SARI line is that it has allowed inland water agencies to recover impaired groundwater resources which would otherwise be unusable.

A lower portion of the Calleguas Regional Salinity Management Pipeline is in operation while the upper reach is still under construction. The Calleguas Regional Salinity Management Pipeline delivers brine from recycled water plants and groundwater desalination facilities in Ventura County to the ocean.

A third regional line is in the planning phase in San Diego County. The Southern California Salinity Coalition, a coalition of water and wastewater agencies, has advocated for state and federal financial assistance to build these regional brine lines.

Seawater Desalination

Changed conditions for seawater desalination include sustained operations of the Carlsbad Seawater Desalination plant, state and federal funding opportunities, and increased permitting uncertainty.

Carlsbad Desalination Project Operations

In 2015, the San Diego County Water Authority (SDCWA) started taking delivery of supplies from the Carlsbad Desalination Project (Carlsbad Project). The Carlsbad Project is the largest seawater desalination in the United States with a capacity of 50 MGD, or 56 TAF per year. The SDCWA developed the Carlsbad Project under a Public-Private Partnership with Poseidon Resources Inc. Production from the project is guided by a Water Purchase Agreement which specifies minimum and maximum purchases and also determines the price SDCWA pays for the supplies from the project. The following Table shows production from the Carlsbad Project since 2015.

Table 3-11
Claude Bud Lewis Carlsbad Seawater Desalination Program Production[1]

Fiscal Year Ending	Production (AF)
2016	27,349
2017	40,421
2018	40,907
2019	46,036
2020 (est.)	43,868

[1] Source: SDCWA

State and Federal Funding Opportunities

Several State and Federal funding opportunities exist to promote the development of seawater desalination projects. Within California, the Department of Water Resources (DWR) provides funding through the Water Desalination Grant Program. DWR taps limited funds for the Grant

Program from Proposition 1 and in the past from Proposition 50. As of January 2020, the Grant Program has funded over $100 million in grants for 70 projects. The program funds new construction, demonstration projects, and research studies. It also covers brackish water desalination projects. In 2018, DWR converted the program to a continuous application process.

Federal funding for desalination projects includes programs administered by the United States Bureau of Reclamation (USBR) and the Department of Energy (DOE).

USBR promotes desalination through its Desalination and Water Purification Research Program (DWPRP). Under DWPRP, USBR funds research, pilot tests and demonstration projects to improve technologies for desalination and brine management. Program goals include reducing desalination costs, energy use and environmental impacts. USBR operates the Brackish Groundwater National Desalination Research Facility and other desalination technology testing laboratories as part of the program. Several member agencies have received DWPRP grants for local desalination projects.

The DOE established a new Water-Energy desalination hub called the National Alliance for Water Innovation (NAWI). NAWI's focus is to accelerate the development of early-stage desalination technologies in order to lower desalination's costs and energy use. Led by Lawrence Berkeley National Laboratory, NAWI is a consortium of national laboratories, university researchers, private companies and water industry stakeholders. DOE is funding NAWI with $100 million over a five-year period starting in 2020. While the focus of NAWI is early-stage pre-commercial technologies, water agencies will have opportunities to participate in research projects and pilot tests. Water agencies will also help guide NAWI's research agenda. Metropolitan joined NAWI in 2020.

Implementation Approach

Local Resources Program

The Local Resources Program (LRP) is the primary tool for Metropolitan to incentivize local resources development. The success of the LRP is due to its adaptability to changed conditions. Periodically, Metropolitan and its member agencies review and update the LRP in response to water supply conditions.

In October 2018, Metropolitan's Board authorized an interim program target of 170 TAF since the program target established in 2007 of 174 TAF was nearly subscribed. The executed agreements, in combination with submitted and proposed LRP applications, exceeded the remaining program capacity under the 2007 LRP target. By establishing an interim target, Metropolitan continues to encourage and support development of local supplies. The interim target may be revised upon completion of the 2020 IRP.

On-Site Retrofit Program

Metropolitan continues to explore ways to help increase recycled water use. In order for a site to receive recycled water, the potable water systems must be retrofitted for recycled water use. In July 2014, to catalyze an increase in recycled water use, Metropolitan established the On-site Retrofit Program to provide financial incentives directly to public or private property owners to convert potable water irrigation or industrial water systems to recycled water service. The goal of this program is to alleviate some of the costs borne by property owners to retrofit their sites. The program offers a rebate of up $195/AF for five years of estimated water savings, capped at actual retrofit costs. Eligible items include retrofit costs related to project design, permitting, construction, connection fees, and required recycled water signage. The program currently has an annual budget of $2 million and is accepting applications on a first-come, first-served basis until funding is exhausted.

Stormwater Pilot Programs

Metropolitan's 2015 IRP Update called for the development of a diverse resource portfolio through local supply projects – including recycled water, groundwater recovery, seawater desalination, and stormwater capture. Metropolitan has played an active role in the development of those local supplies through different approaches and programs developed over the years. Since 1982, Metropolitan has provided incentives to its member agencies to develop local projects through the LRP. Local stormwater capture projects currently are not funded through the LRP in part due to the need to have a better understanding of the connection between captured stormwater and yield.

In 2018, the SCWC published a white paper that detailed benefits and challenges associated with stormwater development. Although stormwater projects deliver multiple benefits, such as supply yield, flood mitigation, habitat creation, and water quality improvements, some of the main challenges with developing stormwater projects are related to costs, metering, data collection, and water supply yield. The relationship between stormwater capture and yield has not been extensively analyzed. In addition, most projects do not demonstrate a direct link to increased groundwater production or yield. This limits the ability to fully characterize stormwater capture project costs or to quantify the water supply benefit.

To better understand the actual costs and potential benefits associated with stormwater capture, yield, and reuse, Metropolitan developed two Stormwater Pilot Programs. The Direct Use Pilot Program aims to develop costs and benefits associated with capture and direct reuse of stormwater. Under this pilot, projects are required to capture stormwater onsite or through storm drain diversion. In addition, projects must meter both captured and reused stormwater. The Recharge Pilot Program was initiated to further examine the relationship between stormwater capture and yield. The Recharge Pilot requires participants to measure both stormwater capture and how much of the captured water reaches the primary pumping and subsequently allows for increased groundwater production or yield. Proposed methods for measuring how stored water recharges the primary pumping aquifers must use at least one physical method and one modeling method. This pilot will help collect data to better understand how stormwater recharge affects usable groundwater. Both pilots provide funding for new construction and installation of monitoring equipment. Additionally, both pilots provide funding for collecting three years of monitoring data. The Direct Use Pilot launched in January of 2020 with a $5.0 million budget, while the Recharge Pilot launched shortly after in March 2020, with a budget of $7.5 million.

The data collected from the pilot programs will provide a better understanding of stormwater projects and their performance. Providing funding to offset construction and monitoring costs alleviates a key constraint in project development and the ability to quantify stormwater volumes. Furthermore, the data collected from the pilot programs will help evaluate the water supply benefits delivered by stormwater projects and provide a basis for potential future funding approaches.

Regional Recycled Water Program

The Regional Recycled Water Program, a partnership with the Los Angeles County Sanitation Districts, will purify wastewater that currently flows to the ocean to produce high quality water that could be used again. On November 10, 2015, Metropolitan's Board authorized Metropolitan to enter into an agreement with the Sanitation Districts to implement a demonstration-scale recycled water treatment plant and to establish the framework of terms and conditions for development of a regional recycled water supply program. Under this agreement, Metropolitan has the opportunity to work collaboratively with the Sanitation Districts to develop a potential regional recycled water supply program that would purify and reuse water. Metropolitan and the Sanitation Districts would jointly develop this program to purify effluent from the Sanitation Districts' Joint Water Pollution Control Plant (JWPCP) using advanced treatment technologies to produce water that is near-distilled in quality and that would be equal to or better than the quality of water currently used to replenish groundwater basins in the Southern California region. The purified water would be delivered to Metropolitan's member agencies to meet their groundwater replenishment and storage requirements. A collaboration between the two districts could advance the reuse of water at a scale, timing, and strategic location to serve the direct needs of multiple member agencies for recharge of groundwater basins in Southern California, and to augment regional supplies for Metropolitan's service area. In addition, with the development of regulations for raw water augmentation, purified water may eventually be blended with imported supplies at Metropolitan's treatment plants and delivered to additional member agencies.

In October 2019, the agencies began operating the Regional Recycled Water Advanced Purification Center, a 0.5 million gallon per day demonstration facility. The facility will generate information needed for the potential future construction of a full-scale advanced water plant. It uses a unique application of membrane bioreactors designed to significantly increase efficiency in water recycling. Scientists and engineers will test the process, utilizing full-scale treatment modules, to ensure the resulting purified water meets the highest water quality standards. Once approved by regulators, this innovative process could be used throughout California and even applied around the globe. Following approval, additional treatment trains will be tested to determine the needed purification processes for a full-scale program.

The full-scale regional RRWP would produce up to 150 million gallons daily, enough to serve more than 500,000 homes. Purified water from the advanced treatment facility would be delivered through 60 miles of new pipelines to the region's groundwater basins, industrial facilities, and potentially two of Metropolitan's treatment plants. Metropolitan prepared feasibility analyses for the RRWP (the Feasibility Study, Report No. 1530) in November 2016 and Conceptual Planning Studies Report (Report 1618, February 21, 2019) in preparation for environmental review and preliminary design. Letters of intent have also been executed with key partners.

In November 2020, Metropolitan's Board of Directors approved the next phase of the program, environmental planning. In addition, the Board also approved an updated agreement with the Sanitation Districts, which further expands the partnership and allows for additional shared responsibilities and resources.

Future Supply Actions

Metropolitan supports the development of local supplies through the FSA Funding Program. FSA are low cost, low risk investments Metropolitan can take now to remove barriers to new supplies so that they can be accelerated in the future, if when needed. The FSA Funding Program is Metropolitan's primary vehicle for promoting innovative new approaches to local supply development. Under the FSA Funding Program, Metropolitan funds member agency studies addressing development challenges for groundwater, recycled water, stormwater and seawater desalination supplies. The goals of the FSA Funding Program include:

- Reduce barriers to future resource production
- Provide results that are unique, yet transferable to other areas in the region
- Advance the field of knowledge
- Represent a critical path to water resource implementation

Metropolitan implemented an initial round of FSA funding in 2013 and launched a second round of funding in 2019. Both rounds have funded a mix of white papers, pilot tests and demonstration studies. The program funds a maximum of $500,000 per study or per agency. In 2018, Metropolitan also co-funded six potable reuse projects and one agricultural reuse study under the FSA Funding Program with the Water Research Foundation. Metropolitan's nearly $1.0 million in co-funding supports WRF's $8.0 million Advancing Potable Reuse Initiative and helped match $4.5 million in State Water Resource Control Board grant funds. Table 3-12 provides a summary of the FSA funding.

Table 3-12
Summary of FSA Funding

	2013 FSA Member Agency Studies		2018 FSA Member Agency Studies		2018 WRF Potable Reuse Studies	
	Studies	**Funding**	**Studies**	**Funding**	**Studies**	**Funding**
Groundwater	4	$900,000	3	$661,000		
Recycled Water	5	$810,000	5	$1,265,000	7	$975,000
Stormwater	2	$814,000	4	865,000		
Seawater Desalination	2	$325,000	2	$365,000		
Total Funding	**13**	**$2,939,000**	**14**	**$3,156,000**	**7**	**$975,000**

Metropolitan also supports local supply development as a regional facilitator for seawater desalination and related resource issues. This includes assisting member agencies with technical issues, supporting member agency projects during permit hearings, coordinating responses to proposed regulations, and collaborating with the member agencies to address development challenges. Metropolitan helped launch and now participates in CalDesal, a consortium of water utility and private stakeholders promoting desalination as an element of California's future supply portfolio.

Achievements to Date

Metropolitan has continued to develop and refine its programs to encourage the involvement of its member agencies in water recycling, groundwater recovery, and desalination. Developing and managing these programs requires considerable coordination and refinement. Changing conditions over the last five years have reduced the costs of these options and allow Metropolitan to rely on these sources for future water supply.

Table 3-13 provides a summary of the status of local agency seawater desalination projects that are under development within Metropolitan's service area. Local agencies are considering several projects with the potential to produce up to 131 TAF, if developed.

Metropolitan is committed to providing financial assistance to the development of water recycling projects throughout its service area. Since 1982, Metropolitan has executed LRP contracts for 85 recycled water projects, 75 of which produced about 138 TAF in 2019. Local projects not receiving funding from Metropolitan provide an additional 370 TAF of recycled water to the region.

Since 1991, Metropolitan has executed GRP and LRP contracts for 27 recovered groundwater projects, 24 of which produced about 50 TAF in 2019. In addition to the projects under

Metropolitan's programs, about 62 TAF of degraded groundwater is recovered by agencies in Metropolitan's service area without Metropolitan's financial assistance.

Table 3-14 provides a summary of recycled water use and groundwater recovery in FY 2019-20. To date, Metropolitan has invested $510 million in recycling programs and $173 million for groundwater recovery. Table 3-15 provides a summary of the groundwater and recycled water production and incentive payments under Metropolitan's programs to date.

Table 3-13
Seawater Desalination Projects Under Development within Metropolitan's Service Area[1]

Project	Member Agency Service Area	Planned Capacity AF per Year	Status as of September 2020
Huntington Beach Seawater Desalination Project	Orange County Water District / Municipal Water District of Southern California	56,000	Permitting
West Basin Ocean Desalination Project	West Basin Municipal Water District	20,000 to 60,000	Environmental Impact Report
Doheny Desalination Project	South Coast Water District / Municipal Water District of Orange County	5,000 to 15,000	Permitting
Total: Potential Projects		**81,000 – 131,000**	

[1] Does not include potential seawater desalination projects in Mexico which could supply Metropolitan's service area through direct deliveries or through exchanges.

Table 3-14
FY 2019-20 Water Production from Recycling and Groundwater Recovery
(TAF)

Type of Project	With Metropolitan Funding	Without Metropolitan Funding	Total
Recycled Water[1]	71	370	441
Groundwater Recovery	50	62	112
Total	**121**	**432**	**553**

[1] Excluding Santa Ana River baseflow.

Table 3-15
Local Resources Program

	Recovered Groundwater	Recycled Water	Total
Projects			
Contracted	27	85	112
In Operation	24	76	100
Ultimate Yield (TAF)	124	348	472
Deliveries (TAF)			
FY 2019-2020	50	71	121
Since Inception	1,052	2,972	4,024
Payments ($ millions)			
FY 2019-2020	$4	$13	$17
Since Inception	$173	$510	$683

3.6 Surface Storage and Groundwater Management Programs: Within the Region

Since the 1950s, local water management in Metropolitan's service area has included the surface water storage and conjunctive use of groundwater. Conjunctive use of water refers to the use and storage of imported surface water supplies in groundwater basins and reservoirs during periods of abundance. This stored water is available for use during periods of low surface water supplies as a way of augmenting seasonal and multiyear shortages.

Background

Metropolitan established general long-term storage guidelines in its Water Surplus and Drought Management (WSDM) Plan. The WSDM Plan provides for flexibility during dry years, allowing Metropolitan to use storage for managing water quality, hydrology, SWP, and Colorado River issues. Dry-year surface storage yields have been characterized in several ways, including delivery capabilities over two- and three-year dry periods. The approach used in Metropolitan's resource planning assumes that dry-year surface storage can be used as needed and as available within the WSDM planning framework. In addition to surface reservoirs in the region, storage capacity in the region's groundwater basins allows for conjunctive use programs. In 2000, the Association of Ground Water Agencies (AGWA) published Groundwater and Surface Water in Southern California: A Guide to Conjunctive Use that estimated the potential for dry-year or long-term conjunctive use in Metropolitan's service area at approximately 4.0 MAF. In 2007, Metropolitan published the Groundwater Assessment Study that estimated 3.2 MAF of space in groundwater basins available for storage within Metropolitan's service area. Metropolitan's 1996 IRP calls for the development of conjunctive use programs with member agencies and groundwater basin managers to store surplus imported supplies in wet years to provide dry-year supplies.

To prepare for supply disruptions, Metropolitan and its member agencies have adopted goals for water storage within the region. Metropolitan has identified in-region storage that should be set aside for use in emergencies, such as a disruption to imported supplies due to a major seismic event at the San Andreas Fault.

Implementation Approach

Surface Storage

Since the beginning of Metropolitan's planning process, two significant changes have occurred to regional surface storage: (1) the construction of DVL, and (2) Metropolitan receiving operational control of 218,940 AF in Castaic Lake and Lake Perris.

<u>Diamond Valley Lake</u>

Construction of Southern California's newest and largest reservoir nearly doubled the area's surface water storage capacity. Transport of imported water to the lake began in November 1999, and the lake reached capacity in early 2003. DVL holds up to 810 TAF, some of which is for dry-year or seasonal storage, and the remainder for emergency storage.

<u>SWP Terminal Reservoirs</u>

Under the 1994 Monterey Agreement and Amendment, Metropolitan is permitted to withdraw up to 218,940 AF in the reservoirs at the southern terminals of the California Aqueduct. Access to this storage capacity in Castaic Lake (153,940 AF) and Lake Perris (65,000 AF) gives Metropolitan greater flexibility in handling supply shortages. Any amount of water withdrawn in a year must be replaced with supplies available to Metropolitan within five years.

Groundwater Storage

Many local groundwater storage programs have been implemented over the years to maximize the use of local water supplies. These programs have included the diversion of water flows into percolation ponds for recharging groundwater basins and the recovery of degraded groundwater.

- For many years, flood control agencies within Metropolitan's service area have captured and spread stormwater for groundwater replenishment. Local runoff and reclaimed water have been conserved via spreading grounds, injection wells, reservoirs, and unlined river channels. In addition, flood control agencies have operated seawater barrier projects in Los Angeles and Orange Counties to prevent seawater intrusion into the coastal groundwater basins.
- Water quality issues have raised serious concerns about the ability to sustain average annual production levels in some groundwater basins. For example, recently recognized threats to groundwater basins posed by emerging contaminants such as per- and polyfluoroalkyl substances (PFAS) have affected groundwater production in many areas. Groundwater levels have been augmented by groundwater water recovery projects discussed in Section 3.5.

Conjunctive use of the aquifers offers an important source of dry year supplies. Unused storage in Southern California groundwater basins can be used to optimize imported water supplies, and the development of groundwater storage projects allows effective management and regulation of the region's major imported supplies from the Colorado River and SWP. Over the years, Metropolitan has implemented conjunctive use through various programs. Typically, this storage takes place in one of two ways:

- Direct deliveries to storage – Metropolitan delivers recharge water directly to water storage facilities, including spreading sites and injection wells.
- In-lieu deliveries to storage – Metropolitan delivers water directly to a member agency's distribution system for use by the member agency rather than, or in-lieu of, pumping the groundwater it otherwise would have taken out of storage. The deferred local production results in water being left in local storage (surface or groundwater) for future use.

Metropolitan has developed a number of local programs to work with its member agencies to increase stored water in groundwater basins through conjunctive use. Conjunctive use agreements provide for storage of imported water that can be called for use by Metropolitan during dry, drought, or emergency conditions. During a dry period, Metropolitan has the option to call water stored in the groundwater basins pursuant to its contractual conjunctive use agreements. At the time of the call, the member agency pays Metropolitan the prevailing rate for that water. Metropolitan has drawn on dry-year supply from nine contractual conjunctive use storage programs to address shortages from the SWP and the Colorado River.

Metropolitan has also made use of the basins to manage its water supply resources through programs such as its cyclic agreements. Cyclic programs allow Metropolitan to deliver water into groundwater basin or surface water reservoir before the agency has a demand for water. Advanced deliveries allow Metropolitan to manage high-supply availability when its own storage capacity is limited. The member agency purchases the delivered water based on a long-term schedule agreed by the parties. Although cyclic programs do not hold stored water for Metropolitan, they provide water resource management flexibility, especially when storage capacity is restricted.

Achievements to Date

In 2000, Metropolitan entered an agreement with DWR to administer $45 million of Proposition 13 state bond funds for Metropolitan's Southern California Water Supply Reliability Projects Program. Metropolitan paired the $45 million of state funds with $35 million of Metropolitan capital funds to develop nine groundwater storage programs in partnership with member and retail agencies and groundwater basin managers. These nine contractual storage programs have an initial 25-year term and provide for storage of up to 212 TAF and dry-year yield of up to 70 TAF. These programs are summarized in Table 3-16. Since inception, the conjunctive use program has been exercised to store water in groundwater basins during wet periods and relied upon to extract that water during dry periods. For example, during the recent drought period from 2012 to 2016, the conjunctive use program provided 64,000 AF of dry year supply to help Metropolitan meet regional demands. As of January 2020, the conjunctive use storage balance is 61,000 AF.

In 2007, Metropolitan prepared the Groundwater Assessment Study Report in collaboration with its member agencies and with groundwater basin managers. The report finds that while there is substantial storage space in service area groundwater basins that could be used for conjunctive use, there are significant challenges that must be overcome in order to implement additional storage programs. Use of additional storage opportunity requires:

- Capture, delivery, and recharge of additional local and imported surface supplies;
- Improved capability to store available surplus surface supplies with adequate conveyance and recharge capacity; and
- Resolution of constraints including: remediation of contamination, institutional and legal issues, funding for significant investment in capital infrastructure, and incongruity between aquifer capability with overlying demand for water supplies.

To follow up on the findings of the Groundwater Assessment Study Report, Metropolitan initiated a series of seven groundwater workshops beginning in July 2008 among Metropolitan, member agencies, groundwater basin managers, and stakeholders to discuss challenges for increasing conjunctive use and to develop recommendations for addressing the challenges. The workgroup's recommendations were submitted as a Board Report to Metropolitan's Board of Directors and provided as input to Metropolitan's current planning process. The recommendations are as follows:

1. Enhance groundwater replenishment with increased stormwater, recycled water, and imported water recharge.
2. Streamline requirements, remove policy constraints, clarify procedures, increase coordination and sharing of information to accomplish recharge goals.
3. Develop flexible regional policies and programs that can be tailored to meet specific local needs of each groundwater basin.
4. Increase integration of local groundwater and regional water supplies with a proposal for a comprehensive modeling study to initiate review of innovative opportunities.
5. Use appropriate price signals to encourage conjunctive use and investments for storage.
6. Increase coordination among Metropolitan, member agencies, basin managers, groundwater producers, and stakeholders inclusive of collaboration for legislative, regulatory, and educational efforts in support of specific initiatives and funding needed for sound groundwater management.

Metropolitan has given updates of the Groundwater Assessment Study to the Board in 2011, 2015, and 2018.

Since 2013, Metropolitan has also been working with the SCWC Stormwater Task Force to evaluate the feasibility of further supporting groundwater production with increases in stormwater capture for groundwater replenishment. Metropolitan remains actively involved in the SCWC Stormwater Task Force. In 2019, the Stormwater Task Force developed a white paper that discussed innovative project implementation and enhanced operation and maintenance strategies. Metropolitan staff gave a presentation on the stormwater pilot program at the annual workshop on September 27, 2019. The workshop brought together more than 200 participants, including local agencies, regional planners, and non-government agencies for a discussion on regional stormwater issues. In 2020, due to the global pandemic, the Stormwater Task Force hosted a series of short informational webinars related to water resources development and innovative stormwater projects.

Table 3-16
Contractual Conjunctive Groundwater Projects

Project and Project Proponents	**Storage Capacity** (TAF)	**Dry-Year Yield** (TAF/Year)	**Storage Account Balance as of 01/01/2020** (TAF)
LOS ANGELES COUNTY			
Long Beach Conjunctive Use Project Long Beach	13.0	4.3	3
Foothill Area GW Storage Project Foothill MWD	9.0	3.0	0
Long Beach CUP: Expansion in Lakewood Long Beach	3.6	1.2	0
City of Compton Conjunctive Use Program City of Compton	2.3	0.8	0
Upper Claremont Heights Conjunctive Use Three Valleys MWD	3.0	1.0	1
ORANGE COUNTY			
Orange County GW Conjunctive Use Program OCWD, MWDOC	66.0	22.0	0
SAN BERNARDINO COUNTY			
Chino Basin Programs IEUA, TVMWD, Chino Basin Watermaster	100.0	33.0	49
Live Oak Basin Conjunctive Use Project Three Valleys MWD	3.0	1.0	0
RIVERSIDE COUNTY			
Elsinore Groundwater Storage Program Western MWD, Elsinore Valley MWD	12.0	4.0	8
Total	**211.9**	**70.3**	**61**

3.7 Water Use Reduction

In November 2009, Governor Arnold Schwarzenegger signed the Water Conservation Act of 2009 (SB X7-7) into law as part of the historic comprehensive water package designed to address the State's growing water challenges. The Act represented the culmination of efforts by water industry leaders (including Metropolitan), the environmental community, and the Legislature to enact legislation that would answer the governor's call for the state to reduce per capita water use 20 percent by the year 2020 (referred to as "20x2020") as part of a larger effort to ensure reliable water supplies for future generations and restore the Bay-Delta.

The 20x2020 legislation requires urban retail water suppliers to develop urban water use targets to help meet the 20 percent reduction in water use by 2020, with interim targets for 2015. The legislation provides flexibility in how targets are established and achieved. Per capita reductions can be accomplished through any combination of increased water conservation, improved water use efficiency, and increased use of recycled water to offset potable demand. Potable demand offsets can occur through direct reuse of recycled water, such as for irrigation, or IPR through groundwater replenishment and reservoir water augmentation. Retail water suppliers receive partial credit for past efforts in conservation and recycled water; therefore, not all agencies need to reduce demand by 20 percent in order to comply with the law.

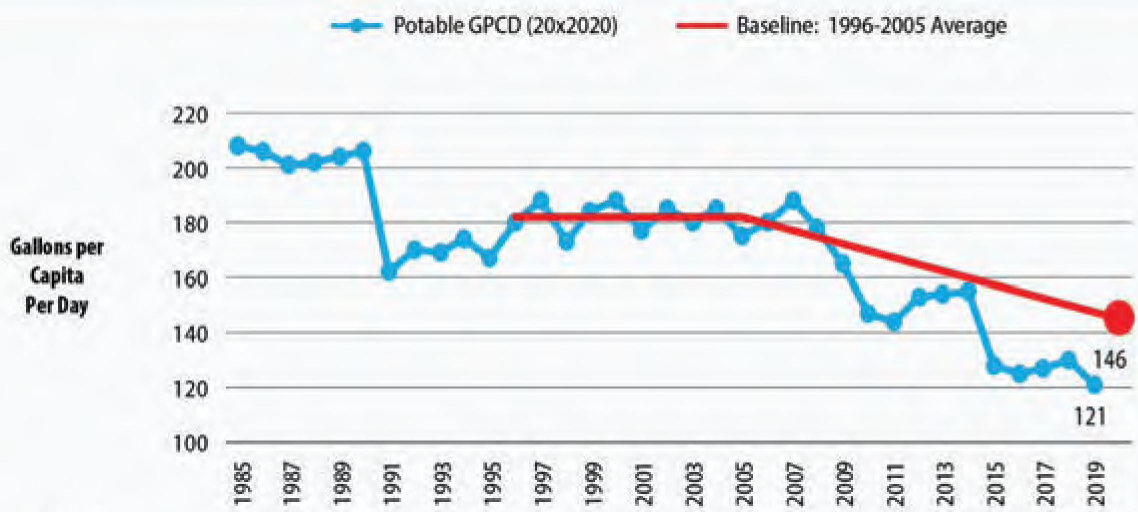
Achievement as of 2020

As a wholesale water agency, Metropolitan is not required to establish or report an urban water use reduction target. However, Metropolitan's regional conservation programs and local resource programs are designed to assist member agencies and retail water suppliers in the service area to comply with SB X7-7. These programs are described in Sections 3.4 and 3.5. Therefore, Metropolitan monitors the progress of its service area.

Based on an analysis of population, demand, and the methodologies for setting targets described in the legislation, Metropolitan's baseline per capita water use is 182 GPCD and the 2020 reduction target is 146 GPCD. From 2011 to 2014, there was a slight increase in per capita water use explained in part by continued economic recovery and drier weather as compared to previous years. With mandatory restrictions from the state and water supply allocation from Metropolitan, Metropolitan's 2015 UWMP reported an interim water use reduction achievement of 131 gallons per capita per day (GPCD), which is a 28 percent reduction from the baseline.

Over the last five years, Metropolitan continued to provide support for retail agency water use reduction efforts through technical assistance, legislation, code and standards updates, and financial incentives where needed to increase water use efficiency. Based on best available data as of January 2021, Metropolitan estimates a 2019 per capita water use of 121 GCPD, well exceeding Metropolitan's 2020 water use target of 146 GPCD with a 34 percent reduction from the baseline of 182 GPCD.

Figure 3-4 Potable Per Capita Water Use: 20% Reduction by 2020
Metropolitan's Service Area (Calendar Year)



Notes:

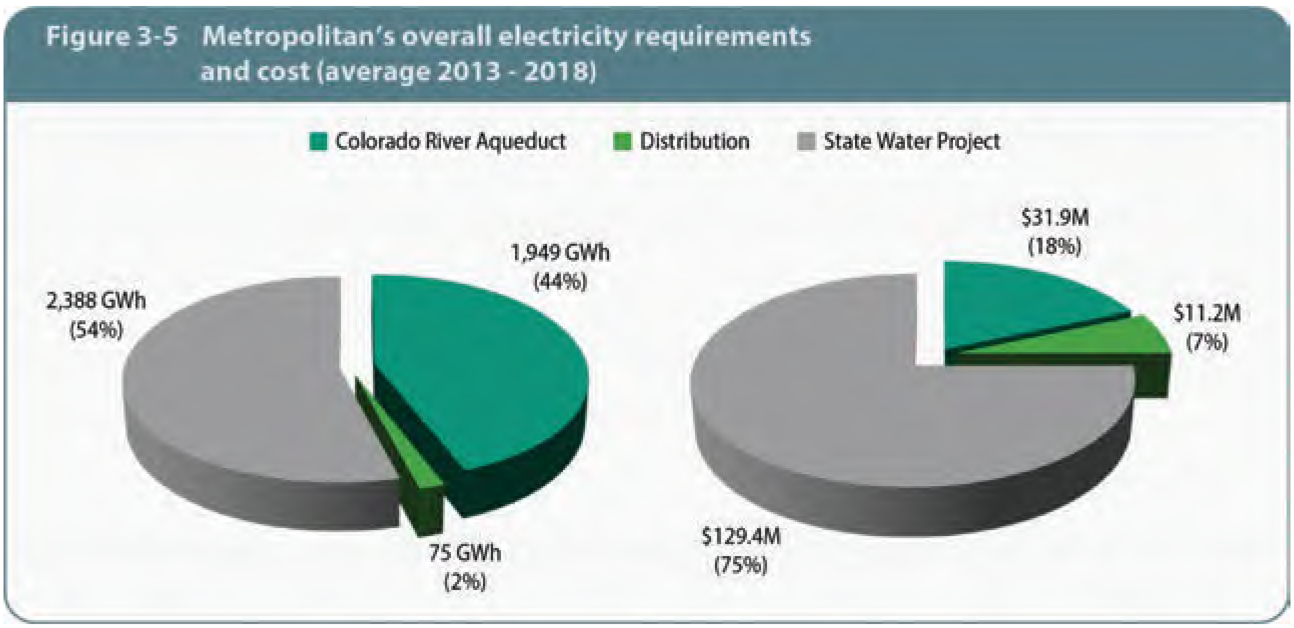
1. Calendar year data.
2. 2019 GPCD based on best available data as of January 2021 and is subject to change.
3. Baseline per capita water use based on 1996-2005 average (182 GPCD).
4. Target GPCD for 2020 based on 20% reduction from baseline (146 GPCD).

3.8 Energy Management Initiative

Metropolitan's mission is to provide its service area with an adequate and reliable supply of high-quality water to meet present and future needs in an environmentally and economically responsible way. The conveyance, treatment, and distribution of water is an energy-intensive and energy-dependent process, and as such, Metropolitan has goals of controlling operational costs and conserving valuable natural resources.

Metropolitan's net energy use and costs are dominated by the pumping (transport) required to import water via the Colorado River Aqueduct (CRA) and State Water Project (SWP) systems (Figure 3-5). Given that Metropolitan does not have direct control over operations of the SWP, its energy strategy focuses exclusively on the energy use and cost for CRA operations (wholesale power) and for Metropolitan's distribution, treatment, and office facilities (retail power), which on average total $43.1 million per year.

Figure 3-5
Metropolitan's overall electricity requirements and cost (average 2013-2018)



Over the past several decades, Metropolitan has implemented many energy initiatives that have reduced energy costs and use, while diversifying its energy portfolio. These have included 130 megawatts (MW) of small hydropower generating facilities, 5.5 MW of solar power generation installations[7], and a 50-year agreement executed in 2017 to receive low-cost carbon-free hydropower from Hoover Dam for CRA operations. Despite these efforts, external factors have resulted in increased energy costs. Five major drivers influence the future energy market and Metropolitan's corresponding energy sustainability strategy, including:

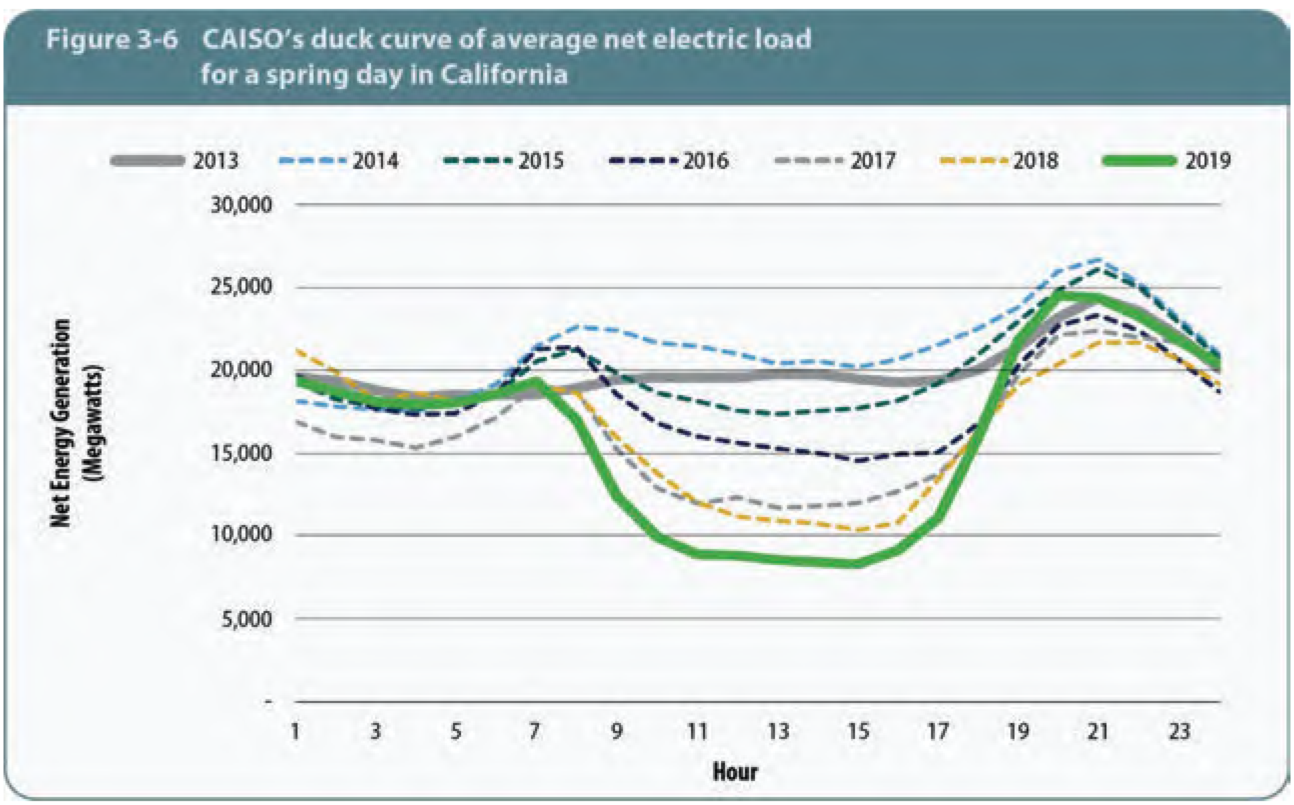
- *Progression of environmental regulations*. California is leading the nation with energy and environmental policy initiatives that are driving electrical grid changes. In particular, California's shift to renewables and carbon-free energy by 2045 (Senate Bill 100) is a primary

[7] This includes 5 MW of solar power capacity located at three of Metropolitan's treatment plants and 0.5 MW located at Diamond Valley Lake.

driver in future energy dynamics and will impact both the cost and volatility of energy markets.

- *Energy market pricing uncertainty*. Approximately 50 to 85 percent of Metropolitan's energy for CRA pumping is supplied from low-cost federal hydropower, and the balance is supplied from supplemental purchases of wholesale energy from the market. The adoption of recent policies and state goals in greenhouse gas (GHG) emission reductions and environmental protection are fundamentally changing the wholesale electric grid and its operation. The high penetration of renewable generation across the state resulted in the "duck curve" effect which has shifted peak prices from periods when demand is highest (typically midday) to periods in which solar generation declines (typically evening hours) (CAISO load minus solar generation is shown in Figure 3-6). In certain times of the year, a significant net load increase occurs when solar generation decreases at the end of the day. This increase must be mitigated by conventional fossil fired energy generators. This effect also creates over-generation during the middle of the day, which produces a "belly" appearance, and a steep ramp for fossil fuel generators during the late afternoon and evening, creating an "arch." The consequent changes in wholesale and retail energy price and structures are impacting hourly energy costs and operations at Metropolitan.

Figure 3-6
CAISO's duck curve of average net electric load for a spring day in California



Source: IEA, 2019

- *Grid reliability.* California has historically depended on fossil-fired generation to provide for the bulk of its energy needs, as well as peaking capacity and operating reserves to balance the system and compensate for system contingencies. The state's environmental policies to reduce fossil generation emissions and cooling water impacts have and will continue to result in the retirement of fossil generation throughout the state and the region. The transition to renewable, non-emitting generation creates challenges for grid operators without the traditional sources of on-demand, fast-ramping capacity.
- *Climate change and natural disasters.* Natural disasters and a changing climate pose substantial risks to the availability and price of energy for Metropolitan. While the timing and extent of these events are unpredictable, their effects can be anticipated and estimated. The main challenge for Metropolitan and its energy providers will be to develop and nimbly execute energy management initiatives that preserve a high degree of long-term flexibility and stable costs.
- *Technological advances and incentives.* New technological advancements and improved practices in the renewable energy and energy storage sectors provide viable options for Metropolitan's long-term energy management goals. For example, energy storage systems are able to capture the energy generated by renewables and store it until the energy is needed. Energy storage can address the power intermittency challenges from renewables and effectively increase utility resiliency and reliability. Several incentive and credit programs are also available, such as the California Public Utilities Commission Self-Generation Incentive Program, to further improve the economic feasibility of battery energy storage projects.

The evolution in California's energy mix and resulting uncertainty in the reliability and cost of energy supplies affect the affordability and reliability of Metropolitan's water supply operations. Metropolitan's review of its energy strategies, practices and projects is an important step to help position itself as a leader in energy sustainability.

In 2020, Metropolitan developed a new Energy Sustainability Plan (ESP) and an updated implementation roadmap, to formulate actions and strategies that best position Metropolitan to adapt to future wholesale and retail energy market changes for its CRA operations and conveyance and distribution system. The ESP's purpose is to foster informed energy management decisions through a framework of sustainable actions focused on energy cost containment, reliability, affordability, conservation and adaptation – now and into the future.

The ESP incorporates an adaptive energy management strategy and project implementation roadmap resulting in projects and initiatives that:

- Contain costs and reduce Metropolitan's exposure to energy price volatility
- Increase operational reliability and flexibility
- Move Metropolitan towards energy independence and sustainability
- Support Metropolitan's Climate Action Plan (CAP) effort to meet proposed GHG emissions reduction targets

Metropolitan's adaptive energy management strategy addresses issues surrounding energy management and cost mitigation. The energy strategy roadmap addresses near- to long-term energy issues and achieves Metropolitan's overarching goals by including projects that address both retail and wholesale energy markets, and energy management best practices. The recommended actions are impacted by numerous factors, considered as indicators in this plan, that will signal the acceleration or change of course for certain actions. The magnitude, nature, and timing of these signals will result in different responses and actions for Metropolitan in the long-term and will be continuously monitored over time.

Selected near-term actions (1-3 years) identified are:

- Implement reconfiguration of the Yorba Linda Power Plant feed to serve the Diemer water treatment plant (WTP) retail load behind the Southern California Edison meter.
- Implement battery storage projects at the Weymouth, Skinner, Jensen, and Mills WTPs and the OC-88 Pumping Plant.
- Evaluate implementation of islanded operations using battery storage for possible future microgrid operations.
- Monitor wholesale energy market developments for major changes to CRA energy costs and evaluate appropriate options, such as generation or energy storage.
- Assess pump modifications at Intake and Gene pumping plants to implement targeted application of variable-speed pump drives.
- Continue to monitor third-party developer projects for opportunities in retail and large-scale wholesale renewable energy and energy storage opportunities.

Metropolitan has made progress on two near-term actions. This includes initiating projects for battery storage at the Skinner, Jensen, and Weymouth treatment plants, as well as OC-88. To support implementation, Metropolitan has applied for $10.3 million in state incentives for these projects. The battery storage facilities will be configured as microgrids to optimize on-site solar generation and increase energy resilience.

Selected mid-term actions (4-7 years) include:

- Assess the performance of implemented Battery Energy Storage System projects and later implement the previously deferred project options based on first phase performance results.
- Implement renewable energy and/or energy storage projects with third-party developers, if determined feasible.
- Continue evaluating low/no carbon power for CRA pumping operations to hedge against rising carbon prices.
- Reevaluate small hydropower opportunities within the distribution system if project economics become favorable.

Metropolitan engages in several energy best practices to reduce Metropolitan's overall energy consumption. These practices focus on energy auditing, monitoring and benchmarking, cost optimization of process and pumping operations, energy efficient design and rehabilitation measures, and providing staff training and communication strategies for energy management. Energy efficiency opportunities that reduce energy usage are evaluated on a continuous basis for short- and long-term benefits to help reduce energy-related costs and GHG emissions.

Long-term planning over the next 10 years will adapt relevant actions and strategies to current conditions. The key goal for Metropolitan's long-term energy management plan is to continuously update the ESP, monitor implemented projects and initiatives, reassess the main market drivers to better understand potential project and energy management opportunities, and adjust the ESP and roadmap accordingly.

The framework is intended to be flexible by accommodating future projects, preferences, and localized needs, and to be adaptable as Metropolitan's goals and technology evolve. The roadmap provides a plan for implementation of the recommended energy projects and initiatives, while accounting for changes in the future. Signals assigned to each action will be monitored over time by Metropolitan staff to indicate when these actions and their economic and operational benefits can serve Metropolitan's needs.

Climate Action Plan

In 2016, California signed into law the country's most stringent GHG reduction target of 40 percent below 1990 levels by the year 2030, as well as a long-term goal of 80 percent below 1990 levels by 2050. In 2017, then Governor Brown signed EO B-55-18, which set an even more progressive long-term goal of carbon neutrality by 2045. While the state has not imposed specific GHG reduction requirements for public water agencies, its 2017 Climate Change Scoping Plan suggests that water agencies should move towards low carbon or net-zero carbon water management systems.

To help California achieve this ambitious goal, Metropolitan is in the process of developing its first ever Climate Action Plan (CAP), which will serve as a road map for reducing greenhouse gas (GHG) emissions from its operations and future construction projects. The CAP will meet the goals of the state by identifying and implementing a number of actions that will reduce Metropolitan's future GHG emissions. In addition, it will serve as a vehicle to streamline project evaluation of GHG impacts under the California Environmental Quality Act (CEQA Guidelines § 15183.5(b) Plans for Reduction of Greenhouse Gas Emissions). The CAP will include the following elements:

- A complete inventory of GHG emissions, both existing and projected
- A GHG reduction target aligned with state goals
- A strategy to reduce emissions to meet the GHG reduction target
- A plan to monitor and verify results
- Adoption of the plan in a public process

Emissions Inventory

Using standard accounting protocols from The Climate Registry (TCR)[8] and the International Council for Local Environmental Initiatives (ICLEI)[9], Metropolitan completed an emissions inventory of three source categories or scopes related to the operational control the organization has over the emission source.

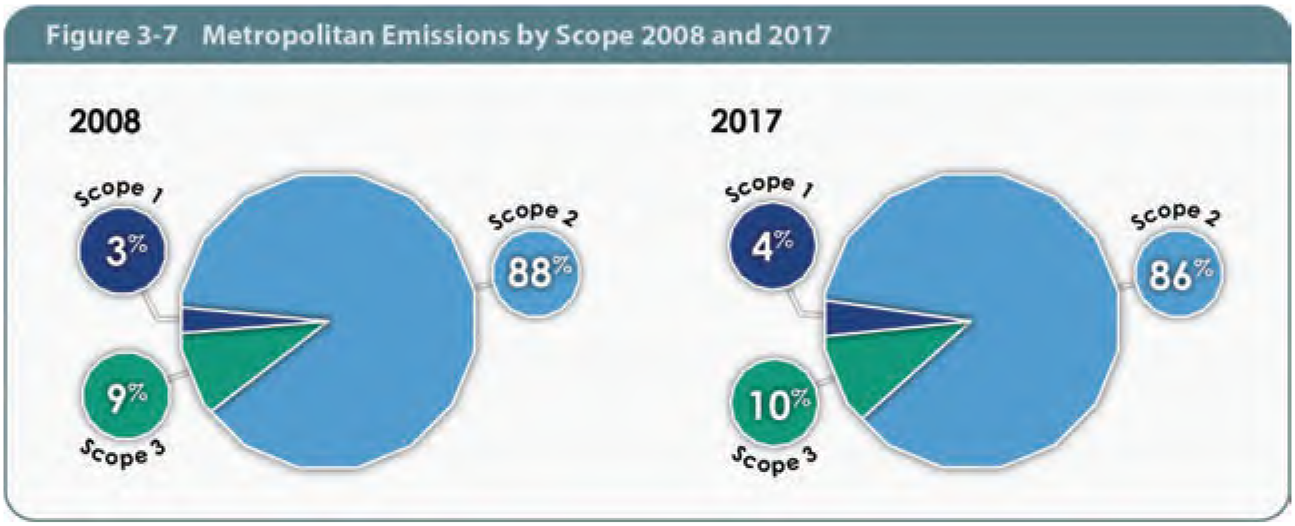
- Scope 1 emissions consist of direct GHG emissions associated with fuel use, such as emissions from gasoline and diesel consumption by Metropolitan's vehicle fleet, propane and natural gas use at its facilities, and unintended fugitive emissions[10].
- Scope 2 emissions consist of indirect GHG emissions associated with the purchase and consumption of electricity used primarily for the transmission, treatment and distribution of water. Scope 2 also includes electricity transmission and distribution losses.

[8] The Climate Registry. https://www.theclimateregistry.org/tools-resources/reporting-protocols/general-reporting-protocol/. Metropolitan's reported GHG emissions to The Climate Registry are shown in Appendix 10.
[9] ICLEI. 2010. Local Government Operations Protocol. http://icleiusa.org/ghg-protocols/.
[10] Fugitive emissions are emissions of gases or vapors from industrial equipment due to leaks or other unintended releases.

- Scope 3 emissions consist of other indirect GHG emissions not captured in Scope 1 or 2, such as those associated with employee commutes, waste generation, water consumption occurring at Metropolitan facilities, and emissions associated with construction projects.

Figure 3-7 illustrates the Metropolitan emissions by scope for calendar years 2008 and 2017.

Figure 3-7
Metropolitan Emissions by Scope 2008 and 2017.



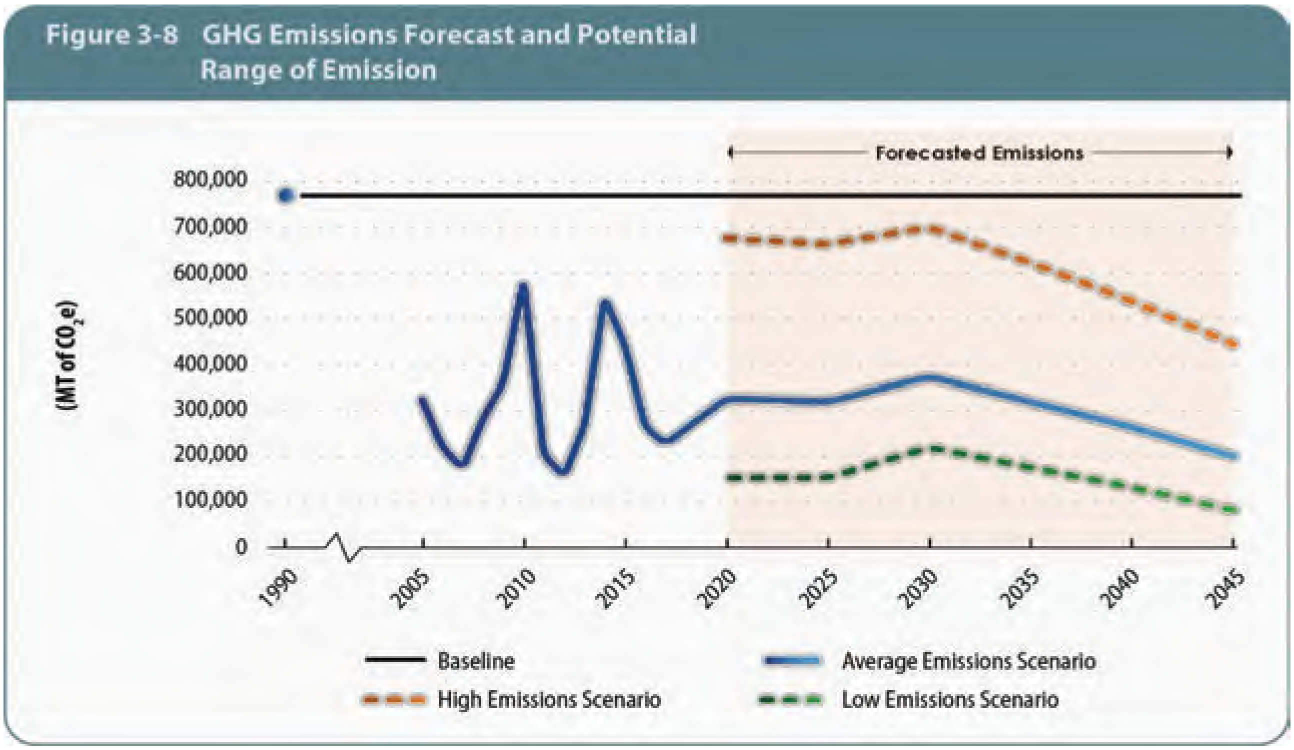
Emissions Forecast

In order to estimate the level of GHG emissions reductions necessary for Metropolitan to achieve its selected GHG reduction target and be consistent with the requirements for a qualified GHG emissions reduction plan, an emissions forecast was prepared based on Metropolitan projected energy demand and energy sources, the anticipated impact of future Metropolitan projects, the anticipated impact of existing energy efficiency and GHG reduction programs, and regional population growth assumptions.

As noted above, Metropolitan does not have direct control over operations of the SWP. Thus, Metropolitan's strategy focuses exclusively on reducing the GHG emissions associated with operation of the CRA, and operation and maintenance of Metropolitan's distribution, treatment, and office facilities. Water deliveries from the CRA require substantial electricity usage, as the water must be pumped up a total lift of 1,614 feet from the Colorado River before flowing by gravity into Metropolitan's distribution system.

CRA water deliveries vary significantly year-to-year based on water needs, rainfall, and availability of water from the SWP. To account for this variability in electricity use and related GHG emissions, three forecast scenarios were modeled to estimate the range of GHG emissions that will need to be reduced to reach Metropolitan's adopted GHG reduction target. A high emissions scenario represents a worst case scenario with extended drought and maximum pumping capacity from the CRA, an average emissions scenario is modelled by averaging pumping data from 2008 through 2017, and a low emissions scenario represents Metropolitan's lowest single year CRA pumping from 2008 through 2017 and high deliveries from the SWP. The results of the potential range of emission that will need to be offset in future years is shown in Figure 3-8. Baseline emissions for 1990 were estimated using the best available data. It is important to note that in all projections, GHG emissions taper off as a result of new California regulations that require all retail energy sold in California to be from 100 percent carbon-free energy by 2045.

Figure 3-8
GHG Emissions Forecast and Potential Range of Emission



GHG Reduction Target

Metropolitan is committed to achieving the state's GHG reduction goals. Therefore, Metropolitan has set its GHG reduction target to be consistent with the state target of 40 percent below 1990 levels by 2030. In addition, Metropolitan is committing to achieving net carbon neutrality by 2045. Metropolitan is well-situated to meet this goal.

Strategy to Meet GHG Reduction Goals

In conjunction with Metropolitan's Energy Management Initiative described above, a number of projects have been identified that will not only ensure Metropolitan's energy reliability, but also further Metropolitan's efforts to reach carbon neutrality by 2045, including developing solar and battery storage facilities, negotiating wholesale carbon-free energy contracts, improving pump efficiency, purchasing zero emission fleet vehicles, and implementing waste recycling techniques. Metropolitan may also leverage extensive land holdings to implement potential carbon sequestration programs that could generate carbon credits. Additional actions will depend on many variables that are not yet quantified, such as the rate of energy storage deployed by the State of California and its utilities, the cost of renewable energy, and the costs associated with infrastructure. Not only do many of these projects ensure energy reliability and reduce GHG emissions, but they may also provide a substantial net cost savings to Metropolitan through reduced energy costs and reduced costs to offset GHG emissions.

Monitoring and Reporting

Ensuring that Metropolitan is meeting its GHG reduction target is a cornerstone of an adopted GHG reduction plan. As such, Metropolitan will track its GHG emissions annually and update the CAP every five years to revise and refine the plan to capture any new measures and ensure Metropolitans is meeting its goals. Metropolitan currently reports verified GHG emissions to TCR's open and transparent GHG Registry. Appendix 10 of this plan contains additional information on Metropolitan's GHG emissions and overall energy intensity.

CAP Adoption

The CAP will be released for public review in spring 2021, with an expected Board adoption of the completed CAP in summer 2021. Metropolitan's unique emissions profile and commitment to environmental and energy sustainability ensure that it is situated to meet not only the state's adopted target of 40 percent below 1990 levels by 2030, but also the state's goal of carbon neutrality by 2045, guaranteeing that Metropolitan remains an industry leader.

Water Quality 4

Metropolitan's planning efforts recognize the importance of the quality of its water supplies. To the extent possible, Metropolitan responds to water quality concerns by protecting the quality of the source water and developing water management programs that maintain and enhance water quality. Contaminants that cannot be sufficiently controlled through protection of source waters must be handled through changed water treatment protocols or blending. These practices can increase costs and/or reduce operating flexibility. This section discusses source water quality and issues of concern affecting water management strategies and water supply reliability.

Background

Metropolitan's planning efforts for groundwater storage, recycled water, and other water management strategies require meeting specific water quality targets for imported water. Metropolitan has two major sources of water: the Colorado River and the State Water Project (SWP). Groundwater inflows are also received into the SWP through groundwater banking programs in the Central Valley. Each source has specific water quality issues, which are summarized in this section. For example, the water industry has had to respond to constituents of emerging concern (CECs). To date, Metropolitan has not identified any water quality risks that cannot be mitigated. However, based on current knowledge, a water quality issue that could potentially affect water management strategies and supply reliability in the future might be increases in the salinity of water resources. Under California's current drought conditions, decreased flows have altered Delta flow patterns and, while the effects of the drought have not been fully studied, there have been some observable changes in water quality such as increased salinity due to increased seawater intrusion. However, even under drought conditions, SWP salinity is significantly lower than Colorado River water salinity, and Metropolitan relies on blending imported water sources to mitigate for the higher salinity Colorado River water. During recent periods of drought, Metropolitan's SWP allocation has been reduced, including to a historical low of five percent in 2014 and twenty percent in 2015 and 2020, which affected blending operations. Metropolitan increased its deliveries of Colorado River water in 2014, 2015, and 2020, and subsequently, salinity in treatment plant influent increased overall from the higher Colorado River salinity levels. Metropolitan anticipates no significant reductions in water supply availability from imported sources due to water quality concerns, such as salinity, over the next five years.

Colorado River

High salinity levels remain a significant issue associated with Colorado River supplies. In addition, Metropolitan has been engaged in efforts to protect its Colorado River supplies from threats of uranium, perchlorate, and chromium-6, which are discussed later in this section. Metropolitan has also been active in efforts to protect these supplies from potential increases in nutrient loading due to agriculture and urbanization, as well as tracking the occurrence of CECs. Metropolitan fully expects its source water protection efforts to be successful, so the only foreseeable water quality constraint to the use of Colorado River water will be the need to blend (mix) it with SWP supplies to meet Metropolitan's Board-adopted salinity standards.

State Water Project

The key water quality issues for the SWP are disinfection byproduct precursors, in particular, total organic carbon, bromide, and low alkalinity. Metropolitan is working to protect the water quality of this source, but it has needed to upgrade its water treatment plants to deal adequately with disinfection byproducts. Disinfection byproducts result from total organic carbon and bromide in the source water reacting with disinfectants at the water treatment plant, and they may place some near-term restrictions on Metropolitan's ability to use SWP water. Low alkalinity water requires a higher percentage of total organic carbon removal in order to reduce disinfection byproduct formation. Metropolitan is overcoming these treatment restrictions through the use of ozone disinfection at its treatment plants, which has been implemented at all five of Metropolitan's treatment plants and blending SWP water with higher alkalinity Colorado River water. Arsenic is also of concern in some groundwater storage programs. Groundwater inflows into the California Aqueduct are managed to comply with regulations and protect downstream water quality while meeting supply targets. Additionally, nutrient levels are significantly higher in the SWP than within the Colorado River, leading to the potential for algal related concerns that can affect water management strategies. Metropolitan is engaged in efforts to protect the quality of SWP water from potential increases in nutrient loading from wastewater treatment plants.

Local Agency Supplies and Groundwater Storage

Drinking water standards for contaminants, such as arsenic, chromium-6, 1,2,3-trichloropropane, and other emerging constituents, such as per- and polyfluoroalkyl substances (PFAS), may add costs to the use of groundwater storage and may affect the availability of local agency groundwater sources. Although Metropolitan has not analyzed the direct effect of these water quality issues on local agency supply, these contaminants are not expected to significantly impact the availability of Metropolitan supplies, but may affect the availability of local agency supplies. This could affect demands on Metropolitan supplies if local agencies abandon impacted supplies in lieu of treatment options or use Metropolitan water to blend with their sources.

In summary, the major regional water quality concerns include the following:

- Salinity
- Perchlorate
- Total organic carbon and bromide (disinfection byproduct precursors)
- Nutrients (as they relate to algal productivity)
- Arsenic
- Uranium
- Chromium-6
- 1,2,3-trichlorpropane
- Constituents of emerging concern (e.g., NDMA, microplastics, and PFAS)

Metropolitan has taken several actions and adopted programs to address these contaminants and to ensure a safe and reliable water supply. These actions, organized by contaminant, are discussed below, along with other water quality programs that Metropolitan has been engaged in to protect its water supplies.

Issues of Potential Concern

Salinity

The State Water Resources Control Board's (SWRCB's) Division of Drinking Water (DDW), formerly the California Department of Public Health, established a secondary drinking water standard for salinity, commonly expressed as total dissolved solids (TDS), with a recommended maximum contaminant level (MCL) of 500 milligrams per liter (mg/L) and upper limit MCL of 1,000 mg/L. Imported water from the Colorado River has high salinity levels, so it must be blended (mixed) with lower-salinity water from the SWP to meet salinity management goals. Higher salinity levels in Colorado River water would increase the proportion of SWP supplies required to meet Metropolitan's Board-adopted imported water salinity objectives. High levels of salinity can impact various water uses such as limiting groundwater and recycled water uses, reducing the lifespan of household appliances, and reducing crop yields. These salinity impacts affect various sectors including residential, agricultural, commercial, industrial, utility, groundwater, and recycled water. Metropolitan adopted an imported water salinity goal because higher salinity could increase costs and reduce operating flexibility. For example,

1. If diminished water quality causes a need for membrane treatment to remove TDS, the process typically results in losses of up to 15 percent of the water processed. These losses would result in both an increased requirement for additional water supplies and environmental constraints related to brine disposal. In addition, the process is costly. However, only a portion of the imported water would need to be processed, so the possible loss in supplies is small.
2. High TDS in water supplies leads to high TDS in wastewater, which lowers the usefulness and increases the cost of recycled water.
3. Water quality degradation of imported water supply could limit the use of local groundwater basins for storage because of standards controlling the quality of water recharged to the basins.

In addition to the link between water supply and water quality, Metropolitan has identified economic benefits from reducing the TDS concentrations of water supplies. Estimates show that a reduction in salinity concentrations of 100 mg/L in both the Colorado River and SWP supplies will yield economic benefits of $95 million per year (1999 dollars) within Metropolitan's service area.[1] This economic benefit provides an additional incentive to reduce salinity concentrations within the region's water supplies.

<u>The Salinity Management Policy</u>

Considering all of these factors, Metropolitan's Board approved a Salinity Management Policy on April 13, 1999. The policy set a goal of achieving salinity concentrations in delivered water of less than 500 mg/L TDS when practical, understanding that hydrologic conditions will make this infeasible at times. It also identified the need for both local and imported water sources to be managed comprehensively to maintain the ability to use recycled water and groundwater. To achieve these targets, lower TDS SWP water supplies are blended with Colorado River supplies. Using this approach, the salinity target could be met an estimated seven out of ten years. In the other three years, hydrologic conditions would result in a reduced volume of SWP supplies and increased salinity. Due to drought conditions, the target goal was exceeded between 2008 and 2011 and again between 2013 and 2018. Metropolitan has alerted its local agencies that high

[1] Metropolitan Water District of Southern California and U.S. Bureau of Reclamation, Salinity Management Study: Final Report (June 1999)

salinity levels are inevitable under these drought conditions despite its best efforts. Metropolitan has also urged its member agencies to structure the operation of their local projects and groundwater supplies so they are prepared to mitigate the effect of higher salinity levels in imported waters.

The adoption of the Salinity Management Policy resulted from the completion of a Salinity Management Study in 1999. Metropolitan worked collaboratively with multiple stakeholders to complete the salinity study which assessed regional salinity problems and developed management strategies. Metropolitan is currently working with the USBR and Southern California Salinity Coalition to update the study. The current study objectives include updating the impact functions of the economic impact model and revising the salinity economic damage assessment for the Colorado River Salinity Control Forum Triennial Review; developing regional salinity indicators to increase awareness and facilitate salinity management in groundwater basins; and assessing Metropolitan's long-term capability of delivering low-salinity water supplies and determining whether new salinity operational goals should be established. In 2020, USBR completed a study updating the economic impact functions of the salinity model. The new model will be used to generate revised estimates for the Lower Colorado River Basin and can be used to update the estimates for Metropolitan's service area. The impacts estimated by the model are based on the change in economic costs from a 500 mg/L baseline condition and the projected elevated salinity concentrations from the Colorado River Simulation System (CRSS) long term planning model which incorporates current and future salinity control projects mainly in the Upper Colorado River Basin.

Within Metropolitan's service area, local water sources account for approximately half of the salt loading, and imported water accounts for the remainder. All of these sources must be managed appropriately to sustain water quality and supply reliability goals. The following sections discuss the salinity issues relevant to each of Metropolitan's major supply sources and other resources.

<u>Colorado River</u>

Colorado River water has the highest level of salinity of all of Metropolitan's sources of supply, averaging around 630 mg/L since 1976. Concern over salinity levels in the Colorado River has existed for many years.

To deal with the concern, the International Boundary and Water Commission approved Minute No. 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River, in 1973, and the President approved the Colorado River Basin Salinity Control Act in 1974. High TDS in the Colorado River as it entered Mexico and the concerns of the seven basin states regarding the quality of Colorado River water in the United States drove these initial actions. To foster interstate cooperation on this issue, the seven basin states formed the Colorado River Basin Salinity Control Forum (Forum).

The salts in the Colorado River system are indigenous and pervasive, mostly resulting from saline sediments in the basin that were deposited in prehistoric marine environments. They are easily eroded, dissolved, and transported into the river system. The Colorado River Basin Salinity Control Program is designed to prevent a portion of this abundant salt supply from moving into the river system. The program targets the interception and control of non-point sources, such as surface runoff, as well as wastewater and saline hot springs. Examples of salinity control measures include improved irrigation practices, rangeland management, and the operation of a deep well brine injection project.

The Forum proposed, the states adopted, and the USEPA approved water quality standards in 1975, including numeric criteria and a plan for controlling salinity increases. The standards require that the plan ensure that the flow-weighted average annual salinity remain at or below the 1972 levels, while the Basin states continue to develop their 1922 Colorado River Compact-apportioned water supply. The Forum selected three points on the main stream of the lower Colorado River to measure the river's salinity. These points and numeric criteria are: (1) below Hoover Dam, 723 mg/L; (2) below Parker Dam, 747 mg/L; and (3) at Imperial Dam, 879 mg/L.

Per the Forum, concentrations of salts in the Colorado River cause approximately $454 million in quantified damages (2019 dollars) in the lower Basin each year.[2] The salinity control program has proven to be very successful and cost-effective. Salinity control projects remove over a million tons of salts from the Colorado River water annually, resulting in reduced salinity concentrations of over 100 mg/L as a long-term average.

During the high-water flows of 1983-1986, salinity levels in the Colorado River dropped to a historic low of 525 mg/L. However, during the 1987-1992 drought, higher salinity levels of 600 to 650 mg/L returned. TDS in Lake Havasu was measured at 662 mg/L in October 2015 and was 592 mg/L in October 2019. Salinity is projected to continue increasing as water development occurs throughout the Colorado River basin, particularly as the Upper Colorado River Basin States continue to develop their apportioned water reducing dilution in the Colorado River. Also, under drought conditions, Lake Powell has received higher salinity water, and as the system normalizes, salinity is expected to increase in the lower Colorado River as water from Lake Powell is released downstream.

<u>State Water Project</u>

Water supplies from the SWP have significantly lower TDS concentrations than the Colorado River, averaging approximately 250 mg/L in water supplied through the East Branch and 325 mg/L on the West Branch over the long-term, with short term variability as a result of hydrologic conditions.[3] Because of this lower salinity, Metropolitan blends SWP water with high salinity Colorado River water to reduce the salinity concentrations of delivered water. However, both the supply and the TDS concentrations of SWP water can vary significantly in response to hydrologic conditions in the Sacramento-San Joaquin watersheds.

As indicated above, the TDS concentrations of SWP water can vary widely over short periods of time. These variations reflect seasonal and tidal flow patterns, and they pose an additional problem for use of blending as a management tool to lower the higher TDS from the Colorado River supply. For example, during the 1977 drought, the salinity of SWP water reaching Metropolitan increased to 430 mg/L, and supplies became limited. During this same event, salinity at the SWP's Banks pumping plant exceeded 700 mg/L. Under similar circumstances in the future, Metropolitan's 500 mg/L TDS objective could only be achieved by reducing imported water from the Colorado River. Thus, it may be infeasible to maintain both the salinity objective and water supply reliability unless salinity concentrations of source supplies can be reduced.

A federal court ruling on a biological opinion issued in consultation with U.S. Fish and Wildlife Service addressing the effects of the water supply pumping operations on sensitive fish species in the Delta has limited SWP exports at specified times of the year since December 2007. These restrictions have increased reliance on higher salinity Colorado River water, impacting the ability at times to meet Metropolitan's goal of 500 mg/L TDS at its blending plants. Drought conditions leading to lower SWP water supply allocations in recent years also affect Metropolitan's ability to meet its salinity goal. The target goal was exceeded between 2008 and 2011 when water supply

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[2] Colorado River Basin Salinity Control Program–Briefing Document (March 20, 2019)

[3] The higher salinity in the West Branch deliveries is due to salt loadings from local streams, operational conditions, and evaporation at Pyramid and Castaic Lakes.

allocations were reduced to 35-50 percent. Similarly, the target goal was exceeded between 2013 and 2015 when restricted annual water supply allocations were reduced to 5-35 percent and were briefly reduced to a historical zero percent allocation in January 2014.

The SWP Water Service Contract Article 19 TDS objectives specify a ten-year average of 220 mg/L and a maximum monthly average of 440 mg/L. These objectives have not been met, and Metropolitan is working with DWR and other agencies on programs aimed at reducing salinity in Delta supplies. These programs aim to reduce salinity on the San Joaquin River through modifying agricultural drainage and developing comprehensive basin plans. In addition, operable gates and channel barriers have been placed in strategic locations in the Delta to impede transport of seawater derived salt. For the first time since 1977, in response to California's drought emergency, DWR installed a temporary rock barrier across False River in May 2015 to help limit salt intrusion from the San Francisco Bay into the central Delta. DWR is also leading the development of the Delta Conveyance Project, which involves water delivery upgrades that could reduce SWP salinity levels by diverting a greater percentage of lower salinity Sacramento River flows to the South Delta export pumps.

Recycled Water

Wastewater flows always experience significantly higher salinity concentrations than the potable water supply. Typically, each cycle of urban water use adds 250 to 400 mg/L of TDS to the wastewater. Salinity increases tend to be higher where specific commercial or industrial processes add brines to the discharge stream or where brackish groundwater infiltrates into the sewer system.

Where wastewater flows have high salinity concentrations, the use of recycled water may be limited or require more expensive treatment (e.g., reverse osmosis). Landscape irrigation and industrial reuse become problematic at TDS concentrations over 1,000 mg/L. Some crops such as strawberries and avocados are particularly sensitive to high TDS concentrations, and the use of high-salinity recycled water may reduce crop yields. In addition, water quality objectives in basin plans may lead to restrictions on the use of recycled water on lands overlying those groundwater basins.

These issues are exacerbated during times of drought, when the salinity of imported water supplies may increase salinity in wastewater flows and recycled water. Basin management plans and recycled water customers may restrict the use of recycled water at a time when its use would be most valuable. Therefore, to maintain the cost-effectiveness of recycled water, the salinity level of the region's potable water sources and wastewater flows must be controlled.

In May 2009, the SWRCB adopted a Recycled Water Policy to help streamline the permitting process and to help establish uniform statewide criteria for recycled water projects. The policy was amended in January 2013 and again in December 2018[4] to include baseline monitoring requirements for CECs. The amended policy includes updated annual volumetric reporting requirements for influent, effluent, and recycled water uses. This policy promotes the development of watershed- or basin-wide salt management plans (to be adopted by the respective Regional Boards) to meet water quality objectives and protect beneficial uses, rather than imposing project-by-project restrictions. The Recycled Water Policy identifies several criteria to guide recycled water irrigation or groundwater recharge project proponents in developing a Salt (and Nutrient) Management Plan (SNMP).

[4] https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/121118_7_final_amendment_oal.pdf

Groundwater Basins

Increased TDS in groundwater basins occurs either when basins near the ocean are overdrafted, leading to seawater intrusion, or when agricultural and urban return flows add salts to the basins. Much of the water used for agricultural or urban irrigation infiltrates into the aquifer, so where irrigation water is high in TDS or where the water transports salts from overlying soil, the infiltrating water will increase the salinity of the aquifer. In addition, wastewater discharges in inland regions may lead to salt buildup from fertilizer and dairy waste. In the 1950s and 1960s, high-TDS Colorado River water was used to recharge severely overdrafted aquifers and prevent saltwater intrusion, resulting in significant salt loadings to the region's groundwater basins.

In the past, these high salt concentrations have caused some basins within Metropolitan's service area to be unsuitable for municipal uses if left untreated. The Arlington Basin in Riverside and the Mission Basin in San Diego required demineralization before they could be returned to municipal service. The capacity of the larger groundwater basins makes them better able to dilute the impact of increasing salinity. While most groundwater basins within the region still produce water of acceptable quality, this resource must be managed carefully to minimize further degradation. Even with today's more heightened concern regarding salinity, approximately 600,000 tons of salts per year accumulate within the region, leading to ever-increasing salinity concentrations in many groundwater basins.[5] Drought conditions have further impacted salinity levels in recycled water, reflective of increased salinity levels in source water. Increased recycled water salinity levels make it difficult for dischargers to comply with water quality objectives for groundwater basins.

To protect the quality of groundwater basins, Regional Boards often place restrictions on the salinity concentrations of water used for basin recharge or for irrigation of lands overlying the aquifers. Those situations may restrict water reuse and aquifer recharge, or they may require expensive mitigation measures. SNMPs offer an opportunity for stakeholders to work with Regional Boards to address salt and nutrient issues regionally. The SNMP development process is locally driven and focuses on addressing all sources of salts and nutrients, instead of only regulating individual recycled water projects which may not address all sources impacting groundwater. The SNMP objectives include: optimizing recycled water use, protecting groundwater supply and beneficial uses, protecting agricultural beneficial uses, and protecting human health. SNMPs were to be completed by May 2014 with a possible two-year extension. After completion, SNMPs may be adopted in a Basin Plan Amendment.

Several SNMPs were completed by the completion deadline, while other plans were granted an extension for completion in 2016. The Santa Ana Region Basin Plan updated its TDS and Nitrogen Management Plan with a subsequent SNMP amendment in 2014. This SNMP highlights efforts to implement extensive groundwater recharge projects using recycled water in the Chino Basin and expansion of the GWRS in Orange County. The Central Basin and West Coast Basin SNMP was approved as an amendment to the Los Angeles Region Basin Plan in February 2015. This SNMP highlights existing and planned implementation measures to ensure future compliance with water quality objectives including increased recharge at seawater intrusion barriers, increased groundwater pump and treat by the Goldsworthy and Brewer Desalters, and increased recycled water use for irrigation. Multiple SNMPs have been completed in the San Diego Region, and basin plan amendments are being considered. SNMPs have also been approved for the Main San Gabriel Basin and the Raymond Basin.

[5] Metropolitan Water District of Southern California and U.S. Bureau of Reclamation, Salinity Management Study: Final Report (June 1999)

Perchlorate

Perchlorate compounds are used as a main component in solid rocket propellant and are also found in some types of munitions and fireworks. Perchlorate compounds quickly dissolve and become highly mobile in groundwater. Unlike many other groundwater contaminants, perchlorate neither readily interacts with the soil matrix nor degrades in the environment. Conventional drinking water treatment (as utilized at Metropolitan's water treatment plants) is not effective for perchlorate removal.

The primary human health concern related to perchlorate is its effect on the thyroid. Perchlorate can interfere with the thyroid's ability to produce hormones required for normal growth and development. Pregnant women who are iodine deficient and their fetuses, infants and small children with low dietary iodide intake, and individuals with hypothyroidism may be more sensitive to the effects of perchlorate.

DDW established a primary drinking water standard for perchlorate in 2007 with an MCL of 6 micrograms per liter (µg/L), and a detection limit for purposes of reporting (DLR) of 4 µg/L. In February 2015, the California Office of Environmental Health Hazard Assessment (OEHHA) lowered the public health goal (PHG)[6] for perchlorate from 6 µg/L to 1 µg/L. In response to the new PHG,[7] DDW reviewed the perchlorate MCL, but there was a lack of occurrence data below the DLR of 4 µg/L. In July 2020, due to improved analytical methods, and in order to evaluate a lower MCL, DDW proposed lowering the DLR for perchlorate initially to 2 µg/L, and subsequently to the PHG of 1 µg/L in a second phase effective January 1, 2024. On October 6, 2020, the SWRCB approved the proposal. There is currently no federal drinking water standard for perchlorate. On June 18, 2020, the USEPA withdrew its 2011 determination to regulate perchlorate under the SDWA and decided not to develop a federal MCL for perchlorate at the present time. Whether the USEPA should issue a national drinking water standard for perchlorate is the subject of ongoing litigation by the Natural Resources Defense Council. The case is currently on hold while EPA is reviewing its prior decision not to set a federal MCL for perchlorate for compliance with the President's Executive Order on "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis."

Perchlorate was first detected in Colorado River water in June 1997 and was traced back to Las Vegas Wash. The source of contamination was found to be emanating from two chemical manufacturing facilities in Henderson, Nevada: (1) the former Tronox, Inc. site, and (2) a facility owned by American Pacific Corporation (AMPAC).

Following the detection of perchlorate in the Colorado River, Metropolitan, along with USEPA and agencies in Nevada including the Nevada Division of Environmental Protection (NDEP), organized the forces necessary to successfully treat and decrease the sources of perchlorate loading. Under NDEP oversight, remediation efforts began in 1998, and treatment operations became fully operational in 2004. These efforts have reduced perchlorate loading into Las Vegas Wash from over 1,000 lbs/day (prior to treatment) to 50-90 lbs/day since early 2007. This has resulted in over 90 percent reduction of the perchlorate loading entering the Colorado River system. As of December 2020, remediation activities in Southern Nevada have resulted in the removal of more than 6,800 tons of perchlorate from the environment. In January 2009, Tronox filed for Chapter 11 bankruptcy protection citing significant environmental liabilities taken from the previous site owner. A settlement was reached in February 2011 which resulted in the

[6] A PHG is a concentration of a contaminant in drinking water that does not pose a significant risk to health.
[7] MCLs are required to be established at a level as close to a chemical's PHG as is technologically and economically feasible, placing primary emphasis on the protection of public health.

formation of the Nevada Environmental Response Trust (NERT). NERT initially received $81 million for cleanup efforts while pursuing additional funding sources.

In April 2014, Tronox reached a $5.15 billion settlement with its predecessors which awarded approximately $1.1 billion, directed to NERT, to clean up perchlorate and certain other contaminants at the former Tronox site in Henderson. The settlement, which represents one of the largest environmental recoveries in history, went into effect in January 2015 and helps to ensure adequate funds are available for site cleanup and protection of the downstream Colorado River. In December 2020, NERT's assets totaled approximately $1.28 billion. NERT is currently investigating remedial options for long-term soil and groundwater cleanup, as well as conducting a regional investigation of downgradient perchlorate-contaminated areas to further reduce loading into Las Vegas Wash. This would help ensure compliance with a potential reduction of California's perchlorate MCL of 6 µg/L, in light of the 1 µg/L PHG.

As a result of the aggressive clean-up efforts, perchlorate levels in Colorado River water at Lake Havasu have decreased significantly in recent years from a peak of 9 µg/L in May 1998. Levels have remained less than 6 µg/L since October 2002 and have been typically less than 2 µg/L since June 2006. Metropolitan routinely monitors perchlorate at over 30 locations within its system, and levels currently remain below 2 µg/L. Metropolitan has not detected perchlorate in the SWP since monitoring began in 1997.

Perchlorate has also been found in groundwater basins within Metropolitan's service area, largely from local sources. The vast majority of locations where perchlorate has been detected in the groundwater are associated with the manufacturing or testing of solid rocket fuels for the Department of Defense and the National Aeronautics and Space Administration (NASA), or with the manufacture, storage, handling, or disposal of perchlorate (such as Aerojet in Azusa in the Main San Gabriel Basin and the Jet Propulsion Laboratory/NASA in the Raymond Basin). Past agricultural practices using fertilizers laden with naturally occurring perchlorate have also been implicated in some areas. As of October 2020, per SWRCB's water quality database, reported monitoring results from 2011 to present indicate that 358 wells in the counties of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura have detected perchlorate in their service areas at levels greater than 4 µg/L, while 219 wells have detected levels greater than 6 µg/L.[8] Water systems may have installed treatment or removed wells from service due to perchlorate concentrations.

Metropolitan has investigated technologies to mitigate perchlorate contamination. Perchlorate cannot be removed using conventional water treatment. Nanofiltration and reverse osmosis do work effectively, but at a very high cost. Endeavour, LLC (which was formed in 2015 to continue operation of AMPAC's groundwater treatment system) and NERT utilize a biological fluidized bed reactor (FBR) process train for the cleanup of their Henderson sites. A number of sites in Southern California have successfully installed ion exchange systems to treat perchlorate impacted groundwater. In November 2009, a study of biological treatment for perchlorate removal in the City of Pasadena's groundwater was completed with funding provided through a Congressional mandate from USEPA to Metropolitan. The City of Pasadena decided to continue using ion exchange treatment for perchlorate removal and expanded treatment to two well sites.

Treatment options are available to recover groundwater supplies contaminated with perchlorate. However, it is very difficult to predict whether treatment will be pursued to recover all lost production because local agencies will make decisions based largely on cost

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[8] DDW data reported from the SWRCB Groundwater Ambient Monitoring Assessment Program's web site: https://gamagroundwater.waterboards.ca.gov/. Numbers reported may change as the website is frequently updated. Also, the website includes additional source data reported by other entities.

considerations, ability to identify potentially responsible parties for cleanup, and the availability of alternative supplies.

Total Organic Carbon and Bromide

Disinfection byproducts (DBPs) form when source water containing high levels of total organic carbon (TOC) and bromide is treated with disinfectants such as chlorine or ozone. Studies have shown a link between certain cancers and DBP exposure. In addition, some studies have shown an association between reproductive and developmental effects and chlorinated water. While many DBPs have been identified and some are regulated under the Safe Drinking Water Act, there are others that are not yet known. Even for those that are known, the potential adverse health effects may not be fully characterized.

Water agencies began complying with new regulations to protect against the risk of DBP exposure in January 2002. This rule, known as the Stage 1 Disinfectants and Disinfection Byproducts (D/DBP) Rule, required water systems to comply with new MCLs and a treatment technique to improve control of DBPs. USEPA then promulgated the Stage 2 D/DBP Rule in January 2006 requiring systems to comply at terminus locations in the distribution system to be more representative of maximum residence time and to protect the public. Metropolitan has been in compliance with the Stage 2 D/DBP Rule since it became effective.

Existing levels of TOC and bromide in Delta water supplies present challenges for water utilities to maintain safe drinking water supplies and comply with regulations. Levels of these constituents in SWP water increase several-fold due to agricultural drainage and seawater intrusion as water moves through the Delta.

SWP water has also experienced lower alkalinity concentrations during years with increased snowmelt, particularly in 2017 and 2019. Low alkalinity requires higher TOC removal by treatment plants and potentially contributes to increased water corrosivity. As a corrosion control strategy, Metropolitan may blend low alkalinity SWP water with Colorado River Water, adjust effluent pH, and increase plant effluent alkalinity.

Source water quality improvements must be combined with cost-effective water treatment technologies to ensure safe drinking water at a reasonable cost. Metropolitan has five treatment plants: two that receive SWP water exclusively, and three that receive a blend of SWP and Colorado River water. In 2003 and 2005, Metropolitan completed upgrades to its SWP-exclusive water treatment plants, Mills and Jensen, respectively, to utilize ozone as its primary disinfectant. This ozonation process minimizes the production of certain regulated disinfection byproducts that would otherwise form in the chlorine treatment of SWP water. The non-ozone plants utilizing blended water met federal guidelines for these byproducts through managing the blend of SWP and Colorado River water. To maintain the byproducts at a level consistent with federal law, Metropolitan limited the percentage of water from the SWP for plants utilizing chlorine as the primary disinfectant. In 2010, 2015, and 2017, Metropolitan completed ozone upgrades at Skinner, Diemer, and Weymouth water treatment plants, respectively. The estimated ozone retrofit cost for all five treatment plants is over $1.1 billion.

Nutrients

Elevated levels of nutrients (phosphorus and nitrogen compounds) can stimulate nuisance algal and aquatic weed growth that affects water system operations and consumer acceptability, including the production of noxious taste and odor compounds and algal toxins. In addition to taste and odor and toxin concerns, increases in algal and aquatic weed biomass can impede flow in conveyances, shorten filter run times, increase solids production at drinking water treatment plants, and add to organic carbon loading. Further, nutrients can provide an increasing food source that may lead to the proliferation of quagga and zebra mussels, and other invasive biological species. Studies have shown phosphorus to be the limiting nutrient in both SWP and Colorado River supplies. Therefore, any increase in phosphorus loading has the potential to stimulate algal growth, leading to the concerns identified above.

SWP supplies have significantly higher nutrient levels than Colorado River supplies. Wastewater discharges, agricultural drainage, and nutrient-rich soils in the Delta are primary sources of nutrient loading to the SWP. Metropolitan and other drinking water agencies receiving Delta water have been engaged in efforts to minimize the effects of nutrient loading from Delta wastewater plants. The Sacramento Regional County Sanitation District (SRCSD), the primary discharger to the Sacramento River, is in the process of constructing wastewater treatment plant upgrades to comply with its 2010 discharge permit requirements for ammonia and nitrate removal. Excessive levels of ammonia are suspected to be altering the Delta's food web which, in turn, has implications for SWP supply reliability. SRCSD expects to complete its EchoWater Project by mid-2022, in compliance with the 2023 deadline, and has stated that the project will serve multiple benefits including improving water quality in the Sacramento River, protecting the fragile Delta ecosystem, and expanding recycled water use opportunities. The improvements include a biological nutrient removal process for ammonia and nitrate removal. The project also includes tertiary treatment processes for filtration and enhanced disinfection. In 2014, the City of Stockton Wastewater Treatment Plant, a discharger to the San Joaquin River, was issued a draft permit with a more stringent nitrate discharge limit consistent with the final discharge limits issued in SRCSD's permit. Due to the lower limit, the City of Stockton began to make plans to implement similar plant upgrades as SRCSD to comply with discharge permit requirements. Construction is planned to be completed in March 2023.

Metropolitan reservoirs receiving SWP water have experienced several taste and odor episodes in recent years. For example, between 2015 and June 2020, Metropolitan reservoirs experienced 13 taste and odor events requiring treatment. A taste and odor event can cause a reservoir to be bypassed and potentially have a short-term effect on the availability of that supply. Metropolitan has a comprehensive program to monitor and manage algae in its source water reservoirs. This program was developed to provide an early warning of algae related problems and taste and odor events to best manage water quality in the system.

The issue of cyanotoxins has become a growing concern as a result of increasing occurrences both nationally and internationally. For example, in August 2014, an algae bloom producing Microcystin in Lake Erie significantly affected the water supply for Toledo, Ohio, prompting the city to issue urgent notices to residents to not drink or boil the drinking water. This event stimulated state and federal legislation to develop health advisories and strategic plans for algal toxins. In June 2015, USEPA issued health advisories for two cyanobacterial toxins: Microcystins and Cylindrospermopsin. The health advisories serve as recommended precautionary levels and are not enforceable federal water quality standards. Cyanotoxins are included on the current Contaminant Candidate List (CCL4), which identifies contaminants considered for regulation under the Safe Drinking Water Act. USEPA has developed improved analytical methods for cyanotoxins to support nationwide monitoring for Microcystins, Anatoxin-a, and Cylindrospermopsin through the Unregulated Contaminant Monitoring Rule 4 program, which was published in 2016 and required monitoring to be conducted between 2018 and 2020. Metropolitan is complying with Unregulated Contaminant Monitoring Rule monitoring and reporting requirements. Although phosphorus levels are much lower in the Colorado River than in the SWP, this nutrient is still of concern. Despite relatively low concentrations (Colorado River has been considered an oligotrophic, or low-productivity, system), any additions of phosphorus to Colorado River water can result in increased algal growth. In addition, low nutrient Colorado River water is relied upon by Metropolitan to blend down the high nutrient SWP water in Metropolitan's blend reservoirs. With population growth expected to continue in the Las Vegas area in the future, ensuring high levels of treatment at wastewater treatment plants to maintain existing phosphorus levels will be critical in minimizing the operational, financial, and public health impacts associated with excessive algal growth and protecting downstream drinking water uses. Metropolitan and other affected drinking water agencies collaborate with wastewater dischargers in the Las Vegas area to protect the phosphorus-limited Colorado River. Since 2001, wastewater dischargers have undertaken considerable efforts to improve treated effluent water quality by removing phosphorus on a year-round basis. In 2005, dischargers also began optimizing their treatment processes to remove greater amounts of phosphorus, maintaining levels well below current permit requirements.

Although current nutrient loading is of concern for Metropolitan and is anticipated to have cost implications, with its comprehensive monitoring program and response actions to manage algal related issues, there should be no impact on availability of water supplies. Metropolitan's source water protection program will continue to focus on preventing future increases in nutrient loading as a result of urban and agricultural sources.

Arsenic

Arsenic is a naturally occurring element found in rocks, soil, water, and air. It is used in wood preservatives, alloying agents, certain agricultural applications, semi-conductors, paints, dyes, and soaps. Arsenic can get into water from the natural erosion of rocks, dissolution of ores and minerals, runoff from agricultural fields, and discharges from industrial processes. Long-term exposure to elevated levels of arsenic in drinking water has been linked to certain cancers, skin pigmentation changes, and hyperkeratosis (skin thickening).

In April 2004, OEHHA set a PHG for arsenic of 0.004 μg/L, based on lung and urinary bladder cancer risk. The MCL for arsenic in domestic water supplies was lowered to 10 μg/L, with an effective date of January 2006 in the federal regulations, and an effective date of November 2008 in the California regulations. Monitoring results submitted to California Department of Public Health (now DDW) since 2010 showed that arsenic is ubiquitous in drinking water sources, reflecting its natural occurrence. They also showed that many sources have arsenic detections above the 10 μg/L MCL. Southern California drinking water sources, by county, that contain concentrations of arsenic over 10 μg/L include San Bernardino (113 sources), Los Angeles (82 sources), Riverside (52 sources), San Diego (5 sources), Orange (10 sources), and Ventura (3 sources).[9]

The arsenic drinking water standard impacts both groundwater and surface water supplies. Historically, Metropolitan's water supplies have had low levels of this contaminant and did not require treatment changes or capital investment to comply with the standard. However, some of Metropolitan's water supplies from groundwater storage programs are at levels near the MCL. These groundwater storage projects are called upon to supplement flow only during low SWP allocation years. Under drought conditions, Metropolitan has further relied on groundwater storage programs and continues to participate in the California Aqueduct Pump-in Facilitation Group to ensure that water quality in the SWP is not adversely affected when considering water supply decisions. Metropolitan has had to restrict flow from one program to limit arsenic increases in the SWP. Implementation of an arsenic treatment facility, which is operated by a groundwater

[9] DDW data reported from the SWRCB Groundwater Ambient Monitoring Assessment Program's web site: https://gamagroundwater.waterboards.ca.gov/. Numbers reported may change as the website is frequently updated. Also, the website includes additional source data reported by other entities.

banking partner, has increased groundwater supply costs. Moreover, Metropolitan has invested in solids handling facilities at its treatment plants and implemented operational changes to manage arsenic in the treatment process residual solids.

The DLR for arsenic is 2 μg/L. Between 2010 and June 2020, arsenic levels in Metropolitan's water treatment plant effluents ranged from non-detect (< 2 μg/L) to 3.3 μg/L. For Metropolitan's source waters, levels in Colorado River water have ranged from 2.2 to 2.8 μg/L, while levels in SWP water have ranged from non-detect to 4.8 μg/L. Increasing coagulant doses at water treatment plants can reduce arsenic levels for delivered water.

Some member agencies may face greater problems with arsenic compliance due to naturally occurring arsenic in groundwater. Per the Water Replenishment District's 2018-2019 Regional Groundwater Monitoring Report, arsenic concentrations greater than the 10 μg/L MCL were detected in 9 of 220 Central Basin production wells.[10] Water supplies imported by the Los Angeles Department of Water and Power may also contain arsenic above the MCL. The cost of arsenic removal from these supplies could vary significantly.

Uranium

The U.S. Department of Energy (DOE) has completed about 66 percent of a project to move a 16-million-ton pile of uranium mill tailings near Moab, Utah, which lies approximately 750 feet from the Colorado River. Due to the proximity of the pile to the Colorado River, there is a potential for the tailings to enter the river as a result of a catastrophic flood event or other natural disaster. In addition, contaminated groundwater from the site is slowly seeping into the river. The DOE is responsible for remediating the site, which includes removal and offsite disposal of the tailings and onsite groundwater remediation.

Previous investigations have shown uranium concentrations contained within the pile at levels significantly above the California MCL of 20 picocuries per liter (pCi/L). Metropolitan has been monitoring for uranium in the CRA and at its treatment plants since 1986. Monitoring at Lake Powell began in 1998. Uranium levels measured at Metropolitan's intake have ranged from 1 to 6 pCi/L, well below the California MCL. Conventional drinking water treatment, as employed at Metropolitan's water treatment plants, can remove low levels of uranium; however, these processes would not be protective if a catastrophic event washed large volumes of tailings into the Colorado River. Public perception of drinking water safety is also of particular concern as to uranium.

Remedial actions at the site since 1999 have focused on removing contaminated water from the pile and groundwater. To date, over 5,300 pounds of uranium in contaminated groundwater have been removed. In July 2005, DOE issued its Final Environmental Impact Statement with the preferred alternative of permanent offsite disposal by rail to a disposal cell at Crescent Junction, Utah, located approximately 30 miles northwest of the Moab site.

Rail shipment and disposal of the uranium mill tailings pile from the Moab site began in April 2009 using American Recovery and Reinvestment Act 2009 funding which helped to accelerate initial cleanup efforts. Through September 2020, DOE has shipped over 10.9 million tons of mill tailings to the Crescent Junction disposal cell. DOE estimates completing movement of the tailings pile by 2034, depending on annual appropriations. Metropolitan continues to track progress of the remediation efforts and work with Congressional representatives to support increased annual appropriations and expedite cleanup.

[10] *Regional Groundwater Monitoring Report Water Year 2018-2019, Los Angeles County, California*, prepared by Water Replenishment District, March 2020.

Another uranium-related issue began receiving attention in 2008 due to a renewed worldwide interest in nuclear energy and a resulting increase in uranium mining claims filed throughout the western United States. Of particular interest were thousands of mining claims filed near Grand Canyon National Park and the Colorado River. Metropolitan sent letters to the Secretary of the Interior to highlight source water protection and consumer confidence concerns related to uranium exploration and mining activities near the Colorado River, and advocate for close federal oversight over these activities. In 2009, Secretary of the Interior Ken Salazar announced a two-year hold on new mining claims on 1 million acres adjacent to the Grand Canyon to allow necessary scientific studies and environmental analyses to be conducted. In January 2012, Secretary Salazar formally signed a 20-year moratorium on new uranium and other hard rock mining claims. The moratorium has been challenged by a number of industry groups and was most recently upheld by a U.S. District Court in September 2014. Meanwhile, local conservation groups continue to defend the moratorium and are seeking additional protection of lands with mines that have been inactive for long periods of time but may resume operations. Although of no direct impact to Metropolitan due to its upstream location and resulting dilution, in August 2015, an accidental release of wastewater from an abandoned mine in southwest Colorado demonstrated the potential threat that mining activities can have on public health and the environment. In 2020, the DOE released a strategy to revive and expand nuclear fuel production which would be of interest to Metropolitan if projects are in proximity to the Colorado River.

Chromium-6

Chromium is a naturally occurring element found in rocks, soil, plants, and animals. Chromium-3 is typically the form found in soils and is an essential nutrient that helps the body use sugar, protein, and fat. Chromium-6 is used in electroplating, stainless steel production, leather tanning, textile manufacturing, dyes and pigments, wood preservation, and as an anti-corrosion agent. Chromium occurs naturally in deep aquifers and can also enter drinking water through discharges of dye and paint pigments, wood preservatives, chrome plating liquid wastes, and leaching from hazardous waste sites. In drinking water, chromium-6 is very stable and soluble, whereas chromium-3 is not very soluble. Chromium-6 is the more toxic species and is known to cause lung cancer in humans when inhaled, but the health effects in humans from ingestion are still in question. There is evidence that when chromium-6 enters the stomach, gastric acids may reduce it to chromium-3. However, recent studies conducted by the National Toxicology Program have shown that chromium-6 can cause cancer in animals when administered orally.

Effective July 1, 2014, California's Office of Administrative Law approved a primary drinking water standard of 10 μg/L for chromium-6. In May 2017, the Superior Court of Sacramento County issued a judgment invalidating California's MCL of 10 μg/L for chromium-6 on the basis that CDPH (now DDW), had not properly considered the economic feasibility of complying with the MCL. DDW therefore rescinded the chromium-6 MCL. However, chromium-6 remains regulated as part of total chromium. California's MCL for total chromium is 50 μg/L. In February 2020, DDW released a white paper discussion on an updated economic feasibility analysis of chromium-6 treatment for the consideration of a new chromium-6 MCL. USEPA regulates chromium-6 as part of the total chromium drinking water standard of 100 μg/L and is currently evaluating whether a new federal drinking water standard for chromium-6 is warranted based on new health effects information.

Metropolitan utilizes an analytical method with a minimum reporting level of 0.03 μg/L, which is less than the State DLR of 1 μg/L. In the past 5 years, the results from all of Metropolitan's source and treated waters are less than the State DLR. The following summarizes chromium-6 levels found in Metropolitan's system:

In the past 5 years, results of source and treated water monitoring for chromium-6 indicate the following:

- Levels in Colorado River water are mostly not detected (<0.03 μg/L), but when detected, levels range from 0.03 to 0.085 μg/L. SWP levels range from 0.03 to 1.0 μg/L. Treated water levels range from 0.03 to 0.8 μg/L.
- There is a slight increase in chromium-6 in the treated water from the oxidation (chlorination and ozonation) of natural background chromium (total) to chromium-6.
- Colorado River monitoring results upstream and downstream of the site of a Pacific Gas and Electric (PG&E) gas compressor station located along the Colorado River near Topock, Arizona (discussed below) have ranged from not detected (<0.03 μg/L) to 0.06 μg/L.
- Chromium-6 in Metropolitan's groundwater pump-in storage programs in the Central Valley has ranged from not detected (< 1 μg/L) to 8.9 μg/L in 2014, with the average for the different programs ranging from < 1 μg/L to 3 μg/L.

PG&E used chromium-6 as an anti-corrosion agent in its cooling towers at the Topock site from 1951 to 1985. Wastewater from the cooling towers was discharged from 1951 to 1968 into a dry wash next to the station. Monitoring wells show the plume concentration has peaked as high as 16,000 μg/L in groundwater. Since 2004, PG&E has operated an interim groundwater extraction and treatment system that is protecting the Colorado River. This interim treatment system will be taken offline in September 2021 and replaced by the long-term groundwater remedy system. Quarterly monitoring of the river has shown levels of chromium-6 less than 1 μg/L, which are considered background levels. The California Department of Toxic Substances Control (DTSC) and the U. S. Department of the Interior are the lead state and federal agencies overseeing the cleanup efforts. Metropolitan participates through various stakeholder workgroups and partnerships that include state and federal regulators, Indian tribes, and other stakeholders (e.g., Colorado River Board) involved in the corrective action process. In January 2011, a final treatment remedy was selected, and an Environmental Impact Report was certified. In November 2015, PG&E completed the final remedy design based on the selected remedy which involves the installation of an in-situ bioremediation treatment system. In April 2015, DTSC required the preparation of a Subsequent Environmental Impact Report (EIR) to address new design details. The Subsequent EIR was certified in April 2018. Construction of Phase 1, consisting of an In-situ reduction zone, began in October 2018 and is expected to be completed in 2021. Phase 2, consisting of a freshwater injection system, is anticipated to begin construction in 2023 and last about one year. Operation of the treatment system will run for an estimated 30 years.

The federal- and state-approved technologies for removing total chromium from drinking water include coagulation/filtration, ion exchange, reverse osmosis, and lime softening. For several years, the cities of Glendale, Burbank, and Los Angeles have been voluntarily limiting chromium-6 levels in their drinking water to 5 μg/L, even after the MCL was rescinded in 2017.

1,2,3-Trichloropropane (1,2,3-TCP)

1,2,3-TCP is a chlorinated hydrocarbon with high chemical stability. It is a manmade chemical found at industrial or hazardous waste sites. It has been used as a cleaning and degreasing solvent and also is associated with pesticide products.

At its July 18, 2017 public meeting, the SWRCB adopted an MCL of 5 parts per trillion (ppt) for 1,2,3-TCP, and related requirements, including establishing a DLR, identifying the best available technology for treatment, and setting public notification and consumer confidence report language. The regulations also included a method for public water systems to substitute existing water quality data for initial monitoring requirements under certain circumstances. Under the new regulation, drinking water agencies are required to perform quarterly monitoring of 1,2,3-TCP. There have been no detections of this chemical in Metropolitan's system. However, 1,2,3-TCP has been detected above the new MCL in groundwater wells of three of Metropolitan's groundwater storage program partners through monitoring performed by these agencies. Levels detected in groundwater wells of the Arvin-Edison Water Storage District are the highest and impact the ability of Metropolitan to put water and take return water under that program. Metropolitan has temporarily suspended operation of this program until the water quality concerns can be further evaluated and managed. The levels of 1,2,3-TCP detected in Metropolitan's other groundwater storage programs are much lower and impact fewer groundwater wells. Metropolitan is evaluating the effects of TCP on the return capability of those programs. Southern California counties that have detected concentrations of 1,2,3-TCP in drinking water sources at or over 5 ppt since 2010 include San Bernardino (48 sources), Los Angeles (63 sources), Riverside (24 sources), San Diego (10 sources), and Ventura (3 sources).[11]

Constituents of Emerging Concern

N-Nitrosodimethylamine

N-Nitrosodimethylamine (NDMA) is part of a family of organic chemicals called nitrosamines. NDMA is a chloramine disinfection by-product, and it is the most abundantly detected nitrosamine in drinking water systems. Metropolitan utilizes chloramines as a secondary disinfectant at its treatment plants. Wastewater treatment plant discharges can contribute organic matter into source waters, which react with chloramines to form NDMA at drinking water treatment plants. Certain coagulation aid polymers used in water treatment, e.g., polydiallyldimethylammonium chloride (polyDADMAC), can also contribute to NDMA formation. Some NDMA control measures are being used to avoid adverse impacts on Southern California drinking water supplies. Metropolitan is involved in several projects to understand the impact of different treatment processes on NDMA and its precursors at drinking water treatment plants and in distribution systems. Certain pre-oxidation processes, such as chlorine and ozone, have been shown to destroy NDMA precursors. Additional studies are being conducted to better understand how polyDADMAC contributes to NDMA formation and to identify measures to reduce polymer-derived NDMA formation.

USEPA considers NDMA to be a probable human carcinogen. USEPA placed NDMA on the Contaminant Candidate List 4 (CCL4). Although there is no federal regulation for nitrosamines in drinking water, DDW set a notification level of 0.01 µg/L each for NDMA and two other nitrosamines. Occurrences of NDMA in treated water supplies at concentrations greater than 0.01 µg/L are recommended to be included in a utility's annual Consumer Confidence Report. In December 2006, OEHHA set a PHG for NDMA of 0.003 µg/L. Since 1999, Metropolitan has conducted voluntary monitoring of the five treatment plant effluents and representative distribution system locations semi-annually. NDMA is the only detected nitrosamine in Metropolitan's treated water systems, and it is in the range of non-detect (<0.002 µg/L) to 0.006 µg/L. NDMA or a broader class of nitrosamines may likely be the next class of disinfection by-products to be regulated by USEPA.

[11] DDW data reported from SWRCB Groundwater Ambient Monitoring Assessment Program's web site: https://gamagroundwater.waterboards.ca.gov/. Numbers reported may change as the website is frequently updated. Also, the website includes additional source data reported by other entities.

Pharmaceuticals and Personal Care Products

Pharmaceuticals and personal care products (PPCPs) are a growing concern to the water industry. Numerous studies have reported the occurrence of these emerging contaminants in treated wastewater, surface water, and sometimes, in finished drinking water in the United States and around the world. The use of ozone in treatment processes may have a beneficial effect on PPCP removal in drinking water. The sources of PPCPs in the aquatic environment include (but may not be limited to) treated wastewater and industrial discharge, agricultural run-off, and leaching of municipal landfills. Currently, there is no evidence of human health risks from long-term exposure to the low concentrations (low ng/L; parts per trillion) of PPCPs found in some drinking water. Furthermore, there are no regulatory requirements for PPCPs in drinking water. USEPA included 14 PPCPs on the CCL3 and 10 PPCPs on the CCL4, nine of which are carried over from the CCL3; however, currently there are no standardized analytical methods for these compounds. USEPA's strategy for addressing PPCPs involves strengthening analytical methods, conducting source studies, improving public understanding of PPCPs in water, building partnerships and promoting stewardship opportunities, and taking regulatory action when appropriate.

In 2007, Metropolitan implemented a short-term monitoring program to determine the occurrence of PPCPs and other organic wastewater contaminants in Metropolitan's treatment plant effluents and selected source water locations within the Colorado River and SWP watersheds. Currently, PPCP monitoring is conducted on an annual basis for Metropolitan's source waters and treatment plants. Some PPCPs have been detected at very low ng/L levels, which is consistent with reports from other utilities. However, analytical methods are still being refined, and more work is required to fully understand occurrence issues. Metropolitan has been actively involved in studies related to PPCPs, including analytical methods improvements, and characterization of drinking water sources in California.

Microplastics

In 2018, Senate Bill No. 1422 added Section 116376 to the Health and Safety Code, which required the SWRCB to adopt a definition of microplastics in drinking water on or before July 1, 2020. Section 116376 also requires the SWRCB on or before July 1, 2021, to: (1) adopt a standard methodology to be used in the testing of drinking water for microplastics; (2) adopt requirements for four years of testing and reporting of microplastics in drinking water, including public disclosure of those results; (3) if appropriate, consider issuing a notification level or other guidance to help consumer interpretations of the results of the testing required; and (4) accredit qualified laboratories in California to analyze microplastics. No other states have defined microplastics. Knowledge in the microplastics field has been primarily provided by the European Union. On June 16, 2020, the SWRCB adopted a definition, acknowledging the definition is a work in progress, and stated the SWRCB will re-visit the microplastic definition as knowledge in the field progresses. The definition reads: *'Microplastics in Drinking Water' are defined as solid polymeric materials to which chemical additives or other substances may have been added, which are particles which have at least three dimensions that are greater than 1nm and less than 5,000 micrometers (µm). Polymers that are derived in nature that have not been chemically modified (other than by hydrolysis) are excluded.* Metropolitan is participating in a study with the Southern California Coastal Water Research Project to develop analytical methods for microplastics.

Per- and Polyfluoroalkyl Substances (PFAS)

Drinking water containing perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS) – and the larger family of per- and polyfluoroalkyl substances (PFAS) – has become an increasing concern due to the persistence of these chemicals in the environment and their tendency to accumulate in groundwater.

In August 2019, the SWRCB's Division of Drinking Water (DDW) updated its guidelines for local water agencies to follow in detecting and reporting the presence of these chemicals in drinking water. The guidelines lower the notification levels from 14 parts per trillion (ppt) to 5.1 ppt for PFOA and from 13 ppt to 6.5 ppt for PFOS. These levels are based on updated health recommendations from the Office of Environmental Health Hazard Assessment (OEHHA), which is part of the California Environmental Protection Agency. Notification levels are non-regulatory, precautionary health-based measures for concentrations of chemicals in drinking water that warrant notification and further monitoring and assessment. If a chemical concentration is greater than its notification level in drinking water that is provided to consumers, DDW recommends that the utility inform its customers and consumers about the presence of the chemical and about health concerns associated with exposure to it. The SWRCB also set new response levels (RLs) of 10 parts per trillion (ppt) for PFOA and 40 ppt for PFOS based on a running four quarter average. Previously, the RL was 70 ppt for the total concentration of the two contaminants combined. A response level is set higher than a notification level and represents a chemical concentration level at which DDW recommends a water system consider taking a water source out of service or providing treatment if that option is available to them. In March 2021, DDW issued an NL of 0.5 parts per billion (ppb) and an RL of 5 ppb for perfluorobutane sulfonic acid (PFBS), another PFAS chemical. The NL for PFBS is 100 times higher than the NLs for PFOA and PFOS. Metropolitan sources have not been affected by PFBS, but Metropolitan has not yet evaluated potential PFBS impacts on its member agencies' sources. DDW has also asked OEHHA to recommend NLs for six other PFAS compounds consistently detected in California drinking water sources: perfluorohexane sulfonic acid (PFHxS), perfluorohexanoic acid (PFHxA), perfluoroheptanoic acid (PFHpA), perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), and 4,8-dioxia-3H-perflourononanoic acid (ADONA). Legislation which took effect on January 1, 2020 (California Assembly Bill 756), requires that water systems that receive a monitoring order from the SWRCB and detect levels of PFAS that exceed their respective RLs must either take the drinking water source out of use or provide specified public notification if they continue to supply water above the RL.

In addition to the updated notification levels, DDW has requested that OEHHA develop PHGs for both PFOA and PFOS, the next step in the process of establishing MCLs in drinking water. As of the writing of this UWMP, draft PHGs have not been released. Other chemicals in the broader group of PFAS may be considered later, either individually or grouped, as data permits. On March 19, 2021, OEHHA announced its intent to list PFOA as a carcinogen under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). On March 26, 2021, OEHHA announced its review of the carcinogenic hazard of PFOS for possible listing under Proposition 65. That same day, OEHHA also announced its assessment of the reproductive toxicity of PFDA, PFHxS, PFNA, and perfluoroundecanoic acid (PFUnDA) for possible listing under Proposition 65. Comments regarding whether PFOA meets the criteria to be listed as a carcinogen under Proposition 65 were due by May 3, 2021. The public had until May 10, 2021, to submit information relevant to the assessment of the carcinogenicity of PFOS and the reproductive toxicity of PFDA, PFHxS, PFNA, and PFUnDA. In November 2017, OEHHA listed PFOA and PFOS as chemicals known to cause reproductive toxicity under Proposition 65. Proposition 65 requires businesses to provide warnings to Californians about significant exposures to chemicals that cause cancer, birth defects or other reproductive harm. Proposition 65 also prohibits California businesses from knowingly discharging significant amounts of listed chemicals into sources of drinking water.

On the federal level, U.S. EPA announced on January 19, 2021 that it is considering whether to designate PFOA and PFOS as hazardous substances under the Comprehensive Environmental Responsibility and Liability Act (CERCLA) and/or hazardous waste under the Resource Conservation and Recovery Act (RCRA). On February 22, 2021, U.S. EPA announced its proposed revisions to the Unregulated Contaminant Monitoring Rule (UCMR 5) for public water systems which includes monitoring for 29 PFAS in drinking water. The proposal would require pre-sampling preparations in 2022, sample collection from 2023-2025, and reporting of final results through 2026. Comments on U.S. EPA's proposal will be due within 60 days after it is published in the Federal Register. On March 3, 2021, U.S. EPA published its final regulatory determination to regulate PFOA and PFOS in drinking water. EPA has 24 months to propose maximum contaminant level goals (MCLG) and MCLs for PFOA and PFOS. Following that deadline, EPA has 18 months to publish final MCLGs and MCLs for PFOA and PFOS.

PFOA and PFOS were introduced in the 1940s and widely used in firefighting foams and in grease and stain-resistant, non-stick coatings in a variety of consumer products such as food paper packaging, carpets, furniture and cookware. The main route of exposure to PFOA and PFOS is through ingestion. While consumer products have been a large source of exposure to these chemicals for most people, drinking water has become an increasing concern due to the persistence of PFAS chemicals in the environment and their tendency to accumulate in groundwater. Groundwater contamination typically has been associated with an industrial facility where these chemicals were manufactured or used in other products, such as airfields and military bases where the chemicals have been used for firefighting or in areas near landfills that accept items containing PFAS.

Metropolitan has not detected PFOA or PFOS in its raw water. In 2019, Metropolitan detected in its supplies low levels of PFHxA, which is not acutely toxic or carcinogenic and is not currently regulated in California or at the federal level. No other PFAS have been detected in Metropolitan's imported or treated supplies. However, some of its member agencies have experienced detections in their groundwater wells. As DDW moves to establish MCLs for PFOA and PFOS, Metropolitan's member agencies may be confronted with the choice of implementing treatment or inactivating their affected sources to remain in compliance with DDW regulations. This may cause those systems to supplement their water needs with increased purchases of Metropolitan water.

1,4-Dioxane

1,4-dioxane has been used as a stabilizer for solvents, in particular 1,1,1- trichloroethane (TCA), and a solvent in its own right, as well as in a number of industrial and commercial applications. 1,4-dioxane is an emerging contaminant. In response to the occurrence data and potential adverse health effects, a notification level for 1,4-dioxane of 1 µg/L was established. The response level for 1,4-dioxane is 35 µg/L.

The SWRCB set a notification level of 1 µg/L for 1,4-dioxane in drinking water in November 2010, revising an earlier notification level of 3 µg/L set in March 1998 that was based on a risk determination by the U.S. EPA and concurrence from OEHHA. In August 2010, U.S. EPA revised its 1,4-dioxane risk evaluation, lowering the recommended levels in drinking water by nearly 10-fold to 0.35 µg/L. Following U.S. EPA's reevaluation of risk, the SWRCB revised the notification level to 1 µg/L in November 2010, considering analytical limitations at the time. On January 22, 2019, the SWRCB asked OEHHA to establish a PHG for 1,4-dioxane. OEHHA's PHG will be used by the SWRCB to set an MCL for 1,4-dioxane in drinking water.

Advanced oxidation treatment is currently the water industry's preferred treatment technology for 1,4-dioxane. However, DDW has not yet adopted a Best Available Technology for 1,4-dioxane treatment.

There are currently 90 wells in Los Angeles County and 21 wells in Orange County that have detected 1,4-dioxane over the NL in the last three years.[12]

Other Water Quality Programs

In addition to monitoring for and controlling specific identified chemicals in the water supply, Metropolitan has undertaken several programs to protect the quality of its water supplies. These programs are summarized below.

Source Water Protection

Source water protection is the first step in a multi-barrier approach to provide safe and reliable drinking water. In accordance with California's Surface Water Treatment Rule, Title 22 of the California Code of Regulations, DDW requires large utilities delivering surface water to complete a Watershed Sanitary Survey every five years to identify possible sources of drinking water contamination, evaluate source and treated water quality, and recommend watershed management activities that will protect and improve source water quality. The most recent sanitary surveys for Metropolitan's water sources are the Colorado River Watershed Sanitary Survey – 2015 Update and the State Water Project Watershed Sanitary Survey – 2016 Update.[13] The next Sanitary Surveys for the watersheds of the Colorado River and the SWP will report on watershed and water quality issues through 2020.

Metropolitan has an active source water protection program and continues to advocate on numerous issues to protect and enhance SWP and Colorado River water quality. As part of its source water protection program, Metropolitan monitors and forecasts source water quality, including closely monitoring the biology and limnology of lakes and aqueducts. Monitoring is conducted to comply with regulatory requirements, respond to water quality events, assess temporal variability, advise operations, and investigate emerging constituents and invasive species.

Colorado River Water Quality Partnerships

Metropolitan collaborates with external partners to asses and manage watershed threats to Colorado River water quality. Metropolitan is a member of the Clean Colorado River Sustainability Coalition, which was formed in 1997 and focuses on protecting and enhancing the Colorado River through monitoring and analysis of water quality to assure and sustain high quality water for all users of the Colorado River. In 2011, Metropolitan formed the Lower Colorado River Water Quality Partnership with SNWA and Central Arizona Project to identify and implement collaborative solutions to address water quality issues facing the Colorado River. Metropolitan also participated in the Lake Mead Water Quality Forum, which was formed in 2012, and its Lake Mead Ecosystem Monitoring Workgroup subcommittee. The Lake Mead Water Quality Forum's goals were to support the protection of human health and the environment and to preserve and improve the water quality of the Las Vegas Wash, Las Vegas Bay, and Lake Mead (and as a

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[12] DDW data reported from SWRCB Groundwater Ambient Monitoring Assessment Program's web site: https://gamagroundwater.waterboards.ca.gov/. Numbers reported may change as the website is frequently updated. Also, the website includes additional source data reported by other entities.

[13] Metropolitan Water District of Southern California, ***Colorado River Watershed Sanitary Survey, 2015 Update***. For the State Water Project, the sanitary survey report was prepared on behalf of the State Water Project Contractors Authority, in 2016, and was titled ***California State Water Project 2016 Watershed Sanitary Survey Update***.

result, the Colorado River). In addition, as discussed earlier, Metropolitan is a member of the Colorado River Basin Salinity Control Forum which facilitates coordination between Basin states and federal agencies on salinity matters and the implementation of the Colorado River Basin Salinity Control Program.

SWP Water Quality Programs

Metropolitan supports DWR policies and programs aimed at maintaining or improving the quality of SWP water delivered to Metropolitan. In particular, Metropolitan supported the DWR policy to govern the quality of non-project water conveyed by the California Aqueduct. In addition, Metropolitan has supported the expansion of DWR's Municipal Water Quality Investigations Program beyond its Bay-Delta core water quality monitoring and studies to include enhanced water quality monitoring and forecasting of the Delta and SWP. These programs are designed to provide early warning of water quality changes that will affect treatment plant operations both in the short-term (hours to weeks) and up to seasonally. The forecasting model is currently suitable for use in a planning mode. It is expected that with experience and model refinement, it will be suitable to use as a tool in operational decision making.

Metropolitan has implemented selective withdrawals from storage programs and exchanges to improve water quality. Although these programs were initially designed to provide dry-year supply reliability, they can also be used to store SWP water at periods of better water quality so the stored water may be withdrawn at times of lower water quality, thus diluting SWP water deliveries. Although elevated arsenic levels have been a concern in one groundwater banking program, there are also short-term water quality benefits that can be realized through storage programs, such as groundwater pump-ins into the California Aqueduct with lower TOC levels (as well as lower bromide and TDS, in some programs).

Regulatory and Legislative Actions

Metropolitan conducts technical reviews of regulatory and legislative actions that may have an effect on the quality of Metropolitan's source waters. These may include changes in federal and state water quality standards; California Environmental Quality Act (CEQA) documents for projects or programs within Metropolitan's source watersheds; National Pollutant Discharge Elimination System permits for wastewater discharges into the Delta or Colorado River systems; and regulations or statewide policies and permits affecting source water quality or reservoir management issues.

In addition, Metropolitan advocates and provides funding requests for key source water protection priorities, including the Moab uranium tailings cleanup and Colorado River salinity control. In 2020, Metropolitan also co-sponsored SB 996 with the California Municipal Utilities Association to establish a statewide CEC program, which has been re-introduced as SB 230 in 2021's legislative session.

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Coordination and Public Outreach 5

Collaborative Regional Planning

Southern California meets its water challenges through collaborative long-range planning, bringing local perspectives and data together with expert knowledge of hydrology, climate change, demographics, and economics. Metropolitan's 2020 Urban Water Management Plan (UWMP) was developed as part of the ongoing 2020 Integrated Water Resources Plan (IRP) planning process and provides a representation of Metropolitan's planning elements reported under the conditions required by the Act. Together, these plans serve as the reliability road map for the region. The planning process involved extensive coordination with Southern California's wholesale and retail water agencies, as well as municipal service providers and public planning agencies. Outreach efforts sought to engage the general public, businesses, environmental organizations, diverse communities, cities, counties, and other stakeholders with an interest in the future of Southern California's water supplies.

This chapter describes how Metropolitan's process to develop the 2020 UWMP, Appendix 11 to the 2015 UWMP, and Water Shortage Contingency Plan (WSCP) complies with the provisions for coordination and public outreach in the Urban Water Management Planning Act included as part of the California Water Code (CWC) §10610, et seq.

Concurrent Planning with the 2020 Integrated Water Resources Plan

Metropolitan and its member agencies used a scenario planning approach for the 2020 IRP. Instead of focusing on a target for future water supply needs, this approach encouraged broader thinking and discussion on possible future conditions for local and imported water supply and retail demand, and the policy implications for Metropolitan. Adaptive management during implementation will allow flexibility in how the region prepares for the supply and demand conditions that are becoming more likely. The planning started with identifying drivers of change for water supply and demand, understanding how they interact, and then assessing the potential scale of impact in the future. Data sources were identified that could be used for quantitative and qualitative analysis. The detailed analyses of future local and imported water supplies; economic growth, demographics and water demands; and changing hydrology were incorporated into the 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP. The IRP planning effort and policy discussions continued into 2021.

Board of Directors Oversight

Metropolitan's Board of Directors provided oversight throughout the ongoing process for the development of the 2020 IRP that informed the preparation of the 2020 UWMP. The Board established the Integrated Resources Plan Special Committee (IRP Committee) to provide focused involvement of the Metropolitan Board for the preparation of these plans. The IRP Committee has 14 members, and all Board members are invited to attend and participate in discussions. The meetings are held online due to COVID-19 concerns. They are open to the public, and the public is invited to provide comments at each meeting. The IRP Committee held 12 meetings between February 2020 and March 2021, as summarized in Table 5-1.

Table 5-1
Summary of Metropolitan Board of Directors IRP Committee Meetings

Date	Committee	Topic
February 25, 2020	IRP Committee	Overview of the planning process, introduction to scenario planning, identify major policy areas
April 28, 2020	IRP Committee	Review process and scenario planning, identify relevant policy questions
May 26, 2020	IRP Committee	Review schedule, overview of stakeholder outreach
June 23, 2020	IRP Committee	Discuss drivers of change and method for constructing scenarios
July 28, 2020	IRP Committee	Qualitative and quantitative assessment for scenarios, collaboration with member agencies
August 17, 2020	IRP Committee	IRP purpose and benefit; development of an example scenario
September 22, 2020	IRP Committee	Draft scenarios and analysis
October 27, 2020	IRP Committee	Scenario assumptions and preliminary analysis of drivers
December 15, 2020	IRP Committee	Draft retrospective of the 2015 IRP, preliminary gap analysis and policy implications of the 2020 IRP
January 26, 2021	IRP Committee	Comments and feedback on 2015 IRP retrospective report, 2020 IRP policy discussion
February 23, 2021	IRP Committee	Policy discussion on portfolio development, preparation for workshops with demand and climate experts
March 23, 2021	IRP Committee	Workshop with water demand experts

Coordination with Member Agencies and Other Organizations

Metropolitan coordinated the preparation of the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP with its 26 member agencies, wastewater management agencies, municipal service providers, groundwater management agencies, cities and counties within which Metropolitan provides water supplies, and regional planning agencies. The extensive regional coordination is consistent with the requirements of CWC Sections 10610.2(a)(4), 10620(d)(3), 10621(b), 10641, and 10642. With the WSCP initially included as part of the 2020 UWMP and the content of Appendix 11 to the 2015 UWMP the same as the content of Appendix 11 to the 2020 UWMP, the required coordination, notification, hearing, and adoption of the WSCP and Appendix 11 to the 2015 UWMP were accomplished side by side and concurrently with the 2020 UWMP process. Additionally, the WSDM Plan and WSAP, which are planning components included as part of the WSCP, were previously developed through extensive coordination with member agencies and various stakeholders and adopted by Metropolitan's Board in 1999 and 2008, respectively, and subsequent revisions to the WSAP were adopted in 2009, 2010, 2011, and 2014.

Metropolitan collaborated with its member agencies through the Member Agency Managers meetings and an IRP Member Agency Technical Workgroup, as well as the UWMP Coordination Meetings with member agencies and other appropriate agencies. These meetings provided an opportunity to share information, discuss scenario development and data analysis, and review draft analyses of future supply and demand. A summary of the meetings is provided in Table 5-2. In addition, Metropolitan staff met with member agency staff individually and provided presentations to member agency boards upon request.

Work with the member agencies was structured to complement presentations and discussions with the IRP Committee. Presentations and discussions with the Member Agency Technical Workgroup were incorporated into the following Member Agency Managers meetings. The feedback from the Member Agency Managers was then used to develop the presentations for the upcoming IRP Committee meetings. The Committee discussion and direction provided to staff informed the preparation of analysis and materials for the next Member Agency Technical Workgroup. This iterative process allowed for regular input and discussion, an essential element of scenario planning.

The first step in the planning process was to identify the drivers of change, those external factors that could impact future water supply and demand for the region. Over several months, Metropolitan worked with the Board, member agencies, stakeholders and the public to identify a broad range of drivers, understand how the drivers interact, and assess the potential scale of impact on water supply and demand. An important part of the discussion focused on how the impact of drivers could be evaluated qualitatively and quantitatively. The member agencies made recommendations on data and methodologies that could be used, and the draft analyses led to refinements.

Using the requirements for the UWMP, Metropolitan analyzed the data provided by the member agencies, other regional planning organizations such as SCAG and SANDAG, the California Department of Water Resources, and the U.S. Bureau of Reclamation. Local and imported water supplies were included, as well as demand management programs, regulations, and public acceptance of conservation as a way of life. Metropolitan prepared the data in five-year increments for conditions under normal water year, single dry year, and for droughts lasting at least five years as required in CWC Section 10631. The analyses were shared with the member agencies for their feedback, and to assist with their preparation and adoption of their plans. When requested, Metropolitan staff met individually with the member agencies to review the data sets and discuss any agency-specific questions or issues. Regional issues and analysis methodologies were discussed during the technical workgroup meetings and the Member Agency Managers meetings. Preliminary estimates of demand and supply were included in the Final Draft 2020 UWMP and draft Appendix 11 to the 2015 UWMP distributed to the member agencies in December 2020. Further refinements of demand and supply estimates were included in the Public Review drafts of the 2020 UWMP and draft Appendix 11 to the 2015 UWMP that were prominently posted on Metropolitan's website in February 2021, March 2021, and April 2021.

Public Outreach during IRP/UWMP/Appendix 11/WSCP Preparation

Metropolitan involved environmental and non-governmental organizations, businesses, academia, diverse communities, and the public in the preparation of the IRP, 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP. Public outreach provides an invitation and a means for the public to provide input on the region's future water supply reliability. Metropolitan's three key objectives for public involvement in the preparation of the 2020 IRP, 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP are as follows:

- Ensure that the planning process is understandable and accessible to anyone who has an interest in Southern California's water resources and water supply reliability
- Provide opportunities for learning, dialogue, and input
- Create a pathway to encourage continued engagement in future policy discussions

"Water Tomorrow" is Metropolitan's brand to build awareness of long-range planning efforts and programs for water reliability. The website MWDWaterTomorrow.com links the IRP, 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP. It provides key information on the IRP and IRP Committee presentations, as well as notice of stakeholder workshops. Metropolitan shares news and updates about the IRP and UWMP through Metropolitan's e-newsletter and social media on several platforms. Metropolitan also provides speakers for community, governmental and business organizations throughout its service area.

To encourage public involvement during the planning process, Metropolitan held two public workshops in May 2020 using an online platform due to COVID-19 concerns. The workshops introduced the scenario planning approach and focused on drivers of change, opening up dialogue and discussion among stakeholders across the region. Over 500 stakeholders participated, sharing their ideas on what could drive future water supply and demand conditions. Throughout the planning process the public was invited to provide comments at each IRP Committee meeting and to view the presentations and listen to the board discussions.

The third outreach objective looks to the future. One of Metropolitan's overarching communication goals is to develop the general public's knowledge of water resource issues and the range of solutions available to Southern California. An informed public is better able to contribute to the discussions and understand the implications and opportunities afforded by decisions. Metropolitan is building on the momentum for the IRP, 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP planning efforts to encourage continued public involvement in water issues. Stakeholders will continue to receive updates through MWDWaterTomorrow.com, social media, and e-news.

2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP Public Notice and Adoption

CWC Section 10632 requires urban water suppliers to prepare a detailed WSCP. While the WSCP is its own independent plan that may be revised at any point in time, it is initially included as part of the 2020 UWMP.

Metropolitan provided notice of the availability of the draft 2020 UWMP (including Appendix 11 which will also be a new Appendix 11 to its 2015 UWMP) and the WSCP, and notice of the public hearing to consider adoption of both plans and Appendix 11 as an addendum to its 2015 UWMP, in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP were posted prominently on Metropolitan's website, mwdh2o.com, on February 1, 2021, more than 60 days in advance of the public hearing on April 12, 2021. The notice of availability of the documents was sent to Metropolitan's member agencies, as well as to cities and counties in Metropolitan's service area. In addition, a public notice advertising the public hearing in English and Spanish was published in 12 Southern California newspapers. The notification in English language newspapers was published on February 1 and 8, 2021. The notification was also published on January 28-30, 2021 and February 1, 4-6, and 8, 2021 in Spanish language newspapers, satisfying the requirement for non-English language notification. Copies of: (1) the notification letter sent to the member agencies, cities and counties in Metropolitan's service area, and (2) the notice published in the newspapers are included in this section. Table 5-3 provides a list of participating member agencies and other appropriate agencies that Metropolitan coordinated with in its regional planning, as well as the cities and counties that were notified about the preparation of its 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP. In addition, the list of newspaper publications is included in Table 5-4.

Metropolitan held the public hearing for the draft 2020 UWMP, draft Appendix 11 to the 2015 UWMP, and draft WSCP on April 12, 2021, at the Board's Water Planning and Stewardship Committee meeting, held online due to COVID-19 concerns. On May 11, 2021, Metropolitan's Board determined that the 2020 UWMP and the WSCP are consistent with the Act and accurately represent the water resources plan for Metropolitan's service area. In addition, Metropolitan's Board determined that Appendix 11 to both the 2015 UWMP and the 2020 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003) which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolutions 9279, 9280, and 9281, the Board adopted the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP, and authorized their submittal to the State of California. Copies of Resolutions 9279, 9280, and 9281 are included in this section.

Submission and Availability of Final 2020 UWMP, Appendix 11 to 2015 UWMP, and WSCP

In fulfillment of CWC Sections 10632(c) and 10645(a) and (b), Metropolitan's final 2020 UWMP, Appendix 11 to its 2015 UWMP, and its WSCP were posted on the mwdh2o.com website in May 2021, following their adoption by the Metropolitan Board. This satisfies the requirement to make the plans available for public review and to make the WSCP available to Metropolitan's customers (which are its member agencies).

In fulfillment of CWC Sections 10632(c), 10635(c), and 10644(a)(1), Metropolitan also mailed copies of the final 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP (in electronic pdf format) to the California State Library and all cities and counties within Metropolitan's service area within 30 days of Board adoption.

In fulfillment of CWC Section 10621(f) and Sections 10644(a)(1), (2), and (b), Metropolitan's final 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP were electronically submitted to the State of California through DWR's WUE data website https://wuedata.water.ca.gov/secure/ in June 2021.

Table 5-2
2020-2021 Member Agency Participation

Date	Group	Topic
May 5, 2020	Member Agency UWMP Coordinators and Consultants	UWMP Member Agency Coordination Meeting #1 – Kickoff of UWMP Process
May 13, 2020	Member Agency Technical Workgroup	IRP schedule and process, drivers of change brainstorm
May 15, 2020	Member Agency Managers Meeting	IRP schedule and process, drivers of change brainstorm
June 10, 2020	Member Agency Technical Workgroup	Drivers of change survey, process for constructing scenarios
June 12, 2020	Member Agency Managers Meeting	Drivers of change survey, process for constructing scenarios
June 30, 2020	Member Agency UWMP Coordinators and Consultants	UWMP Member Agency Coordination Meeting #2 – Coordination with DWR on Guidebook Development and Reduced Delta Reliance Reporting
July 15, 2020	Member Agency Technical Workgroup	Drivers of change, qualitative and quantitative assessment
July 17, 2020	Member Agency Managers Meeting	Drivers of change, qualitative and quantitative assessment
August 5, 2020	Member Agency Technical Workgroup	Qualitative and quantitative assessment
August 6, 2020	Member Agency Managers Meeting	Qualitative and quantitative assessment
August 12, 2020	Member Agency Technical Workgroup	Qualitative and quantitative assessment
August 21, 2020	Member Agency Managers Meeting	IRP progress, draft scenario framework
August 24, 2020	Member Agency Meeting: IEUA	Coordination meeting on IEUA UWMP preparation
September 10, 2020	Member Agency Meeting: MWDOC	Kickoff meeting on UWMP preparation with MWDOC Retail Agencies
September 16, 2020	Member Agency Technical Workgroup	Draft scenario framework, narrative summaries
September 18, 2020	Member Agency Managers Meeting	Draft scenario framework, assumptions
September 28, 2020	Member Agency Meeting: SDCWA	Coordination meeting on UWMP preparation (Reduced Delta Reliance)
October 8, 2020	Member Agency UWMP and IRP Coordinators and Consultants	Technical Meeting on IRP Analysis, Local Supply Information Exchange, Reduced Delta Reliance Reporting
October 14, 2020	Member Agency Technical Workgroup	Draft scenario assumptions, preliminary analysis

Table 5-2 (continued)
2020-2021 Member Agency Participation

Date	Group	Topic
October 16, 2020	Member Agency Managers Meeting	Draft scenario assumptions, preliminary analysis
November 13, 2020	Member Agency Managers Meeting	Imported water supply analysis; preliminary results for UWMP and IRP scenarios
November 24, 2020	Member Agency Technical Workgroup	Preliminary assumptions and gap analysis for IRP scenarios
November 30, 2020	Member Agency UWMP Coordinators, Sanitation Districts, Groundwater Managers, and Stakeholders	UWMP Member Agency Coordination Meeting #3 – Discussion of Final Draft UWMP
December 11, 2020	Member Agency Managers Meeting	IRP update and preliminary results for UWMP
January 15, 2021	Member Agency Managers Meeting	UWMP update and discussion of reliability for IRP
February 12, 2021	Member Agency Managers Meeting	Scenario refinements, engaging local agencies for groundwater, surface water and local projects
February 22, 2021	Member Agency Technical Workgroup	Scenario and gap analysis refinements, engaging local agencies for groundwater, surface water and local projects; preparation for workshops with demand and climate experts
March 12, 2021	Member Agency Managers Meeting	Discussion on workshops with water demand and climate change experts
March 18, 2021	Member Agency UWMP Coordinators and Consultants	UWMP status update, Reduced Delta Reliance reporting, Understanding Alternative Forecasts and Projections for Demand on Metropolitan

Table 5-3
Water Supplier Information Exchange

6 Counties			
Los Angeles	Orange	Riverside	San Bernardino
San Diego	Ventura		
136 Cities			
Agoura Hills	Fillmore	Long Beach	Rosemead
Aliso Viejo	Fontana	Los Alamitos	San Clemente
Arcadia	Fountain Valley	Lynwood	San Dimas
Artesia	Fullerton	Malibu	San Fernando
Azusa	Garden Grove	Manhattan Beach	San Gabriel
Bell Gardens	Gardena	Maywood	San Jacinto
Bellflower	Glendale	Menifee	San Marcos
Bradbury	Glendora	Mission Viejo	San Marino
Buena Park	Hawaiian Gardens	Monrovia	Santa Ana
Burbank	Hermosa Beach	Monterey Park	Santa Fe Springs
Calabasas	Hidden Hills	Moorpark	Santa Monica
Camarillo	Huntington Beach	Murrieta	Seal Beach
Carson	Imperial Beach	National City	Sierra Madre
Chino	Industry	Newport Beach	Signal Hill
Chino Hills	Inglewood	Norco	Simi Valley
Chula Vista	Irvine	Norwalk	Solana Beach
Claremont	Irwindale	Ontario	South El Monte
Compton	La Canada Flintridge	Oxnard	South Gate
Corona	La Habra	Palos Verdes Estates	South Pasadena
Covina	La Habra Heights	Paramount	Stanton
Cudahy	La Mesa	Pasadena	Temecula
Culver City	La Mesa	Perris	Temple City
Cypress	La Mirada	Pico Rivera	Thousand Oaks
Dana Point	La Palma	Placentia	Torrance
Del Mar	La Puente	Pomona	Upland
Diamond Bar	La Verne	Port Hueneme	Ventura
Downey	Laguna Beach	Poway	Villa Park
Duarte	Laguna Hills	Rancho Cucamonga	Vista
Eastvale	Laguna Niguel	Rancho Palos Verdes	Walnut
El Cajon	Laguna Woods	Rancho Santa Margarita	West Hollywood
El Monte	Lake Elsinore	Redondo Beach	Westlake Village
El Segundo	Lake Forest	Riverside	Westminster
Encinitas	Lakewood	Rolling Hills	Whittier
Escondido	Lawndale	Rolling Hills Estates	Wildomar

Table 5-3
Water Supplier Information Exchange (continued)

26 Member Agencies			
Anaheim	Foothill MWD	Municipal Water District of Orange County	Three Valleys MWD
Beverly Hills	Fullerton	Pasadena	Torrance
Burbank	Glendale	San Diego County Water Authority	Upper San Gabriel Valley MWD
Calleguas MWD	Inland Empire Utilities Agency	San Fernando	West Basin MWD
Central Basin MWD	Las Virgenes MWD	San Marino	Western MWD
Compton	Long Beach	Santa Ana	
Eastern MWD	Los Angeles	Santa Monica	
9 Groundwater Basin Management Organizations			
Santa Margarita River Watermaster	Ventura County Watershed Protection District	Water Replenishment District	Upper Los Angeles River Area Watermaster
San Bernardino County Flood Control District	Chino Basin Watermaster	Main San Gabriel Basin Watermaster/	Orange County Water District
Raymond Basin Management Board			
Other Agencies / Planning Organizations			
Los Angeles County Sanitation Districts	City of Los Angeles Bureau of Sanitation	Southern California Association of Governments	Western Riverside Council of Governments
Orange County Sanitation District	City of San Diego Metropolitan Wastewater Department	City of San Diego Recycled Water Section Public Utilities Department	San Diego Association of Governments
California State Water Contractors			

Table 5-4
Newspaper Publication of Public Hearing Notification

English Language Newspapers		
Los Angeles County	Los Angeles Times	February 1 and 8, 2021
Orange County	Orange County Register	February 1 and 8, 2021
San Bernardino	Inland Valley Daily Bulletin	February 1 and 8, 2021
Ventura County	Ventura County Star	February 1 and 8, 2021
Riverside County	Press Enterprise	February 1 and 8, 2021
San Diego County	San Diego Union Tribune	February 1 and 8, 2021
Spanish Language Newspapers		
Los Angeles County	La Opinion	February 1 and 8, 2021
Orange County	Excelsior	January 29, 2021 and February 5, 2021
San Bernardino	El Chicano	January 28, 2021 and February 4, 2021
Ventura County	VIDA Ventura County	January 28, 2021 and February 4, 2021
Riverside County	La Prensa Hispana	January 29, 2021 and February 5, 2021
San Diego County	Fronteras	January 30, 2021 and February 6, 2021

(Notification per California Water Code § 10621(b) and § 10642)
Letter Notifying Cities and Counties

February 1, 2021 [Sent via US Mail to Member Agencies, City Managers, and County Administrators]

Notice of Public Hearing on The Metropolitan Water District of Southern California's Draft 2020 Urban Water Management Plan (UWMP), Draft Appendix 11 to the 2015 UWMP, and Draft Water Shortage Contingency Plan

The Metropolitan Water District of Southern California (Metropolitan) cordially invites you to participate and provide comments at a public hearing on the draft 2020 Urban Water Management Plan (UWMP), draft Appendix 11 as an addendum to the 2015 UWMP, and draft Water Shortage Contingency Plan (WSCP). The UWMP presents Metropolitan's long-term plan for ensuring water supply reliability and water quality for the region. The draft 2020 UWMP complies with California state law requiring urban water suppliers to prepare and update urban water management plans every five years. The draft WSCP includes Metropolitan's efficient management and planned actions to respond to actual water shortage conditions. Metropolitan's WSCP satisfies the requirements of the California Water Code. The draft Appendix 11 to both the 2015 UWMP and the 2020 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003) which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. The hearing will be held as part of the meeting of the Water Planning and Stewardship Committee whose board members are helping to shape a public dialogue on the future of water management and conservation in the region. The meeting details are as follows:

> **Water Planning and Stewardship Committee Meeting**
> **Monday, April 12, 2021 at 10:00 AM**
> **(expected time; please confirm time 7 days prior to meeting)**
> **Teleconference Participation Only**
> **No Physical Meeting Location**
>
> As a result of the COVID-19 emergency and the Governor's Executive Orders to protect public health by limiting public gatherings and requiring social distancing, at this time, this meeting is scheduled to occur via remote presence.
>
> The Water Planning and Stewardship Committee meeting will be live streamed and recorded and may be accessed using the following link:
> http://www.mwdh2o.com/WhoWeAre/Board/Board-Meeting/Pages/default.aspx.
> (Please check this website for final time of the Public Hearing.)

The draft 2020 UWMP, draft Appendix 11 to the 2015 UWMP, and draft WSCP are posted on Metropolitan's website, mwdh2o.com, for your review. Public input is encouraged and will be considered during finalization of the 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP. Written comments are due by **April 12, 2021**.

If you would like to get more information or send comments, please contact Edgar Fandialan at efandialan@mwdh2o.com.

Very Truly Yours,
Brad Coffey
Manager, Water Resource Management Group

(Published on February 1 and 8, 2021 for English language newspapers and January 28-30, 2021 and February 1, 4-6, and 8, 2021 for Spanish language newspapers per California Water Code § 10642, Government Code § 6066, and Chapter 17.5 of the Government Code)

PUBLIC HEARING SCHEDULED ON

DRAFT 2020 URBAN WATER MANAGEMENT PLAN, DRAFT APPENDIX 11 TO 2015 URBAN WATER MANAGEMENT PLAN, AND DRAFT WATER SHORTAGE CONTINGENCY PLAN

The Metropolitan Water District of Southern California (Metropolitan) will hold a public hearing on **Monday, April 12, 2021** to receive comments on its draft 2020 Urban Water Management Plan (UWMP), draft Appendix 11 as an addendum to its 2015 UWMP, and its draft Water Shortage Contingency Plan (WSCP).

The hearing will be held as part of the meeting of the Water Planning and Stewardship Committee whose board members are helping to shape a public dialogue on the future of water management and conservation in the region. The meeting is at:

Water Planning and Stewardship Committee Meeting
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(Please check this website for final time of the Public Hearing.)

The UWMP presents Metropolitan's long-term plan for ensuring water supply reliability and water quality for the region. The draft 2020 UWMP complies with California state law requiring urban water suppliers to prepare and update urban water management plans every five years. The draft Appendix 11 to both the 2020 UWMP and the 2015 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003) which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. The draft WSCP includes Metropolitan's efficient management and planned actions to respond to actual water shortage conditions. Metropolitan's draft WSCP satisfies the requirements of the California Water Code.

The draft 2020 UWMP, draft Appendix 11, and the draft WSCP are available on Metropolitan's website, mwdh2o.com. Public input is encouraged and will be considered during finalization of the 2020 UWMP, Appendix 11, and the WSCP. Metropolitan will accept written comments on the draft plans and draft Appendix 11. All written comments must be received by **April 12, 2021**.

To send comments or for more information on the draft 2020 UWMP, draft Appendix 11, and draft WSCP, please contact Edgar Fandialan of Metropolitan's Water Resource Management Group at efandialan@mwdh2o.com.

Resolution 9279

RESOLUTION
OF THE BOARD OF DIRECTORS
OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
ADOPTING THE 2020 URBAN WATER MANAGEMENT PLAN

WHEREAS, the Urban Water Management Planning Act requires urban water suppliers providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt, in accordance with prescribed requirements, an urban water management plan every five years; and

WHEREAS, the Urban Water Management Planning Act specifies the requirements and procedures for adopting such urban water management plans; and

WHEREAS, the Board of Directors of The Metropolitan Water District of Southern California has duly reviewed, discussed, and considered the 2020 Urban Water Management Plan and has determined the 2020 Urban Water Management Plan to be consistent with the Urban Water Management Planning Act and to be an accurate representation of the water resources plan for The Metropolitan Water District of Southern California.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of The Metropolitan Water District of Southern California that, on May 11, 2021, this District hereby adopts this 2020 Urban Water Management Plan for submittal to the State of California.

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of a resolution adopted by the Board of Directors of The Metropolitan Water District of Southern California, at its meeting held on May 11, 2021.

Judy Abdo

Secretary of the Board of Directors
of The Metropolitan Water District
of Southern California

Resolution Adopting the Appendix 11 Addendum to the 2015 Urban Water Management Plan

Resolution 9280

RESOLUTION
OF THE BOARD OF DIRECTORS
OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
ADOPTING APPENDIX 11 AS AN ADDENDUM TO THE 2015 URBAN WATER MANAGEMENT PLAN

WHEREAS, the Urban Water Management Planning Act requires urban water suppliers providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt, in accordance with prescribed requirements, an urban water management plan every five years; and

WHEREAS, the Urban Water Management Planning Act specifies the requirements and procedures for amending and adopting such urban water management plans; and

WHEREAS, the Board of Directors of The Metropolitan Water District of Southern California has duly reviewed, discussed, and considered Appendix 11 as an addendum to Metropolitan's 2015 Urban Water Management Plan and has determined Appendix 11 to be consistent with the Urban Water Management Planning Act and includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs., tit. 23, § 5003, subd. (c)(1)) which need to be included in a water supplier's urban water management plan to support a certification of consistency for one or more future water supply covered actions in the Sacramento-San Joaquin Delta.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of The Metropolitan Water District of Southern California that, on May 11, 2021, this District hereby adopts this Appendix 11 to the 2015 Urban Water Management Plan for submittal to the State of California.

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of a resolution adopted by the Board of Directors of The Metropolitan Water District of Southern California, at its meeting held on May 11, 2021.

Judy Abdo

Secretary of the Board of Directors
of The Metropolitan Water District
of Southern California

Resolution Adopting the Water Shortage Contingency Plan

Resolution 9281

RESOLUTION
OF THE BOARD OF DIRECTORS
OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
ADOPTING THE WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the Urban Water Management Planning Act requires urban water suppliers providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt, in accordance with prescribed requirements, a water shortage contingency plan;

WHEREAS, the Urban Water Management Planning Act specifies the requirements and procedures for adopting such Water Shortage Contingency Plans;

WHEREAS, the Urban Water Management Planning Act requires urban water suppliers to conduct an annual water supply and demand assessment (Annual Assessment) each year and to include in their water shortage contingency plans the procedures they use to conduct the Annual Assessment;

WHEREAS, the procedures used to conduct an Annual Assessment include, but are not limited to, the written decision-making process that an urban water supplier will use each year to determine its water supply reliability;

WHEREAS, The Metropolitan Water District of Southern California's (Metropolitan's) water shortage contingency plan provides that by June of each year, Metropolitan staff will present a completed Annual Assessment for approval by Metropolitan's Board of Directors or by the Board's authorized designee with expressly delegated authority for approval of Annual Assessment determinations;

and

WHEREAS, the Board of Directors of The Metropolitan Water District of Southern California has duly reviewed, discussed, and considered such Water Shortage Contingency Plan and has determined the Water Shortage Contingency Plan to be consistent with the Urban Water Management Planning Act and to be an accurate representation of the planned actions during shortage conditions for The Metropolitan Water District of Southern California.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of The Metropolitan Water District of Southern California that, on May 11, 2021, this District hereby adopts this Water Shortage Contingency Plan for submittal to the State of California and expressly authorizes the General Manager of The Metropolitan Water District of Southern California to approve the Annual Assessment each year.

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of a resolution adopted by the Board of Directors of The Metropolitan Water District of Southern California, at its meeting held on May 11, 2021.

Judy Abdo

Secretary of the Board of Directors
of The Metropolitan Water District
of Southern California

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Appendix 1

DEMAND FORECAST

Appendix 1
DEMAND FORECAST

Forecast Overview

Retail water demand forecasting is essential for planning total water requirements in Metropolitan's service area. Retail water demand can be met with conservation, local supplies, or imported supplies. As a wholesale imported water supplier, Metropolitan's long-term plans focus on the future demands for Metropolitan's supplies. In order to project the need for resources and system capacity, Metropolitan begins with a long-term projection of retail water demands.

Total retail demands include:

- Retail Municipal and Industrial (M&I) — Retail M&I demands represent urban water use within the region including residential, commercial, industrial, and institutional water uses. To forecast retail M&I demands, Metropolitan uses econometric models that have been adapted for conditions in Southern California. The econometric models are statistical models that can capture and explain the impacts of long-term socioeconomic trends on retail M&I demands. The econometric models incorporate projections of demographic and economic variables from regional transportation planning agencies to produce forecasts of water demand.
- Retail Agricultural Demand — Retail agricultural demands consist of water use for irrigating crops. Metropolitan's member agencies provide projections of agricultural water use based on many factors, including farm acreage, crop types, historical water use, and land use conversion. Metropolitan relies on member agencies' projections of agricultural demands.
- Seawater Barrier Demand — Seawater barrier demands represent the amount of water needed to hold back seawater intrusion into the coastal groundwater basins. Groundwater management agencies determine the barrier requirements based on groundwater levels, injection wells, and regulatory permits.
- Replenishment Demand — Replenishment demands represent the amount of water member agencies plan to use to replenish their groundwater basins in order to maintain sustainable basin health and production.

Retail M&I Demand Forecast

In forecasting retail M&I water demand, Metropolitan utilizes an econometric model (the Metropolitan Water District – Econometric Demand Model or MWD-EDM) developed by The Brattle Group (January 2015). MWD-EDM utilizes multiple regression, which is generally favored by academics and practitioners for long-term water demand analysis. It uses demand relationships based on actual observed behavior to consider the effect of anticipated changes in demand factors on long-term demand.

MWD-EDM is comprised of three separate regression models described below. Each model is developed using historical water consumption, socio-demographic, and economic data specific to the sector:

- Single-Family Residential (SFR) Model — SFR water demand is modeled as a function of price, weather, retailer level housing, socio-demographic characteristics, and member agency level fixed effects. The model used water consumption data from 153 retailers with 3,000 accounts or more in Metropolitan's service area. The dataset, ranging from 1994 to 2011, consisted of 1,225 observations and represented 80 percent of all SFR accounts from all 26 Metropolitan member agencies.

- Multi-family Residential (MFR) Model — MFR demand is modeled as a function of price, retailer level housing, socio-demographic characteristics, and member agency level fixed effects. Water consumption data, ranging from 1994 to 2011, was collected from 53 water retailers consisting of 469 observations and representing 23 out of 26 Metropolitan member agencies.
- Commercial, Industrial, and Institutional (CII) Model — CII demand is modeled as a function of price, weather, employment, the share of employment in the manufacturing sector, and member agency level fixed effects. Water consumption data, ranging from 1994 to 2011, was collected from 75 water retailers consisting of 709 observations and representing 25 out of 26 Metropolitan member agencies.

The SFR and MFR models forecast average monthly household consumption before conservation, while the CII model forecasts average monthly consumption per employee. Table A.1-1 shows the dependent and the covariates uses in the econometric models for each sector.

Table A.1-1
MWD-EDM Variables

Sector	Dependent Variable	Independent Variable (Covariate)
SFR	Water-Use Per Household	Total Average Cost Total Average Cost x Median Lot Size Annual precipitation Average Max Temperature Median Income Average Household Size Median Lot Size
MFR	Water-Use Per Household	Median Tier Price Median Income Median Lot Size Average Household Size
CII	Water-Use Per Employee	Median Tier Price Cooling Degree Days Average Max Temperature Share of Employment In Manufacturing Median Tier Price x Share of Manufacturing

Total retail M&I demand is the product of projected household/employee and the average monthly consumption.

Price Elasticity

Price elasticity of demand is a measure used in economics to show the responsiveness of the quantity of water demanded to a change in its price. The assumed price increase reduces the water use. This reduction can be assessed in MWD-EDM and is considered a conservation savings due to price or "price-effect." Consumers can respond to price increases by installing water-conserving fixtures and appliances such as high-efficiency toilets. However, many of the fixture-based conservation savings options are already factored into Metropolitan's Conservation Savings Model. As more water efficient fixtures are installed, the impact of changing water using behavior through price or rates is reduced. Consider consumers who respond to rate increases by taking shorter showers. Their behavior adjustment will save less water if they use a water-efficient low-flow showerhead compared to a regular showerhead. This effect is known as demand hardening. In order to avoid double-counting conservation savings and account for demand hardening, the impact of price elasticity is reduced. In MWD-EDM, price elasticity is adjusted by 33 percent in 2019 and 66 percent by 2045. Price-effect savings are reduced (and demands increased) as a result of this adjustment. The elasticity is reduced in proportion to increases in conservation savings from the conservation model. Reducing price elasticity to 1/3 of its originally estimated levels is based on professional judgment, assuming that much of the easily obtained water use efficiencies will be achieved by 2020 but allowing for new conservation technologies.

Fixed Effects

MWD-EDM forecasts retail M&I demand for each of the 26 member agencies. To account for the differences observed between each agency, MWD-EDM uses the fixed effects or the constant term that represents the member agency specific intercepts that account for all time-invariant unobserved factors common to an agency.

Demographics

Demographics are recognized by the water industry as drivers of water demand. Metropolitan's retail demand modelling is driven by key demographics such as projected population, households, employment, and median household income.

Metropolitan uses demographic growth projections produced by two regional transportation planning agencies: Southern California Association of Governments (SCAG) and San Diego Association of Governments (SANDAG). Together they represent more than 200 cities in Southern California and produce long-term transportation plans for sustainable communities. Among other responsibilities, SCAG and SANDAG also prepare projections of population, households, income, and employment for their regions. Both planning agencies update their regional growth forecasts approximately every four years, at different times. SCAG is the regional planning agency for six counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura. SANDAG is the regional planning agency for San Diego County. Significantly, SCAG's and SANDAG's official growth projections are backed by environmental reports. These regional growth forecasts provide the core assumptions underlying Metropolitan's retail demand forecasting model.

In May 2020, SCAG approved the 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) for federal transportation conformity purposes, certified the Connect SoCal program environmental impact report (PEIR), and delayed for up to 120 days approval of the plan for other purposes primarily due to the COVID-19 pandemic. This enabled SCAG to submit the plan to the Federal Highway Administration and Federal Transit Administration for review prior to the June 1, 2020, deadline, as required by the federal Clean Air Act. SCAG subsequently approved Connect SoCal in its entirety in September 2020. SCAG's related growth forecast (RTP-20) projects growth in employment, population, and households at the regional, county, jurisdictional, and sub-jurisdictional levels. The regional and county growth forecasts reflect recent and past trends and expert-derived demographic and economic assumptions for Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties. Metropolitan uses the forecast for every county except Imperial, which is outside of Metropolitan's service area. In preparing its demographic and growth forecast, Metropolitan relied on SCAG's 2020 Demographics and Growth Forecast Proposed Final Technical Report to the RTP/SCS. The report includes information on social factors affecting water management such as race, ethnicity, and cultures. As noted in SCAG's report, Southern California is one of the most diverse regions in the nation in race and ethnicity. Race and ethnicity are important for demographers to consider while forecasting since fertility and household formation have strong cultural underpinnings that vary based on these categories.

In October 2019, SANDAG adopted the San Diego Forward: The 2019 Federal Regional Transportation Plan that utilized Version 17 of the SANDAG Series 14 Regional Growth Forecast (SANDAG Series 14). The forecast is a comprehensive projection of the regional demographic, economic, and housing trends for the San Diego region that was developed through a collaborative effort with experts in demography, housing, the economy and other disciplines, and the close cooperation of the local planning directors and their staff. Metropolitan uses the forecast for the San Diego County Water Authority's service area in the retail demand forecast.

Effects of the COVID-19 Pandemic on SCAG's and SANDAG's Forecasts

Both SCAG and SANDAG's forecasts were developed prior to the advent of the COVID-19 global pandemic. For this reason, assumptions about the pandemic's effects on future growth are not reflected in the demographic forecast data used in this UWMP. Although long-term impacts are extremely uncertain, the region is currently experiencing acute and potentially lasting disruptions across a wide range of economic and lifestyle activities that in turn may unsettle pre-pandemic expectations for future household formation, migration, fertility, and life expectancy.

After approving Connect SoCal in May 2020 for the limited purpose of federal air quality conformity, SCAG engaged in a stakeholder outreach process to learn more from stakeholders about how they have been impacted by COVID-19 and learn how Connect SoCal could be better positioned as a tool for recovery and regional resilience. Activities included engagement with regional planning working groups, direct outreach to stakeholders, focus groups with community-based organizations, a public survey, and a public virtual townhall. Given the living nature of Connect SoCal and its existing focus on the need to develop regional resilience strategies targeting vulnerable communities, SCAG staff did not recommend specific modifications or clarifications to Connect SoCal in response to the pandemic at the time. Rather, staff recommended that policy changes and plan updates be considered through future board action informed by its implementation planning and regular processes for updating the Regional Transportation Plan/Sustainable Communities Strategy. With its September 2020 final adoption, SCAG accepted the Connect SoCal in its entirety without substantive changes to the growth forecast.

Forecasts Used by Metropolitan

Metropolitan uses the forecast approved by SCAG in May 2020. During the period between May and September 2020, the cities of Anaheim, Chino, Duarte, Malibu, and some unincorporated areas of Los Angeles and San Bernardino counties made adjustments to the forecast to reflect changes in their general plan capacities and entitlements. The total household change resulted in 0.29% of the region's Transportation Analysis Zones (TAZ) and jobs were shifted in 0.77% of TAZs. Given the timing and the small scale change in the forecast, Metropolitan continues to use the May 2020 release for its planning activities. For the San Diego region, Metropolitan uses a version of SANDAG Series 14 provided by the San Diego County Water Authority.

Trends in Southern California

Population

According to the California Department of Finance, the population in Metropolitan's service area was approximately 19.0 million in 2020. SCAG and SANDAG estimate the population in Metropolitan's service area will reach 20.1 million in 2025 and 22.0 million by 2045. The historical and projected population for the service area, by county, is shown in Figure A.1-1. While Los Angeles County leads in total population, the inland areas of Riverside and San Bernardino counties are projected to grow at the fastest rates over the next ten years. Generally speaking, however, annual growth rates will slow for all counties between 2010 and 2045. In part, this is due to changing patterns of migration, as well as aging of the overall population. It also reflects the effects of the recession of the late 2000s and the ongoing restructuring of the Southern California economy.

Employment

Within Metropolitan's service area, employment growth is likely to occur unevenly across the six counties. Over the 25-year period between 2020 and 2045, the greatest employment increases are expected to occur in Riverside, Los Angeles, and San Diego Counties with estimated increases of 208, 375, and 237 thousand jobs respectively. Relative to existing employment, Riverside and San Bernardino counties are expected to have the highest rates of employment growth.

Figure A.1-2 and Table A.1-3 summarize the projected growth of commercial, industrial, and institutional employment in Metropolitan's service area. The 2020 urban employment number includes the effects of the COVID-19 pandemic based on analysis by the California Employment Development Department (EDD). The EDD estimated a 7 percent decrease in employment in Metropolitan's service area from 2019 to 2020. Employment projections for 2021 through 2023 are based on recovery rates from the UCLA Anderson Forecast. Long-term employment is based on SCAG and SANDAG's forecasts. Total urban employment is expected to increase from 8.6 million in 2020 to about 10.3 million in 2045. This increase of about 12 percent is less than the projected population increase of 14 percent, suggesting a slight decrease in the employed population over time due to aging population.

Figure A.1-1 Actual and Projected Population

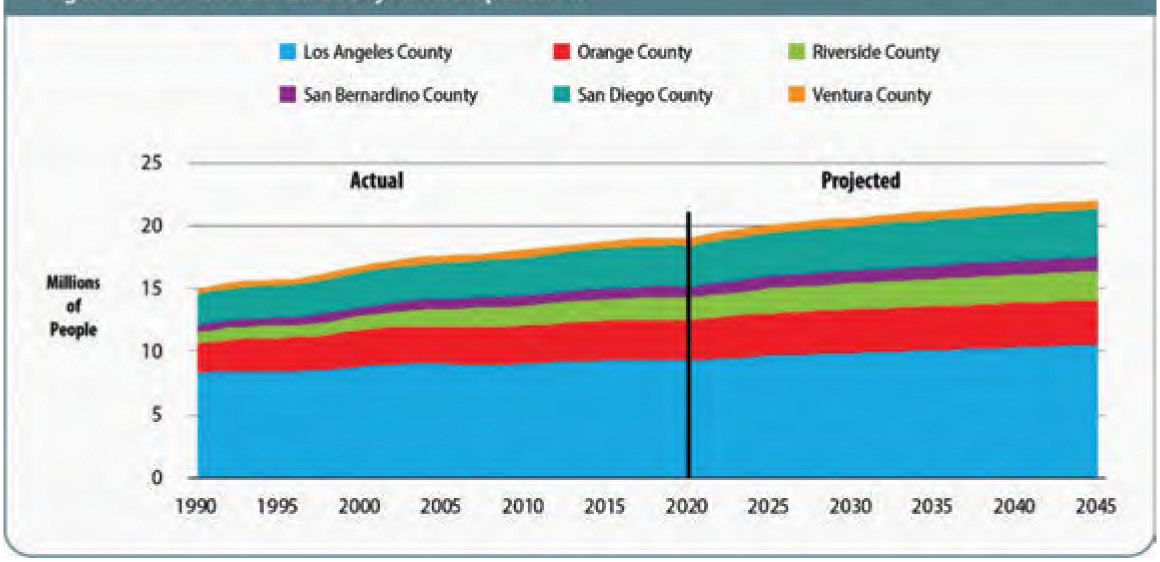
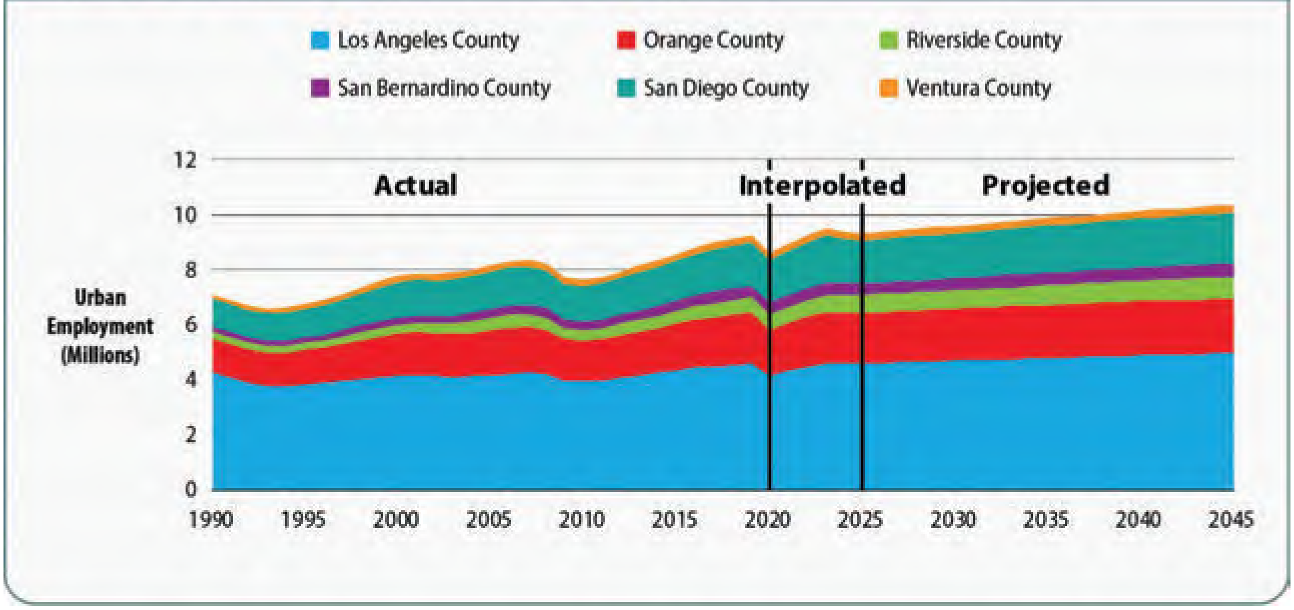


Figure A.1-2 Actual and Projected Urban Employment



Residential Consumers

Southern California's regional planning agencies have forecast residential housing growth in all parts of the Metropolitan service area. These forecasts are shown in Figure A.1-3 and Table A.1-4. The total occupied housing stock is expected to increase more than 20 percent between 2020 and 2045, growing from 6.3 to around 7.6 million households. Much of this growth will likely occur in hotter inland areas of Southern California. Within the service territory, the household occupancy size (household population divided by total occupied dwelling units) is projected to decline slightly from about 3.0 persons per unit currently to 2.9 persons per unit by 2045.

Permits for new residential housing construction are another indicator of the future growth in water demand. Figure A.1-4 shows the pattern of historical growth in residential housing permits between 1970 and 2019. The effect of economic cycles can clearly be seen over time with the precipitous fall in housing construction during the 2007 to 2010 recession being most notable. Overall housing construction has made a modest recovery since 2011. However, in a departure from the previous trend since the late 1980s that favored single-family homes, new dwellings built since 2011 have been mostly multifamily units.

Figure A.1-3 Actual and Projected Households

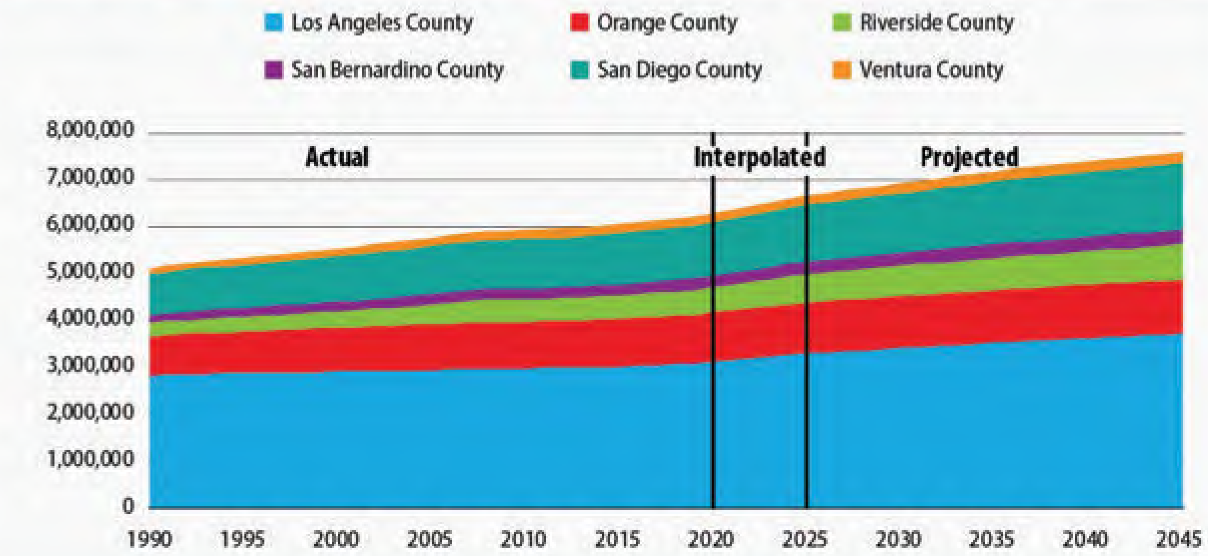
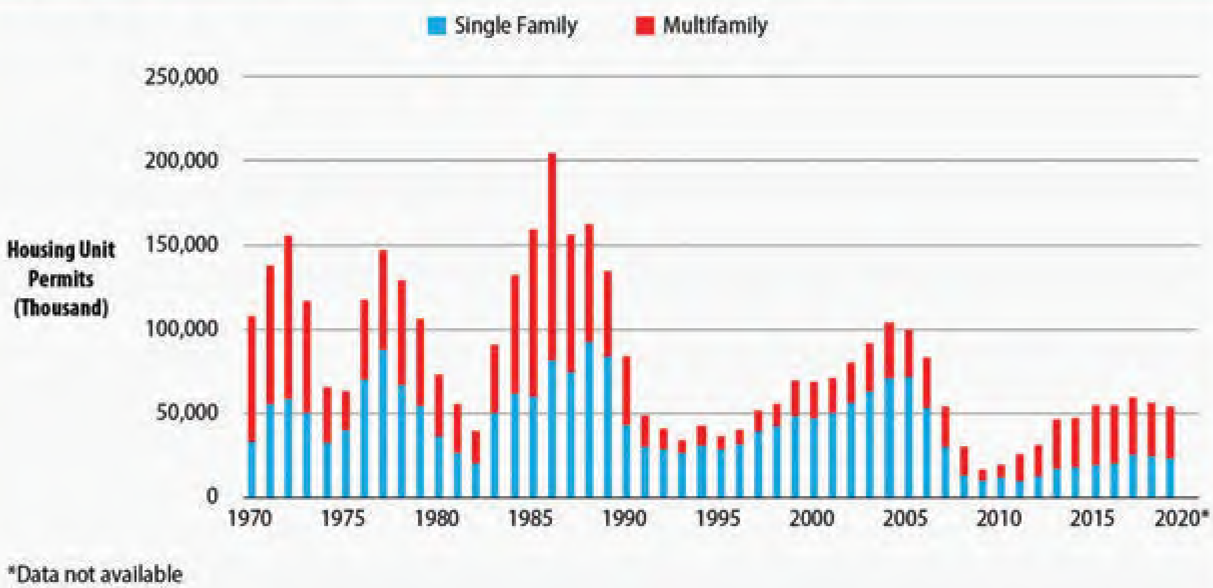


Figure A.1-4 Residential Housing Permits in Six-County Region



Water Demands

As shown in Figure A.1-5, actual retail municipal and industrial (M&I) water demands in 2019 were 2.92 million acre-feet (MAF), which is approximately the same as in 1983. This is due to a number of factors including a higher than normal precipitation, an aggressive outreach campaign and mandatory water use restriction in 2015. Water demand in 2020 is estimated to be 3.1 MAF. In addition, agricultural water use is estimated to be 144 TAF. Similar to M&I demand, agricultural demand was also impacted ty the 2015 drought restriction. By 2045, under average conditions, retail agricultural demand is expected to be about 123 TAF.

Retail Demand

It is estimated that total M&I water use will grow from 3.1 MAF in 2020 to 3.5 MAF in 2045. All water demand projections assume normal weather conditions. Future changes in estimated water demand assume continued water savings due to conservation measures such as water savings resulting from plumbing codes, price effects, and the continuing implementation of utility-funded conservation BMPs. Retail demand was greatly reduced in 2015 due to extraordinary response to statewide calls for a 25 percent reduction in water use in light of historic drought conditions. Between 2020 and 2045, regional water use will grow slowly as driven by population and economic growth while water use efficiency increases.

By County

M&I water demand is not expected to grow uniformly across counties. Consistent with the general pattern of future demographic distributions, the largest absolute increases in urban water demands are expected to occur in Los Angeles and Riverside Counties, with respective estimated increases of about 109 TAF and 108 TAF between 2020 and 2045.

By Sector

Water use can also be broken down by sector. Between 2020 and 2045, single-family residential water use is expected to increase by 9 percent (Table A.1-8), while multifamily water use is estimated to increase by 28 percent (Table A.1-9). Table A.1-10 shows estimated nonresidential water use decreasing by 5 percent between 2020 and 2045.

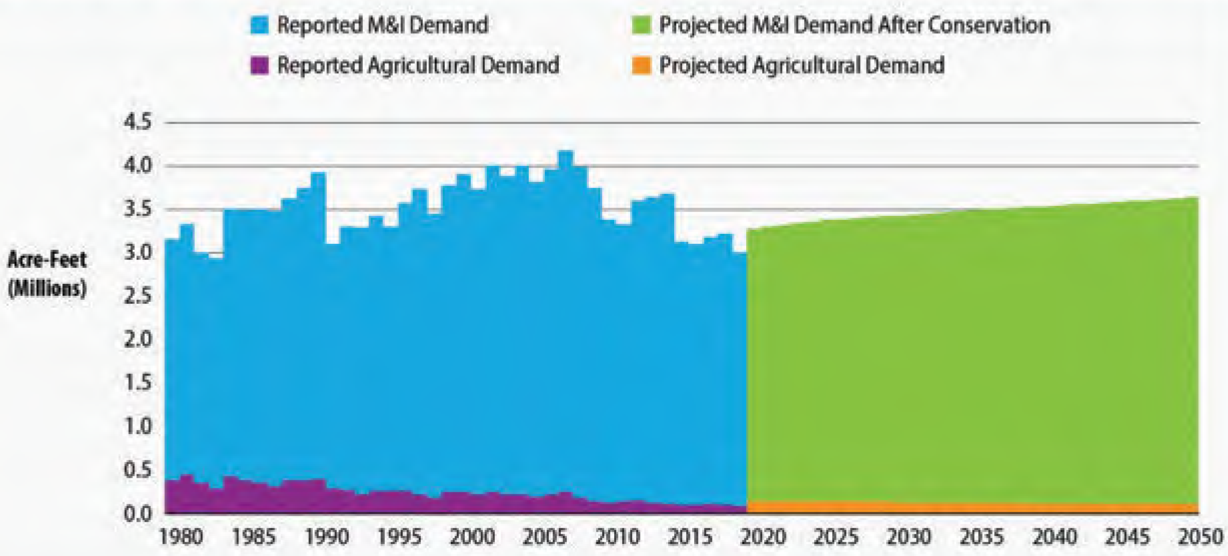
Residential Water Use

While single-family homes are estimated to account for about 60 percent of the total occupied household in 2020, they are responsible for about 75 percent of total residential water demands (Tables A.1-8 and A.1-9). This is consistent with the fact that single-family households are known to use more water than multifamily households (e.g., those residing in duplexes, triplexes, apartment buildings and condo developments) on a per housing-unit basis. This is because single-family households tend to have more persons living in the household; they are likely to have more water-using appliances and fixtures; and they tend to have more landscaping.

Nonresidential Water Use

Nonresidential water use represented approximately 18 percent of the total M&I demands in Metropolitan's service area in 2020 (Table A.1-10). This includes water that is used by businesses, services, government, institutions (such as hospitals and schools), and industrial (or manufacturing) establishments. Within the commercial/institutional category, the top water users include schools, hospitals, hotels, amusement parks, colleges, laundries, and restaurants. In Southern California, major industrial users include electronics, aircraft, petroleum refining, beverages, food processing, and other industries that use water as a major component of the manufacturing process.

Figure A.1-5 Actual and Projected Retail Water Demand



Conservation Savings

Table A.1-12 shows estimated conservation savings resulting from active conservation programs ("Active"), ongoing conservation from natural replacement of plumbing fixtures ("Code-Based"), and conservation induced by projected increases in the real price of water ("Price"). Code-Based savings account for the largest share of total conservation. However, aggressive utility-funded conservation programs have made a significant contribution in this area. For example, Metropolitan-assisted programs were responsible for an estimated 213 TAF in savings during FY 2019-20 and nearly 3.27 MAF in cumulative conservation savings since FY 1990/91.

Projected M&I Demand by Sector

Table A.1-13 provides a summary of municipal and industrial demands, broken down by sector, along with each sector's share of total retail demand. In 2020, residential use accounted for about 82 percent of total projected M&I demand, while non-residential use constituted nearly 18 percent of projected M&I demand. These shares are projected to have a slight increase on residential and a slight decrease on CII by about 2 percent in 2045. System losses and unmetered use are expected to remain relatively constant over this period at about 5 percent.

Table A.1-2 Population Growth in Metropolitan's Service Area (July)

(Acre-feet)

County	Actual				Estimated	Projected				
	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045
Los Angeles County	8,833,000	9,025,000	9,010,000	9,277,000	9,275,000	9,692,000	9,894,000	10,118,000	10,332,000	10,538,000
Orange County	2,854,000	2,954,000	3,012,000	3,148,000	3,184,000	3,353,000	3,433,000	3,491,000	3,524,000	3,527,000
Riverside County	1,120,000	1,409,000	1,620,000	1,719,000	1,813,000	1,987,000	2,105,000	2,191,000	2,271,000	2,344,000
San Bernardino County	706,000	783,000	810,000	843,000	872,000	946,000	987,000	1,031,000	1,075,000	1,119,000
San Diego County	2,730,000	2,863,000	2,989,000	3,169,000	3,261,000	3,442,000	3,536,000	3,624,000	3,709,000	3,789,000
Ventura County	541,000	583,000	616,000	635,000	630,000	669,000	679,000	690,000	699,000	709,000
Metropolitan's Service Area	**16,784,000**	**17,617,000**	**18,057,000**	**18,791,000**	**19,035,000**	**20,089,000**	**20,634,000**	**21,145,000**	**21,610,000**	**22,026,000**

Source: US Census, CA Department of Finance, SCAG's 2020 Regional Transportation Plan (RTP-20) and SANDAG's Series 14 Growth Forecast (version 17).
Growth forecasts do not include COVID-19 impacts.
Note: Totals may not foot due to rounding differences

Table A.1-3 Urban Employment Growth in Metropolitan's Service Area (July)

(Acre-feet)

County	Actual				Estimated	Projected				
	2000	2005	2025	2025	2025	2025	2025	2035	2040	2045
Los Angeles County	4,180,000	4,163,000	3,945,000	4,351,000	4,164,000	4,602,000	4,696,000	4,795,000	4,900,000	4,977,000
Orange County	1,498,000	1,618,000	1,482,000	1,677,000	1,656,000	1,833,000	1,884,000	1,926,000	1,958,000	1,979,000
Riverside County	346,000	451,000	401,000	488,000	582,000	641,000	675,000	711,000	752,000	787,000
San Bernardino County	255,000	322,000	302,000	366,000	402,000	422,000	441,000	459,000	478,000	497,000
San Diego County	1,258,000	1,358,000	1,296,000	1,450,000	1,531,000	1,558,000	1,626,000	1,700,000	1,766,000	1,822,000
Ventura County	218,000	235,000	221,000	238,000	239,000	251,000	257,000	263,000	268,000	272,000
Metropolitan's Service Area	**7,755,000**	**8,147,000**	**7,647,000**	**8,570,000**	**8,574,000**	**9,307,000**	**9,579,000**	**9,854,000**	**10,122,000**	**10,334,000**

Source: US Census, CA Department of Finance, SCAG's 2020 Regional Transportation Plan (RTP-20) and SANDAG's Series 14 Growth Forecast (version 17).
Growth forecasts do not include COVID-19 impacts.
Note: Totals may not foot due to rounding differences

Table A.1-4 Occupied Housing Growth in Metropolitan's Service Area

(Acre-feet)

	Actual				Estimated			Projected		
County	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045
Los Angeles County	2,909,000	2,944,000	2,981,000	3,017,000	3,113,000	3,300,000	3,408,000	3,520,000	3,622,000	3,720,000
Orange County	937,000	974,000	993,000	1,017,000	1,057,000	1,089,000	1,103,000	1,124,000	1,143,000	1,154,000
Riverside County	357,000	432,000	484,000	504,000	539,000	609,000	655,000	688,000	719,000	746,000
San Bernardino County	204,000	220,000	232,000	238,000	249,000	269,000	282,000	295,000	309,000	323,000
San Diego County	963,000	1,016,000	1,045,000	1,081,000	1,131,000	1,195,000	1,265,000	1,335,000	1,389,000	1,427,000
Ventura County	170,000	185,000	195,000	199,000	203,000	209,000	213,000	218,000	221,000	224,000
Metropolitan's Service Area	**5,540,000**	**5,771,000**	**5,930,000**	**6,056,000**	**6,292,000**	**6,671,000**	**6,926,000**	**7,180,000**	**7,403,000**	**7,594,000**

Source: US Census, CA Department of Finance, SCAG's 2020 Regional Transportation Plan (RTP-20) and SANDAG's Series 14 Growth Forecast (version 17).
Growth forecasts do not include COVID-19 impacts.
Note: Totals may not foot due to rounding differences

Table A.1-5 Total Retail Demand in Metropolitan's Service Area with Conservation

(Acre-feet)

	Actual							Projected		
County	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045
Los Angeles County	1,740,000	1,655,000	1,432,000	1,314,000	1,347,000	1,391,000	1,404,000	1,427,000	1,441,000	1,457,000
Orange County	660,000	631,000	553,000	510,000	541,000	543,000	545,000	547,000	548,000	547,000
Riverside County	474,000	492,000	472,000	423,000	474,000	506,000	531,000	550,000	563,000	579,000
San Bernardino County	250,000	261,000	253,000	203,000	225,000	227,000	225,000	228,000	230,000	237,000
San Diego County	659,000	621,000	533,000	558,000	559,000	578,000	591,000	604,000	616,000	626,000
Ventura County	132,000	156,000	152,000	125,000	140,000	141,000	141,000	142,000	142,000	143,000
Metropolitan's Service Area	**3,915,000**	**3,816,000**	**3,395,000**	**3,133,000**	**3,286,000**	**3,386,000**	**3,437,000**	**3,498,000**	**3,540,000**	**3,589,000**

Table A.1-6 Total Retail M&I Demand in Metropolitan's Service Area with Conservation

(Acre-feet)

	Actual				Projected					
County	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045
Los Angeles County	1,738,000	1,653,000	1,431,000	1,313,000	1,346,000	1,389,000	1,403,000	1,426,000	1,440,000	1,455,000
Orange County	643,000	621,000	551,000	506,000	537,000	540,000	543,000	545,000	546,000	545,000
Riverside County	360,000	417,000	409,000	380,000	416,000	450,000	475,000	493,000	508,000	524,000
San Bernardino County	247,000	250,000	224,000	176,000	201,000	209,000	215,000	222,000	229,000	236,000
San Diego County	554,000	530,000	506,000	542,000	521,000	531,000	545,000	559,000	570,000	581,000
Ventura County	124,000	144,000	140,000	109,000	122,000	123,000	123,000	124,000	124,000	125,000
Metropolitan's Service Area	**3,666,000**	**3,615,000**	**3,261,000**	**3,026,000**	**3,143,000**	**3,242,000**	**3,304,000**	**3,369,000**	**3,417,000**	**3,466,000**

Table A.1-7 Total Retail Agricultural Demand in Metropolitan's Service Area

(Acre-feet)

	Actual				Projected					
County	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045
Los Angeles County	1,800	1,700	1,000	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Orange County	17,000	9,600	1,800	3,900	4,500	3,300	2,000	2,000	2,000	2,000
Riverside County	113,500	75,200	63,200	43,000	57,500	56,100	56,600	57,100	54,600	55,000
San Bernardino County	2,100	11,300	28,900	26,500	23,800	18,200	9,800	5,800	1,100	1,100
San Diego County	105,600	91,300	27,100	16,800	38,400	47,100	46,400	45,700	45,600	45,600
Ventura County	7,500	12,600	11,800	15,600	18,400	18,300	18,400	18,700	18,400	18,400
Metropolitan's Service Area	**247,500**	**201,700**	**133,800**	**107,100**	**143,900**	**144,300**	**134,500**	**130,600**	**123,000**	**123,400**

Table A.1-8 Single Family Retail Demand in Metropolitan's Service Area
Average Year (Acre-feet)

County	2020	2025	2030	Projected 2035	2040	2045
Los Angeles County	740,000	766,000	765,000	767,000	771,000	776,000
Orange County	294,000	295,000	296,000	297,000	299,000	300,000
Riverside County	297,000	320,000	339,000	352,000	362,000	373,000
San Bernardino County	113,000	117,000	122,000	126,000	131,000	137,000
San Diego County	320,000	327,000	327,000	329,000	332,000	337,000
Ventura County	85,000	87,000	87,000	88,000	88,000	89,000
Metropolitan's Service Area	1,849,000	1,912,000	1,936,000	1,959,000	1,983,000	2,012,000

Table A.1-9 Multi-family Retail Demand in Metropolitan's Service Area
Average Year (Acre-feet)

County	2020	2025	2030	Projected 2035	2040	2045
Los Angeles County	317,000	338,000	353,000	377,000	392,000	409,000
Orange County	93,000	95,000	96,000	99,000	101,000	102,000
Riverside County	47,000	51,000	53,000	57,000	60,000	63,000
San Bernardino County	27,000	29,000	30,000	31,000	33,000	34,000
San Diego County	110,000	117,000	128,000	140,000	149,000	156,000
Ventura County	11,000	11,000	11,000	12,000	12,000	12,000
Metropolitan's Service Area	605,000	641,000	671,000	716,000	747,000	776,000

Table A.1-10 Commercial, Industrial and Institutional Retail Demand in Metropolitan's Service Area
Average Year (Acre-feet)

County	2020	2025	2030	Projected 2035	2040	2045
Los Angeles County	219,000	213,000	211,000	208,000	201,000	195,000
Orange County	122,000	122,000	123,000	121,000	118,000	115,000
Riverside County	47,000	51,000	53,000	54,000	55,000	56,000
San Bernardino County	47,000	48,000	49,000	49,000	49,000	49,000
San Diego County	73,000	70,000	71,000	71,000	70,000	68,000
Ventura County	18,000	18,000	18,000	17,000	17,000	16,000
Metropolitan's Service Area	526,000	522,000	525,000	520,000	510,000	499,000

Table A.1-11 Unmetered Use in Metropolitan's Service Area
Average Year (Acre-feet)

County	Projected 2020	2025	2030	2035	2040	2045
Los Angeles County	70,000	72,000	73,000	74,000	75,000	76,000
Orange County	27,000	27,000	28,000	28,000	28,000	28,000
Riverside County	25,000	27,000	29,000	30,000	31,000	32,000
San Bernardino County	14,000	15,000	15,000	16,000	16,000	17,000
San Diego County	17,000	18,000	18,000	18,000	19,000	19,000
Ventura County	7,000	7,000	7,000	7,000	7,000	7,000
Metropolitan's Service Area	160,000	166,000	170,000	173,000	176,000	179,000

Table A.1-12 Conservation Savings in Metropolitan's Service Area – 1980 Base Year
(Acre-feet)

County	Estimated 2000	2005	2010	2015	Projected 2020	2025	2030	2035	2040	2045
Los Angeles	166,000	235,000	297,000	368,000	440,000	467,000	485,000	499,000	521,000	546,000
Orange County	55,000	81,000	107,000	132,000	151,000	155,000	157,000	162,000	168,000	173,000
Riverside	22,000	37,000	52,000	66,000	78,000	89,000	97,000	106,000	116,000	126,000
San Bernardino	10,000	16,000	22,000	28,000	32,000	35,000	38,000	40,000	44,000	48,000
San Diego	56,000	78,000	96,000	116,000	137,000	149,000	165,000	183,000	202,000	220,000
Ventura	9,000	13,000	16,000	20,000	24,000	25,000	27,000	29,000	31,000	32,000
Active, Code, Price	**317,000**	**460,000**	**590,000**	**729,000**	**862,000**	**920,000**	**968,000**	**1,020,000**	**1,081,000**	**1,145,000**
Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Total Conservation	**567,000**	**710,000**	**840,000**	**979,000**	**1,112,000**	**1,170,000**	**1,218,000**	**1,270,000**	**1,331,000**	**1,395,000**

Table A.1-13 Projected Municipal and Industrial Demands by Sector
(Acre-feet)

Sector	Historical 2000	2005	2010	2015	Projected 2020	2025	2030	2035	2040	2045
Single-Family	2,269,000	2,237,000	2,018,000	1,872,000	1,849,000	1,911,000	1,935,000	1,959,000	1,984,000	2,011,000
Multi-Family	743,000	732,000	660,000	613,000	605,000	641,000	672,000	715,000	747,000	775,000
Non-Residential	655,000	646,000	583,000	541,000	527,000	520,000	524,000	520,000	510,000	499,000
System Losses/Unmetered	198,000	195,000	176,000	163,000	161,000	166,000	169,000	173,000	176,000	178,000
Metropolitan Total	3,865,000	3,810,000	3,437,000	3,189,000	3,142,000	3,239,000	3,301,000	3,367,000	3,416,000	3,464,000

Appendix 2

EXISTING REGIONAL WATER SUPPLIES

Appendix 2
EXISTING REGIONAL WATER SUPPLIES

Water used in Metropolitan's service area comes from both local and imported sources. Local sources include groundwater, surface water, and recycled water. Sources of imported water include the Colorado River, the State Water Project (SWP), and the Owens Valley/Mono Basin. On average over the last 10 years (from 2011 to 2020), local sources met about 49 percent of the water needs, while imported sources supplied the remaining 51 percent.

The City of Los Angeles imports water from the Owens Valley/Mono Basin east of the Sierra Nevada through the Los Angeles Aqueduct (LAA). This water currently meets about 5 percent of the region's water needs based on a ten-year average from 2011 to 2020 but is dedicated for use by the City of Los Angeles. Metropolitan provides imported water supplies to meet the remaining 46 percent of the region's water needs based on the same ten-year period. These imported supplies are received through Metropolitan's Colorado River Aqueduct (CRA) and the SWP's California Aqueduct. Table A.2-1 and Figure A.2-1 show the historical sources of local and imported supplies within Metropolitan's service area.

Table A.2-2 shows the quantities of Metropolitan water used by member agencies during the last ten years (2011 to 2020). Metropolitan's largest water customers are the San Diego County Water Authority (25 percent), City of Los Angeles (16 percent), and Municipal Water District of Orange County (12 percent).

The following sections describe the current supply sources in more detail. The main body of the Urban Water Management Plan contains descriptions of planned future supplies.

Local Water Supplies

Local sources of water available to the region include surface water, groundwater, recycled water, and seawater desalination. Some of the major river systems in Southern California have been developed into systems of dams, flood control channels, and percolation ponds for supplying local water and recharging groundwater basins. For example, the San Gabriel and Santa Ana Rivers capture over 90 percent of the runoff in their watersheds. The Los Angeles River system, however, is not as efficient in capturing runoff. In its upper reaches, which make up 25 percent of the watershed, most runoff is captured with recharge facilities. In its lower reaches, which comprise the remaining 75 percent of the watershed, the river and its tributaries are lined with concrete, so there are no recharge facilities. The Santa Clara River in Ventura County is outside of Metropolitan's service area, but it replenishes groundwater basins used by water agencies within Metropolitan's service area. Other rivers in Metropolitan's service area, such as the Santa Margarita and San Luis Rey, are essentially natural replenishment systems.

Table A.2-1
Sources of Water Supply to the Metropolitan Service Area
(Acre-Feet)[1]

Calendar Year	Local Supplies[4]	L.A. Aqueduct	Colorado River Aqueduct[2]	State Water Project[3]	Total
1976	1,424,000	430,000	778,000	638,000	3,270,000
1977	1,432,000	275,000	1,277,000	209,000	3,193,000
1978	1,339,000	472,000	710,000	576,000	3,096,000
1979	1,512,000	493,000	784,000	532,000	3,321,000
1980	1,551,000	515,000	791,000	560,000	3,416,000
1981	1,593,000	465,000	791,000	827,000	3,676,000
1982	1,504,000	483,000	686,000	737,000	3,410,000
1983	1,551,000	519,000	850,000	410,000	3,329,000
1984	1,762,000	516,000	1,150,000	498,000	3,926,000
1985	1,698,000	496,000	1,018,000	728,000	3,939,000
1986	1,679,000	515,000	1,001,000	756,000	3,952,000
1987	1,608,000	428,000	1,175,000	763,000	3,974,000
1988	1,659,000	360,000	1,199,000	957,000	4,175,000
1989	1,676,000	274,000	1,189,000	1,215,000	4,355,000
1990	1,595,000	107,000	1,183,000	1,458,000	4,343,000
1991	1,547,000	181,000	1,252,000	625,000	3,605,000
1992	1,631,000	177,000	1,153,000	744,000	3,704,000
1993	1,546,000	289,000	1,144,000	663,000	3,642,000
1994	1,649,000	133,000	1,263,000	845,000	3,890,000
1995	1,719,000	444,000	933,000	451,000	3,546,000
1996	1,842,000	422,000	1,089,000	663,000	4,016,000
1997	1,902,000	436,000	1,125,000	724,000	4,187,000
1998	1,902,000	467,000	941,000	521,000	3,830,000
1999	2,034,000	309,000	1,072,000	792,000	4,206,000
2000	1,899,000	255,000	1,217,000	1,473,000	4,845,000
2001	1,846,000	267,000	1,245,000	1,119,000	4,477,000
2002	1,844,000	179,000	1,198,000	1,415,000	4,636,000
2003	1,790,000	252,000	676,000	1,561,000	4,278,000
2004	1,760,000	203,000	741,000	1,802,000	4,506,000
2005	1,758,000	369,000	707,000	1,525,000	4,358,000
2006	1,861,000	379,000	514,000	1,695,000	4,448,000
2007	1,984,000	129,000	696,000	1,648,000	4,457,000
2008	1,942,000	147,000	896,000	1,037,000	4,023,000
2009	1,959,000	137,000	1,044,000	908,000	4,048,000
2010	1,839,000	251,000	837,000	1,129,000	4,071,000
2011	1,779,000	355,000	445,000	1,379,000	3,991,000
2012	1,979,000	167,000	455,000	1,252,000	3,794,000
2013	1,963,000	65,000	986,000	974,000	4,019,000
2014	1,923,000	64,000	1,168,000	607,000	3,729,000
2015	1,714,000	33,000	1,178,000	593,000	3,480,000
2016	1,795,000	96,000	961,000	1,009,000	3,812,000
2017	1,751,000	380,000	282,000	1,473,000	3,833,000
2018	1,816,000	246,000	757,000	845,000	3,633,000
2019	1,735,000	345,000	298,000	1,232,000	3,611,000
2020	1,787,000	183,000	687,000	588,000	3,245,000

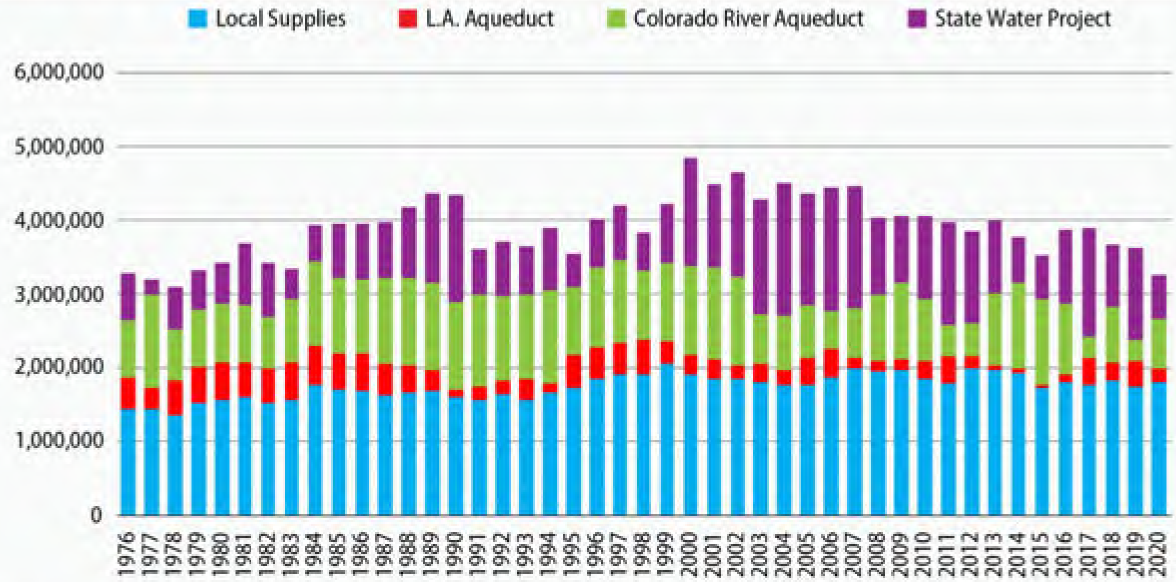
1. Not including system losses.
2. Colorado River Aqueduct supplies are gross Havasu diversions less return flows, deliveries to USBR, Mexico, and storage.
3. State Water Project Supplies include Table A, Art. 21, Art. 14(b), Art. 12(d), Art. 12(e), Art. 55, draws from storage & carryover, DWCV & other exchanges, transfers, Drought Water Bank and Dry Year Pool Purchases, Pools A&B, Flood Water, wheeling, Port Hueneme lease, and SBVMWD Purchases.
4. Local Supplies includes local groundwater, surface water, recycled water, groundwater recovery, and seawater desalination used for MI, AG, SW or GW recharge in MWD service area. Include Santa Ana River Baseflow at Prado Dam for groundwater recharge. Based on best available data at the time of publication, subject to updates without notice. Data for 2020 not available and is estimated based on historical data.

Table A.2-2 Historical Metropolitan Water Deliveries to Member Agencies

(Acre-feet) Calendar Year

Member Agency	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
City of Anaheim	29,000	20,000	20,000	18,000	14,000	13,000	26,000	15,000	13,000	39,000
City of Beverly Hills	10,000	11,000	11,000	12,000	10,000	9,000	10,000	10,000	10,000	10,000
City of Burbank	18,000	15,000	15,000	16,000	12,000	12,000	19,000	12,000	18,000	6,000
Calleguas Municipal Water District	97,000	106,000	112,000	96,000	77,000	86,000	92,000	93,000	90,000	90,000
Central Basin Municipal Water District	67,000	38,000	36,000	30,000	58,000	61,000	24,000	24,000	17,000	21,000
City of Compton	2,000	2,000	1,000	0	0	0	0	20	40	0
Eastern Municipal Water District	90,000	99,000	98,000	102,000	76,000	84,000	89,000	93,000	94,000	93,000
Foothill Municipal Water District	8,000	8,000	9,000	10,000	7,000	7,000	9,000	8,000	7,000	9,000
City of Fullerton	10,000	10,000	9,000	9,000	7,000	5,000	9,000	7,000	5,000	6,000
City of Glendale	18,000	18,000	19,000	19,000	15,000	15,000	15,000	16,000	14,000	16,000
Inland Empire Utilities Agency	76,000	57,000	64,000	68,000	38,000	44,000	62,000	67,000	66,000	44,000
Las Virgenes Municipal Water District	20,000	21,000	24,000	20,000	17,000	18,000	18,000	20,000	17,000	20,000
City of Long Beach	43,000	30,000	35,000	37,000	35,000	28,000	24,000	26,000	25,000	30,000
City of Los Angeles	120,000	328,000	439,000	403,000	384,000	318,000	115,000	218,000	103,000	244,000
Municipal Water District of Orange County	262,000	207,000	216,000	263,000	178,000	196,000	237,000	213,000	143,000	134,000
City of Pasadena	18,000	18,000	21,000	21,000	17,000	17,000	18,000	20,000	20,000	18,000
San Diego County Water Authority	407,000	455,000	492,000	571,000	501,000	436,000	358,000	374,000	319,000	308,000
City of San Fernando	20	110	70	110	0	0	0	0	0	0
City of San Marino	310	840	1,050	1,110	970	970	960	950	960	1,600
City of Santa Ana	16,000	12,000	15,000	11,000	10,000	4,000	14,000	9,000	7,000	8,000
City of Santa Monica	6,000	7,000	6,000	5,000	3,000	3,000	4,000	4,000	3,000	5,000
Three Valleys Municipal Water District	65,000	64,000	69,000	67,000	53,000	67,000	60,000	67,000	71,000	62,000
City of Torrance	17,000	17,000	17,000	17,000	14,000	16,000	16,000	15,000	14,000	15,000
Upper San Gabriel Valley Municipal Water District	35,000	16,000	30,000	22,000	50,000	46,000	46,000	56,000	103,000	15,000
West Basin Municipal Water District	112,000	117,000	121,000	118,000	109,000	109,000	113,000	117,000	113,000	111,000
Western Municipal Water District of Riverside County	72,000	79,000	76,000	82,000	58,000	65,000	71,000	73,000	54,000	68,000
Total of All Agencies	1,618,000	1,756,000	1,956,000	2,018,000	1,744,000	1,660,000	1,450,000	1,558,000	1,327,000	1,374,000

Figure A.2-1 Sources of Supply to Metropolitan's Service Area



Notes:
1. Not including system losses.
2. Colorado River Aqueduct supplies are gross Havasu diversions less return flows, deliveries to USBR, Mexico, and storage.
3. State Water Project Supplies include Table A, Art. 21, Art. 14(b), Art. 12(d), Art. 12(e), Art. 55, draws from storage & carryover, DWCV & other exchanges, transfers, Drought Water Bank and Dry Year Pool Purchases, Pools A&B, Flood Water, wheeling, Port Hueneme lease, and SBVMWD Purchases.
4. Local Supplies includes local groundwater, surface water, recycled water, groundwater recovery, and seawater desalination used for MI, AG, SW or GW recharge in MWD service area. Include Santa Ana River Baseflow at Prado Dam for groundwater recharge. Based on best available data at the time of publication, subject to updates without notice. Data for 2020 not available and is estimated based on historical data.

Local supplies fluctuate in response to variations in rainfall. During prolonged periods of below-normal rainfall, local water supplies decrease. Conversely, prolonged periods of above-normal rainfall increase local supplies. Sources of groundwater basin replenishment include local precipitation, runoff from the coastal ranges, and artificial recharge with imported water supplies. In addition to runoff, recycled water provides an increasingly important source of replenishment water for the region.

Major Groundwater Basins

From 2011-2020, groundwater sources accounted for an average of about 92 percent of the local water supplies, which are found in many basins throughout the Southern California region and provide an annual average total production of about 1.27 MAF per year. Figure A.2-2 shows the locations of the groundwater basins within Metropolitan's service area. Groundwater yield comes from passive recharge from the percolation of rainfall and stream runoff and active recharge from spreading and injection of captured stormwater, recycled water, and imported water. In certain major drainage areas, runoff is retained in flood control reservoirs and released into spreading basins for percolation into the ground. In Los Angeles County, many groundwater recharge facilities located along the upper reaches of the Los Angeles River and San Gabriel River systems provide recharge to San Fernando, Raymond, Main San Gabriel, Central, and West Coast groundwater basins. The Orange County Water District operates a system of diversion structures and recharge basins along the Santa Ana River that captures much of the storm runoff, as well as water from reclamation facilities in Riverside and San Bernardino counties. Storm runoff is also diverted to recharge basins in the Chino Basin. This water, which would otherwise flow into the Pacific Ocean, is allowed to percolate into the underlying aquifers so it may be pumped for local use when needed. Recycled water use for groundwater recharge has increased steadily. The Water Replenishment District of Southern California (WRD) has spread recycled water at the Montebello Forebay to recharge Central and West Coast basins for many years and has expanded this practice with the completion of the WRD Albert Robles Center for Water Recycling and Environmental Learning in 2019. The Inland Empire Utilities Agency (IEUA) provides recycled water for recharge of the Chino Basin. Orange County Water District has implemented the Groundwater Replenishment System (GWRS) to recharge over 100 TAF per year of highly-treated recycled water to the Orange County Basin. Highly treated recycled water is also used at seawater barriers in the West Coast, Central, and Orange County basins and has largely replaced use of imported water for this purpose.

Almost all major groundwater basins in Southern California are either adjudicated or managed by special districts or agencies. Over 95 percent of the groundwater used in Metropolitan's service area is produced from adjudicated or managed groundwater basins. Adjudicated basins in the region include: Raymond Basin, Upper Los Angeles River Area basins (which include San Fernando, Sylmar, Verdugo, and Eagle Rock Basins), Main San Gabriel Basin, Puente Basin, Central Basin, West Coast Basin, Six Basins, Hemet-San Jacinto Basin, Chino Basin, and Cucamonga Basin. The Orange County Groundwater Basin is managed by Orange County Water District; portions of the Ventura County Basins are managed by the Fox Canyon Groundwater Management Agency; and the West San Jacinto Basins are managed by Eastern Municipal Water District. In general, these basins have management plans that include protection from seawater intrusion in the coastal region, water quality deterioration, and excessive lowering of water levels. Groundwater basin managers address treatment of contamination, manage recharge and storage programs, and monitor extraction, water levels, and water quality.

Major River Systems and Reservoirs

Local surface water resources consist of runoff captured in storage reservoirs and diversions from streams. Reservoirs hold the runoff for later direct use, and diversions from streams are delivered directly to local water systems. As Table A.2-3 shows, local water agencies currently own and operate 33 reservoirs. These reservoirs provide a storage capacity of approximately 862 TAF. The historic average yield of these local surface supplies, which come from reservoir releases and stream diversions, is about 87 TAF per year from 2011-2020. The annual yield varies widely between wet and dry years, and most reservoirs that capture local surface runoff are operated with minimal carry-over storage. San Diego County has the greatest storage capacity for these types of reservoirs, with approximately 84 percent of the total local agency storage capacity in Metropolitan's service area.

In addition to the storage that is owned and operated by local agencies, Metropolitan operates DVL, Lake Skinner, and Lake Mathews. DVL stores water imported during years of ample supply. DVL's 810 TAF capacity is used to augment supplies to meet dry year and seasonal needs, and also provides supply for the region during an emergency period. While Lake Skinner and Lake Mathews are largely used for system operations, they may also be used to augment supplies during dry years and emergencies, if necessary and available. Table A.2-4 lists the Metropolitan-owned reservoirs with significant storage capacity.

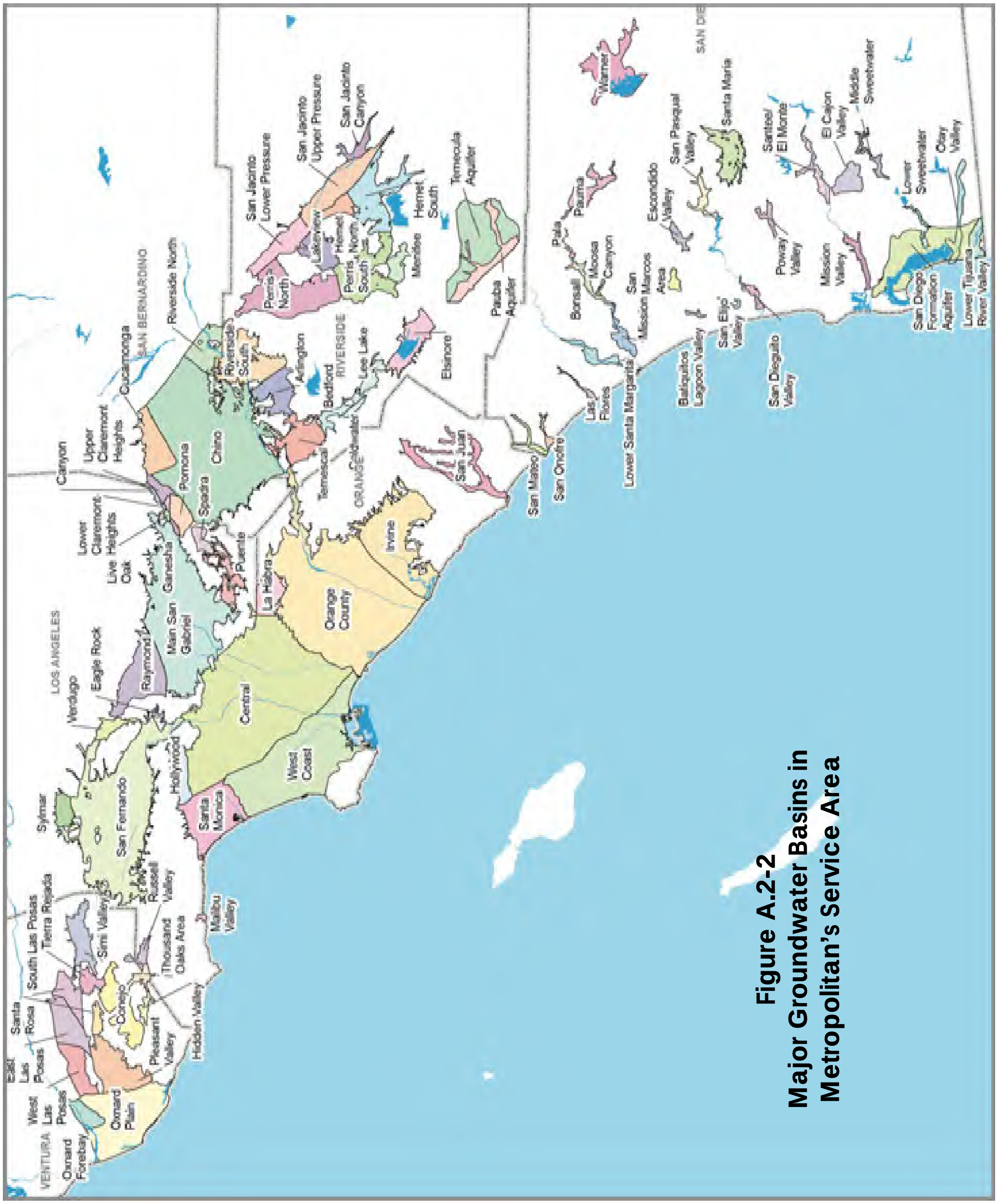


**Figure A.2-2
Major Groundwater Basins in
Metropolitan's Service Area**

Table A.2-3
Local Storage Reservoirs in Metropolitan's Service Area
(Acre-feet)

Member Agency/Sub-agency	Reservoir	Storage Capacity
Eastern MWD		
Rancho California WD	Vail Lake	45,207
Lake Hemet MWD	Lake Hemet	12,750
Las Virgenes MWD	Westlake Reservoir	9,500
City of Los Angeles	Los Angeles	10,170
	Encino	9,800
	Stone Canyon	10,800
	Hollywood	4,200
MWD of Orange County		
Irvine Ranch WD & Serrano ID	Santiago	25,000
San Diego County Water Authority		
Carlsbad MWD	Maerkle	600
Escondido, City of	Dixon	2,606
	Wohlford	2,783
Fallbrook PUD	Red Mountain	1,335
Helix WD	Cuyamaca	8,195
	Jennings	9,790
Poway, City of	Poway	3,432
	Morro Hill	465
Ramona MWD	Ramona	12,000
San Diego County Water Authority	Olivenhain – CWA	24,774
San Diego, City of	Barrett	34,806
	El Capitan	112,807
	Hodges	13,401
	Lower Otay	47,067
	Miramar	6,682
	Morena	50,694
	Murray	4,684
	San Vicente	249,358
	Sutherland	29,508
San Dieguito WD	San Dieguito	883
Sweetwater Authority	Loveland	25,400
	Sweetwater	28,079
Valley Center MWD	Turner	1,612
Vista Irrigation District	Henshaw	51,774
Western MWD of Riverside		
Temescal Water Company	Railroad Canyon	12,000
Total		**862,162**

Table A.2-4
Total Storage Capacity of Metropolitan's Reservoirs
(Thousands Acre-feet)

Reservoir	Capacity
Diamond Valley Lake	810
Lake Skinner[1]	44
Lake Mathews[1]	182

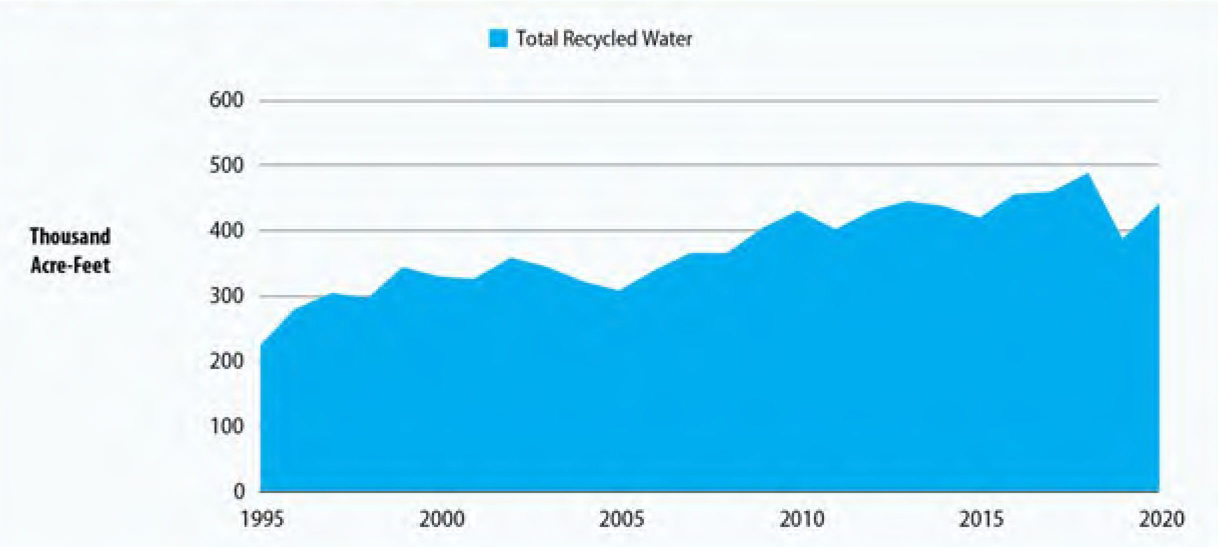
[1] These are used for operations and not primarily for dry year storage.

Lastly, Castaic and Perris are the terminal reservoirs to the West Branch and East Branch of the California Aqueduct operated by DWR. Through the Monterey Amendment to its SWP water service contract, Metropolitan has access to 219 TAF of flexible storage capacity in these SWP terminal reservoirs.

Water Recycling and Groundwater Recovery

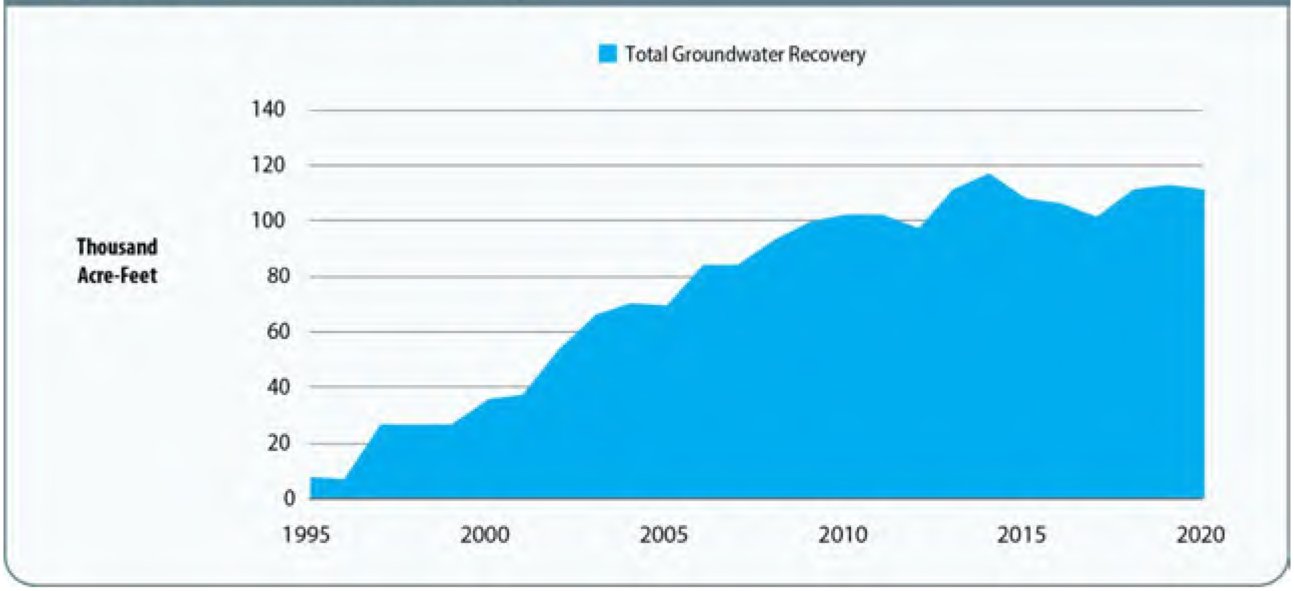
Water recycling projects involve treating wastewater to a level that is acceptable and safe for many non-potable applications. This resource is providing an increasing level of local water. In 1982, Metropolitan began helping to fund its member agencies' recycled water projects. Since that time, Metropolitan has invested approximately $510 million. In fiscal year 2019-20, water recycling projects in which Metropolitan has invested produced over 71 TAF. Local agency projects that did not receive financial assistance from Metropolitan produced an additional 320 TAF, and approximately 50 TAF of Santa Ana River base flow were used to recharge the Orange County basin. This brings the regional total to 441 TAF of recycled water use. Figure A.2-3 demonstrates the increase in this regional supply for direct use.

Figure A.2-3 Recycled Water



In addition, local agencies have implemented several projects to recover contaminated or degraded groundwater for potable uses. The groundwater recovery projects use a variety of treatment technologies to remove nitrates, volatile organic compounds, perchlorate, color, and salt. In 1991, Metropolitan began helping fund its member agencies' groundwater recovery projects. Since that time, Metropolitan has invested approximately $173 million. In FY 2019-20, these groundwater recovery projects produced 50 TAF. Other member agency projects that did not receive funding from Metropolitan produced another 62 TAF, for a regional total of 112 TAF. Figure A.2-4 shows this increase in supply.

Figure A.2-4 Groundwater Recovery



Imported Water

Most member agencies and retail water suppliers depend on imported water for a portion of their water supply. For some member agencies, Metropolitan supplies most of the water used within that agency's service area, while others obtain varying amounts of water from Metropolitan to supplement local supplies. For example, Los Angeles and San Diego (the largest and second largest cities in the state) have historically obtained up to 85 percent of their water from imported sources. These imported water requirements are similar to those of other metropolitan areas within the state, such as San Francisco and other cities around the San Francisco Bay.

Figure A.2-5 shows the conveyance facilities for the state's imported water supplies. Descriptions of each of the imported sources of water available to Metropolitan's service area follow. Justification for projected water supplies from these sources is provided in Appendix 3.

Colorado River

A number of water agencies within California have rights to divert water from the Colorado River. Through the Seven Party Agreement (1931), seven agencies recommended apportionments of California's share of Colorado River water within the state. Table A.2-5 shows the historic apportionment of each agency, and the priority accorded that apportionment.

Table A.2-5
Priorities in Seven Party Agreement and Water Delivery Contracts

Priority	Description	TAF Annually
1	Palo Verde Irrigation District – gross area of 104,500 acres of land in the Palo Verde Valley	
2	Yuma Project (Reservation Division) – not exceeding a gross area of 25,000 acres in California	
3(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys[1] to be served by All American Canal	3,850
3(b)	Palo Verde Irrigation District –16,000 acres of land on the Lower Palo Verde Mesa	
4	Metropolitan Water District of Southern California for use on the coastal plain of Southern California	550
Subtotal		4,400
5(a)	Metropolitan Water District of Southern California for use on the coastal plain of Southern California	550
5(b)	Metropolitan Water District of Southern California for use on the coastal plain of Southern California[2]	112
6(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys[1] to be served by the All American Canal	
6(b)	Palo Verde Irrigation District –16,000 acres of land on the Lower Palo Verde Mesa	300
7	Agricultural Use in the Colorado River Basin in California	
	Total Prioritized Apportionment	**5,362**

[1] The Coachella Valley Water District now serves Coachella Valley.

[2] In 1946, the City of San Diego, the San Diego County Water Authority, Metropolitan, and the Secretary of the Interior entered into a contract that merged and added the City of San Diego's rights to store and deliver Colorado River water to the rights of Metropolitan. The conditions of that agreement have long since been satisfied.

Figure A.2-5
MAJOR WATER CONVEYANCE FACILITIES IN CALIFORNIA

The water is delivered to Metropolitan's service area by way of the CRA, which has a rated capacity of approximately 1,700 cfs. The CRA conveys water 242 miles from its Lake Havasu intake to its terminal reservoir, Lake Mathews, near the City of Riverside. Conveyance losses along the CRA of 10 TAF per year reduce the amount of Colorado River water received in the coastal plain.

Since the date of the original contract, several events have occurred that changed the dependable supply that Metropolitan expects from the Colorado River. The most significant event was the 1964 U.S. Supreme Court decree in *Arizona v. California* that reduced Metropolitan's dependable supply of Colorado River water to 550 TAF per year. The reduction in dependable supply occurred with the commencement of Colorado River water deliveries to the Central Arizona Project. In 1987, Metropolitan entered into a contract with the U.S. Bureau of Reclamation (USBR) for an additional 180 TAF per year of surplus water when surplus water is available. In addition, Metropolitan has obtained a minimum of approximately 85 TAF per year of Colorado River water since 1996 through a conservation program with the Imperial Irrigation District.

In 1979, the Present Perfected Rights (PPRs) of certain Indian reservations, cities, and individuals along the Colorado River were quantified. These PPRs predate the Seven Party Agreement, but the rights holders were not included in the Seven Party Agreement prioritizing California's use and storage of Colorado River water.

In 1999, under the auspices of the Colorado River Board of California, a draft plan, "California's Colorado River Water Use Plan," was developed. The Colorado River Board of California protects California's rights and interests in the resources provided by the Colorado River and represents California in discussions and negotiations regarding the Colorado River and its management. The overall purpose of California's Colorado River Water Use Plan is to provide Colorado River water users with a framework by which programs, projects, and other activities may be coordinated and cooperatively implemented. This framework specified how California would make the transition from relying on surplus water supplies from the Colorado River to living within its normal (basic) water supply apportionment.

To implement these plans, a number of agreements have been executed. In October 2003, representatives from Metropolitan, IID, and Coachella Valley Water District (CVWD) executed the Quantification Settlement Agreement (QSA) and several other related agreements. Parties involved include the San Diego County Water Authority (SDCWA), the California Department of Water Resources (DWR), the California Department of Fish and Wildlife, the U.S. Department of the Interior, and the San Luis Rey Indian Water Rights Settlement Parties. The QSA quantifies the use of water under the third priority of the Seven Party Agreement and allows for implementation of agricultural conservation, land management, and other programs identified in Metropolitan's 1996 IRP. Quantification of the third priority provides the needed numeric baseline from which conservation and transfer programs may be measured. The QSA has helped California reduce its reliance on Colorado River down to its normal apportionment (4,400 TAF).

The quantification of the agricultural priorities under the QSA provided for the water saved under the Palo Verde Land Management and Crop Rotation Program to be made available to Metropolitan. This program provides up to 133 TAF of water to be available to Metropolitan in certain years and will supply a minimum of 33 TAF per year.

SDCWA is participating in QSA-related projects that are providing additional water supplies that the agency exchanges with Metropolitan for receipt of Metropolitan deliveries. First, the water conserved by these projects is made available to Metropolitan. In exchange, Metropolitan is delivering an amount of Metropolitan water equal to the amount of Colorado River water conserved by IID for SDCWA. Second, federal law allocates a portion of the water available as a result of the Coachella Canal Lining Project and the All-American Canal Lining Project for the benefit of parties, including five Indian Bands, and two non-Indian municipal water purveyors (San Luis Rey Settlement Parties) involved in litigation over water rights to the San Luis Rey River in San Diego County. Metropolitan has agreed to exchange that water and provide an equal amount of water to the United States for use by the San Luis Rey Settlement Parties, and SDCWA has agreed to convey the water when capacity is available for use within the Settlement Parties' service areas. The remainder of the water available as a result of the canal lining projects, up to the cap specified in the Metropolitan-SDCWA exchange agreement, is exchanged with SDCWA.

In October 2004, Southern Nevada Water Authority (SNWA) and Metropolitan entered into a storage and interstate release agreement. Under this program, SNWA can request that Metropolitan store unused Nevada apportionment. The amount of water which Metropolitan diverted through 2015 under this agreement was over 422 TAF. In subsequent years, SNWA may request return of approximately 330 TAF. It is expected that SNWA will not request return of stored water until after 2026.

In December 2007, the Secretary of the Interior approved the adoption of specific interim guidelines for reductions in Colorado River water deliveries during declared shortages and coordinated operations of Lake Powell and Lake Mead. These guidelines provide water release criteria from Lake Powell and water storage and water release criteria from Lake Mead during shortage, normal, and surplus conditions in the Lower Basin; provide a mechanism for the storage and delivery of conserved system and non-system water in Lake Mead; and modify and extend interim surplus guidelines through 2026. The Record of Decision and accompanying agreement among the Colorado River Basin States protect reservoir levels by reducing deliveries during drought periods, encourage agencies to develop conservation programs, and allow the states to develop and store new water supplies. The Colorado River Basin Project Act of 1968 insulates California from shortages in all but the most extreme hydrologic conditions.

In May 2006, Metropolitan and the USBR executed an agreement for a demonstration program that allowed Metropolitan to leave conserved water in Lake Mead that Metropolitan would otherwise have used in 2006 and 2007. The water left in Lake Mead must have been made available through extraordinary conservation measures, which was accomplished in 2006 and 2007 through savings realized under the Palo Verde Land Management, Crop Rotation, and Water Supply Program. This demonstration program was an activity eligible for creation of Extraordinary Conservation Intentionally Created Surplus (ICS) under the provisions of the December 2007 federal guidelines for the operation of Lake Powell and Lake Mead. Metropolitan continued to store water in Lake Mead through extraordinary conservation measures as provided in the December 2007 federal guidelines in 2009, 2010, 2011, 2012, 2016, 2017, 2018, and 2019. Metropolitan took delivery of a portion of its extraordinary conservation ICS in 2013, 2014, and 2015. As of January 1, 2020, Metropolitan had approximately 866 TAF of extraordinary conservation ICS water in Lake Mead.

The December 2007 federal guidelines provided Colorado River contractors the ability to create System Efficiency ICS through development and funding of system efficiency projects. To that end, in 2008 the Central Arizona Water Conservation District, SNWA, and Metropolitan contributed funds for the construction of the Drop 2 (Brock) Reservoir by the USBR. The purpose of the Drop 2 reservoir is to increase the capacity to regulate deliveries of Colorado River water at Imperial Dam, reducing the amount of water released downstream, and therefore lost from storage in Lake Mead, by approximately 70 TAF annually. In return for funding one-sixth of the project cost, 100 TAF of water stored in Lake Mead was assigned to Metropolitan as System

Efficiency ICS in 2008. Metropolitan also created approximately 24 TAF of System Efficiency ICS by contributing to a one-year pilot operation of the Yuma Desalting Plant. Overall, from 2008-2011, Metropolitan created over 124 TAF of System Efficiency ICS As of January 1, 2020, Metropolitan had approximately 89 TAF of System Efficiency ICS water in Lake Mead.

In November 2012, as part of the implementation of Minute 319 to the 1944 water treaty between the U.S. and Mexico, Metropolitan executed an agreement with the USBR and other Lower Colorado River Basin stakeholders to fund a pilot water conservation program in the Mexicali Valley region of Mexico in exchange for a portion of the conserved water received as Binational ICS (BICS) stored in Lake Mead, converted from Intentionally Created Mexican Allocation (ICMA). The Minute 319 pilot program was completed in 2017, and Metropolitan received 23,750 AF of BICS, which remained stored in Lake Mead as of January 1, 2020. In September 2017, Metropolitan executed a similar agreement as part of the implementation of Minute 323, through which Metropolitan expects to receive up to 27,275 AF of BICS between 2020 and 2026.

In May 2019, in response to ongoing conditions in the Colorado River Basin and concern over water levels in Lake Mead, Metropolitan, the Secretary of the Interior, and representatives of state governments and water agencies throughout the Colorado River Basin executed the *Agreement Concerning Colorado River Drought Contingency Management and Operations* (DCP). Exhibit 1 of Attachment B to the DCP—*Lower Basin Drought Contingency Operations* (LBOps)—specifies certain changes to the management of Lake Mead. Key provisions include increases in the cumulative allowable ICS storage in Lake Mead for each state, greater flexibility in annual ICS storage limits, and the requirement for Lower Basin states to make contributions to Lake Mead storage ("DCP contributions") when water levels drop below elevation 1075 feet. California DCP contributions are required when Lake Mead levels drop below elevation 1045 feet.

Metropolitan is undertaking ongoing efforts to maintain and improve the flexibility and quality of its water supply from the Colorado River. Section 3.1 of this Plan describes current programs and plans related to flexibility, and Section 4 describes water quality programs.

State Water Project

The State Water Project, which is owned by the state and operated by DWR, is the second source of Metropolitan's imported water supplies. The SWP comprises 32 storage facilities (reservoirs and lakes), 662 miles of aqueduct, and 25 power and pumping plants.

The SWP conveys water from Northern California to the north and south of the San Francisco Bay Area and areas south of the Bay Delta region. Water from the SWP originates at Lake Oroville, which is located on the Feather River in Northern California. That water, along with all additional unused water from the watershed, flows into the Sacramento/San Joaquin Delta. Water from the Delta is then either pumped to water users in the San Francisco Bay area or transported through the California Aqueduct to water users in Central and Southern California.

DWR contracted to deliver water in stages to 32 SWP contractors, with an ultimate delivery of 4,172 TAF per year. Three contractors have had their contract amounts taken on by other contractors; currently, DWR is delivering water to 29 SWP contractors. Metropolitan is the largest, with a contractual amount of 1,911 TAF per year, or approximately 46 percent of the total contracted amount. Metropolitan receives deliveries of SWP supplies via the California Aqueduct at Castaic Lake in Los Angeles County, Devil Canyon Afterbay in San Bernardino County, and Box Springs Turnout and Lake Perris in Riverside County. The first delivery of SWP water to Metropolitan occurred in 1972.

The initial facilities of the SWP, completed in the early 1970s, were designed to meet the original needs of the SWP contractors. It was intended that additional SWP facilities would be built over time to meet projected increases in contractors' delivery needs. Each contractor's SWP contract provided for a buildup in contractual amount over time, with most contractors reaching their maximum annual contractual amount by the year 1990. Since the completion of the initial SWP facilities in the early 1970s, major improvements to the system have included: four new pumps added to the Banks Pumping Plant at the Delta, the completion of the Coastal Branch, and the East Branch enlargement. Even with these improvements, however, there are still significant capacity constraints within the SWP that limit the delivery capability of the full contracted amount. During the same time, the contractors' needs for water from the SWP have increased. As a result, the contractors' demands for SWP water currently exceed the dependable yield.[1] Metropolitan has developed groundwater storage programs with Semitropic Water Storage District, Arvin-Edison Water Storage District, Kern Delta Water District, and Antelope Valley-East Kern Water Agency to supplement the available water supply.

The amount of contractual supplies DWR approves for delivery varies annually with contractor demands and projected water supplies from tributary sources to the Delta, based on snowpack in the Sierra Nevada, reservoir storage, operational constraints, and demands of other water users. Deliveries to Metropolitan reached a high of 1,802 TAF in calendar year 2004. Metropolitan experienced shortages in SWP supplies in fiscal years 1991 and 1992, with reduced deliveries of 391 TAF and 710 TAF, respectively.[2] SWP deliveries were limited to a record low 5 percent of contractual amount in 2014 and 20 percent of contractual amount in 2015. For calendar year 2021, the SWP allocation decreased from an initial allocation of 10 percent to 5 percent based on on-going dry conditions. The five percent SWP allocation for Metropolitan in 2014 and 2021 represents the lowest in the history of the SWP.

In recent years, the listing of several fish species in the Sacramento/San Joaquin River Delta (Delta) under both state and federal Endangered Species Acts has constrained SWP operations and created more uncertainty in SWP supply reliability. These listed species include Delta smelt, winter-run Chinook salmon, spring-run Chinook salmon, Central Valley steelhead, green sturgeon, and Longfin smelt (state-listed only). In August 2020, DWR released the SWP Delivery Capability Report. The report shows that current SWP delivery capability has been negatively impacted by two significant factors. The first is the 2018 Addendum to the Coordinated Operation Agreement (COA), which increased State Water Project obligations to meet in-basin uses and decreased the ability of the State Water Project to export water relative to the Central Valley Project. The second major factor is operational changes by DWR to maintain higher levels of storage in Lake Oroville, made in part to ensure sufficient supplies to meet increased COA obligations. Additionally, the report shows a reduction in future delivery capability because of climate change, which is altering the hydrologic conditions in the State.

Metropolitan is undertaking ongoing efforts to maintain and improve the reliability and quality of its water supply from the State Water Project. Sections 3.2 and 3.3 in this Plan describe current programs and plans for reliability, and Chapter 4 addresses water quality issues.

Los Angeles Aqueduct

The City of Los Angeles imports water from the eastern Sierra Nevada through the Los Angeles Aqueduct (LAA). The original LAA, completed in 1913, imported water from the Owens Valley. In 1940, the aqueduct was extended to the Mono Basin. A second aqueduct, which parallels the original, was completed in 1970.

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[1] The dependable yield of the existing SWP facilities is considered to be the delivery capability during a critically dry seven-year period.

[2] These numbers are Metropolitan's allocated contractual amount. Total water deliveries to Metropolitan's service area are shown in Table A.2-1.

Prior to the 1990-1991 drought, the City of Los Angeles had imported an average of 440 TAF of water annually from the combined Owens Valley/Mono Basin system, of which about 90 TAF came from the Mono Basin. In 1986, the aqueduct delivered a record 520 TAF of water.

In the late 1980s, a series of court injunctions limited the amount of water that Los Angeles could receive from its aqueduct system. In 1990, these limitations, along with a persistent drought, limited the delivery from the aqueduct to only 106 TAF. The Mono Lake Water Rights Decision (Decision) in September of 1994 ended the litigation in the Mono Basin, while negotiations continued with Inyo County on the fate of the Owens Valley water supply. In the Decision, the state ruled that Mono Lake should rise 17 feet over the next 25 years. During this time, Los Angeles would only be permitted to divert a fraction of its historical amounts. After the lake had risen, the City of Los Angeles would still be allowed only significantly reduced diversions. However, the high precipitation during the 1990s allowed increased diversions of water to the LAA to occur at a much earlier time frame than had been foreseen at the time of the Decision.

More recently, the LAA diversions of water from the Owens Valley came under additional pressure. Diversion of water from the Owens River had led to the drying up of Owens Lake by the end of the 1920s. This dry lakebed became a major source of windblown dust, resulting in EPA pressure to develop a State Implementation Plan to bring the region into compliance with federal air quality standards. In 1998, the Los Angeles Department of Water and Power entered into a Memorandum of Agreement with the Great Basin Air Pollution Control District that specified actions needed to control the problem. These actions included shallow flooding and managed vegetation at various lakebed locations. An estimated 54 TAF per year will be required to maintain the dust control measures, further restricting the water available for diversion through the LAA. More recently, the city has been required to restore portions of the Owens River, which could further restrict the water that can be provided from this source. During the last 5 years (2015 to 2019), LAA supplies ranged from a high of 380 TAF in 2017 to a low of 33 TAF in 2015.

Historic Total Regional Water Supplies

The previous sections have presented the various sources of Metropolitan and the region's water supply. The amount of water supplied by each local and imported source from 1976 through 2020 appears in Table A.2-1. The imported supplies represent the amount of water imported into Metropolitan's service area, not the amount delivered to member agencies, which is shown in Table A.2-2. The difference between Metropolitan's imports and deliveries is water placed into or withdrawn from storage.

Appendix 3

JUSTIFICATIONS FOR SUPPLY PROJECTIONS

Appendix 3
JUSTIFICATIONS FOR SUPPLY PROJECTIONS

The California Water Code (CWC) Section 10631 requires that urban water suppliers identify and quantify, to the extent practicable, the existing and planned sources of water available to them over five-year increments to 20 years or as far as data is available. This CWC section further requires urban suppliers to include a detailed description of all water supply projects and water supply programs that may be undertaken to meet the total projected water use. This Appendix provides the basis for the water supply available to Metropolitan as contained in this plan, by each major source of supply. Such bases and proofs are required for supply verification under the legislation.

Throughout this Appendix, references are made to Metropolitan's operating budget and its long-term capital investment plan. The most recent operating budget (for fiscal years 2020-21 and 2021-22) was adopted at the April 14, 2020 meeting of Metropolitan's Board of Directors. A copy of the budget summary and the Capital Investment Plan for fiscal years 2020-21 and 2021-22 can be found at:
http://mwdh2o.com/PDF_Who_We_Are/Biennial%20Budget%20–%20Fiscal%20Years%202020-21%20and%202021-22.pdf.

Another document of interest related to Metropolitan's water supply planning is its annual report to the state Legislature in compliance with Senate Bill 60 of 1999 (Hayden).[1] Senate Bill 60 requires that Metropolitan report on its progress in increasing its emphasis on cost-effective conservation, recycling, and groundwater recharge.

A.3.1. Colorado River Aqueduct Deliveries

A. Colorado River Supplies

Metropolitan obtains water from the Colorado River under its Boulder Canyon Project Section 5 water delivery contract with the Secretary of the Interior providing for permanent service. A number of programs have been developed over the years to enhance and manage Colorado River supplies available under its water delivery contract. Appendix 2 describes the history of water supplies and the expected availability from this source, and Section 3.1 of the 2020 UWMP describes the agreements for water supplies.

Rationale for the Expected Supply

Historical Record

Water supply under Metropolitan's Boulder Canyon Project Section 5 water delivery contract has been delivered since 1939. By existing contract, it is expected to be available in perpetuity because of California's senior water rights to use of Colorado River water.

[1] Metropolitan Water District of Southern California, *Annual Progress Report to the California State Legislature: Achievements in Conservation, Recycling and Groundwater Recharge (February 2021)*, which can be found at http://www.mwdh2o.com/PDF_About_Your_Water/Annual_Achievement_Report.pdf. The legislation requiring this information can be found at http://www.leginfo.ca.gov/pub/99-00/bill/sen/sb_0051-0100/sb_60_bill_19990916_chaptered.pdf. Similar reports have been filed with the Legislature since 2000.

The historical record for available Colorado River water indicates that Metropolitan's contracted Colorado River supply has been available in every year and can reasonably be expected to be available over the next 20 years. Through 2002 the volume of water available and diverted from the Colorado River has been up to the annual capacity of the Colorado River Aqueduct of approximately 1.25 MAF. Since 2003, increased use by the other Colorado River basin states and persistent dry conditions in the Colorado River Basin has reduced the firm available supply to its 550 TAF Priority 4 entitlement.

Written Contracts or Other Proof

Metropolitan's entitlement to Colorado River water is based on a series of interstate compacts, federal laws, agreements, court decrees, and guidelines collectively known as "The Law of the River,"[2] which govern the distribution and management of Colorado River water. The following documents specifically determine Metropolitan's dependable supplies:

1931 Seven Party Agreement.[3] The 1931 Agreement recommended California's Colorado River use priorities and has no termination date. The priorities to water available for use in California held by Palo Verde Irrigation District (PVID), Yuma Project (Reservation Division), Imperial Irrigation District (IID), Coachella Valley Water District (CVWD), and Metropolitan are shown in Table A.2-5. These priorities are incorporated into the water delivery contracts that the Secretary of the Interior executed with the California agencies in the 1930s for water from Lake Mead. Metropolitan holds Priority 4 to California's basic apportionment of Colorado River water and utilizes this water – 550 TAF per year. Metropolitan also holds Priority 5 to 662 TAF per year. Appendix 2 describes the current status of water available under these priorities.

Metropolitan's Basic Contracts.[4] Metropolitan's 1930, 1931, and 1946 basic contracts with the Secretary of the Interior permit the delivery of 1.212 MAF per year when sufficient water is available. Metropolitan's 1987 surplus flow contract for up to 180 TAF with USBR permits the delivery of water to fill the remainder of the Colorado River Aqueduct when water is available.

Consolidated Court Decree.[5] The 1964 U.S. Supreme Court Decree confirmed the Arizona, California, and Nevada basic apportionments of 2.8 MAF per year, 4.4 MAF per year, and 300 TAF per year, respectively. The 1964 Decree also permits the Secretary of the Interior to make water available that is unused by one of the states for use in the other two states. In addition, it permits the Secretary of the Interior to make surplus water available. The Consolidated Decree issued on March 27, 2006, by the U.S. Supreme Court in Arizona v. California consolidated into one decree the initial 1964 decree, the 1979 supplemental decree, the 1984 second supplemental decree, the 2000 third supplemental decree, and the 2006 approval of settlements reached on the water rights claim of the Fort Yuma Indian Reservation. The Consolidated Decree quantified present perfected rights (PPRs) to the use of Colorado River water by certain Indian reservations, federal wildlife refuges, and other users.

2003 Quantification Settlement Agreement (QSA). The QSA and several other related agreements were executed in October 2003.[6] The QSA quantifies the use of water under the third priority of the Seven Party Agreement, and further allocates 38 TAF of the sixth priority to

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[2] A description of many of these documents can be found at http://www.usbr.gov/lc/region/pao/lawofrvr.html.

[3] This agreement among the seven California agencies was dated August 18, 1931, and was codified in federal regulations promulgated by the Secretary of the Interior on September 28, 1931.

[4] Including contract number Ilr-645 dated April 9, 1930, supplemented September 28, 1931.

[5] The Consolidated Decree entered by the U.S. Supreme Court on March 27, 2006, in *Arizona v. California, et al.*, can be found at http://www.usbr.gov/lc/region/pao/pdfiles/scconsolidateddecree2006.pdf.

[6] These agreements can be found at http://www.iid.com/water/library/qsa-water-transfer.

Metropolitan. The QSA provides the numeric baseline needed to measure conservation and transfer programs, and it allows for implementation of agricultural conservation, land fallowing, and other programs identified in Metropolitan's IRP. Although this agreement does not directly impact Metropolitan's entitlements, Metropolitan agreed to forbear consumptive use when necessary so that the Secretary of the Interior can satisfy the uses of holders of miscellaneous and Indian present perfected rights in excess of 14.5 TAF.

<u>2005 Settlement Agreement with Quechan Indian Tribe.</u> In 2005, Metropolitan entered into a settlement agreement in Arizona v. California with the Quechan Indian Tribe and other parties. The Tribe uses Colorado River water on the Fort Yuma Indian Reservation. Under the settlement agreement, the Tribe, in addition to the amounts of water decreed for the benefit of the Reservation in the 1964 decree in Arizona v. California, is entitled to (a) 20 TAF of diversions from the Colorado River, or (b) the amount necessary to supply the consumptive use required for irrigation of a specified number of acres, and for the satisfaction of related uses, whichever is less. Of the additional diversions, 13 TAF became available to the Tribe in 2006. An additional 7 TAF becomes available to the Tribe in 2035. Metropolitan agreed to provide annual incentive payments to the Tribe if the Tribe forbore diversion of the additional water, thereby allowing Metropolitan to divert it.

<u>Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead.</u> In December 2007, the Secretary of the Interior approved a Record of Decision establishing specific interim guidelines for reductions in Colorado River water deliveries in the Lower Basin during declared shortages and coordinated operations of Lake Powell and Lake Mead. These guidelines provide water release criteria from Lake Powell and water storage and water release criteria from Lake Mead during shortage, normal, and surplus conditions in the Lower Basin, and provide a mechanism for Metropolitan to store and take delivery of conserved system and non-system water in Lake Mead. In December 2020, the seven Colorado River Basin States sent a letter to the Secretary of Interior giving notice that the Basin States have begun the process of reconsultation regarding the 2007 interim guidelines. The Basin States and major water contractors, including Metropolitan, will be involved in reconsultation and development of new guidelines for the management and operation of Lake Powell and Lake Mead after the term of the 2007 interim guidelines ends in 2026.

<u>Lower Basin Drought Contingency Plan.</u> In April 2019, the President signed legislation directing the Secretary of the Interior to sign and implement four DCP agreements related to the Upper and Lower Basin DCPs without delay. The agreements were executed and became effective on May 20, 2019 and will continue to be effective through 2026. The Lower Basin Drought Contingency Plan Agreement requires California, Arizona and Nevada to contribute defined volumes of water to Lake Mead ("DCP Contributions") when lake elevations drop below certain levels. California would begin making these contributions if USBR modeling projects Lake Mead's elevation to be at or below 1,045 feet (relative to mean sea level) on January 1. Lake Mead elevation in January 2020 was 1,090 feet. Depending on the lake's elevation, California's annual contributions would range from 200 to 350 TAF. Pursuant to intrastate implementation agreements that terminate in 2026, Metropolitan is responsible for 93 percent of any California DCP Contribution that may be required under the Lower Basin DCP. CVWD is responsible for 7 percent of California's required DCP Contributions.

Implementation of the Lower Basin DCP enhances Metropolitan's ability to store water in Lake Mead and to ensure that water in storage can be delivered at a later date. The Lower Basin DCP increases the total volume of water that California may store in Lake Mead as ICS by 200 TAF. Water stored as ICS will be available for delivery as long as Lake Mead's elevation remains above 1,025 feet. Previously, that water would likely have become inaccessible below a Lake Mead elevation of 1,075 feet. DCP Contributions may be made through conversion of existing ICS. These types of DCP Contributions become DCP ICS. DCP Contributions may also be made by leaving water in Lake Mead to which there was a legal right of delivery. This type of DCP Contribution becomes system water and may not be recovered. Rules are set for delivery of DCP ICS through 2026 and between 2027 to 2057.

Financing

Metropolitan's operating budget (referenced at the beginning of this appendix) includes the cost of delivering Colorado River water and the payment to the Quechan Indian Tribe, which is paid from water sales revenue.

Federal, State, and Local Permits/Approvals

Metropolitan's fourth priority Colorado River water is currently available, and this priority assures delivery of the basic apportionment.

B. IID - Metropolitan Conservation Program

Source of Supply

The IID-Metropolitan Conservation Program provides an annual supply that is delivered to Metropolitan's service area via its Colorado River Aqueduct (CRA). In 1988, Metropolitan executed a Conservation Agreement to fund water efficiency improvements within IID's service area in return for the right to divert the water conserved by those improvements. The program consists of structural and non-structural measures, including the concrete lining of existing canals, the construction of local reservoirs and spill-interceptor canals, installation of non-leak gates, and automation of the distribution system. Other implemented projects include the delivery of water to farmers on a 12-hour basis rather than a 24-hour basis and improvements in on-farm water management.

Expected Supply Capability

The IID-Metropolitan Conservation Program activity began in 1990, has been fully operational since 1998, and makes available 105 TAF of conserved water annually from 2016 onward. The initial program agreement provided CVWD the option to call up to about 45 TAF per year if needed to meet its demands. Execution of the QSA reduced CVWD's option to a maximum of 20 TAF. This water is available to Metropolitan if not required by CVWD, but the minimum supply to Metropolitan has been increased to 85 TAF from 2016 onward through a second amendment to the agreement, and the clarification on the number of 12-hour deliveries that would be included in the program through a letter agreement. This amount was further increased to 90 TAF from 2020-2026 under the 2019 Second Amendment to the Delivery and Exchange Agreement with CVWD, with the remainder of CVWD's option (15 TAF) available for Metropolitan's delivery to CVWD at Whitewater.

Rationale for the Expected Supply

<u>Historical Record</u>

The IID-Metropolitan Conservation Program has been fully operational since 1998. Existing agreements have extended the initial term to at least 2041 or 270 days after the termination of the QSA, whichever is later, and they guarantee Metropolitan a minimum of 85 TAF per year from 2016 onward. A 2019 amendment increases the minimum to 90 TAF from 2020 to 2026.

With operations beginning in 1990, the program has conserved as much as 109.46 TAF per year to date. By an amendment to the program agreement beginning in 2007 and a 2014 letter agreement, the annual conserved water yield will be 105 TAF. The historical record indicates that

Metropolitan's expected minimum supply of 85 TAF per year (and 90 TAF from 2020 to 2026) would be available over at least the next 26 years.

Written Contracts or Other Proof

Metropolitan's annual supply from the IID-Metropolitan Conservation Program is based on three agreements and amendments to those agreements.

1988 IID-Metropolitan Conservation and Use of Conserved Water Agreement. This Agreement was executed in December 1988 by IID and Metropolitan for a 35-year term following completion of program implementation (1998–2033).

1989 Approval Agreement. This Agreement secured the approval of PVID and CVWD to not divert an amount of water equal to the amount conserved except under limited circumstances. The Agreement was executed in December 1989.

1989 Supplemental Approval Agreement. This Agreement was executed in December 1989 between Metropolitan and CVWD to coordinate Colorado River diversions and the use of the conserved water provided by the Program.

2003 Amendments to 1988 Agreement and 1989 Approval Agreement. These amendments revise Metropolitan's potential obligation to reduce its use of the conserved water yield in favor of its use by CVWD down to 20 TAF annually. Any of this water not used by CVWD would be available to Metropolitan. The amendments also extended the term of the IID-Metropolitan conservation program through December 31, 2041, or 270 days beyond the termination of the QSA.

2007 Amendments to 1988 Agreement and 1989 Approval Agreement. These amendments specify that beginning in 2007, the annual conserved water yield has and will be 105 TAF with continued operation of 24 tailwater pump back systems, of which up to 20 TAF would be made available to CVWD upon its request.

2014 Letter Agreement Related to the 1988 Agreement. This letter agreement specifies that beginning in 2016, the annual conserved water yield has and will be 105 TAF, of which up to 20 TAF would be made available to CVWD upon its request. This amendment also removes tailwater recovery systems from the conservation actions and quantifies the yield and number of 12-hour deliveries that are included in the program.

2019 Second Amendment to Delivery and Exchange Agreement Between Metropolitan and Coachella for 35 TAF. The second amendment was executed in December 2019 between Metropolitan and CVWD for the exchange of additional water during the period from 2020 through 2026. Metropolitan will be guaranteed 90 TAF per year from 2020 to 2026, with the remaining amount that CVWD could call (15 TAF) available for Metropolitan's delivery to CVWD at whitewater.

Financing

Construction of the water efficiency improvements under this Program have been funded and put into operation. Metropolitan's five-year financial forecast in the budget includes the cost of operating, maintaining, and delivering the conserved water under the IID--Metropolitan Conservation Program.

Federal, State, and Local Permits/Approvals

A comprehensive environmental review process supported implementation.

EIR for Program. The IID Board certified the final EIR for the Program in December 1986.[7]

Supplemental EIR for Program. The IID Board certified the final EIR for the Completion Program in June 1994.[8]

Program EIR for Quantification Settlement Agreement. Metropolitan's Board certified the final Program EIR for the QSA in June 2002.[9]

Addendums to the QSA Final Program EIR. Metropolitan's Board adopted the Addendum to the QSA Final Program EIR in December 2002 and a second addendum in September 2003. Metropolitan's Board also adopted the Findings of Fact and Statement of Overriding Considerations, and Mitigation and Monitoring and Reporting Program at that time.

C. Palo Verde Irrigation District Land Management, Crop Rotation and Water Supply Program

Source of Supply

At its May 11, 2004 meeting, Metropolitan's Board authorized a 35-year land management, crop rotation, and water supply program with the PVID. Under the program, participating landowners in PVID are being paid to reduce their water use by not irrigating a portion of their land. A maximum of 29 percent of lands within PVID can be fallowed in any given year. Under the terms of the QSA, water savings within the PVID service area are made available to Metropolitan. PVID has the first priority for Colorado River water under the water delivery contracts with the USBR. Implementation of the program began in January 2005. The agreement also specifies that the participating landowners will fallow land in an amount equal to 25% of the landowner's total maximum fallowing commitment during each year.

Expected Supply Capability

It is estimated that the PVID/Metropolitan Program would provide up to 133 TAF per year of additional Colorado River water. This water would be available in any year as needed and in accordance with the provisions described in the agreements with Palo Verde Valley landowners and PVID.

Rationale for the Expected Supply

Historical Record
Metropolitan and PVID tested the concept of developing a water supply for Metropolitan by entering into an agreement in 1992.[10] Agreements were signed with landowners and lessees in the Palo Verde Valley to forego irrigation for a two-year period from August 1992 to July 1994. Water unused by PVID, in the amount of 186 TAF, was stored in Lake Mead for Metropolitan. Both PVID and Metropolitan signed approved Principles of Agreement in 2001. PVID issued the Final

[7] Imperial Irrigation District, *Final EIR, Proposed Water Conservation Program and Initial Water Transfer, Imperial Irrigation District*, October, 1986. SCH Number: 1986012903.
[8] Imperial Irrigation District, *Final EIR for Modified East Lowline and Trifolium Interceptors, and Completion Projects*, May 1994. SCH Number: 1992071061.
[9] Coachella Valley Water District, Imperial Irrigation District, Metropolitan, San Diego County Water Authority, *Final Program EIR, Implementation of the Colorado River Quantification Settlement Agreement*, June 2002, SCH Number 2000061034.
[10] Presented to Metropolitan's Board at its regular meeting on January 14, 1992.

EIR for the Proposed Palo Verde Irrigation District Land Management, Crop Rotation and Water Supply Program in September 2002.[11]

Implementation of the program began in January 2005. In March 2009, Metropolitan and PVID entered into a one-year supplemental fallowing program within PVID that provided for the fallowing of additional acreage, with savings of 24.1 TAF in 2009 and 32.3 TAF in 2010.

Calendar Year	**Volume of Water Saved** (TAF)
2005	108.7
2006	105.0
2007	72.3
2008	94.3
2009	120.2
2010	116.3
2011	122.2
2012	73.7
2013	32.8
2014	43.0
2015	94.5
2016	125.4
2017	119.4
2018	95.7
2019	44.5
2020	50.0 (estimated)

Written Contracts or Other Proof

Contracts for this program are listed below.

August 2004 Forbearance and Fallowing Program Agreement. This agreement establishes the PVID/Metropolitan Program, which provides for a solicitation of and provisional approval of landowner participation offers, specifies the process for incorporating offers into agreements with landowners, and states the terms and conditions for fallowing, including payments made by Metropolitan.

Landowner Agreements for Fallowing in PVID. These agreements specify an escrow process to consummate the transaction, an easement deed to encumber land for fallowing, a tenant agreement to subordinate a tenant's lease to the agreement and easement, and an encumbrance agreement to subordinate any encumbrance (e.g., a mortgage) to the easement. These agreements also state the landowner's fallowing obligation, payments to be made by Metropolitan, and land management measures to be implemented.

[11] SCH Number 2001101149.

Financing

Metropolitan's annual O&M budget (referenced above) includes the cost of the PVID/Metropolitan Program.

Federal, State and Local Permits

EIR for Program. A Notice of Preparation for the PVID/Metropolitan Program was published on October 29, 2001. PVID issued the Final EIR for the Proposed Palo Verde Irrigation District Land Management, Crop Rotation, and Water Supply Program in September 2002 (see reference above).

D. Land Management of Metropolitan Owned Lands in Palo Verde Valley

Source of Supply

In 2017 and 2018, Metropolitan executed new farm leases on 20,478 irrigable acres that it owns in the Palo Verde valley. These leases provide economic incentives for farmers leasing the land to grow less water-intensive crops, generating additional water savings beyond what is achieved by the Land Management, Crop Rotation, and Water Supply Program. The leases also allow Metropolitan and its lessees to collaborate on other types of conservation, such as high-efficiency irrigation and precision irrigation practices. Under the terms of the QSA, water savings within the PVID service area are made available to Metropolitan.

Expected Supply Capability

Metropolitan's lands in PVID generate water savings through the existing PVID Land Management, Crop Rotation and Water Supply Program. Changes in land management through cropping and irrigation practices generate an additional 14 - 25 TAF annually, compared to a baseline of 2015-16 water use. Because all Metropolitan-owned lands are enrolled in the fallowing program, the savings from agricultural practices depend on the fallowing call for each year, with a high call resulting in lower savings due to lower baseline usage.

Rationale for the Expected Supply

Field water use in PVID is currently measured as applied water rather than consumptive use. The baseline applied water use on Metropolitan's lands was 10.6 AF per acre in 2015-16. In 2017, 2018, and 2019, the applied water use was 8.0 to 8.5 AF per acre, representing a 20% to 25% decrease below baseline. If the consumptive water use is assumed to be half of the applied water use, then the consumptive savings on Metropolitan lands are 1.1 – 1.3 AF per acre.

Metropolitan leases 20,478 irrigable acres in the valley, but depending on the fallowing call, only 13,152 to 19,001 acres are in production in any given year. A 1.1 – 1.3 AF per acre decrease results in 14 to 25 TAF of additional supply per year, depending on the call.

Financing

Metropolitan's annual O&M budget includes the cost of the PVID land management program.

Federal, State and Local Permits

This program is not subject to any permits or environmental impact reviews under federal, state, or local laws.

E. Metropolitan-CVWD Delivery and Exchange Agreement for 35,000 Acre-Feet

Source of Supply

Metropolitan delivers to CVWD up to 35 TAF from Metropolitan's available State Water Project (SWP) Table A supply without condition on the actual Department of Water Resources (DWR) allocation for that year. As CVWD does not have a connection to the SWP, the water is delivered to CVWD by an exchange with Colorado River water. Metropolitan takes delivery of the Table A supply in conjunction with forgoing diversion of an equal volume of its Colorado River supply, effectively leaving this water in the River for diversion by CVWD at Imperial Dam. Exchange deliveries may also be made at the CRA Whitewater service connection or through the Metropolitan-CVWD-Desert Water Agency Advance Delivery Agreement. This program represents a net debit to Metropolitan's supplies.

A second source of supply governs an additional 15 TAF a year obligation from 2020-2026 under the 2019 Second Amendment to the Delivery and Exchange Agreement. However, the source of the increase is water CVWD can call from the IID/MWD Conservation Program, which is Colorado River water. Therefore, this portion of the exchange is described in greater detail in the IID/MWD Conservation Program section. This water is a one-for-one exchange and does not represent a net change to Metropolitan's supplies.

Expected Capability

Up to 35 TAF of Metropolitan's SWP Table A supply will be delivered annually to CVWD by exchange.

Rationale for the Expected Supply

This program is undertaken pursuant to the Delivery and Exchange Agreement between Metropolitan and Coachella for 35 TAF dated October 10, 2003 and is a QSA-related agreement.

Program Facilities

Metropolitan takes delivery of the Table A supply from the East Branch of the California Aqueduct at Devil Canyon Afterbay. At Metropolitan's request, the USBR releases a portion of Metropolitan's available Colorado River supply from Lake Mead for diversion by CVWD at Imperial Dam and conveyance through the All-American Canal System.

Historical Record

Since the 2003 execution of the QSA and the Delivery and Exchange Agreement, the following volumes of exchange water were delivered to CVWD at Imperial Dam:

Calendar Year	Volume of Exchange Water (AF)
2003	0
2004	0
2005	0
2006	34,958
2007	0
2008	0
2009	0
2010	10,000
2011	0

Calendar Year	Volume of Exchange Water (AF)
2012	0
2013	0
2014	0
2015	313
2016	0
2017	0
2018	0
2019	0
2020	0

Written Contracts or Other Proof

2003 Delivery and Exchange Agreement. This agreement between Metropolitan and CVWD provides for the delivery of up to 35 TAF of Metropolitan SWP Table A supply by exchange with Colorado River water.

2019 Second Amendment to Delivery and Exchange Agreement Between Metropolitan and Coachella. The second amendment was executed in December 2019 between Metropolitan and CVWD for the exchange of additional water during the period from 2020 through 2026. Metropolitan will exchange an average of 15 TAF per year with CVWD between 2020 and 2026. The source of this water is the portion of the IID/MWD Conservation Program that is subject to call by CVWD.

Federal, State, and Local Permits/Approvals

Program EIR for Quantification Settlement Agreement. Metropolitan's Board certified the final Program EIR for the QSA in June 2002.[12]

Addendums to the QSA Final Program EIR. Metropolitan's Board adopted the Addendum to the QSA Final Program EIR in December 2002 and a second addendum in September 2003. Metropolitan's Board also adopted the Findings of Fact and Statement of Overriding Considerations, and Mitigation and Monitoring and Reporting Program at that time.

September 2002 Final Program EIR for Coachella Valley Water Management Plan and State Water Project Entitlement Transfer. The final Program EIR for the Coachella Valley Water Management Plan and SWP Entitlement Transfer was certified by the CVWD on October 8, 2002.

F. SNWA and Metropolitan Storage and Interstate Release Agreement

Source of Supply

The source of supply is SNWA's unused Nevada apportionment of Colorado River water made available to Metropolitan for diversion and storage. In later years, Metropolitan would return water through reduced diversions of Colorado River water made at the request of SNWA.

[12] Coachella Valley Water District, Imperial Irrigation District, Metropolitan, San Diego County Water Authority, Final Program EIR, Implementation of the Colorado River Quantification Settlement Agreement, June 2002, SCH Number 2000061034.

Expected Supply Capability

As of January 1, 2020, over 422 TAF had been diverted by Metropolitan since 2004. Of the amount that has been stored, 330 TAF is available for return to SNWA.

Returns to SNWA are limited to no more than 30 TAF annually unless Metropolitan agrees to a larger amount. In 2020 and 2021, SNWA may request return of an amount equal to the shortage allocated by the Secretary of the Interior to Nevada, though they are not expected to do so. If the Secretary of the Interior apportions less than 280 TAF of basic apportionment for use in Nevada, SNWA may request the return of up to 50 TAF, 1 acre-foot for each acre-foot less than Nevada's 280 TAF basic apportionment.

If less than 75 TAF has been returned, then during each year prior to 2027 for which Lake Mead begins the year at or below elevation 1,045 feet, Metropolitan will create 50 TAF of Intentionally Created Surplus (ICS) in Lake Mead, until the combined sum of ICS and the amount of water returned to SNWA equals 75 TAF. Prior to 2027, Metropolitan would be able to request delivery of this ICS during a year in which Lake Mead begins the year at or above elevation 1,080 feet.

Rationale for the Expected Supply

Program Facilities

Water is diverted through the CRA by Metropolitan. To return the water to SNWA, Metropolitan would reduce its CRA diversions, and the Secretary of the Interior would make water available to SNWA at Lake Mead.

Historical Record

The annual volumes of water diverted into the CRA, and the volume of water stored for SNWA by Metropolitan are as follows:

Calendar Year	Volume of Water Diverted (AF)	Volume of Water Stored for SNWA (AF)
2004	10,000	10,000
2005	10,000	10,000
2006	5,000	5,000
2007	0	0
2008	45,000	45,000
2009	0	0
2010	0	0
2011	0	0
2012	62,839	41,892
2013	75,000	50,000
2014	65,000	43,333
2015	150,000	125,000
2016	0	0
2017	0	0
2018	0	0
2019	0	0
2020	0	0

No water has been returned to SNWA.

Written Contracts or Other Proof

2004 Storage and Interstate Release Agreement. This agreement among Metropolitan, the Colorado River Commission of Nevada, SNWA, and the United States provides for the Secretary of the Interior to make available to Metropolitan for diversion and storage unused Nevada apportionment. In subsequent years, the agreement provides for Metropolitan to make water available to SNWA by forgoing diversion of a portion of its available Colorado River supply.

Operational Agreement. As amended on August 11, 2009, on October 24, 2012, and on October 19, 2015, the Operational Agreement specifies the conditions under which Metropolitan would divert and store unused Nevada apportionment through 2026 and the return of water to SNWA.

G. Lower Colorado Water Supply Project

Source of Supply

Groundwater is pumped by the Lower Colorado Water Supply Project wells near the All-American Canal and is discharged to the Canal. IID reduces its net diversions of Colorado River water by an amount equal to the amount of Project water discharged into the Canal, permitting entities along the Colorado River that do not have rights or have insufficient rights to divert Colorado River water to obtain a supply of water. In 2007, Metropolitan entered into a contract with the USBR and the City of Needles to utilize the unused Project capacity.

Expected Capability

Metropolitan estimates that it received 8.8 TAF of Lower Colorado Water Supply Project water in 2020.

Rationale for the Expected Supply

Program Facilities

Two Lower Colorado Water Supply Project wells pump water into the All-American Canal. The groundwater level in one of the wells declined to the point that it could not operate at capacity with existing equipment. Replacement equipment to restore pumping capacity was installed. Two new Project wells became operational in 2016 and brought the pumping capacity to the full 10,000 AFY project capacity.

Historical Record

Metropolitan has received the following amounts of Lower Colorado Water Supply Project water:

Calendar Year	Volume of Water (AF)
2007	5,011
2008	6,300
2009	2,349
2010	3,872
2011	3,611
2012	3,253
2013	4,208
2014	6,109
2015	6,722
2016	6,647
2017	6,851

Calendar Year	Volume of Water (AF)
2018	9,469
2019	9,554
2020	8,800 (estimated)

Written Contracts or Other Proof

2007 Lower Colorado Water Supply Project Contract among the United States, the City of Needles, and Metropolitan. This contract, as amended in 2010 and 2020, provides for the United States to deliver Colorado River water to Metropolitan, the availability of which results from the pumping of Lower Colorado Water Supply Project groundwater and the exchange of such water.

Financing

Metropolitan's O&M budget includes the cost associated with receipt of Lower Colorado Water Supply Project water.

H. Lake Mead Storage Program, Drop 2 (Brock) Reservoir Funding, Yuma Desalting Plant Pilot Project, Binational Intentionally Created Surplus, and the Lower Basin Drought Contingency Plan

Source of Supply

Water has been and will be stored in Lake Mead as Intentionally Created Surplus (ICS) through extraordinary conservation measures, such as water saved through the Palo Verde Irrigation District Land Management, Crop Rotation, and Water Supply Program.

Water has been and will be stored in Lake Mead as ICS through system efficiency measures, such as Metropolitan's funding contributions toward construction of the Drop 2 (Brock) Reservoir near the All-American Canal and pilot operation of the Yuma Desalting Plant.

Water will be stored in Lake Mead as Binational ICS through implementation of pilot conservation projects in Mexico.

Water has been stored in Metropolitan's service area for IID as excess conservation.

Expected Capability

Metropolitan may create as much as 400 TAF of Extraordinary Conservation ICS water in a single year less the amount that may be created by IID, which could be as much as 25 TAF. In any given year, if Arizona and Nevada create less than their respective maximums, according to provisions in the Lower Basin Drought Contingency Plan (DCP) Metropolitan may create above 400 TAF, provided that all entities in the Lower Basin create no more than 625 TAF combined.

As stipulated in the DCP, upon creation, 10 percent of the Extraordinary Conservation ICS is deducted, resulting in additional system water stored in Lake Mead and leaving 90 percent of the water available for release to Metropolitan, without additional annual evaporation losses.

Under the DCP, the amount of Extraordinary Conservation ICS accumulated in Lake Mead for Metropolitan is limited to 1.7 MAF less the amount accumulated by IID which could be as much as 50 TAF and less the amount of Binational ICS stored by both IID and Metropolitan. Per the DCP, Arizona is also allowed to request 50 TAF of California Extraordinary Conservation ICS accumulation space. It is expected that Arizona will do so by the end of 2021.

Metropolitan may take delivery of as much as 400 TAF of Extraordinary Conservation ICS from Lake Mead in a year less the amount delivered to IID, which could be as much as 50 TAF, as long as Lake Mead's elevation remains above 1,025 feet.

Under the DCP, Metropolitan must also store defined volumes of water in Lake Mead at specified lake levels. California would begin making contributions if Lake Mead's elevation is projected to be at or below 1,045 feet (relative to mean sea level) on January 1. Depending on the lake's elevation, California's contributions would range from 200 to 350 TAF a year ("DCP Contributions"). Pursuant to intrastate implementation agreements that terminate in 2026, Metropolitan is responsible for 93 percent of any California DCP Contribution that may be required under the Lower Basin DCP. CVWD is responsible for 7 percent of California's required DCP Contributions.

As of January 1, 2020, Metropolitan has 89 TAF of System Efficiency ICS stored in Lake Mead. There are no evaporation losses charged to stored System Efficiency ICS. Metropolitan may take delivery of as much as 24 TAF of this System Efficiency ICS resulting from pilot operation of the Yuma Desalting Plant and 25 TAF of this System Efficiency ICS resulting from construction of the Drop 2 (Brock) Reservoir annually. The USBR may reduce this delivery if it determines a reduction is necessary to avoid a shortage.

Binational ICS is provided for through domestic agreements related to Minutes to the 1944 Treaty between the United States and Mexico. Metropolitan received 23.75 TAF of Binational ICS in Lake Mead in 2017 under Minute 319. Under Minute 323 Metropolitan will receive 27,275 AF of Binational ICS in Lake Mead between 2020 and 2026.

Additionally, under the California ICS Agreement, rather than storing conserved water in Lake Mead, IID may, with the written consent of Metropolitan, have up to 25 TAF of this water delivered to Metropolitan for storage in any one calendar year. Upon request by IID, Metropolitan would return 90 percent of the stored water to IID with the remaining 10 percent left for Metropolitan's use. A 2015 Amendment allowed IID to increase the amount of water it could deliver to Metropolitan for storage from 2015 to 2017. Metropolitan would return 95 percent of the stored water to IID, with additional 3 percent reductions in return obligation each year starting in 2020. Also, Metropolitan may make temporary use of IID's Extraordinary Conservation ICS accumulated in Lake Mead. As of January 1, 2020, Metropolitan has stored approximately 168 AF of IID's conserved water.

Rationale for the Expected Supply

Program Facilities

This program makes use of Lake Mead and the CRA.

Historical Record

From 2006 to 2010, Metropolitan created approximately 201.5 TAF of Extraordinary Conservation ICS.

In 2008, the USBR assigned to Metropolitan 100 TAF of water stored in Lake Mead as System Efficiency ICS due to Metropolitan's contributions to the Drop 2 Reservoir project, and Metropolitan diverted 34 TAF of that water.

In 2010 and 2011, the USBR assigned to Metropolitan 16.75 TAF and 7.647 TAF of water stored in Lake Mead as System Efficiency ICS, respectively, due to Metropolitan's contributions to the Yuma Desalting Plant pilot project.

From 2011 to 2012, Metropolitan created approximately 348.7 TAF of Extraordinary Conservation ICS.

From 2013 through 2015, Metropolitan took delivery of approximately 475.6 TAF of Extraordinary Conservation ICS.

From 2016 to 2019, Metropolitan created approximately 896.7 TAF of Extraordinary Conservation ICS.

In 2017, Metropolitan received 23.75 TAF of Binational ICS.

As of January 1, 2020, Metropolitan's Extraordinary Conservation ICS, System Efficiency ICS, and Binational ICS volumes in Lake Mead were approximately 866 TAF, 89.4 TAF, and 23.8 TAF respectively, and no DCP Contributions to Lake Mead have been required.

Written Contracts or Other Proof

2007 Lower Colorado River Basin Intentionally Created Surplus Forbearance Agreement among the Arizona Department of Water Resources, PVID, IID, the City of Needles, CVWD, Metropolitan, SNWA, and the Colorado River Commission of Nevada. This agreement sets forth the rules under which ICS water is developed, stored in, and delivered from Lake Mead. It also provides for IID storing conserved water with Metropolitan under certain conditions.

2007 California Agreement for the Creation and Delivery of Extraordinary Conservation Intentionally Created Surplus among Metropolitan, PVID, IID, CVWD, and the City of Needles. This agreement determines the conditions under which California contractors receiving Colorado River water may store and deliver water from Lake Mead.

2007 Agreement among the United States, the Colorado River Commission of Nevada, and the SNWA for the Funding and Construction of the Lower Colorado River Drop 2 Storage Reservoir Project. This agreement provides for: the United States to design and construct the Drop 2 Storage Reservoir Project; SNWA to fund the capital cost of the Project; the United States to credit SNWA's ICS account with 600 TAF of System Efficiency ICS; and allows Metropolitan to become a party to the agreement, requiring that Metropolitan provide funding for a portion of the capital cost.

2007 Delivery Agreement between the United States and Metropolitan. This agreement provides the procedures for creating ICS water and guarantees delivery of the water to Metropolitan.

2008 Metropolitan Notice of Election to Participate as a Party to the Drop 2 Funding Agreement. This notice requires Metropolitan to provide funding for a portion of the capital cost of the Drop 2 Storage Reservoir Project, and the United States to credit Metropolitan's ICS account with 100 TAF of System Efficiency ICS, reducing the amount of System Efficiency ICS in SNWA's account by an equal amount.

2009 Agreement among the United States, Metropolitan, the Colorado River Commission of Nevada, SNWA, and the Central Arizona Water Conservation District for a Pilot Project for Operation of the Yuma Desalting Plant. This agreement provides for the allocation of the costs for the preparation and pilot operation of the Yuma Desalting Plant.

2010 Yuma Desalting Plant Pilot Project Delivery Agreement between the United States and Metropolitan. This agreement secures delivery of the ICS water created and specifies the manner in which this water will be accounted.

2012 Agreement among the United States, Metropolitan, the Colorado River Commission of Nevada, SNWA, and the Central Arizona Water Conservation District for a Pilot Program for the Conversion of Intentionally Created Mexican Allocation to Intentionally Created Surplus. This agreement provides for the allocation of the costs among the agencies for the implementation of pilot conservation projects within Mexico and the allocation of 95 TAF of conserved water among the non-federal agencies as Binational ICS in Lake Mead.

<u>2012 Interim Operating Agreement for Implementation of Minute No. 319 of the International Boundary and Water Commission.</u> This agreement among the United States, the Upper Basin states, and Lower Basin states' agencies, including Metropolitan, sets forth the rules under which Intentionally Created Mexican Allocation is to be converted to Binational ICS for storage in and delivery from Lake Mead.

<u>2012 Lower Colorado River Basin Forbearance Agreement for Binational Intentionally Created Surplus.</u> This agreement among the state of Arizona, the Colorado River Commission of Nevada and SNWA, and California Colorado River water contractors, including Metropolitan, ensures that the Binational ICS made available to a contractor that invests in a project in Mexico cannot be claimed by another contractor in another state.

<u>2012 Binational ICS Delivery Agreement.</u> This agreement between Metropolitan and the United States secures delivery of the Binational ICS water made available by exchange and specifies the manner in which this water would be accounted.

<u>2013 Agreement between Metropolitan and IID Regarding Binational Intentionally Created Surplus.</u> This agreement allows IID to provide a payment to Metropolitan of up to 50 percent of the financial contribution to be made to the United States by Metropolitan for the implementation of pilot conservation projects within Mexico. As a result of IID's payment, Metropolitan received 23.75 TAF and IID received 23.75 TAF of Binational ICS in 2017.

<u>2015 Amendment 2 to the California Agreement for the Creation and Delivery of Extraordinary Conservation Intentionally Created Surplus.</u> This agreement between Metropolitan, PVID, IID, CVWD, and the City of Needles increased both IID's put capacity and cumulative capacity limits on storing conserved water with Metropolitan during the three-year period from 2015-2017.

<u>2017 Agreement among the United States, Metropolitan, the Colorado River Commission of Nevada, SNWA, IID, and the Central Arizona Water Conservation District for a Pilot Program for the Conversion of Mexico's Water Reserve to Binational ICS.</u> This agreement provides for the allocation of the costs among the agencies for the implementation of pilot conservation projects in Mexico and the allocation of 109.1 AF of conserved water to the non-federal agencies as Binational ICS in Lake Mead.

<u>2017 Interim Operating Agreement for Implementation of Minute No. 323.</u> This agreement between the United States, the Upper Basin states, and Lower Basin states' agencies, including Metropolitan, sets forth the rules under which Intentionally Created Mexican allocation is to be converted to Binational ICS for storage in and delivery from Lake Mead.

<u>2017 Binational ICS Agreement.</u> This agreement between the state of Arizona, the Colorado River Commission of Nevada and SNWA, and California Colorado River water contractors, including Metropolitan, ensures that the Binational ICS made available to a contractor that invests in a project in Mexico cannot be claimed by another contractor in another state.

<u>2017 Binational ICS Delivery Agreement.</u> This agreement between Metropolitan and the United States secures delivery of the Binational ICS water made available by exchange and specifies the way this water would be accounted for.

<u>2019 Lower Basin Drought Contingency Plan.</u> This agreement creates additional guidelines under which ICS water is developed, stored in, and delivered from Lake Mead.

I. Metropolitan/Bard Seasonal Fallowing Program

Source of Supply

At its December 2019 meeting, Metropolitan's Board authorized a 7-year seasonal fallowing program with the Bard Water District (Bard). Under the program, participating farmers in Bard are being paid to reduce their water use by not irrigating a portion of their land. A maximum of 3,000 acres can be fallowed in any given year. Under the terms of the QSA, water savings within the Bard service area are made available to Metropolitan. Bard Unit, as part of the Yuma Project, has the first priority for Colorado River water under the water delivery contracts with the USBR. Implementation of the program began in March 2020.

Expected Supply Capability

It is estimated that the Seasonal Fallowing Program would provide up to 6 TAF per year of additional Colorado River water. This water would be available in any year as needed and in accordance with the provisions described in the agreements with Bard Unit farmers and Bard.

Rationale for the Expected Supply

Historical Record

Metropolitan and Bard tested the concept of developing a water supply for Metropolitan by entering into agreements for a two-year Metropolitan/Bard Water District Land Management and Seasonal Fallowing Pilot Program. Agreements were signed with farmers, with written consent from landowners if leasing land, in the Bard Unit to forego irrigation for two summers between March and July in 2016 and 2017. Water unused by Bard was about 2.3 TAF and was stored in Lake Mead for Metropolitan. Bard was issued a categorical exemption for the Proposed Metropolitan/Bard Seasonal Fallowing Pilot Program in January 2016.[13] Implementation of the program began in March 2016.

Written Contracts or Other Proof

December 2019 Agreement for the Implementation of a Seasonal Land Fallowing Program. This agreement establishes the Bard/Metropolitan Program, which provides for a solicitation of farmer interest in participation in the program, specifies the process for incorporating eligible lands into agreements with farmers, and states the terms and conditions for fallowing, including payments made by Metropolitan.

Agreement for Seasonal Fallowing in Bard Unit (Farmer Fallowing Agreements). These agreements specify the process for farmers in the Bard Unit to participate in the Program. These agreements establish the fallowing period, the eligibility criteria for the fallowed land, the farmers' fallowing obligations, payments to be made by Metropolitan, and the land management measures to be implemented.

May 2020 First Amendment Agreement for the Implementation of a Seasonal Land Fallowing Program. This amendment clarifies Metropolitan's method of calculating fallowed acreage for the Program. To ensure Metropolitan only provides funding to lands that could have been otherwise irrigated, the amendments defines which acres within the Bard Unit are "fallowable" and therefore eligible for participation in the Program. The parties did not make changes to the Metropolitan Board-approved terms of the original December 2019 agreement.

[13] SCH Number 2001101149.

Financing

Metropolitan's annual O&M budget (referenced above) includes the cost of the Metropolitan/Bard Program. Metropolitan will provide an annual incentive per acre of irrigable land fallowed. The agreement provides for escalating the incentive every year using the Consumer Price Index. Metropolitan will pay for 75 percent of the incentive to the participating farmer and 25 percent to Bard.

J. Exchange with SDCWA

Source of Supply

SDCWA has acquired conserved Colorado River water reaching an annual volume of 277.7 TAF by 2023. SDCWA makes this water available at Lake Havasu for Metropolitan diversion, where Metropolitan takes possession of the water and provides a matching volume from Metropolitan's blended supplies to SDCWA by exchange in equal monthly amounts. The conserved water is acquired by SDCWA through its transfer agreement with the Imperial Irrigation District (IID) and from the lining of the All-American and Coachella canals.

Under the transfer agreement with IID, the stabilized annual transfer volume of 200 TAF is generated from conservation of water through on-farm efficiency conservation arrangements made by IID with its customers and other system efficiency measures.

The Coachella Canal Lining Project consists of a 35-mile concrete-lined canal, including siphons, which replaced an earthen canal. The project was completed in December 2006 and conserves 30,850 AF annually. The All-American Canal Lining Project consists of a concrete-lined canal constructed parallel to 23 miles of earthen canal, was completed in 2009 conserving 67,700 AF annually.

Pursuant to the QSA and related agreements, the 98,550 AF of water resulting from these projects annually is allocated as follows: 16,000 AF to the San Luis Rey Settlement Parties in San Diego County, 77,700 AF to SDCWA, and 4,850 AF for Coachella Canal Lining Project mitigation, with the amount not needed for mitigation becoming available to SDCWA.

Expected Supply Capability

In 2021, the IID transfer to SDCWA reaches 205 TAF, reduces to 202.5 TAF in 2022, then stabilizes at 200 TAF per year in 2023, which will be made available to Metropolitan for exchange each year through 2047. At least 77.7 TAF of canal lining water will be made available to Metropolitan for exchange each year through 2112. After 2022, the annual volume SDCWA will make available to Metropolitan is limited to 277.7 TAF.

Rationale for the Expected Supply

Historical Record

The IID transfers to SDCWA began in 2003 for a volume of 10,000 AF and have ramped up each year thereafter according to a defined schedule, reaching 192.5 TAF in 2020.

Conserved water from the All-American Canal Lining Project first became available in 2008 when 7,385 AF was allocated to SDCWA, increased to 54,429 AF in 2009, reached 56,200 AF in 2010, and has continued at that volume through 2020.

Conserved water from the Coachella Canal Lining Project first became available in 2006 when 687 AF was allocated to SDCWA and ranged from 21,511 AF to 25,759 AF from 2007 through 2019.

SDCWA has made available to Metropolitan all of this conserved water at Lake Havasu, where Metropolitan took possession and managed the water at its complete discretion for the benefit of all member agencies. Of the volume received at Lake Havasu Metropolitan delivered an equal volume to SDCWA by exchange from a blend of sources that were available to Metropolitan at a price that is less than its full service rate.

Written Contracts or Other Proof

Amended and Restated Agreement between The Metropolitan Water District of Southern California and the San Diego County Water Authority for the Exchange of Water. This October 10, 2003, agreement provides for Metropolitan delivery of Exchange Water to SDCWA in exchange for conserved Colorado River water SDCWA makes available to Metropolitan at Lake Havasu.

Agreement Between Imperial Irrigation District And San Diego County Water Authority For Transfer Of Conserved Water. This April 9, 1998, agreement, as amended, provides for IID to conserve water for transfer to SDCWA and establishes the price SDCWA pays to IID for the conserved water.

Allocation Agreement. This October 10, 2003, agreement among the United States, CVWD, IID, SDCWA, Metropolitan, and the San Luis Rey Settlement Parties provides for the allocation of water conserved from the All-American Canal Lining Project and the Coachella Canal Lining Project, and Metropolitan's assignment to SDCWA of it rights to both canal lining projects.

Colorado River Water Delivery Agreement: Federal Quantification Settlement Agreement. By this October 10, 2003, agreement, among the Secretary of the Interior. CVWD, IID, SDCWA, and Metropolitan, the Secretary agreed to deliver IID-SDCWA transfer water and canal lining water allocated to SDCWA to Metropolitan's Colorado River Aqueduct Intake at Lake Havasu for diversion by Metropolitan.

Financing

Metropolitan's annual O&M budget (referenced above) incorporates the price that SDCWA pays for Metropolitan delivery of Exchange Water, which is less than Metropolitan full service rate.

K. Exchange with the United States

Source of Supply

The Coachella Canal Lining Project consists of a 35-mile concrete-lined canal, including siphons, which replaced an earthen canal. The project was completed in December 2006 and conserves 30,850 AF annually. The All-American Canal Lining Project consists of a concrete-lined canal constructed parallel to 23 miles of earthen canal, was completed in 2009 conserving 67,700 AF annually.

Pursuant to the QSA and related agreements, the 98,550 AF of water resulting from these projects annually is allocated as follows: 16,000 AF to the San Luis Rey Settlement Parties in San Diego County, 77,700 AF to SDCWA, and 4,850 AF for Coachella Canal Lining Project mitigation, with the amount not needed for mitigation becoming available to SDCWA.

The United States furnishes the 16 TAF allocated to the San Luis Rey Settlement Parties at Metropolitan's Colorado River Intake on Lake Havasu. Metropolitan takes possession of the water and by exchange delivers an equal volume of Metropolitan's blended supplies to SDCWA. By separate agreement SDCWA conveys the water to the San Luis Rey Settlement Parties.

Expected Supply Capability

So long as water conserved by the All-American Canal Lining Project and Coachella Canal Lining Project is allocated to and available for use by the San Luis Rey Settlement Parties, the United States will make 16 TAF available for diversion by Metropolitan in perpetuity.

Rationale for the Expected Supply

Historical Record

The allocation of canal lining water to the San Luis Rey Settlement Parties was 172 AF in 2006, 4,500 AF in 2007, 6,013 AF in 2008, 15,648 AF in 2009, and 16,000 AF each year thereafter. The United States has made this water to available for diversion by Metropolitan. Through May 31, 2017, all water furnished by the United States at Lake Havasu was available for use by Metropolitan for the benefit of all member agencies. Beginning June 1, 2017, Metropolitan took possession of the water furnished by the United States and managed that water at its complete discretion for the benefit of all member agencies and delivered an equal volume to SDCWA by exchange from a blend of sources that were available to Metropolitan at a discounted price paid by the United States.

Written Contracts or Other Proof

Allocation Agreement. This October 10, 2003, agreement among the United States, CVWD, IID, SDCWA, Metropolitan, and the San Luis Rey Settlement Parties provides for the allocation of water conserved from the All-American Canal Lining Project and the Coachella Canal Lining Project, and Metropolitan's assignment to SDCWA of it rights to both canal lining projects.

Agreement Relating to Supplemental Water Among The Metropolitan Water District of Southern California, The San Luis Rey Settlement Parties, and The United States. This October 10, 2003, agreement provides that the United States will furnish to Metropolitan up to 16 TAF per year of water conserved by the canal lining projects for the benefit of the San Luis Rey Settlement Parties.

Financing

Metropolitan's annual O&M budget (referenced above) incorporates the price that United States pays for Metropolitan delivery of Exchange Water, which is less than Metropolitan full service rate, and the delivery of an equal volume by exchange to SDCWA.

L. Programs Under Development

Expansion of the Palo Verde Irrigation District (PVID) Land Management Program: Additional fallowing agreements may be developed in subsequent years as needed.

Quechan Seasonal Fallowing Program: The Quechan Indian tribe has expressed interest in participating in a fallowing program similar to the Bard Water District Seasonal Fallowing Program. Such a program is under consideration.

A.3.2 California Aqueduct Deliveries

A. State Water Project Deliveries

Source of Supply

The State Water Project (SWP) provides imported water to the Metropolitan service area and has provided from 25 to 50 percent of Metropolitan's supplies. In accordance with its contract with the Department of Water Resources (DWR), Metropolitan has a Table A allocation of 1,911,500 AF per year under contract from the SWP. Actual deliveries have never reached this amount. The availability of SWP supplies for delivery through the California Aqueduct over the next 18 years is estimated according to the historical record of hydrologic conditions, existing system capabilities as may be influenced by environmental permits, requests of the SWC, and the SWP contract provisions for allocating Table A, Article 21 supplies, and other SWP deliveries including San Luis carryover to each contractor. As shown in this 2020 UWMP, the estimates of SWP deliveries to Metropolitan are based on DWR's 2019 SWP Delivery Capability Report.

As part of its contract with DWR, Metropolitan pays both the fixed costs of financing SWP facilities construction and the variable costs of operations, maintenance, power, and replacement costs for water delivered each year. SWP water is delivered to Metropolitan through the East Branch at Devil Canyon Power Plant afterbay, along the Santa Ana Valley Pipeline, and at Lake Perris. Metropolitan takes delivery from the West Branch at Castaic Lake.

Expected Supply Capability

The Edmund G. Brown California Aqueduct transports Metropolitan's supplies from the SWP. The quantity of water available for export through the California Aqueduct can vary significantly year to year. The amount of precipitation and runoff in the Sacramento and San Joaquin watersheds, system reservoir storage, regulatory requirements, and contractor demands for SWP supplies impact the quantity of water available to Metropolitan.

Rationale for the Expected Supply

Metropolitan and 28 other public entities have contracts with the State of California for SWP water. These contracts require the state, through DWR, to use reasonable efforts to develop and maintain the SWP supply. SWP contractors have the right to participate in the system, with an entitlement to water service from the SWP and the right to use the portion of the SWP conveyance system necessary to deliver water to them. The state has made significant investment in infrastructure. It has constructed 28 dams and reservoirs, 26 pumping and generation plants, and about 660 miles of aqueducts. More than 25 million California residents benefit from SWP water. DWR estimates that with current facilities and regulatory requirements, the project will deliver approximately 2.4 MAF under average hydrology considering regulatory requirements from the SWRCB Water Quality Control Plan, the USFWS and NMFS biological opinions and the CDFW Incidental Take Permit. In addition, these estimates incorporate 2018 amendments to the Coordinated Operations Agreement between the SWP and CVP.

On a yearly basis, DWR estimates the amount of supplies that are available for that year. Metropolitan uses a forecasting method for SWP deliveries based on historical patterns of precipitation, runoff, and actual deliveries of water.

Further, under the water supply contract, DWR is required to use reasonable efforts to maintain and increase the reliability of service to Metropolitan. As discussed in a subsequent section, DWR is participating in the Bay-Delta process to achieve these requirements.

Historical Record

The historical record shows significant accomplishments by DWR in providing its contractors with SWP water supplies. Through 2018, the SWP has delivered over 103 MAF to its contractors. The maximum annual water supply was delivered in 2017, and totaled 3.77 MAF, exceeding the previous record delivery of 3.75 MAF in 2005. In 2006 and 2011 the project delivered 3.7 MAF. DWR has continued to invest in SWP facilities to deliver water to its contractors.

Written Contracts or Other Proof

1960 Contract between the State of California and The Metropolitan Water District of Southern California for a Water Supply. This contract, initially executed in 1960 and amended numerous times since, is the basis for SWP deliveries to Metropolitan. It requires DWR to make reasonable efforts to secure water supplies for Metropolitan and its other contractors. The contract expires in 2035. In December 2018, Metropolitan signed a Contract Extension Amendment that would extend the contract term to 2085. The amendment is not effective until approval of the December 2018 validation action filed by DWR in Sacramento County Superior Court, which is still pending.

Financing

Metropolitan's payments for its State Water contract obligation are approved each year by its Board of Directors and currently constitute approximately a third of the annual budget.

Federal, State and Local Permit/Approvals

Operation of the SWP. The DWR is responsible for acquiring, maintaining, and complying with numerous federal and state permits for operation of the SWP. Metropolitan has been active in monitoring the issues affecting its contract with DWR.

EIR for the East Branch Enlargement. In April 1984, DWR prepared and finalized an EIR for the Enlargement of the East Branch of the Governor Edmund G. Brown California Aqueduct.

EIR for the Harvey O. Banks Pumping Plant. In January 1986, DWR prepared and finalized an EIR for the additional pumping units at Harvey O. Banks Delta Pumping Plant.

EIR for the Mission Hills Extension. In 1990, DWR prepared and finalized an EIR for the SWP Coastal Branch, Phase II and Mission Hills Extension.

East Branch Extension Project Phase 1. In 1998, DWR completed an EIR to extend the East Branch of the California Aqueduct to provide service to San Gorgonio Pass Water Agency. Phase 1 was completed in 2002.

State Water Resources Control Board Water Quality Control Plan for the San Francisco/ Sacramento-San Joaquin Delta Estuary (Bay-Delta WQCP), Sacramento-San Joaquin Bay-Delta Estuary Revised Water Right Decision 1641 (D-1641), March 2000.

National Marine Fisheries Service Biological Opinion on Long Term Operation of the Central Valley Project and the State Water Project, October 2019.

U.S. Fish and Wildlife Service Biological Opinion for the Reinitiation of Consultation on the Coordinated Operations of the Central Valley Project and State Water Project, October 2019.

California Department of Fish and Wildlife Incidental Take Permit for Long-Term Operation of the State Water Project in the Sacramento-San Joaquin Delta, March 2020.

B. Port Hueneme Lease of Ventura Table A

Source of Supply

Metropolitan has a right to delivery of up to 1,850 AF of Table A from the Ventura County Watershed Protection District (Ventura), one of 29 SWP contractors, via a sublease agreement with the Port Hueneme Water Agency (Port Hueneme). United Water Conservation District, one of three agencies holding a contract right to Ventura Table A supply, leases this portion of their total 5,000 AF of Table A to Port Hueneme, who in turn subleases the Table A to Metropolitan. The long-term lease is a condition of the 1996 annexation of the Port Hueneme service area to Calleguas Municipal Water District and Metropolitan.

Expected Supply Capability

The amount of supply available to Metropolitan under the long-term lease is up to 1,850 AF of Ventura Table A. This water supply is in addition to Metropolitan's Table A, and the amount available each year is determined by the SWP allocation, with 1,850 AF available at a 100 percent allocation.

Rationale for the Expected Supply

The DWR estimates the amount of supplies that are available each year. Metropolitan uses a forecasting method for SWP deliveries based on historical patterns of precipitation, runoff and actual deliveries of water.

Historical Record

Metropolitan has taken delivery of Port Hueneme Lease water since 1997. These supplies are delivered to Metropolitan from the West Branch of the California Aqueduct and have ranged from 93 AF under a 5 percent allocation to 1,850 AF under a 100 percent allocation.

Written Contracts or Other Proof

Port Hueneme Water Agency Annexation. By Minute Item 41728, dated January 9, 1996, Metropolitan's Board adopted Resolution 8487 granting the concurrent annexation of Annexation No. 32 to Calleguas Municipal Water District and The Metropolitan Water District of Southern California, and fixing Metropolitan's terms and conditions for the annexation.

1996 Sublease Agreement. The Port Hueneme and Metropolitan executed a sublease agreement to facilitate annual delivery to Metropolitan of up to 1,850 AF of Ventura Table A that is leased to Port Hueneme by United Water Conservation District.

Financing

Financial obligations to DWR related to the 1,850 AF Port Hueneme Lease supply, including variable transportation charges for delivery, remain the responsibility of the Ventura County Watershed Protection District.

Federal, State, and Local Permits/Approvals

DWR is responsible for acquiring, maintaining, and complying with numerous Federal and State permits for operation of the SWP.

C. Desert Water Agency/Coachella Valley Water District/Metropolitan Water Exchange and Advance Delivery Programs

Source of Supply

The Desert Water Agency (DWA) and CVWD, both in Riverside County, have rights to SWP deliveries, but do not have any physical connections to the SWP facilities. Both agencies are adjacent to the CRA. For DWA and CVWD to obtain water equal to their SWP allocations, Metropolitan has agreed to exchange an equal quantity of its Colorado River water for DWA and CVWD's SWP water. DWA has a SWP Table A contract right of 55.75 TAF per year, and CVWD has a SWP Table A contract right of 138.35 TAF per year, for a total of 194.1 TAF per year. Additionally, CVWD has a long-term water supply agreement for 9.5 to 16.5 TAF annually from Rosedale Rio-Bravo Water Storage District.

Expected Supply Capability

Under the existing agreements, Metropolitan provides water from its CRA to DWA and CVWD in exchange for SWP deliveries. Metropolitan can deliver additional water to its DWA/CVWD service connections, permitting these agencies to store water. When supplies are needed, Metropolitan can then receive its full Colorado River supply, as well as the SWP allocation from the two agencies, while the two agencies can rely on the stored water for meeting their water supply needs. The amount of DWA and CVWD SWP Table A water available to Metropolitan depends on total SWP deliveries and varies from year to year.

In addition to their Table A and long-term water supplies, DWA and CVWD, subject to available capacity, may take delivery of SWP supplies available under Article 21, the Turn-back Pool Program, and non-SWP water supplies they may acquire and convey through the SWP facilities. These other supplies are delivered to DWA and CVWD by exchange with Metropolitan in the same manner as Table A deliveries. DWA and CVWD are participants in the Yuba Dry Year Water Purchase Program. Additionally, DWA participated in the 2009 Drought Water Bank and the 2015-2016 Multi-Year Water Pool Demonstration Program.

Rationale for the Expected Supply

The DWR estimates the amount of supplies that are available each year. Metropolitan uses a forecasting method for SWP deliveries based on historical patterns of precipitation, runoff and actual deliveries of water.

<u>Historical Record</u>

DWA and CVWD Exchange Program is currently in operation. The Advance Delivery Agreement has been in place since 1984. Since 1973, Metropolitan has been taking delivery of these agencies' SWP Table A water and has provided equivalent water to those agencies from Metropolitan's Colorado River supplies. Metropolitan has also been delivering water in advance of the amount needed under the exchange agreements. With water having been delivered in advance, Metropolitan can reduce deliveries to DWA and CVWD as needed. The Advance Delivery Account is a key tool for managing abundant SWP supplies. In 2017, Metropolitan managed an 85 percent SWP allocation in part by making 245 TAF of advance deliveries, bringing the account balance up to 325 TAF by the end of the year.

<u>Written Contracts or Other Proof</u>

<u>1967 and 1983 Water Exchange Contract and Agreements.</u> The DWA and CVWD Program is currently in operation. The DWA and CVWD water exchange contract has been in place since 1967, was amended in 1972, and was modified with execution of additional agreements in 1983.

1984 Advance Delivery Agreement. The Advance Delivery Agreement allows Metropolitan to supply DWA and CVWD with Colorado River water in advance of the time these agencies are entitled to receive water under the exchange agreements. In future years, Metropolitan can recover this water by reducing its deliveries under the exchange agreements.

The 2003 Exchange Agreement. DWA, CVWD, and Metropolitan executed the 2003 Exchange Agreement under which Metropolitan transferred 88.1 TAF and 11.9 TAF of its SWP Table A water to DWA and CVWD, respectively, reducing Metropolitan's Table A volume from 2,011.5 TAF to 1,911.5 TAF. The 2003 Exchange Agreement became operational in calendar year 2005 with the execution of letter agreements among DWA, CVWD, and Metropolitan governing its implementation. The exhibits to the November 9, 2004, and November 19, 2007, letter agreements also modify certain provisions of the Water Exchange Contract and Agreements and the Advance Delivery Agreement.

November 2012 Letter Agreement. CVWD and Metropolitan executed the letter agreement to deliver non-SWP water in exchange for Colorado River water under which CVWD arranged for the delivery of up to 16.5 TAF per year of water to Metropolitan provided by Rosedale-Rio Bravo Water Storage District to CVWD. Metropolitan delivers to CVWD an equal amount of Colorado River water.

2019 Amended and Restated Agreement for Exchange and Advance Delivery. In December 2019, CVWD, DWA, and Metropolitan executed an amendment to the exchange and delivery agreements in order to provide greater certainty for water supply and financial planning, simplify implementation of the exchange, provide Metropolitan with additional revenue, and improve dry-year water supply reliability.

Financing

The funds for deliveries under this Program are included in Metropolitan's O&M budget and Long-Range Finance Plan (referenced above).

Federal, State, and Local Permits/Approvals

DWR is responsible for acquiring, maintaining, and complying with numerous Federal and State permits for operation of the SWP.

July 26, 1983, CVWD Negative Declaration, Whitewater River Spreading Area expansion Phase 1.

February 1983, DWA Final EIR for the proposed extension of time for utilizing Colorado River water to recharge the upper Coachella Valley groundwater basins to the year 2035, Volume I and II, April 1983, Volume III.

September 2002, Final Program EIR for Coachella Valley Water Management Plan and SWP Entitlement Transfer was certified by CVWD on October 8, 2002.

In 2020, an application was filed with the Bureau of Land Management to renew and amend the existing Right-of-way grant for groundwater replenishment purposes on the Whitewater River Groundwater Replenishment Facility.

D. Semitropic Water Banking and Exchange Program

Source of Supply

The agreement between Semitropic Water Storage District (Semitropic) and Metropolitan was executed in February 1994. Semitropic obtains water from the SWP through its contracts with the Kern County Water Agency. SWP supplies irrigate an area of 161,200 acres within Semitropic's service area. When this surface water is not available, these growers withdraw water from the underlying aquifer. The agreement between Semitropic and Metropolitan allows Metropolitan to make use of 350 TAF of storage in Semitropic's groundwater basin. In years of plentiful supply, Metropolitan can deliver available SWP supplies to Semitropic through the California Aqueduct. During dry years, Metropolitan can withdraw this stored water. Five other banking partners participate in this Program and use 650 TAF of storage in Semitropic's groundwater basin.

Expected Supply Capability

The Semitropic-Metropolitan Program provides Metropolitan with the capacity to store up to 350 TAF of water under the current agreement. During dry years, Metropolitan can recover its stored water through a combination of direct pumping of the groundwater and delivery of Semitropic's SWP Table A water in the California Aqueduct. In 2014, Metropolitan amended the program to increase the return yield by an additional 13.2 TAF per year that has since been reduced to 6.7 TAF. The minimum annual yield available to Metropolitan from the program is currently 38.2 TAF, and the maximum annual yield is 229.77 TAF depending on the available unused capacity and the SWP allocation. The average annual supply capability for a single dry year similar to 1977 is 45 TAF. For a five-year consecutive drought condition similar to the period of 1988-1992, the expected supply capability is 50 TAF.

Rationale for the Expected Supply

Historical Record

The Semitropic-Metropolitan Water Banking and Exchange Program has been operational since 1994. With existing agreements, it will continue to operate over the term of 41 years (1994 to 2035). By the end of 2020, the program had 261 TAF in its storage account.

Written Contracts or Other Proof

1992 Turn-in/out Construction, Operation and Maintenance Agreement. This Agreement was executed in 1992 by DWR and Semitropic to allow construction, operation, and maintenance of the Semitropic California Aqueduct Turn in/out.

1993 Temporary Semitropic-Metropolitan Water Banking Agreement. This Agreement was executed in February 1993 by Semitropic and Metropolitan to allow the storage of available Metropolitan supplies in advance of execution of the long-term agreement.

1994 Semitropic/Metropolitan Water Banking and Exchange Agreement. This Agreement was executed in December 1994 by Semitropic and Metropolitan to implement the program for a 41-year term (1994-2035).

1995 Point of Delivery Agreement. This agreement, with DWR, Kern County Water Agency, and Metropolitan, allows Metropolitan to divert water from the California Aqueduct into Semitropic's service area.

1995 Introduction of Local Water into the California Aqueduct. This agreement, with DWR, Kern County Water Agency, and Semitropic, allows Metropolitan to receive water from the program into the California Aqueduct.

2014 Amendment to Increase Program Yield. The amendment increased Metropolitan's minimum return yield by 13,200 acre-feet per year.

Financing

Metropolitan's O&M budget (referenced above) includes payments for the Semitropic Program.

Federal, State, and Local Permits/Approvals

Final EIR. Semitropic acting as the lead agency under CEQA and Metropolitan acting as a responsible agency jointly completed the EIR for the Program. The EIR was certified by Semitropic in July 1994 and adopted by Metropolitan in August 1994.

Regulatory Approvals. All regulatory approvals are in place, and the program is operational.

E. Arvin-Edison Water Management Program

Source of Supply

The Arvin-Edison Water Storage District (Arvin-Edison) manages the delivery of local groundwater and water imported into its service area from the Central Valley Project's (CVP) Millerton Reservoir via the Friant-Kern Canal. The surface water service area consists of 132,000 acres of predominantly agricultural land, and to a minor degree, municipal and industrial uses. It is situated in Kern County. Arvin-Edison operates its supplies conjunctively, storing water in the underlying aquifer when imported supplies are available and withdrawing that water when the availability of imported supplies is reduced. In 1997, Metropolitan entered into an agreement with the Arvin-Edison Water Storage District. The agreement allows Metropolitan to store available water in Arvin-Edison's groundwater basin, either through direct spreading operations, or through deliveries to growers in Arvin-Edison's service area. Similar to Arvin-Edison's own usage, this previously stored water could be withdrawn when the availability of imported supplies to Metropolitan is reduced.

Expected Supply Capability

The Arvin-Edison/Metropolitan Program provides Metropolitan with the capacity to store up to 350 TAF of water under the current agreement. During dry years, Metropolitan can recover its stored water either through direct pumping of the groundwater or through exchange. Based on the terms and conditions of the program agreement, the return of water to Metropolitan ranges from a minimum of 40 TAF per year (peak 4-month summer period) up to 110 TAF (over a 12-month period). Metropolitan staff are currently working to overcome a new challenge of detections of 1,2,3-trichloropropane (TCP) above the Maximum Contaminant Level (MCL) of five parts per trillion (ppt) in wells that are part of the Arvin-Edison/Metropolitan Program. These levels of TCP impact Metropolitan's ability to put water and take return water under that program. As a result, Metropolitan has temporarily suspended operation of the program until the water quality concerns can be further evaluated and managed.

Rationale for the Expected Supply

Historical Record

The Arvin-Edison/Metropolitan Water Management Program has been operational since 1997. With existing agreements, it will continue to operate over the term of 38 years (1997 to 2035). By the end of 2020, the program had 142 TAF in its storage account.

Written Contracts or Other Proof

1997 Arvin-Edison/Metropolitan Water Management Agreement. This Agreement was executed in December 1997 by Arvin-Edison and Metropolitan to implement the program for a 30-year term (1997-2027).

1998 Turn-in/out Construction and Maintenance Agreement. This Agreement was executed in 1998 by DWR, Kern County Water Agency, Arvin-Edison, and Metropolitan to allow construction, operation and maintenance of the Arvin-Edison California Aqueduct Turn in/out.

1998-2002 Water Delivery and Return Agreements. These agreements, with DWR, Kern County Water Agency, Arvin-Edison, and Metropolitan, allow Metropolitan to divert water from, and introduce water to, the California Aqueduct.

2004 Point of Delivery Agreement. This agreement, with DWR, Kern County Water Agency, and Metropolitan, allows Metropolitan to divert water from the California Aqueduct into Arvin-Edison's service area.

2004 Introduction of Water into the California Aqueduct. This agreement, with DWR, Kern County Water Agency, and Arvin-Edison, allows Metropolitan to receive water from the program into the California Aqueduct.

2007 First Amended and Restated Agreement Between Arvin-Edison Water Storage District and The Metropolitan Water District of Southern California for a Water Management Program. This amendment increased the maximum storage level to 350 TAF, extended the agreement term to 2035, and provided for the construction of the South Canal Improvement Project. The project increases the reliability of Arvin-Edison returning higher water quality to the California Aqueduct.

Financing

Metropolitan's O&M budget (referenced above) includes payments for the Arvin-Edison Program.

Federal, State, and Local Permits/Approvals

Environmental Status: A Negative Declaration was completed in 1996.

An Addendum to the 1996 Negative Declaration was completed in 2003.

A Negative Declaration for the Arvin-Edison South Canal Improvement Project was completed in 2007.

Regulatory Approvals: All regulatory approvals are in place, and the program is operational.

F. San Bernardino Valley Municipal Water District Program

Source of Supply

The San Bernardino Valley Municipal Water District Program allows Metropolitan to purchase a dependable annual supply, as well as an additional supply for dry year needs. Under this program, Metropolitan purchases water provided to San Bernardino Valley Municipal Water District (Valley District) from its annual SWP water allocation. Valley District delivers the purchased supplies to Metropolitan's service area through the coordinated use of facilities and interconnections within the water conveyance system of the two districts.

The purchased SWP supply is provided to Metropolitan as direct deliveries of annual SWP water through the California Aqueduct to Metropolitan's service area, as well as deliveries of SWP water to the San Bernardino groundwater basin that will subsequently be delivered to Metropolitan's service area. Under this program, Metropolitan purchases surplus Valley District supplies on a fixed price schedule based on the final SWP allocation each calendar year.

To facilitate the transfer, the program also provides the coordinated use of existing facilities, including the Valley District's Foothill Pipeline and the Inland Feeder, to improve the conveyance capabilities of the delivery of SWP water to the service areas of both districts. The intertie between the Foothill Pipeline and the Inland Feeder has been constructed and was operational as of December 2002. This intertie allows Metropolitan to move SWP water from the East Branch of the California Aqueduct through the Foothill Pipeline and Inland Feeder, into DVL and the CRA. As a result of this intertie, Metropolitan has an alternative conveyance capacity of 260 cfs into Metropolitan's system should an outage occur on the upper section of the Inland Feeder.

Expected Supply Capability

The program changed from the minimum purchase program to a surplus program. Valley District will provide Metropolitan surplus SWP supplies likely in higher than normal SWP allocations. The historical average for the program is expected to be around 13 TAF per year.

Rationale for the Expected Supply

Historical Record

The San Bernardino Valley Municipal Water District Program began operations in 2001 and ended in 2016. Since its inception in 2001, this program has delivered 200 TAF to Metropolitan. Metropolitan and Valley District approved a new Coordinated Operating Agreement in 2021 that will provide Metropolitan surplus Valley District supplies and emergency mutual aid.

Written Contracts or Other Proof

Metropolitan's annual and dry-year supplies from the San Bernardino Valley Municipal Water District Program are based on Metropolitan Board actions and agreements.

2000 Board Approval of Coordinated Operating Agreement. In June 2000, Metropolitan's Board authorized entering into a Coordinated Operating Agreement between Metropolitan and Valley District to develop projects that could provide benefits to both districts through the coordinated use of facilities and SWP supplies.

2000 Coordinated Operating Agreement. The Coordinated Operating Agreement between Metropolitan and Valley District was executed in July 2000.

2001 Board Approval of the Coordinated Use Agreement. In April 2001, Metropolitan's Board authorized entering into the Coordinated Use Agreement for Conveyance Facilities and SWP Water Supplies between Metropolitan and Valley District for the purchase of dependable annual and dry year supplies by Metropolitan.

2001 Coordinated Use Agreement. The Coordinated Use Agreement for Conveyance Facilities and SWP Water Supplies between Metropolitan and Valley District for the purchase of dependable annual and dry year supplies by Metropolitan was executed May 2001. The Agreement is effective as of July 1, 2001, for an "evergreen" term (10-years with automatic annual extensions unless otherwise notified).

2021 Coordinated Operating Agreement. The Coordinated Operating Agreement between Metropolitan and Valley District was approved by Metropolitan's Board in March 2021. The agreement will terminate on December 31, 2035 unless there is an extension of the SWP Contract.

Financing

Metropolitan's O&M budget (referenced above) includes the funds to purchase Program water.

Federal, State, and Local Permits/Approvals

The Program became effective July 1, 2001. An environmental review process and regulatory approval supported implementation.

Final EIR. Final Regional Water Facilities Master Plan EIR dated February 1, 2001, was certified by Valley District, as lead agency, and by Metropolitan, as responsible agency. Notices of determinations were filed by Valley District and Metropolitan on May 29, 2001, and April 18, 2001, respectively.

State Water Contractors' Review. In May 2001, the SWC reviewed and issued a letter supporting the program.

DWR Review. DWR agreed to the program in December 2001.

G. San Gabriel Valley Municipal Water District Program

Source of Supply

The San Gabriel Valley Municipal Water District Program allows Metropolitan to exchange supplies to provide additional water for normal and dry year needs. Under this program, Metropolitan delivers supplies to the City of Sierra Madre, a San Gabriel Valley MWD member agency. In exchange for Metropolitan delivering one acre-foot, San Gabriel Valley MWD returns two acre-feet to Metropolitan in the Main San Gabriel Basin, up to 5 TAF. For any exchange amount less than 5 TAF, Metropolitan purchases the balance of the 5 TAF. The program provides increased reliability to Metropolitan by allowing additional water to be delivered to Metropolitan's member agencies Three Valleys MWD and Upper San Gabriel Valley MWD that rely upon the Main San Gabriel Basin for their supplies.

Expected Supply Capability

The average annual supply capability for a single dry year similar to 1977 is a net 2 TAF. For a five-year consecutive drought condition similar to the period of 1988-1992, the expected supply capability is 2 TAF.

Rationale for the Expected Supply

Historical Record

The San Gabriel Valley Municipal Water District Program began operations in 2013 and is expected to be renewed continually in the future. Since its inception in 2013, the program has completed the exchange and purchase of 30.66 TAF, with a net increase to Metropolitan's supply by an additional 19.5 TAF.

Written Contracts or Other Proof

Metropolitan's dependable annual and dry-year supplies from the San Gabriel Valley Municipal Water District Program are based on Metropolitan Board action and agreement.

2013 San Gabriel Valley MWD Exchange and Purchase Agreement. The agreement between Metropolitan and San Gabriel Valley MWD was executed in September 2013.

2013 Board Approval of the San Gabriel Valley MWD Exchange and Purchase Agreement. In August 2013, Metropolitan's Board authorized entering into the agreement with San Gabriel Valley MWD.

Financing

Metropolitan's O&M budget (referenced above) includes the funds to purchase water.

Federal, State, and Local Permits/Approvals

The Program became effective as of September 2013. An environmental review process supported implementation.

CEQA Compliance. The proposed action involved an exchange and purchase agreement associated with the leasing, licensing, and operating of existing public water conveyance facilities with negligible or no expansion of use and no possibility of significantly impacting the physical environment.

H. Antelope Valley East Kern Water Agency Exchange and Storage Program

Source of Supply

The Antelope Valley East Kern Water Agency (AVEK) Program allows Metropolitan to both exchange and store SWP supplies to provide additional water for normal and dry year needs. Under this program, AVEK provides Metropolitan its unused SWP supplies. For every two acre-feet provided by AVEK, Metropolitan will return one acre-foot. The exchange program when implemented is expected to deliver 30 TAF over ten years, with 10 TAF available in dry years. At this time, the Department of Water Resources has not approved the exchange program element. Metropolitan has storage capability in the groundwater basin, with a capacity of 30 TAF, and a dry year return capability of 10 TAF.

Expected Supply Capability

The average annual supply capability for a single dry year similar to 1977 is 3 TAF for each program. For a five-year consecutive drought condition similar to the period of 1988-1992, the expected supply capability is 4 TAF for each program.

Rationale for the Expected Supply

Historical Record

The AVEK Program started providing benefits in 2017. By the end of 2020, the program had 27 TAF in its storage account.

Written Contracts or Other Proof

Metropolitan's dependable annual and dry-year supplies from the AVEK Exchange and Storage Program are based on Metropolitan Board action and proposed agreement.

2015 Board Approval of the AVEK Exchange and Storage Agreement. In November 2015, Metropolitan's Board authorized entering into the agreement with AVEK.

Financing

Metropolitan's Board authorized up $16.6 million for the program with additional funds, if needed, from Metropolitan's O&M budget (referenced above).

Federal, State, and Local Permits/Approvals

The storage element of the Program became effective after the agreement was executed in 2016. The Department of Water Resources has not approved the exchange program element at this time.

CEQA Compliance. The proposed action involved an exchange and purchase agreement associated with the leasing, licensing, and operating of existing public water conveyance facilities with negligible or no expansion of use and no possibility of significantly impacting the physical environment.

I. High Desert Water Bank

Source of Supply

The High Desert Water Bank with Antelope Valley East Kern Water Agency (AVEK) allows Metropolitan to store supplies to provide additional water for normal and dry year needs. Metropolitan has a storage capability in the groundwater basin, with a capacity of 280 TAF, and a dry year return capability of 70 TAF. The program is planned to be fully operational in 2024.

Expected Supply Capability

The High Desert Water Bank is currently under design and construction. When the High Desert Water Bank is completed, the program would provide 70 TAF of additional water supply capability in a dry year.

Rationale for the Expected Supply

<u>Historical Record</u>

The High Desert Water Bank is expected to be fully operational in 2024. The program may be providing recharge capability earlier. By the end of 2020, the program has yet to store water in its storage account.

<u>Written Contracts or Other Proof</u>

<u>2019 Board Approval of the High Desert Water Bank Agreement.</u> In April 2019, Metropolitan's Board authorized entering into the agreement with AVEK.

Financing

Metropolitan's Board authorized up $131 million for construction of the program with additional funds for program operation.

Federal, State, and Local Permits/Approvals

<u>CEQA Compliance.</u> The Metropolitan Board reviewed and considered AVEK's adopted Mitigated Negative Declaration and took related CEQA action.

J. Bay-Delta Improvements

Source of Supply

Improving the water supply reliability of the State Water Project (SWP) is a primary focus of Metropolitan's long-term planning efforts. Metropolitan's strategy is to reduce its dependence on SWP supplies during dry years, when risks to the Bay-Delta ecosystem are greatest, and to maximize its deliveries of available SWP water during wetter years to store in surface reservoirs and groundwater basins for later use during droughts and emergencies.

State resource agencies and various water user entities are currently engaged in the development of the Delta Conveyance Project (DCP), which would include new diversion and conveyance facilities in the Delta necessary to restore and protect the reliability of SWP water deliveries and, potentially, Central Valley Project (CVP) water deliveries south of the Delta, consistent with the State's Water Resilience Portfolio. The DCP objectives are to address sea level rise, climate change and extreme weather events; minimize the potential for public health and safety impacts from reduced quantity and quality of SWP water deliveries, and potentially CVP water deliveries, south of the Delta resulting from a major earthquake that causes breaching of Delta levees; protect the ability of the SWP, and potentially the CVP, to deliver water when hydrologic conditions result in the availability of sufficient amounts, consistent with the requirements of state and federal law and contractual commitments; and to provide operational flexibility to improve aquatic conditions in the Delta and better manage risks of further regulatory constraints on project operations.

The SWP conveys water from the western slope of the Sierra Nevada to water users both north and south of the Bay-Delta. Specifically, SWP water is delivered to Metropolitan's service area through a system of reservoirs, the Bay-Delta, pumping plants, and the California Aqueduct. Owned and operated by the California Department of Water Resources (DWR), the SWP provides municipal and agricultural water to 29 State Water Contractors. Annual deliveries for the SWP average about 1.96 MAF. Municipal uses account for about 60 percent of annual deliveries, with the remaining 40 percent going to agriculture.

SWP supplies are estimated using the 2019 SWP Delivery Capability Report distributed by DWR in August 2020. The 2019 Delivery Capability Report presents the current DWR estimate of the amount of water deliveries for current (2019) conditions and conditions 20 years in the future. These estimates incorporate regulatory requirements in accordance with the SWRCB Water Quality Control Plan, the USFWS and NMFS biological opinions and the CDFW Incidental Take Permit. In addition, these estimates incorporate 2018 amendments to the Coordinated Operations Agreement between the SWP and CVP. Future capability estimates also reflect the potential impacts of climate change and sea level rise. Under the 2019 Delivery Capability Report, the delivery estimates for the SWP for 2019 conditions as percentage of Table A amounts are seven percent, equivalent to 134 TAF for Metropolitan, under a single dry-year (1977) condition and 58 percent, equivalent to 1.1 MAF for Metropolitan, under long-term average conditions.

In dry, below-normal conditions, Metropolitan has increased the supplies received from the California Aqueduct by developing flexible Central Valley/SWP storage and transfer programs. The goal of these storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the available Banks pumping capacity to maximize deliveries through the California Aqueduct during dry hydrologic conditions and regulatory restrictions.

Delta Conveyance Project

In 2000, several State and federal agencies released the CALFED Bay Delta Programmatic Record of Decision ("ROD") and Environmental Impact Report/Environmental Impact Statement ("EIR/EIS") that outlined and disclosed the environmental impacts of a 30-year plan to improve the Bay-Delta's ecosystem, water supply reliability, water quality, and levee stability. The CALFED ROD remains in effect and many of the State, federal, and local projects begun under CALFED continue.

Building on CALFED and other Bay-Delta planning activities, in 2006 multiple state and federal resource agencies, water agencies, and other stakeholder groups entered into a planning agreement for the Bay-Delta Conservation Plan ("BDCP"). The BDCP was originally conceived as a comprehensive conservation strategy for the Bay-Delta designed to restore and protect ecosystem health, water supply, and water quality within a stable regulatory framework to be implemented over a 50-year time frame with corresponding long-term permit authorizations from fish and wildlife regulatory agencies. The BDCP included both alternatives for new water conveyance infrastructure and extensive habitat restoration in the Bay-Delta.

In 2015, the State and federal lead agencies proposed an alternative implementation strategy and new alternatives to the BDCP to provide for the protection of water supplies conveyed through the Bay-Delta and the restoration of the ecosystem of the Bay-Delta, termed "California WaterFix" and "California EcoRestore," respectively. In this alternative approach, DWR and the

Bureau of Reclamation would implement planned water conveyance improvements as a stand-alone project. Ecosystem improvements and habitat restoration more generally (California EcoRestore) would be undertaken under a more phased approach than previously contemplated by the BDCP and would not be linked with the California WaterFix project or permits. Accelerated restoration actions totaling 30,000 acres of tidal marsh habitat were proposed to be undertaken in the coming decade to provide public benefits for listed fish in the Bay-Delta.

In his State of the State address delivered February 12, 2019, Governor Newsom announced that he did not "support WaterFix as currently configured" but does "support a single tunnel." On April 29, 2019, Governor Newsom issued Executive Order N-10-19, directing several agencies to (among other things), "inventory and assess… [c]urrent planning to modernize conveyance through the Bay Delta with a new single tunnel project." In light of the Governor's announcement and Executive Order, DWR withdrew all approvals and environmental compliance documentation associated with California WaterFix.

On January 15, 2020, DWR issued a Notice of Preparation of Environmental Impact Report for the Delta Conveyance Project. Planning, environmental review and conceptual design work by DWR for a proposed single tunnel project is expected to take approximately 18 to 36 months.

California EcoRestore

The main objective under the EcoRestore Program is to pursue at least 30,000 acres of Delta habitats. These restoration programs would include projects and actions that are in compliance with pre-existing regulatory requirements designed to improve the overall health of the Delta. Other priority restoration projects would also be identified by the Delta Conservancy and other local governments. Funding would be provided through multiple sources including state bonds and other state-mandated funds, SWP/CVP contractors funds as part of existing regulatory obligations, and from various local and federal partners.

As of May 2020, 32 projects have been identified that restore more than the targeted 30,000 acres of habitat, including a projected 18,580 acres of floodplain, 14,000 acres of tidal habitat, 3,500 acres of non-tidal wetlands and 1,650 acres of riparian and upland habitat. To date, 12 projects have been completed, four more are under construction, and the remaining 16 projects are planned to begin construction by 2021.

Sites Reservoir

Sites Reservoir first emerged as part of a second stage of the SWP proposed in the 1980s, which included a peripheral canal and other northern California water-related projects. In 1996, the project was further analyzed by DWR and USBR as part of the CALFED Bay-Delta process. The CALFED process resulted in a Programmatic Record of Decision that recommended implementation of the project as a component of the Preferred Program Alternative. In 2010, the Sites Project Authority was formed as a joint powers authority to continue moving forward with development of the Sites Reservoir project.

Sites Reservoir would be located north of Sacramento, about 10 miles west of the town of Maxwell. The project includes water storage reservoir of 1.3 to 1.5 MAF and would require the construction of two large dams up to 310 feet high and nine smaller saddle dams. The water stored in the reservoir would be diverted from the Sacramento River during high flow events and returned to the Sacramento River during dry and critical years, thereby providing additional dry-year water for environmental flows and project partners including CVP and SWP agencies south of the Delta.

The current operations model estimates the annual water yield of Sites Reservoir at approximately 240 TAF per year. This model utilizes upstream Sacramento River flow and fishery criteria, assumed in earlier phases of the Project. Additional modeling analyses will continue to be conducted as further refinements are made to Project operations and projected regulatory requirements, including proposed Delta Conveyance operations. Implementation of the proposed Delta Conveyance Project would allow for greater yields south of the Delta. DWR estimates that if the Project were operational in 2016 (categorized as a 'below-normal' water year for the Sacramento River), the reservoir could have captured 448 TAF of water supplies. Final Project formulation and annual operations will determine how the firm yield will be divided between meeting water supply and environmental improvements funded by state Proposition 1 grant and federal Water Infrastructure Investment for the Nation (WIIN) Act appropriations.

In 2020, the Sites Project Authority and its participating agencies conducted an internal value-planning effort to minimize potential project costs and impacts. That effort resulted in a project cost reduction of over $2 billion (i.e., $5.2B to $2.9B). The Sites Project Authority is recommending a new workplan and schedule that will move the project forward through the end of 2021. This 16-month workplan (Phase 2) will focus on the continued development and possible revision of project permits and environmental planning documents, and the development of a final feasibility report, and a draft operations plan.

An initial feasibility study and Administrative Draft Environmental Impact Report (EIR) were completed in 2013 by DWR. A Public Draft EIR/Environmental Impact Statement (EIS) for the Project was released by the Sites Project Authority (state lead agency) and the USBR (federal lead agency) in August 2017. However, with the completion of the recent value-planning process, a Revised Draft EIR and Supplemental EIS will need to be released due to the smaller Project footprint and operational changes. The Revised Draft EIR and Supplemental EIS are scheduled to be released in July 2021, with a Final EIR/EIS completed in mid-2022.

Water Quality Control Plan for the Bay-Delta/Voluntary Agreements

The State Water Resources Control Board (SWRCB) is continuing its phased review and update of the 2006 Water Quality Control Plan for the Bay-Delta (Bay-Delta WQCP). Phase 1 focuses on the southern Delta salinity objectives for the protection of agriculture, San Joaquin River flow objectives for the protection of fish and wildlife, and a program of implementation for achieving those objectives. Phase 2 considers the comprehensive review of the other elements of the Bay-Delta WQCP, including but not limited to Sacramento River and Delta outflow objectives.

The SWRCB has also encouraged all stakeholders to work together to reach one or more voluntary agreements for consideration by the SWRCB that could implement the proposed amendments to the Bay-Delta WQCP through a variety of tools, while seeking to protect water supply reliability. Metropolitan is participating in the Phase 2 proceedings and voluntary agreement negotiations.

In December 2018, the SWRCB adopted the Plan amendments and Final Substitute Environmental Document for Phase 1, which establishes the Lower San Joaquin River flow objectives and revised southern Delta salinity objectives. On February 25, 2019, the Office of Administrative Law approved the Plan amendments, which are now in effect, although enforceable obligations to implement the water quality objectives will be imposed in future proceedings involving the specific exercise of the SWRCB's water right or water quality authority. Various stakeholders filed suit against the SWRCB challenging the Phase 1 amendments.

The Phase 1 amendments are highly controversial because they include new requirements for the San Joaquin River tributaries (Stanislaus, Tuolumne, and Merced Rivers) of 40-percent of unimpaired outflow, with an adaptive range between 30-percent and 50-percent for the protection of fish and wildlife beneficial uses. Unimpaired flow is the flow that would accumulate in surface waters in response to rainfall and snowmelt and flow downstream if there were no reservoirs or diversions to change the quantity, timing, and magnitude of flows. Modeling of this objective shows significant reductions in water supplies available for human consumptive use during most water year types. While the southern Delta salinity objective for the protection of agricultural beneficial uses has been amended to 1.0 dS/m EC (a measure of salinity), the Phase 1 amendments continue the United States Bureau of Reclamation's existing obligation to meet 0.7 dS/m EC on the Lower San Joaquin River at Vernalis.

As part of Phase 2 proceedings, the SWRCB released a framework document in July 2018 focused on the Sacramento River and its tributaries, Delta eastside tributaries, Delta interior Delta flows and Delta outflows. The framework describes changes that will likely be proposed by SWRCB staff through formal proposed amendments and supporting environmental documents. The proposed changes include certain unimpaired flow requirements for the Sacramento River and its salmon-bearing tributaries. an inflow level of 45-percent to 65-percent of unimpaired flow, with a starting point of 55-percent.

The SWRCB has also encouraged all stakeholders to work together to reach one or more voluntary agreements for consideration by the SWRCB that could implement the proposed amendments to the Bay-Delta WQCP through a variety of tools, while seeking to protect water supply reliability. In July of 2019, the State submitted to the SWRCB an update on the voluntary agreement processes. On February 4, 2020, the State agencies released a framework for voluntary agreements that outlined a 15-year program to improve environmental conditions, in an adaptive way, through new flows dedicated to the environment and providing additional habitat. The California Natural Resources Agency and the California Environmental Protection Agency are leading an effort to negotiate voluntary agreements to improve conditions for native fish through an unprecedented commitment to increased flows for the environment, creation of 60,000 acres of new and restored habitat, and $5 billion in new funding for environmental improvements and science. If successful, these agreements will implement the SWRCB's legally required update to the Bay-Delta WQCP and improve conditions for native fish through a broad set of tools. The agreements hold the potential to achieve meaningful landscape-scale solutions to meet the needs of the Delta and its major rivers, reconnect our floodplains and wetlands to the rivers and estuary, and comprehensively manage these vital watersheds. Metropolitan is participating in the Phase 2 proceedings and voluntary agreement discussions.

Rationale for the Expected Supply

Implementation Status

Expected supplies are projected in accordance with the approved implementation.

Written Contracts or Other Proof

Metropolitan Board Actions and Policies:

Policy Principles Regarding Long-term Actions for the Sacramento-San Joaquin River Delta approved in April 2006.

Delta Action Plan Framework approved in June 2007.

Delta Conveyance Criteria approved in September 2007.

Execution of Initial Funding Agreement approved in December 2008.

Execution of Amendments to Planning Agreement approved in December 2009.

Execution of Planning Agreement Amendment (additional funds) approved in July 2010.

Execution of Amendment to Memorandum of Agreement approved in August 2011.

Authorized Funding and Entered into Project Agreement with Sites Project Authority for Phase 1, April 2017.

Authorized Funding and Entered into Project Agreement with Sites Project Authority for 2019 Workplan, February 2019.

Appropriated Funding and Authorized Amendment to 2019 Reservoir Project Agreement with Sites Project Authority to Allow Participation in Phase 2 Workplan, November 2020.

Board action on "Water Management Tools" approved February 2021.

Board vote on California WaterFix, October 2017.

Board vote on California WaterFix, July 2018.

Board vote on Funding Agreement with DWR for Metropolitan's share of the Delta Conveyance Project planning and pre-construction costs, and execution of an amendment to the Joint Powers Agreement for Delta Conveyance Design and Construction Authority, December 2020.

Supporting Agreements and Contracts:

Bay-Delta Accord approved in December 1994.

CALFED Framework, June 2000.

Lower Yuba River Accord, May 2008.

Delta Reform Act Legislation enacted in 2009.

State and Federal Funding:

Proposition 204 funds approved by voters in November 1996.

Proposition 13 funds approved by voters in March 2000.

Proposition 50 funds approved by voters in November 2002.

Proposition 1, approved by the voters in 2014, authorized $7.545 billion in general obligation bonds for state water supply infrastructure projects, including surface and groundwater storage, ecosystem and watershed protection and restoration, and drinking water protection.

Annual federal appropriations from 1998 to present, authorized in annual Energy and Water Development Appropriations balls and the CALFED Bay-Delta Authorization Act.

California Water Commission approved $816 million of Proposition 1 funding for Sites Reservoir, July 2018

Financing

The Delta Conveyance Project would be paid for by public water agencies that would receive the water supply reliability benefits.

California EcoRestore is a program separate from the Delta Conveyance Project and the prior California WaterFix planning efforts. The state would pursue at least 30,000 acres of Delta habitat restoration over the next few years, pursuant to pre-existing regulatory requirements such as the 2008 and 2009 Biological Opinions and various enhancements to improve the overall health of the Delta ecosystem and its native fish and wildlife species. Proposition 1 funds and other state public dollars will be directed exclusively for public benefits unassociated with any regulatory compliance responsibilities.

Federal, State, and Local Permits/Approvals

CALFED's Bay-Delta Program.

CALFED Programmatic EIR/EIS finalized in July 2000.

Record of Decision issued in August 2000 for the final Programmatic EIR/EIS regarding the CALFED Bay-Delta Program.

K. Kern Delta Water Management Program

Source of Supply

In December 1999, Metropolitan advertised a request for proposals for participation in "The California Aqueduct Dry-year Transfer Program." As a result of this request for proposals, four programs, including one from the Kern Delta Water District (Kern Delta), were selected for further consideration. In 2001, Metropolitan entered into Principles of Agreement with Kern Delta for the development of a dry-year supply program. Kern Delta serves 125,000 acres of actively farmed highly productive farmland located in the San Joaquin Valley portion of southern Kern County. Kern Delta has under contract 180 TAF per year of good quality, highly reliable pre-1914 Kern River water and 25.5 TAF per year of SWP Table A contract right (under contract with Kern County Water Agency).

The dry-year supply program between Kern Delta and Metropolitan involves the storage of water with Kern Delta. In years of plentiful supply, the agreement allows Metropolitan to store water in Kern Delta's groundwater basin, either through direct spreading operations or through deliveries to growers in Kern Delta's service area. Metropolitan has the ability to store up to 250 TAF of water. Agreement provisions may allow for storage beyond this amount. When needed, Metropolitan can recover its stored water either through direct pumping of the groundwater or exchange at a rate of 50 TAF per year. The program duration will be from 2002 to 2027 with provisions that allow the water to be withdrawn until 2033.

Expected Supply Capability

The Kern Delta/Metropolitan Program provides Metropolitan with the capacity to store up to 250 TAF of water at any one time. When needed, Metropolitan can recover its stored water either through direct pumping of the groundwater or exchange at a rate of 50 TAF per year.

Rationale for the Expected Supply

Implementation Status

Expected supplies are projected in accordance with accepted detailed groundwater modeling that has been accomplished for the program. In addition, the Kern Delta/Metropolitan Water Management Program was operational and accepting water for storage by fall of 2003. By the end of 2020, the program had 181 TAF in its storage account.

Written Contracts or Other Proof

2001 Kern Delta/Metropolitan Principles of Agreement. Principles of agreement were entered into between Kern Delta and Metropolitan in June 2001, covering program costs, operational aspects, and risks/responsibilities.

2002 Kern Delta and Metropolitan Boards of Directors Approval. These actions approved execution of the long-term agreement, which delineates program operations, costs, and risks/responsibilities

Financing

Metropolitan's O&M budget (referenced above) includes payments for the Kern Delta/ Metropolitan Program.

Federal, State, and Local Permits/Approvals

Kern Delta, acting as lead agency under CEQA, has prepared a full EIR. As part of this EIR, Kern Delta published a Notice of Preparation and held meetings with the general public, interested agencies, and resource agencies. In November 2002, the Final EIR was certified by Kern Delta and adopted by Metropolitan.

L. Central Valley / State Water Project Storage and Water Transfers

Source of Supply

Around 34 MAF of water (80 percent of California's developed water) is delivered for agricultural use every year. Over half of this water is used in the Central Valley; and much of it is delivered by, or adjacent to, SWP and Central Valley Project (CVP) conveyance facilities. This allows for the voluntary transfer of water to many urban areas, including Metropolitan's service area, via the California Aqueduct.

In recent years, a portion of this agricultural water supply has been secured by Metropolitan through mutually beneficial transfer agreements:

The Governor's Water Bank (Bank) in 1991, 1992, 1994, and 2009 secured 75 to 820 TAF per year of water supply. Further, the DWR's Dry Year Water Purchase Program (Purchase Program) in 2001, 2002, and 2003 secured a total of 162 TAF. DWR established and administered the Bank and the Purchase Program by facilitating purchasing water from willing sellers and transferring the water to those with critical needs using the SWP facilities. Sellers, such as farmers and water districts, made water available for the Bank and Purchase Program by fallowing crops, shifting crops, releasing surplus reservoir storage, and by substituting groundwater for surface supplies.

In 2003, Metropolitan secured options to purchase approximately 145 TAF of water from willing sellers in the Sacramento Valley during the irrigation season. Using these options, Metropolitan purchased approximately 125 TAF of water for delivery to the California Aqueduct.

In 2005, Metropolitan, in partnership with three other SWC, secured options to purchase approximately 130 TAF of water from willing sellers in the Sacramento Valley during the irrigation season, of which Metropolitan's share was 113 TAF. Metropolitan also had the right to assume the other SWC options if they chose not to exercise their options. Due to improved hydrologic conditions, Metropolitan and the other SWC did not exercise these options.

In December 2007, Metropolitan entered into a long-term agreement with DWR providing for Metropolitan's participation in the Yuba Dry Year Water Purchase Program between Yuba County Water Agency and DWR that was approved by the SWRCB as part of the Yuba River Accord. This program provides for transfers of water from the Yuba County Water Agency during dry years through the year 2025, and Metropolitan has purchased approximately 200 TAF to date.

In 2008, Metropolitan, in partnership with eight other SWC, purchased approximately 40 TAF of water from willing sellers in the Sacramento Valley during the irrigation season, of which Metropolitan's share was approximately 27 TAF.

In 2009, Metropolitan participated in the Governor's Water Bank, which purchased approximately 74 TAF, of which Metropolitan's share was approximately 36.9 TAF.

In 2010, Metropolitan in partnership with three other SWC, secured approximately 100 TAF of water from willing sellers in the Sacramento Valley, of which Metropolitan's share was approximately 88 TAF.

In 2010, Metropolitan purchased approximately 18 TAF of water from CVP Contractors located in the San Joaquin Valley. In addition, Metropolitan entered into an unbalanced exchange agreement that resulted in Metropolitan receiving approximately 37 TAF.

In 2015, Metropolitan, in partnership with eight other SWC, secured approximately 20 TAF of water from willing sellers in the Sacramento Valley, of which Metropolitan's share was approximately 12 TAF.

In addition, Metropolitan has secured water transfer supplies under the Multi-Year Water Pool Demonstration Program. In 2013, 2015, and 2016, Metropolitan secured 30 TAF, 1.3 TAF, and 7 TAF, respectively. Unlike the other transfer programs discussed herein, which were derived from agricultural sellers, a portion of these transfer supplies came from urban sellers.

Expected Supply Capability

The combined effect of the 2019 National Marine Fisheries Service's and United States Fish and Wildlife Service's biological opinions and the 2020 California Department of Fish and Wildlife's Incidental Take Permit have resulted in uncertainty in how the CVP and SWP will be operated to facilitate water transfers. The new state and federal permits result in the SWP being required to dedicate approximately 200 TAF on average to additional outflow, in addition to the SWP being required to reduce water diversions under a larger number of environmental conditions. The CVP is not subject to the same state permit requirements and will be diverting more frequently, particularly in April and May. There are also new limits on the CVP's ability to use the SWP's facilities for water transfers, particularly when the SWP is under heightened export limits, which could impact how water transfer deals are structured. While the new state and federal permits allow the water transfer window to be extended through November, the 2020 state Incidental Take Permit includes new November export limits on the SWP; and when these limits are triggered, the CVP would also be precluded from using SWP facilities. Under the new permit, the SWP is further obligated to implement a new water transfer monitoring program, which will increase costs to the SWP water contractors.

Rationale for the Expected Supply

<u>Historical Record</u>

Metropolitan has made rapid progress in developing SWP transfer programs. This progress may be attributed to several factors, including Metropolitan dedicating additional staff to identify, develop, and implement SWP transfer programs; increased willingness of Central Valley agricultural interests to enter into transfer programs with Metropolitan; and Metropolitan staff's ability to work with DWR and USBR staff to facilitate SWP storage and transfer programs. The availability of dry year supplies has been demonstrated by the annual water purchase programs described above. In addition, Metropolitan participates in longer-term programs to secure water like the Yuba Accord and the Multi-Year Water Pool Demonstration Program.

The historical record for purchases from the Bank, Purchase Program, Metropolitan-initiated Central Valley programs, Yuba Accord, and Multi-Year Demonstration Program, as well as the number of sellers and buyers participating in these Programs, are strong indicators that there are significant amounts of water that can be purchased through spot market or long-term water transfers during dry years. This historical record from 1991 through 2016 is summarized in Table A.3-1 below. Metropolitan did not purchase supplies from nor participated in any dry year transfer programs from 2017 through 2020.

Approximately 20-35 percent of these north of the Delta water transfers are dedicated to improving Delta water quality to comply with regulations governing Delta pumping.

<u>Written Contracts or Other Proof</u>

With near record-low precipitation in California in recent years, Governor Edmund G. Brown Jr. issued several executive orders to expedite processing of water transfers within the state:

Executive Order B-21-13 (May 20, 2013): The Department of Water Resources and the State Water Resources Control Board are to "take immediate action to address the dry conditions and water delivery limitations by doing the following: … (1) Expedite processing of one-year water transfers for 2013 and assist water transfer proponents and suppliers as necessary, provided that the transfers will not harm other legal users of water and will not unreasonably affect fish, wildlife, or other in-stream beneficial uses; (2) The SWRCB shall expedite review and processing of water transfer petitions in accordance with the applicable provisions of the Water Code; (3) The DWR shall expedite and facilitate water transfer proposals in accordance with applicable provisions of the Water Code..."

January 1, 2014 Drought Proclamation: "The Department of Water Resources and the State Water Resources Control Board will expedite the processing of water transfers, as called for in Executive Order B-21-13. Voluntary water transfers from one water right holder to another enables water to flow where it is needed most."

April 25, 2014 Drought Proclamation: "The Department of Water Resources and the State Water Resources Control Board will immediately and expeditiously process requests to move water to areas of need, including requests involving voluntary water transfers, forbearance agreements, water exchanges, or other means. If necessary, the Department will request that the Water Board consider changes to water right permits to enable such voluntary movements of water."

Executive Order B-29-15 (April 1, 2015): "The Department shall immediately consider voluntary crop idling water transfer and water exchange proposals of one year or less in duration that are initiated by local public agencies and approved in 2015 by the Department subject to the criteria set forth in Water Code section 1810." [This executive order incorporated by reference the previous drought proclamations.]

In February 2021, Metropolitan's Board approved a water management amendment to the State Water Contract that provides greater water management flexibility with transfers and exchanges of SWP water within the SWP service area. The amendment will provide increased opportunities among the State Water Project Contractors to work together on programs that will improve the management of existing SWP water.

Table A.3-1
Historical Record of MWD Central Valley Water Transfers

Program	Purchases (AF per year) Total	Metropolitan	Participants Sellers	Buyers
1991 Governor's Water Bank	820,000	215,000	351	13
1992 Governor's Water Bank	193,246	10,000	18	16
1994 Governor's Water Bank	220,000	100	6	15
2001 Dry-Year Purchase Program	138,806	80,000	9	8
2003 MWD Water Transfer Program	146,230[1]	126,230	11	1
2005 SWC Water Transfer Program	127,275[2]	0	3	4
2008 SWC Water Transfer Program	39,152	26,621	4	8
2009 Governor's Water Bank	47,505	36,900	10	9
2010 SWC Water Transfer Program	98,959	88,159	11	4
2013 Multi-Year Water Pool Demo	92,232	30,000	4	9
2015 Multi-Year Water Pool Demo	3,000	1,374	1	14
2015 SWC Water Transfer Program	19,686	12,358	5	9
2016 Multi-Year Water Program	15,000	6,871	2	9

[1] Quantities denote options Metropolitan secured, of which 20,000 AF were not exercised due to improved hydrologic conditions.

[2] Quantities denote options Metropolitan secured, but were not exercised due to improved hydrologic conditions.

Agreements Between Sellers and Buyers. Since 1991, Metropolitan has entered into Central Valley water transfer agreements in eleven years with sellers, or DWR acting in an intermediary capacity for the Drought Water Bank. The essential terms and conditions for negotiating purchases, including maximum offering price, quantity of water needed, and the timing of delivery, were established in these agreements.

1999 Board Directive. Metropolitan's Board has authorized water transfers in accordance with the Water Surplus and Drought Management Plan (WSDM Plan) adopted in April 1999. The WSDM Plan is a comprehensive policy guideline for managing Metropolitan's water supply during periodic surplus and shortage conditions. During shortage conditions, the plan specifies the type, priority, and timing of drought actions, including the purchase of transfers on the spot market that could be taken in order to prevent or mitigate negative impacts on retail demands.

Financing

Funds for Central Valley water transfers are included in Metropolitan's O&M budget (referenced above).

Federal, State, and Local Permits/Approvals

Environmental documentation for the Drought Water Bank. In November 1993, DWR prepared and finalized a programmatic EIR for the operation of the Drought Water Bank during future drought events. In 2009, an emergency CEQA exemption was issued to support the Drought Water Bank.

Individual CEQA and NEPA documents for Metropolitan's 2003, 2005, and 2008 Central Valley water transfer programs. Individual sellers prepared CEQA documentation to support their transfers. In addition, the USBR prepared NEPA documentation for those transfers requiring federal approval.

M. Mojave Storage Program

Source of Supply

Water from Metropolitan's SWP supply is delivered to Mojave Water Agency through SWP facilities for deposit into an exchange account managed by Mojave. Returns to Metropolitan are made on an acre-foot-for-acre-foot basis (i.e., no losses) at Metropolitan's request by exchange with Mojave's SWP supplies delivered through SWP facilities, subject to rules reserving a minimum annual SWP supply for use by Mojave.

Expected Supply Capability

Through 2021, Metropolitan can annually withdraw the Mojave Water Agency's SWP contractual amounts in excess of 10%. After 2021, the withdrawal rate lowers, reserving 20% of Mojave Water Agency's SWP contractual amounts. Under a 100% allocation, the State Water Contract provides Mojave Water Agency 82.8 TAF of water.

Rationale for the Expected Supply

Implementation Status

Presently, the Mojave Water Agency is not accepting additional water from Metropolitan. As of January 2021, Metropolitan has approximately 19 TAF remaining in storage. Without additional deliveries to the exchange account, the program may not be able to provide return supplies beyond 2025.

Written Contracts or Other Proof

2003 Mojave Water Agency and Metropolitan Boards of Directors Approval. These actions approved the Mojave Water Agency Groundwater Recharge and Exchange Demonstration Project.

2003 Agreement for a Demonstration Water Exchange Program. Provided for a demonstration water exchange between Metropolitan and the Mojave Water Agency for the immediate benefit of both agencies and for the purpose of determining what mutual benefits can result from increased coordinated management of water and facilities. Provides for Metropolitan to deliver up to 75,000 AF for an exchange through December 2004 and the return of water to Metropolitan by December 2014.

2005 Mojave Water Agency and Metropolitan Boards of Directors Approval. These actions approved a one-year extension of the period for Metropolitan to deliver up to the maximum amount of 75,000 AF for an exchange and a one-year extension of the return of water supply to Metropolitan.

2005 First Amendment to the Agreement for a Demonstration Water Exchange Program. Provides for a one-year extension of the period for Metropolitan to deliver up to the maximum amount of 75,000 AF for an exchange and a one-year extension of the return of water supply to Metropolitan.

2011 Mojave Water Agency and Metropolitan Boards of Directors Approval. These actions approved an amendment to the Agreement for a Demonstration Water Exchange Program to provide for a longer term Water Storage Program for Metropolitan to store up to an additional 390,000 acre-feet of SWP supplies through 2035.

2011 Amended Agreement for a Water Storage Program. Establishes the Water Storage Program under which Metropolitan to store up to an additional 390,000 acre-feet of SWP supplies through 2035 for subsequent return by Mojave Water Agency.

Financing

Metropolitan O&M budget includes payments to deliver Metropolitan's SWP supplies to Mojave Water Agency and the recovery on that water by exchange with Mojave Water Agency's SWP supplies.

Federal, State, and Local Permits/Approvals

The Mojave Water Agency, as the Lead Agency, adopted a Final Environmental Impact Report on January 26, 2006, for the Mojave Water Agency Water Supply Reliability and Groundwater Replenishment Program (SCH#2005041103), adopted a mitigation monitoring and reporting program, and filed a Notice of Determination with the State Clearinghouse on January 31, 2006. Metropolitan's Board certified the CEQA documents as a Responsible Agency on July 12, 2011.

On September 8, 2011, Metropolitan and Mojave Water Agency entered into a Point of Delivery Agreement with DWR providing for the delivery of Metropolitan's SWP supplies to Mojave Water Agency and the return to Metropolitan through an exchange of Mojave's SWP supplies.

N. Yuba Accord Dry Year Purchase Program

Source of Supply

As part of a comprehensive settlement of a State Water Resources Control Board (SWRCB) proceeding in which the Yuba County Water Agency (YCWA) is required to increase Yuba River fishery flows, referred to as the "Yuba River Accord" (Accord), YCWA reached agreement with DWR and USBR to sell a portion of the water it would be required to release, plus additional water made available by reoperation of YCWA's storage reservoirs and groundwater substitution. DWR entered into a purchase agreement with YCWA under which one-half of the water available for purchase would be available to SWP contractors that elected to participate in the purchase program.

Under this 25-year program, the price for water is set by the agreement between DWR and the YCWA. There are four categories of water sold, and the price for each type of water depends on hydrology.

Expected Supply Capability

Metropolitan's share of the water made available under the Yuba Accord Dry Year Purchase Program is approximately 25 percent. Should other participating contractors decline to purchase their respective shares, that water is allocated to the remaining interested participating contractors. Metropolitan's likely share of assured YCWA transfer water would be at least 13,750 AF in dry years and up to 35,000 AF or more in other years. These volumes are as provided by YCWA north-of-the-Delta and are subject to conveyance losses through the Delta to the Banks Pumping Plant (approximately 20 to 35 percent).

Rationale for the Expected Supply

Historical Record

Actual volumes purchased by Metropolitan since program inception were as follows:

Year	**Purchased Volume (AF)**
2008	26,430
2009	42,915
2010	67,068
2011	0
2012	0
2013	14,548
2014	10,962
2015	8,192
2016	0
2017	0
2018	21,131
2019	0
2020	8,950 Estimate

Written Contracts or Other Proof

DWR-YCWA Purchase Agreement. This December 4, 2007, agreement provides the annual determination of the amount of water to be made available by YCWA and purchased by DWR. The agreement also specifies the costs of various categories of water to be made available under a variety of hydrologic conditions.

DWR-Metropolitan Participation Agreement. This December 21, 2007, agreement provides Metropolitan's election to purchase water made available by YCWA to DWR and the scheduling delivery of the purchased water. The agreement provides for mechanisms for Metropolitan payments to DWR that are due to YCWA under the DWR-YCWA Purchase Agreement.

Amended DWR-Metropolitan Participation Agreement. This December 5, 2014, amendment established prices for surface water transfer supplies between 2016 and 2020 and clarifies YCWA's rights to sell to third parties.

Amended DWR-Metropolitan Participation Agreement. The amendment, executed in September 2020, established new prices for surface water transfer supplies between 2020 and 2025.

Financing

Funds for purchases of water from the Yuba Accord Dry Year Purchase Program are included in Metropolitan's O&M budget (referenced above).

Federal, State, and Local Permits/Approvals

SWRCB Order WR 2008-0014. Approval of YCWA's petition to modify revised Water Right Decision 1644 related to Water Right Permits 15026, 15027, and 15030 (Applications 5632, 15204, and 15574), and petition for long-term transfer of up to 200,000 AF of water per year from YCWA to the DWR and the USBR under Permit 15026 (Application 5632) - Lower Yuba River in Yuba County.

O. 2011 Coordinated Operating, Water Storage, Exchange and Delivery Agreement among Metropolitan, Municipal Water District of Orange County, and Irvine Ranch Water District

Source of Supply

In July 2010, Metropolitan's Board authorized the Coordinated Operating, Water Storage, Exchange and Delivery Agreement among Metropolitan, Municipal Water District of Orange County (MWDOC), and Irvine Ranch Water District (IRWD). The agreement allows Metropolitan to manage additional SWP supplies obtained from other State Water Contractors. The SWP supplies are obtained through unbalanced exchanges with other State Water Contractors and stored in IRWD storage facilities along the California Aqueduct. Metropolitan maintains ownership and control over the SWP supplies that would be later delivered into the region. MWDOC and IRWD receive a benefit that when the storage programs operate consistent with Metropolitan's Water Supply Allocation Plan, MWDOC and IRWD would receive an extraordinary supply benefit. MWDOC continues to pay the full-service rate for the water generated and delivered under the program.

Expected Supply Capability

The average annual supply benefit is estimated at around 2,000 AFY which can vary drastically based on hydrologic conditions. The maximum supply benefit during a water supply allocation may be as high as 28,750 AF if IRWD has sufficiently developed supplies in storage.

Rationale for the Expected Supply

The expected supply is estimated on the SWP Supplies that the program typically develops through 2020.

Historical Record

The program has allowed Metropolitan to acquire additional supplies through unbalanced exchanges with Antelope Valley-East Kern Water Agency, Dudley Ridge Water District, and Santa Barbara County Flood Control and Water Conservation District.

Written Contracts or Other Proof

2011 Coordinated Operating, Water Storage, Exchange and Delivery Agreement among Metropolitan, Municipal Water District of Orange County, and Irvine Ranch Water District.

Financing

Metropolitan does not fund the exchanges or storage program. IRWD is responsible for the normal program costs. There are provisions where Metropolitan can utilize the program facilities on a limited basis and would reimburse actual operating costs.

A.3.3 In-Region Storage and Supplies

A. Surface Storage

Source of Supply

Surface storage is a critical element of Southern California's water resources strategy. Because California experiences dramatic swings in weather and hydrology, surface storage is important to regulate those swings and mitigate possible supply shortages. Surface storage provides a means of storing water during normal and wet years for later use during dry years, when imported supplies are limited. Since the early twentieth century, DWR and Metropolitan have constructed surface water reservoirs to meet emergency, drought/seasonal, and regulatory water needs for Southern California. These reservoirs include Pyramid Lake, Castaic Lake, Elderberry Forebay, Silverwood Lake, Lake Perris, Lake Skinner, Lake Mathews, Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, Orange County Reservoir, and Metropolitan's DVL. Some reservoirs such as Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, and Orange County Reservoir, which have a total combined capacity of about 3,500 AF, are used solely for regulating purposes. The remaining surface reservoirs are primarily used to meet emergency, drought, and seasonal requirements. The total gross storage capacity for these larger remaining reservoirs is 1,757,600 AF. However, not all of the gross storage capacity is available to Metropolitan; dead storage and storage allocated to others reduce the amount of storage that is available to Metropolitan to 1,665,200 AF.

Expected Supply Capability

Surface storage reservoirs are an important tool that allows Metropolitan to meet the water needs of its service area. As discussed in the EIR for the Eastside Reservoir (DVL) Project dated October 1991 and Metropolitan's IRP, the allocation of available surface storage can be divided into two primary components: emergency and drought/seasonal. As specified by Metropolitan's Board of Directors in the Final EIR for DVL, "Metropolitan shall maintain sufficient water reserves within its service area to supplement local production during an emergency or severe water shortage." With DVL in operation, Metropolitan can now re-operate the surface reservoirs and meet the Board's stated objectives.

Updated Emergency Storage Objective

Metropolitan established its original criteria for determining emergency storage requirements in the October 1991 Final Environmental Impact Report for the Eastside Reservoir, which is now named Diamond Valley Lake. These criteria were again discussed in the 1996 IRP. Metropolitan's Board approved both of these documents. Emergency storage requirements are based on the potential of a major earthquake that would damage all supply aqueducts isolating Southern California from its imported water sources. In 2019, Metropolitan and its member agencies completed a process to update the regional planning estimate of Metropolitan's Emergency Storage Objective. This emergency storage represents the amount of water that Metropolitan would store for the region in preparation for a catastrophic earthquake that would damage the aqueducts that transport imported water supplies to Southern California, including: the Colorado River Aqueduct, both the East and West branches of the California Aqueduct, and the Los Angeles Aqueduct. The emergency storage allows Metropolitan to deliver reserve supplies to the member agencies to supplement local production. This helps avoid severe water shortages during periods when the imported water aqueducts may be out of service. The Emergency Storage Objective considers a six- and twelve-month outage period for the imported supply aqueducts incorporating latest seismic information and operational flexibility of Metropolitan's system, a retail water demand cutback ranging from 25 to 35 percent considering the level of conservation that the region achieved during the recent drought, and an aggregated loss of 10 to 20 percent of local supplies accounting for factors could affect local production during emergency conditions. Under this update, Metropolitan's Emergency Storage Objective was set to 750 TAF, as this level of storage would prevent severe water shortages to the region given new information on expected recovery durations. The emergency storage volume represents a planning estimate for the amount of water that Metropolitan would store for the region in preparation for a catastrophic earthquake or other disaster. It is not intended to set a basis or a policy for allocating or apportioning storage for any individual member agency. A detailed description of Metropolitan's Emergency Storage Objective is included in Appendix 8.

The storage reserved in system reservoirs for emergency purposes is shown in Table A.3-2.

Updated Storage Requirements for Dry-Year Supply and Seasonal Needs

Storage capacity in system reservoirs, including DVL, is also earmarked for dry-year supply and system regulation purposes. Dry-year supply storage within Metropolitan's service area is required to meet the additional water demands that occur during single-year and extended droughts. As specified in the Final EIR for DVL and further discussed in the IRP, this storage requirement is defined as the difference between average-year demand and above average demand during dry years. In addition to dry-year storage, seasonal storage is required to meet seasonal peak demands, which are defined as the difference between average winter demands and average summer demands. The dry-year supply and seasonal storage also provide sufficient reserves to permit approximately five percent downtime for rehabilitation, repair, and maintenance of raw water transmission facilities.

Table A.3-2
Surface Storage Utilization
(acre-feet per year)

Forecast Year	2025	2030	2035	2040	2045
MWD Dry-Year/Seasonal Surface Storage					
DVL, Mathews, Skinner	596,000	596,000	596,000	596,000	596,000
Flexible Storage in Castaic & Perris	217,000	217,000	217,000	217,000	216,000
Subtotal of Dry-Year/Seasonal Storage	**813,000**	**813,000**	**813,000**	**813,000**	**812,000**
MWD Emergency Storage					
DVL, Mathews, Skinner	436,000	436,000	436,000	436,000	436,000
Emergency Storage in DWR Reservoirs	381,000	381,000	381,000	381,000	381,000
Subtotal of Emergency Storage	**817,000**	**817,000**	**817,000**	**817,000**	**817,000**
Total MWD Surface Storage	**1,630,000**	**1,630,000**	**1,630,000**	**1,630,000**	**1,629,000**

Historical Record

Metropolitan has a contract with the DWR that allows use of its terminal reservoirs, such as Castaic Lake on the West Branch and Lake Perris on the East Branch of the California Aqueduct (see Section A.3.3.B for a discussion of Metropolitan's contractual rights to storage in these DWR reservoirs). In addition, Metropolitan owns and operates surface reservoirs such as Lake Skinner, Lake Mathews, and DVL to enhance water supply reliability for its member agencies.

Written Contracts or Other Proof of Usage

The surface reservoirs used by Metropolitan are available either by contract (in the case of the DWR terminal reservoirs) or by construction of its own facilities. The following historical record is provided:

November 1960 Contract between the State of California Department of Water Resources and the Metropolitan Water District of Southern California for a Water Supply. This Contract and its numerous amendments describe Metropolitan's legal access to and obligations for the operation of the SWP for the benefit of its Contractors. Metropolitan has an entitlement to 1,911,500 AF of water each year subject to availability. The terms of this Contract describe Metropolitan's rights to and obligations for the terminal surface reservoirs for water supply purposes.

November 1974 Memorandum of Understanding and Agreement on Operation of Lake Skinner. This MOU and the January 2005 Amendment, signed by Metropolitan and other affected parties, govern Metropolitan's operations of Lake Skinner in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.

November 1994 Memorandum of Understanding on Operation of Domenigoni Valley Reservoir (now known as Diamond Valley Lake). This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of DVL in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.

Elderberry Forebay Contract for Conditions for Use. Conditions for use of storage are described in the contract between the DWR, State of California, and the Department of Water and Power, City of Los Angeles, for Cooperative Development, West Branch, California Aqueduct; Amendment No. 1, July 3, 1969; and Amendment No. 4, June 27, 1985.

June 2002 Division of Safety of Dams Certificate of Approval. The DWR, Division of Safety of Dams issued the Certificate of Approval for operation of DVL in early 2000, with three conditions. These conditions were: (1) Satisfactory operation of the butterfly valves and emergency gate in the inlet/outlet tower, (2) completion of the Tank Saddle Cutoff remediation, and (3) completion of the Signal Spillway. Metropolitan completed these conditions in 2001, and DVL is currently operational in accordance with the Certificate of Approval.

October 1991 Final EIR for the Eastside Reservoir Project (DVL). The EIR established criteria for integrating the operations of Metropolitan's reservoirs and DWR's southern reservoirs for emergency purposes. These criteria also provided that Metropolitan reservoirs could be expected to withdraw all drought storage water within a two-year period.

B. Flexible Storage Use of Castaic Lake and Lake Perris

Source of Storage

Metropolitan's flexible storage accounts in Castaic Lake and Lake Perris, which are SWP reservoirs, are 153,940 AF and 65,000 AF, respectively. These accounts provide Metropolitan with dry-year supply that is independent of the Table A allocation. Metropolitan can withdraw water from these reservoirs in addition to its allocated supply in any year on an as-needed basis. Withdrawn water must be replaced from supplies available to Metropolitan within five years of each withdrawal. This "flexible storage" is available in Castaic Lake to Metropolitan, Ventura County Flood Control and Water Conservation District, and to Santa Clarita Valley Water Agency. It is available in Lake Perris to Metropolitan only.

Expected Supply Capability

The dry-year supply available to Metropolitan from the flexible storage use of Castaic Lake and Lake Perris totals 218,940 AF, made up of 153,940 AF in Castaic Lake and 65,000 AF in Lake Perris. Table A.3-3 shows the use of this available supply in accordance with Metropolitan's operating criteria.

Table A.3-3
Estimated Water Supplies Available for Metropolitan's Use Under the Flexible Storage Use of Castaic Lake and Lake Perris[1]
(TAF per year)

Year	Five Year Drought (1988-1992)	Single Dry Year (1997)
2025	43	217
2030	43	217
2035	43	217
2040	43	217
2045	43	217

[1]Source: Metropolitan's operating criteria.

Rationale for the Expected Supply

Implementation Status

Express provisions related to flexible storage have been incorporated in Metropolitan's SWP contract since 1995. The operating options have been available for use since that time and will continue to be in effect as a part of the SWP contracts.

Historical Record

Metropolitan has exercised the flexible storage provision on numerous occasions and withdrew the full contract amount during calendar year 2014. The full amount was replaced by the beginning of 2017. Its use is based on existing contract provisions.

DWR Bulletin 132-94. The use of Castaic Lake and Lake Perris is determined in accordance with the proportionate use factors from Bulletin 132-94, Table B, upon which capital cost repayment obligations are based. Based on its capital repayment obligations, Metropolitan's proportionate use of Castaic Lake is 96.2 percent and of Lake Perris is 100 percent. Per its SWP contract, Metropolitan has express rights to use certain portions of the SWP's southern reservoirs independently of DWR to supply water in amounts in addition to approved SWP deliveries.

Metropolitan's SWP Contract. Metropolitan's SWP contract was amended in 1995 to include Article 54, "Usage of Lakes Castaic and Perris." This article provides flexible storage to contractors participating in repayment of the capital costs of Castaic Lake and Lake Perris. Each contractor shall be permitted to withdraw up to a Maximum Allocation from Castaic Lake and Lake Perris. These contractors may withdraw a collective Maximum Allocation up to 160 TAF in Castaic Lake and 65 TAF in Lake Perris, which shall be apportioned among them pursuant to the respective proportionate use factors, as shown in Table A.3-4 below.

Financing

The cost associated with the withdrawal and replacement of water in the flexible storage is included in Metropolitan's annual payments under the State Water Contract.

Federal, State, and Local Permits/Approvals

The flexible storage provision became effective in 1995. DWR has the approval authority to affect changes in the operations and usage of existing SWP facilities, including Castaic Lake and Lake Perris.

Table A.3-4
Flexible Storage Allocations

Participating Contractor	Proportionate Use Factor	Maximum Flexible Storage Allocation (AF)
Castaic Lake		
Metropolitan	.96212388	153,940
Ventura County Flood Control and Water Conservation District	.00860328	1,376
Santa Clarita Valley Water Agency	.02927284	4,684
Total Castaic Lake	1.00000000	160,000
Lake Perris[1]	1.00000000	65,000
Metropolitan		

[1] The 2003 Exchange Agreement among Metropolitan, CVWD, and DWA, among other things, transferred to CVWD and DWA a portion of Metropolitan's capacity in the California Aqueduct and the East Branch including Lake Perris. However, Metropolitan's rights to the full 65,000 AF of Lake Perris flexible storage account was retained by Metropolitan.

C. Metropolitan Surface Reservoirs

Source of Supply

Storage capacity in Metropolitan reservoirs, including Lake Skinner, Lake Mathews, Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, Orange County Reservoir, and DVL, is earmarked to meet emergency, dry-year/seasonal, and system regulation needs, as these have been defined above.

Expected Supply Capability

The total available storage capacity for all Metropolitan-controlled surface reservoirs (Metropolitan-owned and DWR terminal reservoirs) is 1,632,000 AF. As discussed earlier, approximately 750,000 AF has been set aside to meet the emergency storage objective of the service area. After accounting for emergency storage, the surface storage available in Metropolitan-owned reservoirs to meet dry-year/seasonal requirements is presented in Table A.3-5.

Rationale for the Expected Supply

Program Facilities

Major facilities for Lake Mathews include an earthen dam to impound water and a recently completed new outlet tower. Major facilities for Lake Skinner include an earthen dam to impound water, an outlet tower, an inlet from the San Diego Canal to deliver water into the reservoir, a water treatment filtration facility, and recreational facilities consisting of a marina, parks, swimming areas, golf course, and hiking trails. Major facilities at DVL include three earthen dams to impound water, an inlet/outlet tower, a secondary inlet from the Inland Feeder, a large pumping station to deliver water into the reservoir, and power generating facilities. Recreational facilities consisting of a marina, parks, swimming areas, golf course, hiking trails, equestrian trails, and lodging are planned.

Historical Record

DVL has been operational for over 20 years. Lake Mathews and Lake Skinner have been in service since the 1940s and 1970s, respectively.

November 1974 Memorandum of Understanding and Agreement on Operation of Lake Skinner. This MOU and the January 2005 Amendment, signed by Metropolitan and other affected parties, govern Metropolitan's operations of Lake Skinner in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.

October 1991 Final EIR for the Eastside Reservoir Project (DVL). The EIR established criteria for integrating the operations of Metropolitan's reservoirs and DWR's southern reservoirs for emergency purposes. These criteria also provided that Metropolitan reservoirs could be expected to withdraw all drought storage water within a two-year period.

November 1994 Memorandum of Understanding on Operation of Domenigoni Valley Reservoir (now known as Diamond Valley Lake). This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of DVL in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.

June 2002 Division of Safety of Dams Certificate of Approval. The DWR Division of Safety of Dams issued the Certificate of Approval for operation of DVL in early 2000, with three conditions. These conditions were: (1) satisfactory operation of the butterfly valves and emergency gate in the inlet/outlet tower, (2) completion of the Tank Saddle Cutoff remediation, and (3) completion of the Signal Spillway. Metropolitan completed these conditions in 2001, and DVL is currently operational in accordance with the Certificate of Approval.

Table A.3-5
Estimated Supplies Available from Metropolitan's Surface Storage Program Capabilities
(acre-feet per year)

Forecast Year	Five Year Drought (1988-92)	Single Dry Year (1977)
2025	161,000	807,000
2030	161,000	809,000
2035	161,000	808,000
2040	161,000	808,000
2045	161,000	806,000

Source: Metropolitan analysis

Financing

The capital cost of DVL, Lake Mathews, and Lake Skinner was financed by a combination of revenue bonds and operating revenues. Annual operating costs, including maintenance and pumping, are included in Metropolitan's annual O&M budget (referenced above).

Federal, State, and Local Permits/Approvals

All necessary permits have been obtained. A permit to generate and sell power has been acquired from the Federal Energy Regulatory Commission. No further regulatory permits are required.

D. Groundwater Conjunctive Use Programs

Source of Supply

Metropolitan's IRP established the strategy to store imported water that is most available during wet years in surface reservoirs or groundwater aquifers for later use during droughts and emergencies. In this way, Metropolitan can reduce its reliance on direct deliveries from the SWP and the Colorado River during dry years when competing demands by other users and risks to the watershed ecosystems are greatest. Metropolitan has implemented a conjunctive use program for imported water storage in groundwater basins within the service area based upon policy principles adopted in 2000.

In 2007, Metropolitan published the Groundwater Assessment Study which estimated 3.2 MAF of available storage space in groundwater basins. Due to drought and the subsequent decline in water levels, it is estimated that storage in the groundwater basins has declined about 700 TAF from 2000 to 2019. Additionally, the 2020 IRP may lead to policies and strategies for ensuring sustainable groundwater production in light of a potential for extended multiple-year dry conditions.

Rationale for the Expected Supply

<u>Implementation Status</u>

The status of implementation for the groundwater conjunctive use programs has been described above.

<u>Historical Record</u>

In 2000, Metropolitan entered an agreement with DWR to administer $45 million of Proposition 13 state bond funds for Metropolitan's Southern California Water Supply Reliability Projects Program. Metropolitan paired the $45 million of state funds with $35 million of Metropolitan capital funds to develop nine groundwater storage programs in partnership with member and retail agencies and groundwater basin managers. These nine contractual storage programs have an initial 25-year term and provide for storage of up to 212 TAF and dry-year yield of up to 70 TAF. These programs are summarized in Table 3-16. Since inception, the conjunctive use program has been exercised to store water in groundwater basins during wet periods and relied upon to extract that water during dry periods. For example, during the recent drought period from 2012 to 2016, the conjunctive use program provided 64,000 AF of dry year supply to help Metropolitan meet regional demands. As of January 2020, the conjunctive use storage balance is 61,000 AF.

Metropolitan has also implemented a Cyclic Program to help capture additional imported supplies that would otherwise be lost to the region, when available storage capacity is limited. Under the Cyclic Program, Metropolitan delivers imported water supplies to the member agencies for storage in their local groundwater basin or surface water reservoir in advance of the demand for the water for a future use. The member agency purchases the water based on a mutually agreed upon schedule but has full discretion on the use of the stored water. The Cyclic Program creates additional flexibility for managing Metropolitan's water supplies.

Metropolitan has ten-year cyclic agreements with the City of Burbank, City of Pasadena, Calleguas Municipal Water District, Eastern Municipal Water District, Municipal Water District of Orange County, San Diego County Water Authority, and Western Municipal Water District. These agreements commenced between 2017 and 2019. In addition to these agreements, Metropolitan has existing agreements with two other member agencies. The Cyclic Storage Agreement with Upper San Gabriel Valley MWD allows pre-delivery and storage of up to 100 TAF of imported water. The agreement was originally signed in 1975 for a term of five years and has been extended in five-year increments. The agreement currently expires in November 2023. Metropolitan amended this agreement in August 2019 to increase the storage amount to up to 200 TAF. Metropolitan is working with Upper San Gabriel Valley MWD to enter into a new ten-year agreement. The Cyclic Storage Agreement with Three Valleys MWD allows for pre-delivery and storage of up to 40 TAF. This agreement was originally signed in 1991 for a term of five years and has been extended in five-year increments. Metropolitan entered into a new agreement that increased the storage amount to 50 TAF and expires in June 2030. Both agreements are expected to be renewed repeatedly in the future.

<u>Written Contracts or Other Proof</u>

Metropolitan's dry-year supply from the groundwater conjunctive use programs is based on Metropolitan's Board actions and agreements.

Proposition 13 Groundwater Conjunctive Use Programs.

Metropolitan Water District published the Groundwater Assessment Study Report in 2007 in collaboration with its member agencies and groundwater basin managers documenting existing use and development of groundwater resources in Metropolitan's service area and estimating additional groundwater basin storage potential.

Principles for groundwater storage adopted by the Metropolitan Board in January 2000.

Resolution for Proposition 13 Funds adopted by the Metropolitan Board in October 2000.

Agreement executed with the DWR for Interim Water Supply Construction Grant Commitment Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection (Proposition 13, Chapter 9, Article 4) providing for Metropolitan to administer $45 million in state Proposition 13 grant funds for groundwater reliability programs; October 2000.

Agreement executed for Long Beach Conjunctive Use Project, July 2002, amended in July 2003, October 2005, and November 2008.

Agreement executed for Live Oak Conjunctive Use Project, October 2002.

Agreement executed for Foothill Area Groundwater Storage Project, February 2003, amended in August 2006, April 2008, and February 2009.

Agreement executed for Chino Basin Programs, June 2003, amended in May 2004, August 2004, August 2005, May 2008, March 2009, September 2009, July 2010, and January 2015.

Agreement executed for Orange County Groundwater Storage Program, June 2003, amended in July 2004, December 2005, and July 2008.

Agreement executed for Compton Conjunctive Use Program, February 2005.

Agreement executed for Long Beach Conjunctive Use Project — Expansion in Lakewood, July 2005, amended in April 2006, August 2007, November 2008, and February 2010.

Agreement executed for Upper Claremont Basin Groundwater Storage Program, September 2005, amended in April 2008.

Agreement executed for Elsinore Basin Conjunctive Use Program, December 2006, amended in May 2008.

All of these programs have an initial 25-year term, with provision for renewal or extension after that period.

Financing

Financing has been supplied from multiple sources as discussed below:

Financing from Proposition 13 and Additional Groundwater Storage Programs.

Proposition 13 funds ($45 million) were allocated to Metropolitan by the state in May 2000 for the development of local groundwater storage projects.

Metropolitan has executed groundwater storage funding agreements for nine storage programs, expended $45 million of the Proposition 13 funds, and appropriated over $35 million of Metropolitan capital funds for the storage programs in the Orange County and Chino groundwater basins. All nine storage programs have completed facilities and are currently active. Metropolitan began calling for production of stored water beginning in 2007.

Table A.3-6 provides details on groundwater storage programs.

Federal, State, and Local Permits/Approvals

Long Beach Conjunctive-use Storage Project. Environmental documentation for the Long Beach Conjunctive-use Storage Project was certified by the City of Long Beach in August 2001.

Live Oak Basin Conjunctive-use Storage Project. Environmental documentation for the Live Oak Basin Conjunctive-use Storage Project was certified by Three Valleys MWD in January 2002.

Foothill Area Groundwater Storage Project. Environmental documentation for the Foothill Area Groundwater Storage Project was certified by Foothill Municipal Water District in January 2003.

Chino Basin Programs Groundwater Storage Project. Environmental documentation for the Chino Basin Programs Groundwater Storage Project was certified by Inland Empire Utility Agency in December 2002.

Long Beach Conjunctive Use Storage Project – Expansion in Lakewood. Environmental documentation for the project was certified by the City of Lakewood in May 2005.

City of Compton Conjunctive Use Program. Environmental documentation for the project was certified by the City of Compton in December 2004.

Orange County Groundwater Conjunctive Use Program. Environmental documentation for the project was certified by Orange County Water District in March 1999 and in July 2002.

Upper Claremont Basin Groundwater Storage Program. Environmental documentation for the project was certified by Three Valleys MWD in July 2005.

Elsinore Basin Conjunctive Use Program. Environmental documentation for the project was certified by Elsinore Valley MWD in February 2004.

E. Program under Development

Regional Recycled Water Program

The Regional Recycled Water Program (RRWP), a partnership with the Los Angeles County Sanitation Districts, will purify wastewater to produce high quality water that could be used again. The RRWP would produce up to 150 MGD of purified water from the Joint Water Pollution Control Plant in Carson for groundwater replenishment, industrial use, and potentially raw water augmentation. The agencies have been working together for over 10 years on the program. As a first step toward full implementation, Metropolitan and the Sanitation Districts cooperated to complete the Advanced Purification Center in 2019. The Advanced Purification Center is a 0.5 million gallon per day demonstration facility that will generate information needed for the potential future construction of a full-scale recycled water facility. It uses a unique application of membrane bioreactors designed to significantly increase efficiency in water recycling. Scientists and engineers will test the process, utilizing full-scale treatment modules, to ensure the resulting purified water meets the highest water quality standards. Once approved by regulators, this innovative process could be used throughout California and even applied around the globe.

Metropolitan and the Sanitation Districts are continuing to move forward with the program, to enhance their partnership and begin the next phase of the program. Metropolitan's Board approved proceeding with the environmental planning phase of the project in November 2020.

Table A.3-6
Metropolitan's In-Region Groundwater Storage Programs

Program	Metropolitan Agreement Partners	Program Term	Max Storage AF	Dry-Year Yield AF/Yr
Long Beach Conjunctive Use Storage Project (Central Basin)	Long Beach	June 2002-2027	13,000	4,300
Foothill Area Groundwater Storage Program (Monkhill/ Raymond Basin)	Foothill MWD	February 2003-2028	9,000	3,000
Orange County Groundwater Conjunctive Use Program	MWDOC OCWD	June 2003-2028	66,000+	22,000
Chino Basin Conjunctive Use Programs	IEUA TVMWD Watermaster	June 2003-2028	100,000	33,000
Live Oak Basin Conjunctive Use Project (Six Basins)	TVMWD City of La Verne	October 2002-2027	3,000	1,000
City of Compton Conjunctive Use Project (Central Basin)	Compton	February 2005-2030	2,289	763
Long Beach Conjunctive Use Program Expansion in Lakewood (Central Basin)	Long Beach	July 2005-2030	3,600	1,200
Upper Claremont Basin Groundwater Storage Program (Six Basins)	TVMWD	Sept. 2005- 2030	3,000	1,000
Elsinore Basin Conjunctive Use Storage Program	Western MWD Elsinore Valley MWD	May 2008- 2033	12,000	4,000
Total			**211,889**	**70,263**

Table A.3-7
Colorado River
Program Capabilities
Year 2025
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
DCP Contribution Reduction[1]	0	0	0
IID/MWD Conservation Program	105,000	105,000	105,000
Priority 5 Apportionment (Surplus)	0	0	0
PVID Land Management, Crop Rotation, and Water Supply Program	99,000	130,000	117,000
Bard Seasonal Fallowing Program	6,000	6,000	6,000
Lower Colorado Water Supply Project	9,000	9,000	9,000
Lake Mead ICS Storage Program	400,000	400,000	400,000
Binational ICS	17,000	0	42,000
Forbearance for Present Perfected Rights	0	0	0
CVWD SWP/QSA Transfer Obligation	(50,000)	(50,000)	(50,000)
DWCV SWP Table A Obligation	(47,000)	(12,000)	(113,000)
DWCV Advance Delivery Account	47,000	12,000	113,000
IID Payback	(20,000)	(20,000)	(20,000)
SNWA Agreement Payback	0	0	0
Subtotal of Current Programs	***1,116,000***	***1,130,000***	***1,159,000***
Programs Under Development			
Additional Transfer Programs	0	0	0
Subtotal of Proposed Programs	***0***	***0***	***0***
Additional Colorado River Exchange Supplies			
Exchange with SDCWA	278,000	278,000	278,000
Exchange with United States	16,000	16,000	16,000
Subtotal of Additional Colorado River Supplies	***294,000***	***294,000***	***294,000***
Maximum CR Supply Capability2	**1,410,000**	**1,424,000**	**1,453,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(160,000)*	*(174,000)*	*(203,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**

[1] DCP contribution beyond capacity of ICS accounts.
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The CRA delivery capacity is 1.25 MAF annually.

Table A.3-7
Colorado River
Program Capabilities
Year 2030
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
DCP Contribution Reduction[1]	0	0	0
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	0
PVID Land Management, Crop Rotation, and Water Supply Program	130,000	130,000	117,000
Bard Seasonal Fallowing Program	6,000	6,000	6,000
Lower Colorado Water Supply Project	9,000	9,000	9,000
Lake Mead ICS Storage Program	337,500	337,500	337,500
Binational ICS	51,000	51,000	51,000
Forbearance for Present Perfected Rights	(2,000)	(2,000)	(2,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(49,000)	(12,000)	(113,000)
DWCV Advance Delivery Account	49,000	12,000	113,000
IID Payback	0	0	0
SNWA Agreement Payback	(22,000)	(22,000)	(22,000)
Subtotal of Current Programs	***1,109,500***	***1,109,500***	***1,096,500***
Programs Under Development			
Additional Transfer Programs	0	0	0
Subtotal of Proposed Programs	***0***	***0***	***0***
Additional Colorado River Exchange Supplies			
Exchange with SDCWA	278,000	278,000	278,000
Exchange with United States	16,000	16,000	16,000
Subtotal of Additional Colorado River Supplies	***294,000***	***294,000***	***294,000***
Maximum CR Supply Capability[2]	**1,403,500**	**,403,500**	**1,390,500**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(153,500)*	*(153,500)*	*(140,500)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**

[1] DCP contribution beyond capacity of ICS accounts.
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The CRA delivery capacity is 1.25 MAF annually.

Table A.3-7
Colorado River
Program Capabilities
Year 2035
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
DCP Contribution Reduction[1]	0	0	0
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	0
PVID Land Management, Crop Rotation, and Water Supply Program	130,000	130,000	117,000
Bard Seasonal Fallowing Program	6,000	6,000	6,000
Lower Colorado Water Supply Project	9,000	9,000	9,000
Lake Mead ICS Storage Program	337,500	337,500	337,500
Binational ICS	51,000	0	51,000
Forbearance for Present Perfected Rights	(2,000)	(2,000)	(2,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(51,000)	(12,000)	(113,000)
DWCV Advance Delivery Account	51,000	12,000	113,000
IID Payback	0	0	0
SNWA Agreement Payback	(22,000)	(22,000)	(22,000)
Subtotal of Current Programs	***1,109,500***	***1,058,500***	***1,096,500***
Programs Under Development			
Additional Transfer Programs	0	0	0
Subtotal of Proposed Programs	***0***	***0***	***0***
Additional Colorado River Exchange Supplies			
Exchange with SDCWA	278,000	278,000	278,000
Exchange with United States	16,000	16,000	16,000
Subtotal of Additional Colorado River Supplies	***294,000***	***294,000***	***294,000***
Maximum CR Supply Capability[2]	**1,403,500**	**1,352,500**	**1,390,500**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(153,500)*	*(102,500)*	*(140,500)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**

[1] DCP contribution beyond capacity of ICS accounts.
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The CRA delivery capacity is 1.25 MAF annually.

Table A.3-7
Colorado River
Program Capabilities
Year 2040
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
DCP Contribution Reduction[1]	0	0	0
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	0
PVID Land Management, Crop Rotation, and Water Supply Program	130,000	130,000	117,000
Bard Seasonal Fallowing Program	6,000	6,000	6,000
Lower Colorado Water Supply Project	9,000	9,000	9,000
Lake Mead ICS Storage Program	350,000	337,500	337,500
Binational ICS	0	0	0
Forbearance for Present Perfected Rights	(2,000)	(2,000)	(2,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(53,000)	(12,000)	(113,000)
DWCV Advance Delivery Account	53,000	12,000	113,000
IID Payback	0	0	0
SNWA Agreement Payback	(22,000)	(22,000)	(22,000)
Subtotal of Current Programs	***1,071,000***	***1,058,500***	***1,045,500***
Programs Under Development			
Additional Transfer Programs	0	0	0
Subtotal of Proposed Programs	***0***	***0***	***0***
Additional Colorado River Exchange Supplies			
Exchange with SDCWA	278,000	278,000	278,000
Exchange with United States	16,000	16,000	16,000
Subtotal of Additional Colorado River Supplies	***294,000***	***294,000***	***294,000***
Maximum CR Supply Capability[2]	**1,365,000**	**1,352,500**	**1,339,500**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(115,000)*	*(102,500)*	*(89,500)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**

[1] DCP contribution beyond capacity of ICS accounts.
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The CRA delivery capacity is 1.25 MAF annually.

Table A.3-7
Colorado River
Program Capabilities
Year 2045
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
DCP Contribution Reduction[1]	0	0	0
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	0
PVID Land Management, Crop Rotation, and Water Supply Program	130,000	130,000	117,000
Bard Seasonal Fallowing Program	6,000	6,000	6,000
Lower Colorado Water Supply Project	9,000	9,000	9,000
Lake Mead ICS Storage Program	343,750	343,750	343,750
Binational ICS	0	0	0
Forbearance for Present Perfected Rights	(2,000)	(2,000)	(2,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(53,000)	(12,000)	(113,000)
DWCV Advance Delivery Account	53,000	12,000	113,000
IID Payback	0	0	0
SNWA Agreement Payback	0	0	0
Subtotal of Current Programs	***1,086,750***	***1,086,750***	***1,073,750***
Programs Under Development			
Additional Transfer Programs	0	0	0
Subtotal of Proposed Programs	***0***	***0***	***0***
Additional Colorado River Exchange Supplies			
Exchange with SDCWA	278,000	278,000	278,000
Exchange with United States	16,000	16,000	16,000
Subtotal of Additional Colorado River Supplies	***294,000***	***294,000***	***294,000***
Maximum CR Supply Capability[2]	**1,380,750**	**1,380,750**	**1,367,750**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(130,750)*	*(130,750)*	*(117,750)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**

[1] DCP contribution beyond capacity of ICS accounts.
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The CRA delivery capacity is 1.25 MAF annually.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2025
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
MWD Table A [1]	459,000	122,000	1,108,000
DWCV Table A	47,000	12,000	113,000
San Luis Carryover [2]	56,000	282,000	282,000
Article 21 Supplies	0	0	25,000
San Gabriel Valley MWD Exchange and Purchase	2,000	2,000	2,000
Yuba River Accord Purchase	12,800	14,000	6,000
Central Valley Storage and Transfers			
Semitropic Program	50,000	45,000	68,000
Arvin Edison Program[3]	0	0	0
Mojave Storage Program	0	0	0
Antelope Valley/East Kern Acquisition and Storage	20,000	70,000	70,000
Kern Delta Program	38,000	50,000	50,000
Transfers and Exchanges	50,000	50,000	50,000
Subtotal of Current Programs	***734,800***	***647,000***	***1,774,000***
Programs Under Development			
San Bernardino Valley Water District Program	0	0	13,000
Subtotal of Proposed Programs	***0***	***0***	***13,000***
Maximum Supply Capability	**734,800**	**647,000**	**1,787,000**

[1] Includes Port Hueneme Lease.
[2] Includes DWCV carryover.
[3] Take and put amounts limited due to water quality considerations.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2030
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
MWD Table A [1]	479,000	122,000	1,108,000
DWCV Table A	49,000	12,000	113,000
San Luis Carryover [2]	57,000	283,000	283,000
Article 21 Supplies	0	0	22,000
San Gabriel Valley MWD Exchange and Purchase	2,000	2,000	2,000
Yuba River Accord Purchase	0	0	0
Central Valley Storage and Transfers			
Semitropic Program	50,000	45,000	68,000
Arvin Edison Program[3]	0	0	0
Mojave Storage Program	0	0	0
Antelope Valley/East Kern Acquisition and Storage	43,000	70,000	70,000
Kern Delta Program	42,000	50,000	50,000
Transfers and Exchanges	50,000	50,000	50,000
Subtotal of Current Programs	***772,000***	***634,000***	***1,766,000***
Programs Under Development			
San Bernardino Valley Water District Program	0	0	13,000
Subtotal of Proposed Programs	***0***	***0***	***13,000***
Maximum Supply Capability	**772,000**	**634,000**	**1,779,000**

[1] Includes Port Hueneme Lease.
[2] Includes DWCV carryover.
[3] Take and put amounts limited due to water quality considerations.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2035

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
MWD Table A [1]	499,000	122,000	1,108,000
DWCV Table A	51,000	12,000	113,000
San Luis Carryover [2]	57,000	283,000	283,000
Article 21 Supplies	0	0	20,000
San Gabriel Valley MWD Exchange and Purchase	2,000	2,000	2,000
Yuba River Accord Purchase	0	0	0
Central Valley Storage and Transfers			
Semitropic Program	50,000	45,000	68,000
Arvin Edison Program[3]	0	0	0
Mojave Storage Program	0	0	0
Antelope Valley/East Kern Acquisition and Storage	43,000	70,000	70,000
Kern Delta Program	42,000	50,000	50,000
Transfers and Exchanges	50,000	50,000	50,000
Subtotal of Current Programs	***794,000***	***634,000***	***1,764,000***
Programs Under Development			
San Bernardino Valley Water District Program	0	0	13,000
Subtotal of Proposed Programs	***0***	***0***	***13,000***
Maximum Supply Capability	**794,000**	**634,000**	**1,777,000**

(acre-feet per year)

[1] Includes Port Hueneme Lease.
[2] Includes DWCV carryover.
[3] Take and put amounts limited due to water quality considerations

Table A.3-7
California Aqueduct
Program Capabilities
Year 2040
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
MWD Table A [1]	519,000	122,000	1,108,000
DWCV Table A	53,000	12,000	113,000
San Luis Carryover [2]	57,000	283,000	283,000
Article 21 Supplies	0	0	18,000
San Gabriel Valley MWD Exchange and Purchase	2,000	2,000	2,000
Yuba River Accord Purchase	0	0	0
Central Valley Storage and Transfers			
Semitropic Program	50,000	45,000	68,000
Arvin Edison Program[3]	0	0	0
Mojave Storage Program	0	0	0
Antelope Valley/East Kern Acquisition and Storage	43,000	70,000	70,000
Kern Delta Program	42,000	50,000	50,000
Transfers and Exchanges	50,000	50,000	50,000
Subtotal of Current Programs	***816,000***	***634,000***	***1,762,000***
Programs Under Development			
San Bernardino Valley Water District Program	0	0	13,000
Subtotal of Proposed Programs	***0***	***0***	***13,000***
Maximum Supply Capability	**816,000**	**634,000**	**1,775,000**

[1] Includes Port Hueneme Lease.
[2] Includes DWCV carryover.
[3] Take and put amounts limited due to water quality considerations.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2045
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
MWD Table A [1]	519,000	122,000	1,108,000
DWCV Table A	53,000	12,000	113,000
San Luis Carryover [2]	56,000	282,000	282,000
Article 21 Supplies	0	0	18,000
San Gabriel Valley MWD Exchange and Purchase	2,000	2,000	2,000
Yuba River Accord Purchase	0	0	0
Central Valley Storage and Transfers			
Semitropic Program	50,000	45,000	68,000
Arvin Edison Program[3]	0	0	0
Mojave Storage Program	0	0	0
Antelope Valley/East Kern Acquisition and Storage	20,000	70,000	70,000
Kern Delta Program	42,000	50,000	50,000
Transfers and Exchanges	50,000	50,000	50,000
Subtotal of Current Programs	***792,000***	***633,000***	***1,761,000***
Programs Under Development			
San Bernardino Valley Water District Program	0	0	13,000
Subtotal of Proposed Programs	***0***	***0***	***13,000***
Maximum Supply Capability	**792,000**	**633,000**	**1,774,000**

[1] Includes Port Hueneme Lease.
[2] Includes DWCV carryover.
[3] Take and put amounts limited due to water quality considerations.

Table A.3-7
In-Region Supplies and Programs
Program Capabilities
Year 2025
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	118,000	590,000	590,000
Flexible Storage in Castaic & Perris	43,000	217,000	217,000
Groundwater Storage			
Conjunctive Use	33,000	68,000	68,000
Subtotal of Current Programs	***194,000***	***875,000***	***875,000***
Programs Under Development			
Subtotal of Proposed Programs	***0***	***0***	***0***
Maximum Supply Capability	**194,000**	**875,000**	**875,000**

Table A.3-7
In-Region Supplies and Programs
Program Capabilities
Year 2030
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	118,000	592,000	592,000
Flexible Storage in Castaic & Perris	43,000	217,000	217,000
Groundwater Storage			
Conjunctive Use	36,000	68,000	68,000
Subtotal of Current Programs	***197,000***	***877,000***	***877,000***
Programs Under Development			
Subtotal of Proposed Programs	***0***	***0***	***0***
Maximum Supply Capability	**197,000**	**877,000**	**877,000**

Table A.3-7
In-Region Supplies and Programs
Program Capabilities
Year 2035
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	118,000	591,000	591,000
Flexible Storage in Castaic & Perris	43,000	217,000	217,000
Groundwater Storage Conjunctive Use	36,000	68,000	68,000
Subtotal of Current Programs	***197,000***	***876,000***	***876,000***
Programs Under Development			
Subtotal of Proposed Programs	***0***	***0***	***0***
Maximum Supply Capability	**197,000**	**876,000**	**876,000**

Table A.3-7
In-Region Supplies and Programs
Program Capabilities
Year 2040
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	118,000	591,000	591,000
Flexible Storage in Castaic & Perris	43,000	217,000	217,000
Groundwater Storage Conjunctive Use	36,000	68,000	68,000
Subtotal of Current Programs	***197,000***	***876,000***	***876,000***
Programs Under Development			
Subtotal of Proposed Programs	***0***	***0***	***0***
Maximum Supply Capability	**197,000**	**876,000**	**876,000**

Table A.3-7
In-Region Supplies and Programs
Program Capabilities
Year 2045
(acre-feet per year)

Hydrology	Five Year Drought (1988-1992)	Single Dry Year (1977)	Normal Year (1922-2017)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	118,000	589,000	589,000
Flexible Storage in Castaic & Perris	43,000	217,000	217,000
Groundwater Storage			
Conjunctive Use	36,000	68,000	68,000
Subtotal of Current Programs	***197,000***	***874,000***	***874,000***
Programs Under Development			
Subtotal of Proposed Programs	***0***	***0***	***0***
Maximum Supply Capability	**197,000**	**874,000**	**874,000**

Table A.3-8
Colorado River
Supply Characterization[1] Year 2021-2025
Repeat of 1988-1992 Hydrologies
(acre-feet per year)

Hydrology	2021	2022	2023	2024	2025
Current Programs					
Basic Apportionment – Priority 4	550,000	550,000	550,000	550,000	550,000
DCP Contribution Reduction[2]	0	0	0	0	0
IID/MWD Conservation Program	105,000	105,000	105,000	105,000	105,000
Priority 5 Apportionment (Surplus)	0	0	0	0	0
PVID Land Management, Crop Rotation, and Water Supply Program	42,000	64,000	130,000	130,000	130,000
Lower Colorado Water Supply Project	9,000	9,000	9,000	9,000	9,000
Bard Seasonal Fallowing Program	6,000	6,000	6,000	6,000	6,000
Lake Mead ICS Storage Program	400,000	400,000	400,000	100,000	100,000
Binational ICS	33,000	33,000	0	0	0
Forbearance for Present Perfected Rights	0	0	0	0	(2,000)
CVWD SWP/QSA Transfer Obligation	(50,000)	(50,000)	(50,000)	(50,000)	(50,000)
DWCV SWP Table A Obligation	(22,000)	(95,000)	(28,000)	(45,000)	(35,000)
DWCV Advance Delivery Account	22,000	95,000	28,000	45,000	35,000
SNWA Agreement Payback	0	0	0	0	0
IID Payback	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)
Subtotal of Current Programs	***1,075,000***	***1,097,000***	***1,130,000***	***830,000***	***828,000***
Additional Colorado River Exchange Supplies					
Exchange with SDCWD	283,000	281,000	278,000	278,000	278,000
Exchange with United States	16,000	16,000	16,000	16,000	16,000
Subtotal of Additional Colorado River Supplies	***299,000***	***297,000***	***294,000***	***294,000***	***294,000***
Maximum CR Supply Capability[3]	**1,374,000**	**1,394,000**	**1,424,000**	**1,124,000**	**1,122,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(124,000)*	*(144,000)*	*(174,000)*	*0*	*0*
Subtotal of CR Core Supplies	**919,000**	**866,000**	**996,000**	**979,000**	**987,000**
Subtotal of CR Storage	**331,000**	**384,000**	**254,000**	**145,000**	**135,000**
Maximum Expected CRA Deliveries[4]	**1,250,000**	**1,250,000**	**1,250,000**	**1,124,000**	**1,122,000**

[1] Supply characterization for the Drought Risk Assessment is based on core supplies as defined in WSCP Appendix 4. Flexible and storage supplies from CR, SWP, and In-Region may be exercised as supply augmentation action to any potential core supply shortfall.
[2] DCP contribution beyond capacity of ICS accounts.
[3] Total amount of supplies available without taking into consideration CRA capacity constraint.
[4] The CRA delivery capacity is 1.25 MAF annually.

Table A.3-8
California Aqueduct
Supply Characterization[1] Year 2021-2025
Repeat of 1988-1992 Hydrologies
(acre-feet per year)

Hydrology	2021	2022	2023	2024	2025
Current Programs					
MWD Table A[2]	221,000	940,000	274,000	442,000	345,000
DWCV Table A	22,000	95,000	28,000	45,000	35,000
Article 21 Supplies	0	0	0	0	0
San Gabriel Valley MWD Exchange and Purchase	2,000	2,000	2,000	2,000	2,000
Subtotal of SWP Core Supplies	***245,000***	***1,037,000***	***304,000***	***489,000***	***382,000***
San Luis Carryover[3]	200,000	0	69,000	0	0
Yuba River Accord Purchase	14,000	11,000	14,000	11,000	14,000
Central Valley Storage and Transfers					
Semitropic Program	40,000	0	40,000	44,000	41,000
Arvin Edison Program[4]	0	0	0	0	0
Mojave Storage Program	0	0	0	0	0
Antelope Valley/East Kern Acquisition and Storage	27,000	0	27,000	0	11,000
Kern Delta Program	50,000	0	50,000	50,000	40,000
Transfers and Exchanges	50,000	50,000	50,000	50,000	50,000
Subtotal of SWP Flexible and Storage Programs	***381,000***	***61,000***	***250,000***	***155,000***	***156,000***
Programs Under Development					
San Bernardino Valley Water District Program	0	0	0	0	0
Subtotal of Proposed Programs	***0***	***0***	***0***	***0***	***0***
Maximum Supply Capability	**626,000**	**1,098,000**	**554,000**	**644,000**	**538,000**

[1] Supply characterization for the Drought Risk Assessment is based on core supplies as defined in WSCP Appendix 4. Flexible and storage supplies from CR, SWP, and In-Region may be exercised as supply augmentation action to any potential core supply shortfall.
[2] Includes Port Hueneme lease.
[3] Includes DWCV carryover.
[4] Take and put amounts limited due to water quality considerations.

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Appendix 4

WATER SHORTAGE CONTINGENCY PLAN

Appendix 4
WATER SHORTAGE CONTINGENCY PLAN

This Water Shortage Contingency Plan (WSCP) complies with California Water Code (CWC) Section 10632, which requires that every urban water supplier shall prepare and adopt a WSCP as part of its urban water management plan (UWMP). Section 10632.2 provides, "An urban water supplier shall follow, where feasible and appropriate, the prescribed procedures and implement determined shortage response actions in its water shortage contingency plan...or reasonable alternative actions, provided that descriptions of the alternative actions are submitted with the annual water shortage assessment report pursuant to Section 10632.1." Notwithstanding, the CWC does not prohibit an urban water supplier from taking actions not specified in its WSCP, if needed, without having to formally amend its UWMP or WSCP.

The WSCP is a guide for the Metropolitan Water District of Southern California's (Metropolitan's) intended actions during water shortage conditions. It is meant to improve preparedness for droughts and other impacts on water supplies by describing the process used to address varying degrees of water shortages. Certain elements of the WSCP are required by the CWC, including response actions that align with six standard water shortage levels based on water supply conditions, as well as shortages resulting from catastrophic supply interruptions. The WSCP also describes Metropolitan's procedures for conducting an Annual Water Supply and Demand Assessment (Annual Assessment) that is required by CWC Section 10632.1 and is to be submitted to the California Department of Water Resources (DWR) on or before July 1 of each year, or within 14 days of receiving final allocations from the State Water Project (SWP), whichever is later.

Metropolitan's WSCP is included as Appendix 4 to its 2020 UWMP which will be submitted to DWR by July 1, 2021. However, this WSCP is created separately from Metropolitan's 2020 UWMP and can be amended, as needed, without amending the UWMP.

Organization of this Document

The WSCP covers the required elements as set forth by CWC Section 10632. Because Metropolitan is a wholesale urban water supplier, elements that pertain only to retail water suppliers are not addressed in this WSCP.[1] The document contains eight sections. Section A.4.1 is an introduction that explains the purpose of the WSCP and provides background on Metropolitan's service area and system. Section A.4.2 is a summary of the water supply analysis and water reliability findings from the 2020 UWMP, pursuant to CWC Section 10635. Section A.4.3 is a description of procedures to conduct and approve the Annual Assessment. Section A.4.4 explains the WSCP's six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, 50, and more than 50 percent shortages and describes the WSCP's shortage response actions that align with the defined shortage levels. Section A.4.5 addresses communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments regarding any current

[1] WSCP elements that apply specifically to retailer water suppliers are: (1) a description of customer compliance, enforcement, appeal, and exemption procedures for triggered response actions (CWC Section 10632(a)(6)); (2) a description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1 (CWC Section 10632(a)(8)(c)); and (3) monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements (CWC Section 10632(a)(9)).

or predicted shortages and any resulting shortage response actions. Section A.4.6 is a description of the legal authorities that enable Metropolitan to implement and enforce its shortage response actions. Section A.4.7 is a description of the financial consequences of and responses for drought conditions. Section A.4.8 addresses reevaluation and improvement procedures for monitoring and evaluating the functionality of the WSCP and describes the process to adopt, submit, and amend the WSCP.

A.4.1 Background Information on Metropolitan

Background

Metropolitan is a public agency organized in 1928 by a vote of the electorate of 13 Southern California cities. The agency was enabled by the adoption of the original Metropolitan Water District Act (MWD Act) by the California Legislature "for the purpose of developing, storing, and distributing water for domestic purposes." The MWD Act also allows Metropolitan to sell "surplus water not needed or required for domestic or municipal uses within the district for beneficial purposes." In 1992, the Metropolitan Board of Directors adopted the following mission statement:

> *"To provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way."*

Water used in Southern California comes from several sources. The investments that Metropolitan has made and its ongoing efforts in many different areas coalesce toward its goal of long-term regional water supply reliability. The first function of Metropolitan was building the Colorado River Aqueduct (CRA) to convey water from the Colorado River. Deliveries through the CRA to member agencies began in 1941 and supplemented the local water supplies of the Southern California member cities. In 1960, to meet growing water demands in its service area, Metropolitan contracted with DWR for participation in the SWP, which delivers water to Metropolitan's service area via the California Aqueduct. SWP deliveries began in 1972. Metropolitan currently receives imported water from both of these sources: (1) Colorado River via the CRA, and (2) the SWP via the California Aqueduct. Beyond its core imported supplies from the Colorado River and SWP, Metropolitan actively supports efforts to develop storage and groundwater management programs, and to increase conservation, water recycling, groundwater recovery, and seawater desalination projects.

Service Area

Metropolitan's service area covers the Southern California coastal plain. It extends about 200 miles along the Pacific Ocean from the city of Oxnard to the north to the international boundary with Mexico to the south, and it reaches as far as 70 miles inland from the coast. The total area served is approximately 5,200 square miles, and it includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Table A.4-1 shows that although only 14 percent of the land area of the six Southern California counties is within Metropolitan's service area, approximately 86 percent of the population of those counties resides within Metropolitan's boundaries.

Table A.4-1
July 1, 2020 Area and Population in the
Six Counties of Metropolitan's Service Area

County	Total County	In Metropolitan Service Area	Percent in Metropolitan
Land Area (Square Miles)			
Los Angeles County	4,061	1,408	35%
Orange County	789	699	89%
Riverside County	7,208	1,057	15%
San Bernardino County	20,052	242	1%
San Diego County	4,200	1,420	34%
Ventura County	1,845	365	20%
Metropolitan's Service Area	**38,155**	**5,191**	**14%**
Population (Persons)			
Los Angeles County	10,172,000	9,275,000	91%
Orange County	3,191,000	3,184,000	100%
Riverside County	2,449,000	1,813,000	74%
San Bernardino County	2,184,000	872,000	40%
San Diego County	3,352,000	3,261,000	97%
Ventura County	841,000	630,000	75%
Metropolitan's Service Area	**22,189,000**	**19,035,000**	**86%**

Metropolitan is currently composed of 26 member agencies, including 14 cities, 11 municipal water districts, and one county water authority. Metropolitan is a water wholesaler with no retail customers. It provides treated and untreated water to its member agencies.

Metropolitan's 26 member agencies deliver to their customers a combination of local groundwater, local surface water, recycled water, desalinated seawater, and imported water received from Metropolitan. For some member agencies, Metropolitan supplies all the water used within that agency's service area, while others obtain varying amounts of water from Metropolitan to supplement local supplies. Between 2011 and 2020, Metropolitan has provided between 40 and 50 percent of the municipal, industrial, and agricultural water used in its service area. The remaining water supply comes from local wells, local surface water, recycling, and the city of Los Angeles' aqueducts from the Owens Valley/Mono Basin east of the Sierra Nevada. Member agencies also implement conservation programs that can be considered part of their supplies.

Some member agencies provide retail water service, while others provide water to their local area as wholesalers. Table A.4-2 shows Metropolitan's member agencies and the type of service that they provide. As shown in the table, 15 member agencies provide retail service to customers, nine provide only wholesale service, and two provide a combination of both. Metropolitan's member agencies serve residents in 152 cities and 89 unincorporated communities. Throughout Metropolitan's service area, approximately 250 retail water suppliers directly serve the population.

Table A.4-2
Metropolitan's Member Agencies and Type of Water Service Provided

Member Agency	Retail or Wholesale
Los Angeles County	
Beverly Hills, City of	Retail
Burbank, City of	Retail
Central Basin Municipal Water District	Wholesale
Compton, City of	Retail
Foothill Municipal Water District	Wholesale
Glendale, City of	Retail
Las Virgenes Municipal Water District	Retail
Long Beach, City of	Retail
Los Angeles, City of	Retail
Pasadena, City of	Retail
San Fernando, City of	Retail
San Marino, City of	Retail
Santa Monica, City of	Retail
Three Valleys Municipal Water District	Wholesale
Torrance, City of	Retail
Upper San Gabriel Valley Municipal Water District	Wholesale
West Basin Municipal Water District	Wholesale
Orange County	
Anaheim, City of	Retail
Fullerton, City of	Retail
Municipal Water District of Orange County	Wholesale
Santa Ana, City of	Retail
Riverside County	
Eastern Municipal Water District	Retail & Wholesale
Western Municipal Water District	Retail & Wholesale
San Bernardino County	
Inland Empire Utilities Agency	Wholesale
San Diego County	
San Diego County Water Authority	Wholesale
Ventura County	
Calleguas Municipal Water District	Wholesale

Reliability Planning

Metropolitan continuously engages in planning for various aspects of its water management, including operations, long-term reliability, and emergency response. These planning efforts include the 1996 Integrated Water Resources Plan (IRP) and its three updates in 2004, 2010, and 2015; the 2020 IRP (currently in development); the WSCP; the Water Surplus and Drought Management (WSDM) Plan; the Water Supply Allocation Plan (WSAP); the Emergency Storage Objective; and the Seismic Risk Assessment and Mitigation Plan. Collectively, they provide a policy framework, operating guidelines, and resource targets for Metropolitan to ensure regional water supply reliability.

The IRP is Metropolitan's evolving long-term plan to assure adequate water supplies for Southern California. The first IRP was adopted in 1996 to address the complexity of developing, maintaining and delivering water to meet changing demands in the face of growing challenge. The IRP has been updated several times over the past 25 years. In 2020, Metropolitan started development of a new IRP that incorporates planning for multiple future scenarios to address an extended range of uncertainty. While Metropolitan coordinates regional supply planning through its inclusive IRP process, Metropolitan's member agencies also conduct their own planning analyses, including their own urban water management plans, and may develop projects independently of Metropolitan.

The WSCP is designed to be consistent with the WSDM Plan and the WSAP described below. Throughout the year, Metropolitan evaluates member agency demands, available water supplies, and existing water storage levels on a monthly basis to determine the appropriate actions identified in the WSDM Plan.

The 1999 WSDM Plan provides policy guidance for managing regional water supplies during surplus and shortage conditions. Similar in concept to the WSCP, the WSDM Plan provides an overall vision for operational supply management and characterizes a flexible sequence of actions to minimize the probability of severe shortages and reduce the likelihood of extreme shortages. WSDM Plan principles guide the specific actions to be taken under WSCP shortage stages (see section A.4.4). Data collection, continual analysis, and monthly reporting processes of WSDM Plan implementation will form the basis for Metropolitan's Annual Water Supply Demand Assessment that will be provided annually to the state beginning in July 2022. The WSDM Plan is included as Attachment A to this WSCP.

The WSAP is Metropolitan's policy and formula for equitably allocating available water supplies to the member agencies during extreme water shortages when Metropolitan determines it is unable to meet all of its demands. The WSAP is included as Attachment B to this WSCP.

The Emergency Storage Objective is the regional planning estimate for emergency storage, which represents the amount of water that Metropolitan would hold in storage for the region in preparation for a catastrophic earthquake that would damage the aqueducts that transport imported water supplies to Southern California: the CRA, both the East and West branches of the California Aqueduct, and the Los Angeles Aqueduct. In 2019, Metropolitan and its member agencies completed a process to update the planning estimate of Metropolitan's Emergency Storage Objective. The emergency storage allows Metropolitan to deliver reserve supplies to the member agencies to supplement local production. This helps avoid severe water shortages during periods when the imported water aqueducts may be out of service.

Beginning January 2020, CWC Section 10632.5 mandates urban water suppliers to include in their UWMP a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. For Metropolitan, this requirement was addressed as part of developing its resilience strategy and is presented in detail in Metropolitan's seismic resiliency reports in Appendix 9 to the 2020 UWMP, which are incorporated herein by reference.

A.4.2. Analysis of Water Supply Reliability

Besides the WSCP, the Urban Water Management Planning Act requires suppliers to conduct two other planning analyses to evaluate supply reliability. The first is a Water Reliability Assessment that compares the total water supply sources available to the water supplier with long-term projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The second is a Drought Risk Assessment that evaluates a drought period that lasts five consecutive water years starting from the year following when the assessment is conducted.

Metropolitan completed its Water Reliability Assessment and Drought Risk Assessment as part of the 2020 UWMP. Through the Water Reliability Assessment, Metropolitan determined that, under the conditions required by the Urban Water Management Planning Act, it has supply capabilities sufficient to meet expected demands from 2025 through 2045 under a single dry-year condition and a period of drought lasting five consecutive water years, as well as in a normal water year hydrologic condition. Metropolitan's near-term Drought Risk Assessment revealed that its supply capabilities are expected to exceed its projected water use for the year 2022. However, estimates of projected water supply and use reveal that there could be a possible shortfall of core supplies in 2021, 2023, 2024, and 2025. This shortfall is largely triggered by the assumed low supply conditions from the SWP under a repeat of the historical condition of 1988 to 1992, which is modeled at 12% for 2021, 15% for 2023, 23% for 2024, and 18% for 2025. Actual supply conditions for the next five years may prove different from historic supply conditions. The WSCP shows Metropolitan's potential shortage response actions if such shortfalls were to happen. The Drought Risk Assessment projected supplies and demands for the years 2021 through 2025 using the driest five-year sequence.

Metropolitan's principal sources of water supplies are the SWP and the Colorado River. Metropolitan receives water delivered from the SWP under State Water Contract provisions, including contracted supplies, use of carryover storage in San Luis Reservoir, and surplus supplies. Metropolitan holds rights to Colorado River water for CRA diversion at Lake Havasu. Water management programs supplement these Colorado River supplies. To secure additional supplies, Metropolitan has groundwater banking partnerships and water transfer and storage arrangements within and outside its service area.

Hydrologic conditions and environmental regulations can have a significant impact on Metropolitan's imported water supply sources. For Metropolitan's SWP supplies, precipitation in California's northern Sierra Nevada during the fall and winter helps replenish storage levels in Lake Oroville, a key SWP facility. The source of Metropolitan's Colorado River supplies is primarily the watersheds of the Upper Colorado River Basin in the states of Colorado, Utah, and Wyoming. Although precipitation is primarily observed in the winter and spring, summer storms are common and can affect water supply conditions. Hydrologic variability, potential climate change, and regulatory risk are embedded in Metropolitan's modeling efforts. Metropolitan's modeling utilizes historical hydrologic conditions from 1992 to 2017 to simulate expected demands on Metropolitan supplies, as well as capacities and constraints of its storage facilities and supply programs. While potential impacts from climate change remain subject to study and debate, climate change is among the uncertainties that Metropolitan seeks to address through its various planning processes. Metropolitan's 2020 IRP is further addressing ways to account for and mitigate these uncertainties.

As demonstrated by the findings of both the Water Reliability Assessment and the Drought Risk Assessment, Metropolitan is able to mitigate the challenges posed by hydrologic variability, potential climate change, and regulatory risk on its imported supply sources through the significant storage capabilities it has developed over the last two decades, both dry-year and emergency storage.

A.4.3. Annual Water Supply and Demand Assessment Procedures

As an urban water supplier, Metropolitan is required under CWC Section 10632(a)(2) to prepare and submit an "annual water supply and demand assessment" (Annual Assessment). The Annual Assessment is a determination of Metropolitan's near-term outlook for supplies and demands and how a perceived shortage may relate to WSCP shortage stage response actions in the current calendar year. This determination will be based on known circumstances and information available to Metropolitan at the time of analysis. Starting in 2022, the Annual Assessment will be due by July 1 of every year, as indicated by CWC Section 10632.1. CWC Section 10632.1 also states that *"[a]n urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later*." The Annual Assessment and related reporting are to be conducted based on the procedures described in this WSCP. This section describes Metropolitan's procedures for conducting the Annual Assessment, which include: (1) the written decision-making process to determine water supply reliability; and (2) the key data inputs and assessment methodology to evaluate water supply reliability for the current year and one dry year.

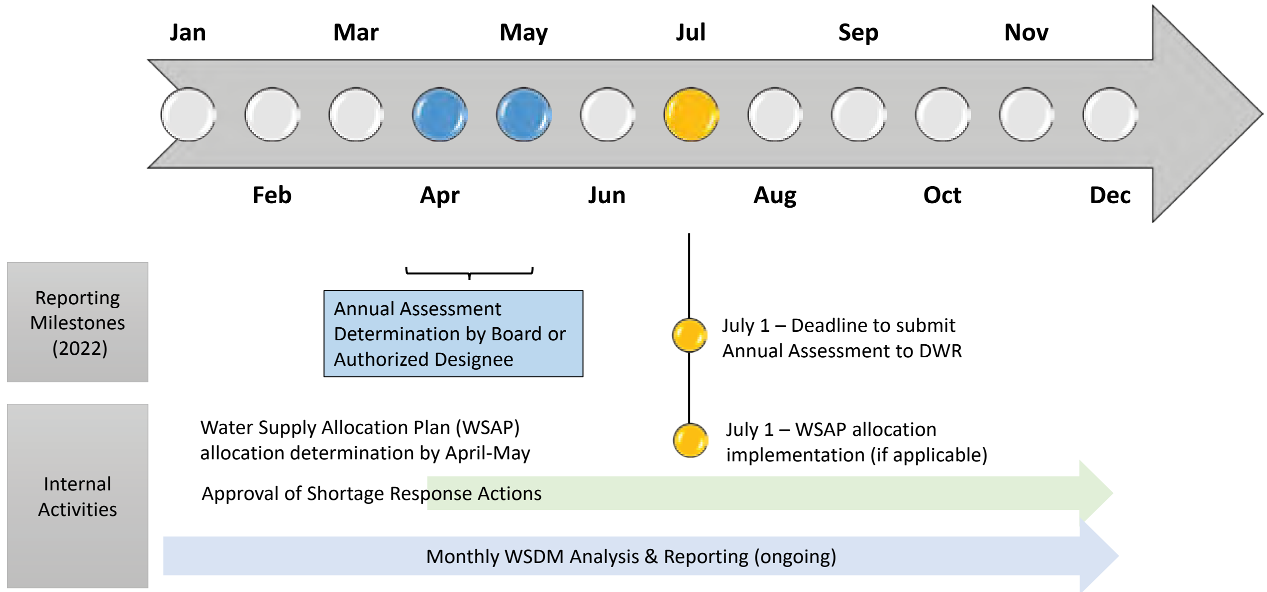
Steps to Approve the Annual Assessment Determination

The Annual Assessment will be primarily based on Metropolitan's ongoing WSDM supply-demand tracking process which is exhibited in monthly reporting to the Board of Directors throughout the year. WSDM planning activities involve examination of developing demand and supply conditions for the calendar year, as well as considerations of potential actions consistent with the WSDM Plan. These monthly analyses provide key information for Metropolitan to manage resources to meet a range of estimated demands and adjust to changing conditions throughout the year.

As a water supply wholesaler, Metropolitan's water demands are a function of retail-level demands and local water production. Water from Metropolitan serves as a supplemental source of supply for its 26 member agencies. For many member agencies, their primary source of water is produced locally from groundwater basins, surface reservoirs, recycled water projects, groundwater recovery projects, and seawater desalination. When local supplies are not enough to meet retail demands, member agencies purchase supplemental water from Metropolitan. Some member agencies rely heavily on Metropolitan due to limited local supplies. As described below, Metropolitan collects estimates of projected consumptive and replenishment water demands from its member agencies. This information is adjusted to determine unconstrained demands for the purpose of the Annual Assessment shortage percentage evaluation.

By June, Metropolitan staff will present a completed Annual Assessment for approval by the Board of Directors or by the Board's authorized designee with expressly delegated authority for approval of Annual Assessment determinations. This presentation will include a request that the approval of the Annual Assessment determination also appropriately triggers any recommended specific shortage response actions resulting from the assessment. Upon approval, Metropolitan staff will then formally submit the Annual Assessment to DWR by July 1. Figure A.4-1 provides a graphic representation of the decision-making process.

Figure A.4-1
Sample Annual Assessment Decision-Making Timeline



Data Inputs and Assessment Methodology

This section describes how Metropolitan will evaluate water supply reliability for the current year and one dry year for the purpose of the Annual Assessment. The Annual Assessment determination will be based on considerations of available core water supplies, unconstrained water demand, and infrastructure considerations. The difference between core water supplies and unconstrained demand will be used to determine what, if any, shortage stage is expected under the WSCP framework. The standard shortage stage percentage will be calculated by dividing the difference between core supplies and unconstrained demand by unconstrained demand. This calculation will be performed separately for anticipated current year conditions and for an assumed dry year condition.

Locally Applicable Evaluation Criteria

Because shortages are based on the difference between expected core supplies and unconstrained demand under current year and dry year conditions, the locally-applicable evaluation criteria to be used in the Annual Assessment for determining a shortage include the following:

- Characterization of current year and dry year scenarios based on best-available data, including anticipated hydrologic conditions for Metropolitan's supply source watersheds in the Colorado River basin and Northern California, as well as for local conditions in Metropolitan's service area in Southern California.
- Estimation of available core supplies (see below) for current year and dry year scenarios
- Estimation of unconstrained demands (see below) for current year and dry year scenarios

Together, these three criteria provide the necessary information to calculate shortage percentages by dividing the difference between core supplies and unconstrained demand by unconstrained demand, under current year and dry year scenarios. These criteria findings will also be given additional context and influenced by infrastructure considerations discussed below which will differ from year to year.

The information and analyses that comprise the Annual Assessment will be based on ongoing planning processes that include the monthly WSDM supply-demand reporting. The Annual Assessment represents a mid-year evaluation at a given point in time; even after formal approval and submittal of the Annual Assessment determination by July 1, Metropolitan will continue to monitor emerging supply and demand conditions and take appropriate actions consistent with the flexibility and adaptiveness inherent to this WSCP. Some locally-applicable conditions that affect Metropolitan's wholesale supply and demand, such as the Higher Priority Water Use Adjustment for Colorado River use (see below), local supply production, annual SWP allocations, the status of Metropolitan storage accounts, the status of the local groundwater basins, changed water use practices, and local economic activity entail a high degree of uncertainty and can differ significantly from earlier projections throughout the year.

Description and Quantification of Each Source of Water Supply (Core Supplies)

Metropolitan's core water supplies are counted as the supply component of the Annual Assessment. Core supplies include estimated water supplies from the Colorado River and the SWP for the current year. Imported core supplies vary from year to year and are influenced by annual weather and hydrology, as well as demand by other higher priority users and operational and regulatory factors.

Because core supplies are used every year, they are differentiated from the WSCP's shortage response actions for supply augmentation; supply augmentation actions are comprised of Metropolitan's portfolio of water storage reserves and flexible supply sources that are available on an as-needed basis.

Metropolitan's core supplies come from several programs, which are shown in Table A.4-3 and described below.

Table A.4-3
Core Water Supplies

Source	Core Supply
Colorado River	Colorado River Basic Apportionment Higher Priority Water Use Adjustment to Colorado River Basic Apportionment IID/MWD Conservation Program PVID Fallowing Program Bard Water District Seasonal Fallowing Program Lower Colorado Water Supply Project Exchange with SDCWA Exchange with the United States
State Water Project	MWD SWP Table A SWP Article 21 Interruptible Supplies SWP Port Hueneme Lease of Ventura Table A Desert Water Agency/Coachella Valley Water District/Metropolitan Water Exchange and Advance Delivery Programs San Gabriel Valley Municipal Water District Program

Colorado River

Colorado River Basic Apportionment

Metropolitan built, owns, and operates the 242-mile CRA. The CRA originates at Lake Havasu on the Colorado River and winds through a series of pump stations and reservoirs through the California desert to its terminal reservoir at Lake Mathews in Riverside County. The CRA has a full delivery capacity of about 1.25 MAF.

The state of California holds a 4.4 MAF per year normal apportionment to Colorado River water. Metropolitan has the Fourth Priority right to normal apportionment of 550,000 AF per year of the State's normal apportionment. Metropolitan also holds the Fifth Priority right for an additional 662,000 AF per year which is utilized during surplus conditions or when supplies from other Colorado River users are available.

Higher Priority Water Use Adjustment to Metropolitan's Colorado River Basic Apportionment

Entitlements to use Colorado River water in California under priorities 1, 2, and 3 are limited to 3.85 MAF per year. Priority 3(a) is held by the Imperial Irrigation District and the Coachella Valley Water District (CVWD) totaling 3.43 MAF. After accounting for contractual conservation and transfers, any unused volume available to Priority 3(a) becomes available for use by Metropolitan. Of the 3.85 MAF, the remaining 420,000 AF is available for use under priorities 1, 2, and 3(b) held by the Palo Verde Irrigation District and the Yuma Project lands within California. Any unused amount from this volume is available for use by Metropolitan, however, Metropolitan must forego its otherwise available Colorado River supplies to meet annual uses under priorities 1, 2, and 3(b) that are in excess of 420,000 AF. Lastly, there are additional high-priority "present perfected rights" within California not incorporated into the priorities, for which Metropolitan must forego its otherwise available Colorado River supplies to meet uses of present perfected rights that exceed 14,500 AF. The net sum of these volumes is the "higher priority water use adjustment" to Metropolitan's base supply.

Imperial Irrigation District-Metropolitan Conservation Program

Since 1988, Metropolitan has funded water conservation programs within Imperial Irrigation District's (IID) service area. The amount of water conserved from these programs is then transferred to Metropolitan. Conservation approaches range from distribution system improvements (such as canal lining, spill capture and the installation of non-leak irrigation gates) to efficient on-farm water management practices (such as delivering water to farmers on a 12-hour rather than a 24-hour basis). Through this program, a total of 105,000 AF per year of water is conserved and made available to Metropolitan.

Palo Verde Irrigation District Land Management, Crop Rotation and Water Supply Program

In 2005, Metropolitan entered a 35-year program with the Palo Verde Irrigation District (PVID). Under the program, participating farmers in PVID are paid to reduce their water use by leaving acreage unirrigated. A base amount of 25 percent of the program acreage must be fallowed every year. Metropolitan may elect to call for additional acreage to be fallowed up to 90.3%. Fallowing calls must be made at least one year in advance by July 31 of each year and would take effect on August 1 of the following year. The reduced consumptive use due to fallowed lands reduces uses under priorities 1, 2, and 3(b), thereby increasing the Colorado River water supply available to Metropolitan. The fallowing program saves a minimum of 33,000 AF per year and up to 133,000 AF in certain years.

Metropolitan/Bard Seasonal Fallowing Program

At its December 2019 meeting, Metropolitan's Board authorized a 7-year seasonal fallowing program with the Bard Water District (Bard). Under the program, participating farmers in Bard are being paid to reduce their water use by not irrigating a portion of their land. A maximum of 3,000 acres can be fallowed in any given year. Under the terms of the QSA, water savings within the Bard service area are made available to Metropolitan. Bard Unit, as part of the Yuma Project, has the first priority for Colorado River water under the water delivery contracts with the USBR. Implementation of the program began in March 2020. It is estimated that the Seasonal Fallowing Program would provide up to 6,000 AF per year of additional Colorado River water. This water would be available in any year as needed and in accordance with the provisions described in the agreements with Bard Unit farmers and Bard.

Lower Colorado Water Supply Project

Groundwater is pumped by the Lower Colorado Water Supply Project near the All-American Canal and is discharged to the Canal. IID reduces its net diversions of Colorado River water by an amount equal to the amount of Project water discharged into the Canal, permitting entities along the Colorado River that do not have rights or have insufficient rights to divert Colorado River water to obtain a supply of water. In 2007, Metropolitan entered into a contract with the USBR and the City of Needles to utilize the unused Project capacity.

Exchange with the San Diego County Water Authority (SDCWA)

SDCWA has acquired conserved Colorado River water reaching an annual volume of 277.7 TAF by 2023. SDCWA makes this water available at Lake Havasu for Metropolitan diversion, where Metropolitan takes possession of the water and provides a matching volume from Metropolitan's blended supplies to SDCWA by exchange in equal monthly amounts. The conserved water is acquired by SDCWA through its transfer agreement with IID and from the lining of the All-American and Coachella canals.

Under the transfer agreement with IID, the stabilized annual transfer volume of 200 TAF is generated from conservation of water through on-farm efficiency conservation arrangements made by IID with its customers and other system efficiency measures.

The Coachella Canal Lining Project consists of a 35-mile concrete-lined canal, including siphons, which replaced an earthen canal. The project was completed in December 2006 and conserves 30,850 AF annually. The All-American Canal Lining Project consists of a concrete-lined canal constructed parallel to 23 miles of earthen canal and was completed in 2009, conserving 67,700 AF annually.

Pursuant to the QSA and related agreements, the 98,550 AF of water resulting from these projects annually is allocated as follows: 16,000 AF to the San Luis Rey Settlement Parties in San Diego County, 77,700 AF to SDCWA, and 4,850 AF for Coachella Canal Lining Project mitigation.

Exchange with the United States

Of the 16 TAF allocated to the San Luis Rey Settlement Parties from the All-American and Coachella canal lining projects, the United States furnishes this water at Metropolitan's Colorado River Intake on Lake Havasu. Metropolitan takes possession of the water and by exchange delivers an equal volume of Metropolitan's blended supplies to SDCWA. By separate agreement, SDCWA conveys the water to the San Luis Rey Settlement Parties. So long as water conserved by the All-American Canal Lining Project and Coachella Canal Lining Project is allocated to and available for use by the San Luis Rey Settlement Parties, the United States will make 16 TAF available for diversion by Metropolitan in perpetuity.

State Water Project

Table A Contract Amount

In accordance with its participation contract with DWR, Metropolitan's basic contract amount is for 1,911,500 AF per year. This represents the amount of water supply that would be available to Metropolitan in years where there is sufficient water supply for the SWP to deliver 100 percent of its total contract amounts. The amount of supply actually available on an annual basis is allocated to the State Water Contractors based on their proportionate Table A amounts.

DWR estimates the amount of supplies that are available each year. Metropolitan uses a forecasting method for SWP deliveries based on historical patterns of precipitation, runoff and actual deliveries of water. Annual SWP allocations have ranged from 5 percent to 100 percent of the Table A contract amounts.

Article 21 Interruptible Supplies

Metropolitan has a contract to water supplies that are made available on an intermittent basis. Storm flows can occasionally make water supplies available that are in excess to the Table A allocation. State Water Contractors can take delivery of these supplies, with their rights being based on their proportional Table A contract amounts. Historically, Article 21 interruptible supplies have ranged from 0 to 240,000 AF annually.

SWP Port Hueneme Lease of Ventura Table A

Metropolitan has a right to delivery of up to 1,850 AF of Table A supply from the Ventura County Watershed Protection District (Ventura), one of 29 SWP contractors, via a sublease agreement with the Port Hueneme Water Agency (Port Hueneme). United Water Conservation District, one of three agencies holding a contract right to Ventura Table A supply, leases this portion of their total 5,000 AF of Table A supply to Port Hueneme, which in turn subleases the Table A supply to Metropolitan. The long-term lease is a condition of the 1996 annexation of the Port Hueneme service area to Calleguas Municipal Water District and Metropolitan. This water supply is in addition to Metropolitan's Table A, and the amount available each year is determined by the SWP allocation, with 1,850 AF available at a 100 percent allocation.

Desert Water Agency/Coachella Valley Water District/Metropolitan Water Exchange and Advance Delivery Programs

The Desert Water Agency (DWA) and CVWD, both in Riverside County, have rights to SWP deliveries, but do not have any physical connections to the SWP facilities. Both agencies are adjacent to the CRA. For DWA and CVWD to obtain water equal to their SWP allocations, Metropolitan has agreed to exchange an equal quantity of its Colorado River water for DWA and CVWD's SWP water. DWA has a SWP Table A contract right of 55.75 TAF per year, and CVWD has a SWP Table A contract right of 138.35 TAF per year, for a total of 194.1 TAF per year. Additionally, CVWD has a long-term water supply agreement for 9.5 to 16.5 TAF annually from Rosedale Rio-Bravo Water Storage District.

Under the existing agreements, Metropolitan provides water from its CRA to DWA and CVWD in exchange for SWP deliveries. Metropolitan can deliver additional water to its DWA/CVWD service connections, permitting these agencies to store water. When supplies are needed, Metropolitan can then receive its full Colorado River supply, as well as the SWP allocation from the two agencies, while the two agencies can rely on the stored water for meeting their water supply needs. The amount of DWA and CVWD SWP Table A water available to Metropolitan depends on total SWP deliveries and varies from year to year.

In addition to their Table A and long-term water supplies, DWA and CVWD, subject to available capacity, may take delivery of SWP supplies available under Article 21, the Turn-back Pool Program, and non-SWP water supplies they may acquire and convey through the SWP facilities. These other supplies are delivered to DWA and CVWD by exchange with Metropolitan in the same manner as Table A deliveries. DWA and CVWD are participants in the Yuba Dry Year Water Purchase Program. Additionally, DWA participated in the 2009 Drought Water Bank and the 2015-2016 Multi-Year Water Pool Demonstration Program.

San Gabriel Valley Municipal Water District Program

The San Gabriel Valley Municipal Water District Program allows Metropolitan to exchange supplies to provide additional water for normal and dry year needs. Under this program, Metropolitan delivers supplies to the City of Sierra Madre, a San Gabriel Valley Municipal Water District member agency. In exchange for Metropolitan delivering one AF, San Gabriel Valley Municipal Water District returns two AF to Metropolitan in the Main San Gabriel Basin, up to 5 TAF. For any exchange amount less than 5 TAF, Metropolitan purchases the balance of the 5 TAF. The program provides increased reliability to Metropolitan by allowing additional water to be delivered to Metropolitan member agencies that rely upon the Main San Gabriel

Basin for their supplies – Three Valleys Municipal Water District and Upper San Gabriel Valley Municipal Water District.

Unconstrained Demands

For the purpose of the Annual Assessment and WSCP, CWC Section 10632(a)(2)(B)(i) directs Metropolitan to use current year "unconstrained demand" when assessing water supply reliability. The WSCP and Annual Assessment define unconstrained demand as expected water use in the current assessment year, based on recent water use, and before any projected shortage response actions that may be taken under the WSCP. Unconstrained demand is distinguished from observed demand, which may be constrained by preceding, ongoing, or future actions, such as emergency supply allocations during a multi-year drought. WSCP shortage response actions, if any are in place, that result in extraordinary demand reductions in the current year to constrain demand are inherently extraordinary; routine activities such as ongoing conservation programs and regular operational adjustments are not considered as constraints on demands.

To forecast near-term demands, Metropolitan begins by gathering data from its member agencies. In July of each year, member agencies submit their five-year demand forecasts to Metropolitan. Metropolitan uses this information as the foundation for forecasting demands. As the year progresses, the member agency forecasts are compared to the current demand trend. This comparison allows Metropolitan to adjust member agency forecasts to current conditions, while collaborating with member agencies as needed.

Metropolitan builds upon member agency demand projections to develop its own near-term forecast for its monthly WSDM supply-demand reporting. This forecast considers additional factors such as historical demand trends, changes in local supply production, weather trends, water-use efficiency trends, retail demand estimates, and updated estimates from member agencies.

Because these forecasted demands would be "constrained" observed demands rather than unconstrained demands, Metropolitan will adjust its near-term demand forecast for the Annual Assessment to account for extraordinary demand management measures that Metropolitan may intend or have already put into effect for the current year. Extraordinary demand management measures may include intensified communication and public outreach, and shortage allocations to its member agency customers through implementation of Metropolitan's WSAP. Non-extraordinary water savings from regular conservation and community outreach activities are considered part of Metropolitan's baseline demands and are not counted again for assessments of unconstrained demand.

Water Conditions for Current Year Available Supply Considering Current Year Conditions and One Dry Year

CWC Section 10632(a)(2)(B)(ii) requires the Annual Assessment to determine *"current year available supply, considering hydrological and regulatory conditions in the current year and one dry year."* The Annual Assessment will include two separate estimates of Metropolitan's annual water supply and unconstrained demand using: 1) current year conditions, and 2) assumed dry year conditions. Accordingly, the Annual Assessment's shortage analysis will present separate sets of findings for the current year and dry year scenarios. The CWC does not specify the characteristics of a dry year, allowing discretion to the Supplier. Metropolitan will use this discretion to refine and update its assumptions for a dry year scenario in each Annual Assessment as information becomes available.

In the 2020 UWMP, the "single dry year" is characterized to resemble conditions as a year in which conditions reflect the lowest water supply available to the Supplier. Metropolitan developed estimates of future demands and supplies from local sources and from Metropolitan sources based on 96 years (1922-2017) of historic hydrologic conditions. Supply and demand analyses for the single-dry year case was based on conditions affecting the SWP as this supply availability fluctuates the most among Metropolitan's sources of supply. Based on the 96-year period, 1977 was the single driest year for SWP supplies to Metropolitan. In addition, staff analysis of the 8-river index indicated that 1977 was the single driest year from 1922 through 2017. The 8-river index is used by DWR and other water agencies as an estimate of the unimpaired runoff (or natural water production) of the Sacramento and San Joaquin River basins, which are sources of water for the SWP.

Infrastructure Considerations

The Annual Assessment will consider any infrastructure issues that may pertain to near-term water supply reliability, including repairs, construction, and environmental mitigation measures that may temporarily constrain capabilities, as well as any new projects that may add to system capacity.

Metropolitan operates a distribution system that is flexible and adaptable allowing delivery of supplies from a combination of SWP, Colorado River, and regional storage sources to meet demands throughout its service area, as shown in Figure A.4-2. System distribution capabilities and limitations can add complexity to near-term reliability. For example, a portion of Metropolitan's service area currently cannot be served by Colorado River supplies. In the event of very low SWP supplies and available storage along the SWP system, Metropolitan's operations may be acutely challenged to meet SWP-only demands even though in that same year total supplies including Colorado River supplies may exceed total demands.

Metropolitan also has five regional water treatment plants, with capacities presented in Table A.4-4. Portions of Metropolitan's service area may receive water treated by one or a combination of several of these water treatment plants. Over the last 40 years, Metropolitan effectively delivered to its member agencies water supplies to meet demands ranging from 1.2 MAF per year to over 2.5 MAF per year.

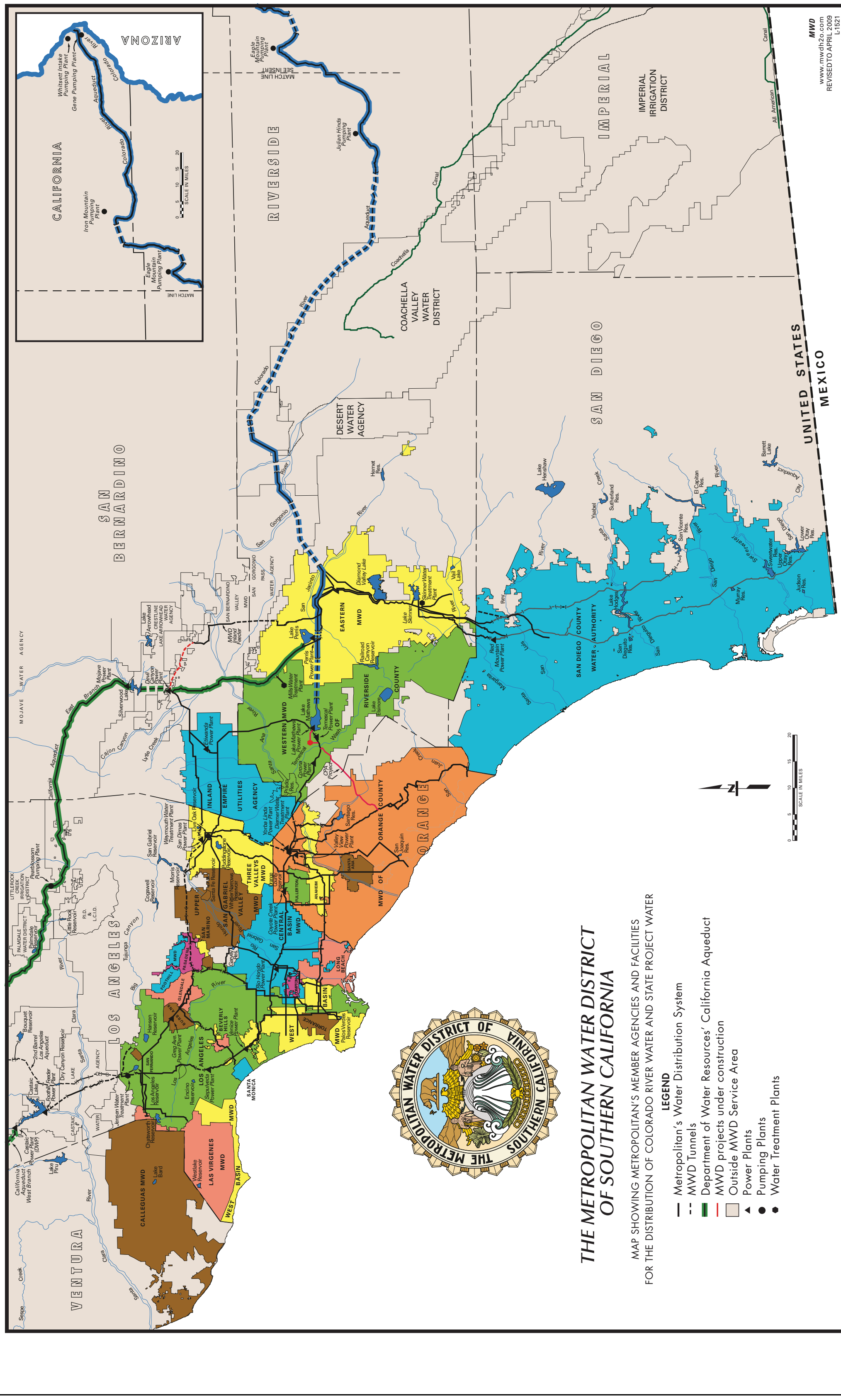
Table A.4-4
Metropolitan's Water Treatment Plants

Water Treatment Plant	Capacity (in MGD)
Jensen	750
Weymouth	520
Diemer	520
Mills	220
Skinner	350

Note: Rated capacity. Effluent capacities may be less to account for backwash.

Metropolitan and its member agencies continue to implement system improvements and modifications to effectively increase system flexibility during both normal operations when imported supplies are available and during extraordinary times when SWP supplies are reduced to maximize the use of more readily available Colorado River water and Diamond Valley Lake supplies.

Figure A.4-2
Metropolitan's Service Area



Throughout each year, Metropolitan regularly carries out preventive and corrective maintenance of its facilities. Metropolitan plans and performs shutdowns to inspect and repair pipelines and facilities and support capital improvement projects. These shutdowns involve a high level of planning and coordination within Metropolitan, as well as with member agencies, other affected organizations, contractors, and the community. These shutdowns are scheduled to ensure that major portions of the distribution system are not out of service at the same time. Operational flexibility within Metropolitan's system and the cooperation of member agencies allow shutdowns to be successfully completed while continuing to meet all system demands.

Metropolitan's Infrastructure Reliability Strategy helps to ensure long-term reliable performance of the system in an efficient and cost-effective manner. Infrastructure reliability is addressed through three programs: the Maintenance Management Program, the Infrastructure Protection Plan, and the Dam Safety Program. The activities performed under these programs allow for Metropolitan to extend the life span of its facilities and equipment and improve the overall reliability of the entire conveyance, treatment, and distribution system. In addition, seismic resiliency issues are addressed in the Seismic Risk Assessment and Mitigation Plan, which is included in Appendix 8 to the 2020 UWMP and incorporated herein by reference.

In the event that Metropolitan anticipates that an infrastructure issue is likely to impede or expand Metropolitan's capability to convey, treat, or distribute water during the current year, then the issue would be documented, and the determination of water reliability in the Annual Assessment would be adjusted accordingly.

Other Factors

Water quality is of paramount importance to water supply reliability. Metropolitan owns and operates five water treatment plants. Metropolitan is a national leader in providing safe drinking water that meets increasingly stringent standards, testing for over 400 constituents and performing nearly 200,000 water quality tests annually on samples gathered throughout its distribution system. Metropolitan's Water Quality Laboratory analyzes these samples to ensure that Metropolitan's delivered water meets or surpasses all state and federal drinking water standards. Because treatment to remove specific contaminants can be more costly than measures to protect water at the source, Metropolitan also actively supports improved watershed protection programs for its source waters in the Colorado River and SWP. For the Annual Assessment, any known issues related to water quality will be considered for their potential effects on water supply reliability.

A.4.4. Shortage Levels and Shortage Response Actions

Six Standard Water Shortage Levels

As required by California Water Code Section 10632(a)(3)(A), the WSCP is framed around six standard water shortage levels that correspond to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortages. As shown in Table A.4-5, each of the six shortage levels represents an increasing gap between Metropolitan's estimated core supplies and unconstrained demand as determined in the Annual Assessment. As explained above, shortage percentages will be calculated by dividing the difference between core supplies and unconstrained demand by unconstrained demand. This calculation will be performed separately for anticipated current year conditions and for assumed dry year conditions. Shortage levels also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other emergency events. The shortage levels are defined in terms of the percent shortfall of supplies against demands.

Shortage Response Actions

California Water Code Section 10632(a)(4) requires the WSCP to specify shortage response actions that align with the defined shortage levels, and include, at a minimum, all of the following:

- Locally appropriate supply augmentation actions
- Locally appropriate demand reduction actions to adequately respond to shortages
- Locally appropriate operational changes
- Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions (Not applicable to Metropolitan)
- An estimate of the extent to which the gap between supplies and demand will be reduced by implementation of each action.

As indicated in Table A.4-5, shortage responses will be customized to meet the circumstances for the particular shortage. Because circumstances can change at any time, Metropolitan's shortage responses actions will be adjusted accordingly throughout the year. To determine specific actions that would be taken at each standard shortage level, Metropolitan will evaluate conditions specific to cost, timing, distribution needs and capabilities, and other variables that include SWP allocation, Colorado River conditions, demand reduction measures, supply program take capacities, and storage balances.

Shortages are characterized not merely by shortfalls in annual core water supplies, but also by the water balances in Metropolitan's storage programs. Thus, a 10 percent shortfall in core supplies could be met entirely with stored water if storage levels are high. If storage levels are already depleted, the same shortfall in core supplies could potentially require a more complex mix of supply augmentation and demand reduction actions. In the most severe situations, allocating shortages to member agencies through the WSAP would address any remaining shortages not already mitigated by supply augmentation and lesser demand reduction actions.

Metropolitan has invested extensively in a diverse portfolio of supply sources and system resiliency to prepare for a wide range of possible challenging conditions. Metropolitan follows the principles of its WSDM Plan, which was adopted in 1999 and provides policy guidance for managing regional water supplies to achieve reliability. It identifies a broad sequence of actions during surpluses and shortages to minimize probability of severe shortages, based on detailed modeling of Metropolitan's existing and expected resource mix. The WSDM Plan recognizes the link between surplus and shortages and integrates planned operational actions with respect to both conditions. The WSDM Plan is included as Attachment A to this document.

Table A.4-5
Shortage Stages and Response Actions

Shortage Stage	Shortage Percentage	Shortage Response	
1	Up to 10%	Take from Storage Execute Flexible Supplies Implement Voluntary Demand Reduction Implement Water Supply Allocation Plan	• 0 to 100% met by Storage • 0 to 100% met by Flexible Supplies • 0 to 20% of total retail water use met by implementing Communication Plan • 0 to 50% of total base demand met by WSAP supply allocation
2	10% to 20%	Take from Storage Execute Flexible Supplies Implement Voluntary Demand Reduction Implement Water Supply Allocation Plan	• 0 to 100% met by Storage • 0 to 100% met by Flexible Supplies • 0 to 20% of total retail water use met by implementing Communication Plan • 0 to 50% of total base demand met by WSAP supply allocation
3	20% to 30%	Take from Storage Execute Flexible Supplies Implement Voluntary Demand Reduction Implement Water Supply Allocation Plan	• 0 to 100% met by Storage • 0 to 100% met by Flexible Supplies • 0 to 20% of total retail water use met by implementing Communication Plan • 0 to 50% of total base demand met by WSAP supply allocation
4	30% to 40%	Take from Storage Execute Flexible Supplies Implement Voluntary Demand Reduction Implement Water Supply Allocation Plan	• 0 to 100% met by Storage • 0 to 100% met by Flexible Supplies • 0 to 20% of total retail water use met by implementing Communication Plan • 0 to 50% of total base demand met by WSAP supply allocation
5	40% to 50%	Take from Storage Execute Flexible Supplies Implement Voluntary Demand Reduction Implement Water Supply Allocation Plan	• 0 to 100% met by Storage • 0 to 100% met by Flexible Supplies • 0 to 20% of total retail water use met by implementing Communication Plan • 0 to 50% of total base demand met by WSAP supply allocation
6	More than 50%	Take from Storage Execute Flexible Supplies Implement Voluntary Demand Reduction Implement Water Supply Allocation Plan Take from Emergency Storage, if needed	• 0 to 100% met by Storage • 0 to 100% met by Flexible Supplies • 0 to 20% of total retail water use met by implementing Communication Plan • 0 to 50% of total base demand met by WSAP supply allocation • Take from emergency storage during a catastrophic event

Supply Augmentation Actions

Generally, Metropolitan's first response to any gap between core supplies and demand is to make optimal use of its supply augmentation options consisting of draws from flexible supply programs and storage reserves listed in Table A.4-6. To supplement its core water supplies from the SWP and Colorado River, Metropolitan has developed and actively manages a portfolio of water supply programs, including water transfer, storage and exchange agreements, the supplies created by which are conveyed through available CRA capacity or the California Aqueduct. Metropolitan pursues voluntary water transfer and exchange programs with other entities to help mitigate supply/demand imbalances and provide additional dry-year supply sources. Metropolitan has also developed significant storage capacity in reservoirs and groundwater banking programs both within and outside of the Southern California region. In a hypothetical single dry year assessment within the 2020 Urban Water Management Plan, Metropolitan could take up to approximately 1.8 MAF in a single year to meet dry year demands. Actual take capabilities would depend on various factors including water balances, location, and operational constraints.

Flexible Supplies

Metropolitan can augment its core Colorado River supplies through agreements with other agencies that have rights to use such water. Metropolitan determines the delivery schedule of these supplies throughout the year based on changes in the availability of SWP and to a smaller extent the higher priority water use adjustment for Colorado River water.

In addition to the basic SWP contract provisions, Metropolitan has other contract rights that facilitate augmentation of its SWP supply. Each SWP contractor has the right to use the facilities to move water supplies associated with agreements, water transfers, and water exchanges at the incremental cost. Metropolitan utilizes this ability in conveying water obtained through a number of agreements and exchanges with agencies in California's Central Valley north of the Bay-Delta and southward to Southern California.

Storage

A key component of Metropolitan's water supply capability is the amount of water in Metropolitan's storage facilities and programs in which surplus amounts of water in normal and wet years are captured until needed to augment core supplies. Metropolitan has developed an extensive storage portfolio made up of units within and outside Metropolitan's service area that includes both dry-year and emergency storage capacity. Such units, totaling approximately 6.0 MAF, include reservoirs, conjunctive use and other groundwater storage programs within the service area, and groundwater and surface storage accounts outside the service area delivered through the CRA or SWP. Consistent with the Emergency Storage Objective that was revised in 2019, approximately 750,000 AF of total stored water is emergency storage reserved for use in the event of supply interruptions from earthquakes or similar emergencies.

Table A.4-6
Supply Augmentation Actions: Flexible Supplies and Storage

Source	Flexible Supplies	Storage
Colorado River		Lake Mead Intentionally Created Surplus (ICS) Storage Program Southern Nevada Water Agency Storage and Interstate Release Agreement Desert Water Agency/Coachella Valley Water District Advanced Delivery Account Imperial Irrigation District Storage
State Water Project	SWP Transfers: State Water Contractors Buyers Group SWP Transfers: Yuba Accord Dry-Year Purchase San Bernardino Valley Municipal Water District Program	SWP Carryover DWR Flexible Storage (Castaic Lake and Lake Perris) SWP Banking Programs
In-Region		Diamond Valley Lake Lake Mathews Lake Skinner Conjunctive Use Programs (CUP)

Demand Reduction Actions

Demand reduction actions are extraordinary measures taken to temporarily constrain water demand during a shortage. For the purpose of the WSCP and the Annual Assessment, it is important to separate temporary reductions in demand from baseline conservation as they relate to constrained and unconstrained demands. WSCP demand reduction actions result in constrained demands. Water savings from WSCP demand reduction actions must be factored into estimates of unconstrained demands for Annual Assessment shortage determinations. Intensity of demand reduction measures will vary by the severity of shortage and availability of other cost-effective supply augmentation measures. Early demand reduction actions tend to be voluntary measures that are comprised of outreach and education actions from Metropolitan's WSCP Communication Plan (see following section A.4.5). More severe conditions may necessitate supply allocations to wholesale customers through implementation of the WSAP. Table A.4-7 shows the demand reduction measures available to Metropolitan.

Table A.4-7
Demand Reduction Actions

	Demand Reduction Actions
Voluntary Measures	Implement Communication Plan (May apply to Shortage Levels 1-6, Crisis) • Public information campaigns • Community outreach and media relations • Public opinion research • Interagency and intergovernmental coordination
Mandatory Measures	Implement Water Supply Allocation Plan (May apply to Shortage Levels 1-6, Crisis)

Benefits of public information campaigns include rapid implementation and raising public awareness of the severity of the water shortage. For this reason, public information campaigns are included as a Demand Reduction Action in the WSCP. According to the American Water Works Association, water savings from this measure alone range from 5 to 20 percent, depending on the time, money, and effort spent.[2] If public outreach targets between 5 and 10 percent of population, then demand would be assumed to be reduced by 5 to 20 percent of the 5 to 10 percent. The size of media campaign is correlated with the number of people being reached.

Implement Communications Plan

Metropolitan's WSCP Communication Plan details Metropolitan's action-oriented strategy for education, outreach, and coordination during each WSCP standard shortage stage and in response to a catastrophic loss of supply. See the following section A.4.5 for the WSCP Communications Plan.

Enhanced Conservation Program

Although not considered as a WSCP demand reduction action because of their limited effect in the immediate term, Metropolitan administers regional conservation programs and co-funds member agency conservation programs designed to achieve greater water use efficiency in residential, commercial, industrial, institutional, and landscape uses. Metropolitan may implement extraordinary measures to temporarily enhance conservation during a shortage which include, but are not limited to, increasing rebates, reducing program eligibility requirements, working with rebate vendors to create in-store marketing and direct outreach to businesses, increasing direct install efforts with member agencies and partners, and working with water retailers and retail customers to develop onsite leak prevention programs. While the savings from conservation programs may not be realized quickly enough to mitigate the need for other shortage response actions, water-efficient device retrofit rebates, landscape conversions, and leak prevention all contribute to ongoing structural water savings. Conservation device retrofits help to recover storage in future years by lowering demands in all years, not only shortage years.

[2] American Water Works Association. 2019. Manual of Water Supply Practices – M60, Second Edition: Drought Preparedness and Response. p. 35

Water Supply Allocation Plan

Under most conditions, Metropolitan can meet all of its service area's wholesale water needs. However, during severe water shortage situations when pubic information campaigns and enhanced conservation programs are insufficient to generate the needed demand reduction, Metropolitan may find it necessary to temporarily limit and allocate supplies to its member agencies. Metropolitan's WSAP allocates Metropolitan's water supplies among its member agencies, based on the principles contained in the WSDM Plan, to mitigate drawdowns from water storage reserves. The WSAP was originally approved by Metropolitan's Board in February 2008 and has been implemented three times since its adoption, most recently in April 2015. The WSAP provides a formula for equitable distribution of limited water supplies. If needed, a WSAP action is typically approved in the month of April with implementation beginning in the following July. This allows Metropolitan's member agencies time to prepare and to adjust their estimates for Metropolitan current year supply for their own WSCP Annual Assessments.

The WSAP allocation is a costly shortage response action that places acute burdens upon member agencies and the public. Other shortage response actions are generally preferred to the extent practicable. Metropolitan's overall strategy considers WSAP allocations to be a fallback option to address any remaining shortages when supply augmentation actions and other demand management measures are insufficient to meet demand reduction objectives. For reference, the WSAP is included as Attachment B to this document.

Operational Changes

During shortage conditions, operations may be affected by supply augmentation or demand reduction responses. For example, Metropolitan may temporarily alter maintenance cycles, defer planned system outages, and adjust the flow and routing of water through its system to more effectively distribute available supply across the service area, including areas that are currently only able to be served by SWP water supplies.

Because of the extensive and complex nature of Metropolitan's conveyance and distribution system, and the varying levels of local supplies available among each of the member agencies, by necessity, any supply-related shortage response actions triggered under the WSCP would be carefully chosen to optimally match available resources with specific localized demands by the member agencies.

Metropolitan's diversified portfolio of water supplies presents operational opportunities and challenges during droughts. Because water resources available to the Metropolitan service area come from three geographically distinct regions—Northern California, the Colorado River, and local resources—a relatively dry year affecting one of these three regions can be offset by relatively abundant supplies from the other two regions. For example, a year of ample precipitation within Metropolitan's service area tends to depress demand and enhances local water resources, further reducing demands on imported supplies. A wet year in the Sacramento-San Joaquin watersheds increases the SWP allocation, facilitating reduced diversions from the Colorado River in favor of storing supplies in Lake Mead or in the Desert Water Agency/Coachella Valley Water District Advanced Delivery Account. Conversely, a shortfall on the SWP may require system operational modifications to maximize Colorado River diversions and the delivery of Colorado River supplies to areas normally served with SWP supplies. Metropolitan's Colorado River core supplies are relatively stable from year to year and are less subject to severe supply reductions.

Additional Mandatory Prohibitions (not applicable)

California Water Code Section 10632(a)(4)(D) calls for "additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions" to be included among the WSCP's shortage response actions. However, this item is not applicable to Metropolitan. As a regional wholesaler, Metropolitan does not dictate or control the end uses of water by retail consumers.

Shortage Response Action Effectiveness

As shown in Table A.4-5, WSCP shortage response actions will be implemented to reflect the overall conditions facing Metropolitan and the resources available in that given year. Supply augmentation actions consisting of stored water and as-needed flexible supplies are expected to address between 0 to 100 percent of anticipated shortages for any shortage stage, depending on availability of those supplies; in lesser WSCP shortage stages, it is likely that shortages can be completely addressed through supply augmentation.

Efficacy of demand reduction efforts is difficult to estimate or predict, but water savings are a function of the extent to which public information campaigns reach water users and the degree of consumer response to those messages. Given the estimate of between 5 to 20 percent effectiveness described above, in concept, up to 20 percent of retail demands could be reduced if a successful media campaign reached and influenced the entire service area population. Consistent with the WSCP Communications Plan in the following section A.4.5, anticipated shortages will involve an appropriately-sized outreach campaign to address the targeted demand reduction, which depends on the combined effectiveness of other shortage response actions.

As shown in Table A.4-8 below, the WSAP is designed to reduce demands by up to approximately 50 percent of the WSAP's calculated base demand. The WSAP contains 10 levels of allocation, and each level is approximated to generate an additional 5 percent reduction from base demands. Table A.4-8 gives examples of estimated savings by each WSAP level using a hypothetical base demand of 1.8 MAF. Actual reductions and base demands are based on a formula that includes various factors such as actual local supply production, population growth, and conservation. The WSAP is expected to address any remaining shortage not met by other shortage response actions.

Table A.4-8
Water Supply Allocation Plan Levels

WSAP Level	Approximate Percent Reduction	Example Base Demand	Estimated Demand Reduction
1	5%	1.8 MAF	90,000 AF
2	10%		180,000 AF
3	15%		270,000 AF
4	20%		360,000 AF
5	25%		450,000 AF
6	30%		540,000 AF
7	35%		630,000 AF
8	40%		720,000 AF
9	45%		810,000 AF
10	50%		900,000 AF

Catastrophic Interruption of Water Supplies

Metropolitan's Emergency Storage Objective is a planning estimate that represents the amount of water that Metropolitan would hold in storage for the region in preparation for a catastrophic earthquake that would damage the aqueducts that transport imported water supplies to Southern California, including: the Colorado River Aqueduct, both the East and West branches of the California Aqueduct, and the Los Angeles Aqueduct. Emergency storage allows Metropolitan to deliver reserve supplies to the member agencies to supplement local production. This helps avoid severe water shortages during periods when the imported water aqueducts may be out of service.

The Emergency Storage Objective considers a six- and twelve-month outage period for the imported supply aqueducts incorporating latest seismic information and operational flexibility of Metropolitan's system, a retail water demand cutback ranging from 25 to 35 percent considering the level of conservation that the region achieved during the recent drought, and an aggregated loss of 10 to 20 percent of local supplies accounting for factors that could affect local production during emergency conditions.

In 2019, Metropolitan and its member agencies completed a process to update the Emergency Storage Objective, which was set at 750,000 AF. This level of storage would prevent severe water shortages to the region given new information on expected recovery durations. The emergency storage volume represents a planning estimate for how much water Metropolitan would store for the region in preparation for a catastrophic earthquake or other disaster. It is not intended to set a basis or a policy for allocating or apportioning storage for any individual member agency.

As an additional tool, in July 2019, the Board adopted amendments to Metropolitan's Administrative Code enabling deliveries of member agency water supplies in Metropolitan's system in an emergency. These deliveries are intended to provide Metropolitan's member agencies the ability to deliver member agency water through Metropolitan's system under specific emergency conditions. Emergency deliveries can only be made if Metropolitan is unable to make deliveries to a member agency due to physical damage to Metropolitan's system resulting from a natural disaster or other emergency, and there are no alternate means for Metropolitan or the member agency to provide service to an area without the use of a portion of Metropolitan's system.

Metropolitan's strategy for catastrophic water shortage conditions is further discussed in Appendix 8 to the 2020 UWMP and incorporated herein by reference.

Emergency Freshwater Pathway (Sacramento-San Joaquin Delta)

DWR has estimated that in the event of a major earthquake in or near the Delta, water supplies could be interrupted for up to three years, posing a significant and unacceptable risk to the California business economy. A post-event strategy would provide necessary water supply protections to avert this catastrophe. Such a plan has been coordinated through DWR, the Army Corps of Engineers, USBR, California Office of Emergency Services, Metropolitan, and the State Water Contractors. Additional information on the creation of an emergency freshwater pathway and other actions in the Delta is included in Section 2.5 of the 2020 UWMP and incorporated herein by reference.

Emergency Response Plans

Metropolitan also has two Emergency Response Plans: one dated March 2019 that has been in place long-term and is updated periodically; and a second dated September 2020, prepared pursuant to the requirements of the recently-enacted America's Water Infrastructure Act of 2018. The two plans work in conjunction. Together, Metropolitan's Emergency Response Plans present Metropolitan's organization and strategy for response to emergencies caused by natural hazards, malevolent acts, or other unavoidable circumstances. Metropolitan operates in accordance with the California Standardized Emergency Management System, the Incident Command System, and the National Incident Management System. The Emergency Response Plans provide guidelines for evaluating an emergency situation, responding to an emergency, and activating Incident Command Posts and the Emergency Operations Center. They also describe the Emergency Response Organization. Although the plans provide a framework for emergency response, they do not attempt to identify and discuss every potential situation or problem that may occur during an emergency. The plans will be exercised and updated regularly.

Seismic Risk Assessment and Mitigation Plan

Although the magnitude of damages resulting from a significant seismic event are impossible to predict, Metropolitan's water conveyance and distribution facilities are designed either to withstand a maximum probable seismic event or to minimize the potential repair time in the event of damage. Metropolitan's holistic strategy for seismic resilience follows a "defense in depth" multi-layered approach for managing risk. Metropolitan's Seismic Resilience Strategy has three primary objectives:

1. Provide a diversified water supply portfolio, system flexibility, and emergency storage
2. Prevent damage to water delivery infrastructure in probable seismic events and limit damage in extreme events
3. Minimize water delivery interruptions through a dedicated emergency response and recovery organization

Beginning January 2020, CWC Section 10632.5 mandates urban water suppliers to include in their UWMPs a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. For Metropolitan, the required seismic risk assessment and mitigation plan is part of its resilience strategy and is included in Metropolitan's 2020 UWMP Appendix 9: Seismic Risk Assessment and Mitigation Plan and incorporated herein by reference.

A.4.5. WSCP Communications Plan

Introduction

Following the record-breaking drought of 2012-2016, Metropolitan concentrated on building on its conservation and education outreach programs to emphasize water efficiency as a sustainable way of life, rather than solely a response to dry conditions or drought. Messaging has encouraged behavioral changes that can be sustained regardless of weather and uses tools and technology that can be implemented to permanently save water in homes and businesses, particularly outdoors where up to 70% of total water use occurs. These efforts have helped solidify a conservation ethic across Southern California, supporting a $1.5 billion investment in conservation, recycling and groundwater recovery since 1990. When combined with additional investments in storage, local supply development and programs to increase water storage reserves in wet years, the region is well positioned to withstand future droughts. Still, in response to the challenges of climate change and other abnormal supply conditions, increased water efficiency will still be necessary. And as those conditions become more prevalent, effective communication strategies and a common understanding of necessary actions between water agencies, the public, elected officials and other key stakeholders become even more important should the district need to activate the WSCP. These relationships and communication tools must be well-established to be successful. To that end, water providers should aim to communicate to customers in the following areas:[3]

1. Steps customers should take to plan for and protect themselves in emergency situations, ranging from abnormal to catastrophic water supply conditions
2. Actions water providers are taking to plan for and respond to these emergency situations
3. Efforts to invest and maintain critical water infrastructure
4. Steps water providers are taking to prepare for and respond to emergency situations that could impact water supplies – from drought to natural disasters

Several factors influence the communication strategies needed to address the diverse characteristics of Metropolitan's 5,200 square-mile service area, particularly when there is an urgent need for conservation. As a wholesaler serving 26 member agencies and a diverse region that is home to 19 million people, no single communication message or strategy connects with everyone in the region. Furthermore, state and local water regulations during periods of drought or supply shortages can result in a broad range of water-saving requirements and goals across the region. Qualitative research from previous droughts has also provided valuable insight on attitudes and behaviors toward water conservation, including drought fatigue, water quality concerns, increasing water rates and equity issues. These factors, though inherently complex, are conducive to collaboration that elevates the importance of drought resiliency. This section of the WSCP describes the basic communications strategies needed to help Metropolitan effectively communicate vital information for each of the six standard water shortage levels that represent changes from normal reliability. The six standard water shortage levels depicted in this communications plan correspond to:

- Progressively increasing estimated shortage conditions: up to 10, 20, 30, 40, 50, and greater than 50% shortage compared to the normal reliability conditions

[3] Source: 2019 Statewide Survey of Residential Customers Covering Water

Collaboration

Collaboration with its member agencies is central to Metropolitan's outreach plans during drought, water shortages or other demand management periods. Developing and delivering a concise regional message in multiple languages is made possible through consistent coordination with member agencies and their constituents. Metropolitan's External Affairs group regularly engages and interacts with member agency staff in several capacities, including but not limited to the following groups:

- Member agency managers
- Legislative and government affairs representatives
- Water use efficiency/conservation coordinators
- Public information officers
- Education coordinators

In addition to member agency coordination, Metropolitan interacts with agencies and organizations outside of the region, including:

- Department of Water Resources
- State Water Resources Control Board
- Association of California Water Agencies
- California Municipal Utilities Association
- Colorado River Water Users Association
- California Water Efficiency Partnership
- Alliance for Water Efficiency
- Other state and federal agencies

As seen in past droughts, the methods of communication within these groups and the frequency of meetings fluctuate based on the changing needs of our member agencies and their key audiences. Water shortage conditions are ever-evolving, therefore remaining flexible yet focused not only reduces the risk of discordance, it also ensures key audiences throughout Southern California receive timely, valuable and cohesive information.

As mentioned, Metropolitan's WSCP includes six levels of potential shortage. The water-savings actions associated with each level of shortage will vary greatly, and Metropolitan recognizes the many different approaches to properly respond to each WSCP level. This section provides a general description of messaging strategies that would be implemented at each level, leading up to more focused crisis communication strategies. The plans need to be adaptable and cannot offer one-size-fits-all approaches. Metropolitan management and/or Board of Directors could also call for specific messaging strategies that address unique shortage scenarios.

Key Audiences

Communicating to various stakeholders is essential during normal supply periods and becomes increasingly more involved during water shortages. Below is a list of key audiences:

- Member agencies and their customers
- General public

- State, federal and local elected officials and their district office staff
- Homeowners and renters
- Multi-family property owners/managers/landlords
- Business associations/chambers of commerce
- Commercial-industrial property owners/managers
- Landscape contractors/suppliers
- Restaurant/hotel industries
- School districts/educators/students
- Building and construction trade associations
- Community/civic leaders
- Land-use agencies
- Environmental groups
- Community-based and non-profit organizations
- Non-English-speaking populations
- Disadvantaged/under-invested communities

Communicating to these audiences requires varying levels of involvement depending on the status of supply conditions. Feedback, research, and leveraging existing relationships are central to an effective communications plan; therefore, External Affairs and Water Resource Management staff will continue to coordinate closely with member agencies, stakeholders, and governing agencies on an ongoing basis to ensure appropriate messaging is culturally competent and provided in multiple languages to reflect the region's demographics.

Goals and Objectives

Metropolitan's communications goals are rooted in the following guiding principles:

- Motivate key audiences to:
    - Increase conservation
    - Follow voluntary or mandatory water use guidelines
    - Participate in water-saving incentive programs
    - Encourage family, friends, neighbors and colleagues to do all the above
- Raise awareness about:
    - Water shortage and/or drought conditions
    - Water sources, supplies and reserves
    - Local, regional and state regulations
- Educate key audiences about:
    - Water supply reliability
    - Water infrastructure and delivery
    - Water quality

- Prepare the region for:
  - Varying water supply conditions
  - Escalating supply shortage levels

Standard Communication

Conservation as a way of life remains central to messaging during normal supply conditions. Regional rebate programs, indoor and outdoor water use efficiency, investments to maintain infrastructure, emergency preparedness, local supply programs, water quality, and regional supply reliability are among some of the themes that make up a normal supply period's communications mix to encourage ongoing conservation actions. Below is a snapshot of the various strategies involved:

- Media relations (news releases and advisories, interviews, op-eds)
- Social media (Twitter, Instagram, Facebook, YouTube, LinkedIn)
- Websites and Blogs
  - mwdh2o.com
  - bewaterwise.com
  - socalwatersmart.com
- Digital, print and other paid media marketing
- Search engine optimization
- E-newsletters
- Community events
- Education outreach
- Business outreach

Level 1 Communications – up to 10% Shortage

This section addresses communications strategies Metropolitan uses during periods of 10% water shortage conditions. In addition to the district's ongoing communications efforts, a 10% shortage would require the following elements:

- Media relations and communications
  - Maintain media relations activities with enhanced communication about the specific need to conserve; provide media with regional water supply conditions and Metropolitan's shortage response action updates
    - Press releases, advisories, op-eds, direct outreach to media to drive earned media opportunities
    - Ethnic media outreach in multiple languages
  - Produce and distribute fact-based informational materials such as fact sheets, podcasts, and B-roll video
- Social media
  - Emphasize ways to conserve immediately (shorter showers, less watering, links to tools on bewaterwise.com, etc.), as well as continued promotion of conservation as a way

of life initiatives such as regional water use efficiency incentives and other rebate programs including the district's Turf Replacement Program

    - Paid social media boosting to target the district's entire service area

  - Encourage member agency co-branding and messaging continuity

    - Share social media creative with the public information officer working group and conservation coordinators

- Web

  - Establish a SharePoint site for member agency and public to download all water supply and conservation materials

  - Update all Metropolitan websites with pertinent conservation and water supply information and highlight such information

  - Provide links to local watering restrictions and conservation efforts

- Member agency coordination

  - Enhance collaboration and communication with member agencies to streamline messaging

  - Involve member agencies in development of a communications plan

  - Provide regular campaign updates to member agency managers, staff and board members.

  - Provide member agencies with campaign outreach materials (newsletter articles, creative design, bill inserts, etc.) for customization and distribution

- Community outreach

  - Make water supply conditions and conservation messaging a key component of all regular community outreach

  - Make additional, specialized outreach to inform non-profit organizations and civic/community leaders about water supply conditions and conservation efforts

    - Community events/webinars

    - Non-profit organization e-newsletters

- Education outreach

  - Update district curriculum to reflect the enhanced need to conserve and make water supply conditions and conservation messaging a key component of all regular education outreach

  - Communicate to K-12 school districts and colleges/universities about the need for increased conservation

  - Provide regional water and environmental education programs with materials addressing the need for increased conservation

- Legislative and government affairs

  - Coordinate with local, state and other elected officials in the region about the need to conserve

  - Encourage officials to promote these efforts to constituents

In addition:

- Work with member agencies to target key industries or groups to raise awareness about water-use efficiency programs and regional water supply conditions
  - o Restaurants
  - o Hotels/motels
  - o Public agencies
- Research and public opinion
  - o Conduct research to gain insights on public opinion, attitudes and beliefs toward conservation and water shortage levels
  - o Message testing with key audiences

Level 2 Communications – up to 20% Shortage

In a more severe supply shortage or demand management period, Metropolitan will continue actions outlined in Level 1 communications strategies, and add the following efforts, which are designed to address a 20% percent mandatory conservation under the WSCP:

- Media relations and communications
  - o Paid advertising – Execute a multimedia, multilingual regional advertising campaign to reflect a more urgent message emphasizing the need for compliance with mandatory water-use restrictions. Place paid advertisements in the following platforms:
    - ▪ Out of Home (billboards, bulletins, bus shelter ads)
    - ▪ Radio
    - ▪ Television
    - ▪ Digital
    - ▪ Grassroots
  - o Host press conference to discuss current water shortage conditions, shortage response actions, and outlook
  - o Coordinate with other regional or state agencies for greater impact and reach
- Social media
  - o Emphasize a clear and practical message conveying mandatory water-use restrictions, drought conditions and ways to save water
  - o Establish more targeted and focused social media advertising strategies – targeted boosting and messaging
- Member agency coordination
  - o Meet with member agencies to streamline a more urgent and serious campaign tone
  - o Coordinate paid media flights with member agencies to leverage regional exposure and distribution
  - o Provide multimedia and multilingual campaign materials for member agency customization

- Community outreach
  - Coordinate with community-based organizations and leaders with higher impact, reach and credibility
  - Inform, debrief and prepare community/civic leaders to become water conservation ambassadors in their respective communities
- Legislative and government affairs
  - Increase briefing activity with state and local officials on water supply conditions, shortage response actions, and water conservation advertising campaign

In addition:

- Help prepare and distribute materials about restrictions, ordinances and guidelines through stakeholder communication channels, including but not limited to:
  - Business organizations
  - Civic organizations
  - Elected officials
  - Building/plumbing/construction associations
  - Building managers
  - Landscape contractors
- Increase outreach efforts to key associations and interest groups throughout the region, emphasizing immediate conservation goals

Level 3 and 4 Communications – up to 30% or 40% Shortage

In addition to Level 2 communications strategies, the following efforts will address an even more severe shortage of 30%-40% mandatory conservation under the WSCP:

- Media relations and communications
  - Increase media relations activities, with an added emphasis on the severe regional water supply conditions, the shortage response actions triggered or expected to be triggered, and the mandatory need to conserve
  - Host news conference in multiple languages alongside high-level public officials to highlight severity and extreme measures needed
  - Continue the following with greater frequency and stronger, more critical messaging:
    - Paid advertising campaign
    - Press releases, advisories, op-eds, etc.
    - Direct media outreach offering pre-recorded radio and TV interviews
    - Ethnic media outreach in multiple languages
- Social media
  - Messaging shift to reflect severity of supply conditions and shortage response actions triggered or expected to be triggered– conservation is mandatory to maintain day-to-day activity and future supplies, quality of life now being impacted

- Web
  - Make conservation messaging front and center on all websites
- Community Outreach
  - Host a community leader briefing, bringing together representatives from community-based organizations from across the region to learn about the severity of water supply conditions
- Member agency coordination
  - Continue to streamline messaging about WSCP level escalation to ensure message continuity throughout the region
  - Help member agencies address local and mandatory conservation needs
  - Coordinate with member agencies on any updated messages and campaign activities emphasizing extreme actions that must be taken
- Legislative and government affairs
  - Outreach to legislative leadership at state and federal level to raise awareness at high levels

In addition:

- Specialized targeted outreach to:
  - Special interest groups
  - Public agencies
  - County and city departments
- Assess the goals and objectives of regional rebate programs, begin a shift toward immediate water-saving actions
- Research and public opinion
  - Conduct public opinion research studies including focus groups to determine attitudes and beliefs toward extreme conservation levels in order to effectively communicate severity of supply conditions and the mandatory need to conserve

Level 5-6 Communications – 50% Shortage or more

The severity of this level of the WSCP calls for immediate, extreme conservation measures and a focus on water use for health and safety only. As with previous levels, communications strategies at this level of the WSCP incorporate and build upon ongoing efforts.

Key Communications Strategies

- Consider establishing a Joint Information Center (JIC) to pool crisis communications among emergency responders and affected local, state and federal agencies
- Produce and distribute fact-based informational materials such as fact sheets, podcasts, and B-roll video
- Host a press conference to announce the severity of water shortage level and shortage response actions triggered or anticipated to be triggered, to be held in conjunction with regional and/or state emergency response and public health authorities

- Emphasize work being done by Metropolitan and its member agencies to alleviate the impacts of such a severe shortage
- Focus on the need for residential and commercial customers across the region to do their part to get through the crisis situation
- Offer vulnerable populations increased assistance, in coordination with regional emergency response teams
- Keep the media and key stakeholders informed with frequent supply condition reports
- Shift from traditional advertising campaign efforts to emergency and crisis communication approach
- Messaging is no longer conservation-focused, begin shift to crisis response communications protocols

Crisis Communications – Catastrophic Shortage

In the event of a catastrophic shortage due to an infrastructure failure and/or natural disaster, Metropolitan will enact its crisis communications plan in accordance with local, regional, state and federal emergency response guidelines that ensure a coordinated effort and effective response. This plan utilizes the Standard Emergency Management System, the Incident Command System and the National Incident Management System.

Strategic Message Development

- In an emergency, communications messages will be created in a complex environment in which the tensions of multidirectional information flows must be balanced with the need for strategic message development

Message Dissemination

Communication efforts will center on the core identified tasks: providing information to the public and external audiences. Information dissemination tools:

- Website (mwdh2o.com, bewaterwise.com)
- Social Media (Twitter, Facebook, Instagram, YouTube)
- MetAlert Emergency Notification System + RSS Feeds
- Press Releases and statements
- Participation in joint information centers

Information Dissemination

- Public Information
    - o Activate and manage the mechanisms for responding to public requests for information via social media, telephone, in writing, or by e-mail
    - o Prepare Metropolitan's telephone operators for responding to and monitoring calls related to emergency incidents; brief them and provide scripts on how to respond to questions and where to direct calls for other requests
    - o Work with subject matter experts to create situation-specific fact sheets, Q&A documents and updates
    - o Respond to requests and inquiries from special interest groups

  - Oversee and manage Metropolitan's emergency response website if needed, in addition to mwdh2o.com, social media, telephone, and public email correspondence response systems; establish and maintain links to other emergency response websites
  - Manage the development and testing of messages and materials for cultural and language requirements of special populations
  - Post updates on social media channels. Monitor and respond to comments as needed/appropriate
- Member agencies, partnering agencies and elected/legislative officials:
  - The Public Information Officer (PIO) or Crisis Communications Team will communicate, as needed, with the PIOs for member agencies and other partnering agencies
  - Help organize and facilitate official meetings and briefings to provide information and receive input from member agencies, other partners or stakeholders
  - Notify legislative/elected officials as needed

A.4.6. Legal Authorities

This section describes the legal authorities that empower Metropolitan to implement and enforce its shortage response actions. Metropolitan is a wholesale water provider organized as a cooperative of 26 voluntary members. Metropolitan was formed pursuant to the Metropolitan Water District Act, Statutes 1969, chapter 209, codified at California Water Code, Appendix Section 109 (the "MWD Act"). Pursuant to the MWD Act, Metropolitan has the express and implied statutory authority to "[p]rovide, sell, and deliver water at wholesale for municipal and domestic uses and purposes," among other powers. (MWD Act, §§ 120, 130.) To accomplish the provision of water, Metropolitan is also expressly authorized to promote and implement conservation programs, including during times of water shortage. (MWD Act, § 130.5.)

Metropolitan also has authority under the California Water Code to implement supply shortage programs. (Cal. Water Code, §§ 350-359, 375-378.) For example, Section 375(a) of the Water Code provides:

> *Notwithstanding any other provision of the law, any public entity which supplies water at retail or wholesale for the benefit of persons within the service area or area of jurisdiction of the public entity may, by ordinance or resolution adopted by a majority of the members of the governing body after holding a public hearing upon notice and making appropriate findings of necessity for the adoption of a water conservation program, adopt and enforce a water conservation program to reduce the quantity of water used by those persons for the purpose of conserving the water supplies of the public entity.*

Cal. Water Code, § 375(a). Water Code Section 375(b) also provides the authority for pricing to encourage water conservation.

> *With regard to water delivered for other than agricultural uses, the ordinance or resolution may specifically require the installation of water-saving devices that are designed to reduce water consumption. The ordinance or resolution may also encourage water conservation through rate structure design.*

Metropolitan's Board of Directors has approved many policies and rules, codified in Metropolitan's own Administrative Code, which further provide Metropolitan the authority to ensure the availability of its water during times of shortages. For example, Administrative Code Section 3107 requires that any territory annexed to Metropolitan comply with Metropolitan's water use efficiency guidelines.

The Board has also ratified various policies and rules to implement a Water Supply Allocation Plan (WSAP) to address shortage conditions. Metropolitan's WSAP provides a standardized methodology for allocating supplies during times of shortage. The WSAP is authorized pursuant to the following Board actions:

- By Minute Item 43514, dated April 13, 1999, the Board adopted the WSDM Plan.
- By Minute Item 44005, dated June 17, 2000, the General Manager has the authority to reduce Interim Agriculture Water Program deliveries up to 30 percent prior to imposing any mandatory allocation under the WSDM Plan.
- By Minute Item 47393, dated February 12, 2008, the Board adopted the WSAP.
- By Minute Item 48376, dated August 17, 2010, the Board approved adjustments to the WSAP.

- By Minute Item 48803, dated September 12, 2011, the Board approved adjustments to the WSAP.
- By Minute Item 74526, dated February 11, 2014, the Board adopted the Water Supply Alert Resolution.
- By Minute Item 49979, dated December 9, 2014, the Board approved adjustments to the WSAP.

In addition to the statutes and other legal authorities set forth above, Metropolitan is empowered to implement and enforce its shortage response actions pursuant to various resolutions. For example, on April 11, 2016, Metropolitan's Board voted to adopt Metropolitan's 2015 UWMP and authorized its submittal to the State of California as stated in Resolution 9209. Metropolitan's 2015 UWMP contains Metropolitan's December 2014 WSAP in Appendix 4. Metropolitan's 2015 UWMP also describes in Section 2.4 Metropolitan's WSAP and WSDM Plan, which guides Metropolitan's planning and operations during both shortage and surplus conditions. Similarly, on May 11, 2021, Metropolitan's Board voted to adopt Metropolitan's UWMP and WSCP as stated in Resolutions 9279 and 9281, respectively. These two Resolutions authorize Metropolitan to implement and enforce its shortage response actions contained in the WSCP, which is attached as Appendix 4 to the 2020 UWMP.

Additionally, numerous agreements allow Metropolitan to take its core supplies and shortage response actions. Core supplies and supply augmentation actions are authorized by the agreements shown in 2020 UWMP Appendix 3: Justifications for Supply Projections, which include:

Colorado River Supplies

- 1931 Seven Party Agreement dated August 18, 1931
- Metropolitan's 1930, 1931, and 1946 water delivery contracts with the Secretary of the Interior
- Consolidated Decree of the Supreme Court of the United States in *Arizona v. California*
- 2003 Quantification Settlement Agreement (QSA) and related agreements
- 2005 Settlement Agreement with Quechan Indian Tribe
- Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead
- 1988 IID-Metropolitan Conservation and Use of Conserved Water Agreement
- 1989 Approval Agreement
- 1989 Supplemental Approval Agreement
- August 2004 Forbearance and Fallowing Program Agreement with PVID
- Landowner Agreements for Fallowing in PVID
- 2003 Delivery and Exchange Agreement between Metropolitan and Coachella Valley Water District
- 2004 Storage and Interstate Release Agreement among Metropolitan, the Colorado River Commission of Nevada, Southern Nevada Water Authority, and the United States
- 2007 Lower Colorado Water Supply Project Contract among the United States, the City of Needles, and Metropolitan

- 2007 Lower Colorado River Basin Intentionally Created Surplus Forbearance Agreement among the Arizona Department of Water Resources, PVID, IID, the City of Needles, CVWD, Metropolitan, SNWA, and the Colorado River Commission of Nevada
- 2007 California Agreement for the Creation and Delivery of Extraordinary Conservation Intentionally Created Surplus among Metropolitan, PVID, IID, CVWD, and the City of Needles
- 2007 Agreement among the United States, the Colorado River Commission of Nevada, and the SNWA for the Funding and Construction of the Lower Colorado River Drop 2 Storage Reservoir Project
- 2007 Delivery Agreement between the United States and Metropolitan
- 2008 Metropolitan Notice of Election to Participate as a Party to the Drop 2 Funding Agreement
- 2009 Agreement among the United States, Metropolitan, the Colorado River Commission of Nevada, SNWA, and the Central Arizona Water Conservation District for a Pilot Project for Operation of the Yuma Desalting Plant
- 2010 Yuma Desalting Plant Pilot Project Delivery Agreement between the United States and Metropolitan
- 2012 Agreement among the United States, Metropolitan, the Colorado River Commission of Nevada, SNWA, and the Central Arizona Water Conservation District for a Pilot Program for the Conversion of Intentionally Created Mexican Allocation to Intentionally Created Surplus
- 2012 Interim Operating Agreement for Implementation of Minute No. 319 of the International Boundary and Water Commission
- 2012 Lower Colorado River Basin Forbearance Agreement for Binational Intentionally Created Surplus
- 2012 Binational ICS Delivery Agreement
- 2013 Agreement between Metropolitan and IID Regarding Binational Intentionally Created Surplus
- 2015 Amendment 1 to the California Agreement for the Creation and Delivery of Extraordinary Conservation Intentionally Created Surplus
- 2017 Agreement among the United States, Metropolitan, the Colorado River Commission of Nevada, SNWA, IID, and the Central Arizona Water Conservation District for a Pilot Program for the Conversion of Mexico's Water Reserve to Binational ICS
- 2017 Interim Operating Agreement for Implementation of Minute No. 323
- 2017 Binational ICS Agreement
- 2017 Binational ICS Delivery Agreement
- 2019 Lower Basin Drought Contingency Plan
- December 2019 Agreement for the Implementation of a Seasonal Land Fallowing Program
- Agreement for Seasonal Fallowing in Bard Unit (Farmer Fallowing Agreements

- May 2020 First Amended Agreement for the Implementation of a Seasonal Land Fallowing Program
- Agreement Relating to Supplemental Water among The Metropolitan Water District of Southern California, the San Luis Rey Settlement Parties, and the United States
- Amended and Restated Agreement between The Metropolitan Water District of Southern California and the San Diego County Water Authority for the Exchange of Water. This October 10, 2003 agreement provides for Metropolitan delivery of Exchange Water to SDCWA in exchange for conserved Colorado River water SDCWA makes available to Metropolitan at Lake Havasu.
- Agreement Between Imperial Irrigation District And San Diego County Water Authority For Transfer Of Conserved Water. This April 9, 1998 agreement, as amended, provides for IID to conserve water for transfer to SDCWA and establishes the price SDCWA pays to IID for the conserved water.
- Allocation Agreement. This October 10, 2003 agreement among the United States, CVWD, IID, SDCWA, Metropolitan, and the San Luis Rey Settlement Parties provides for the allocation of water conserved from the All-American Canal Lining Project and the Coachella Canal Lining Project, and Metropolitan's assignment to SDCWA of it rights to both canal lining projects.
- Colorado River Water Delivery Agreement: Federal Quantification Settlement Agreement. By this October 10, 2003 agreement, among the Secretary of the Interior. CVWD, IID, SDCWA, and Metropolitan, the Secretary agreed to deliver IID-SDCWA transfer water and canal lining water allocated to SDCWA to Metropolitan's Colorado River Aqueduct Intake at Lake Havasu for diversion by Metropolitan.

State Water Project Supplies

- 1960 Contract between the State of California and The Metropolitan Water District of Southern California for a Water Supply
- Port Hueneme Water Agency Annexation: By Minute Item 41728, dated January 9, 1996, Metropolitan's Board adopted Resolution 8487 granting the concurrent annexation of Annexation No. 32 to Calleguas Municipal Water District and The Metropolitan Water District of Southern California, and fixing Metropolitan's terms and conditions for the annexation
- 1996 Sublease Agreement between the Port Hueneme Water Agency and Metropolitan
- 1967 and 1983 Water Exchange Contract and Agreements with Desert Water Agency and Coachella Valley Water District
- 1984 Advance Delivery Agreement with Desert Water Agency and Coachella Valley Water District
- The 2003 Exchange Agreement with Desert Water Agency and Coachella Valley Water District
- November 2012 Letter Agreement with Coachella Valley Water District
- 2019 Amended and Restated Agreement for Exchange and Advance Delivery with Desert Water Agency and Coachella Valley Water District
- 1997 Arvin-Edison/Metropolitan Water Management Agreement

- 1998 Turn-in/out Construction and Maintenance Agreement between DWR, Kern County Water Agency, Arvin-Edison, and Metropolitan
- 1998-2002 Water Delivery and Return Agreements with DWR, Kern County Water Agency, Arvin-Edison, and Metropolitan
- 2004 Point of Delivery Agreement with DWR, Kern County Water Agency, and Metropolitan
- 2004 Introduction of Water into the California Aqueduct with DWR, Kern County Water Agency, and Arvin-Edison
- 2007 First Amended and Restated Agreement Between Arvin-Edison Water Storage District and The Metropolitan Water District of Southern California for a Water Management Program
- 2000 Coordinated Operating Agreement between Metropolitan and San Bernardino Valley Municipal Water District
- 2001 Coordinated Operating Agreement between Metropolitan and San Bernardino Valley Municipal Water District
- 2011 Coordinated Operating, Water Storage, Exchange and Delivery Agreement among Metropolitan, Municipal Water District of Orange County, and Irvine Ranch Water District
- 2013 San Gabriel Valley MWD Exchange and Purchase Agreement
- 2019 Board Approval of the High Desert Water Bank Agreement with Antelope Valley East Kern Water Agency
- 2001 Kern Delta/Metropolitan Principles of Agreement
- 2002 Kern Delta and Metropolitan Boards of Directors Approval
- 2007 DWR-Yuba County Water Agency Purchase Agreement
- 2007 DWR-Metropolitan Yuba Dry Year Program Participation Agreement
- 2014 Amended DWR-Metropolitan Yuba Dry Year Program Participation Agreement
- 2019 Amended and Restated Agreement Among The Metropolitan Water District of Southern California, Coachella Valley Water District, and Desert Water Agency for the Exchange and Advance Delivery of Water
- 2020 Amended DWR-Metropolitan Yuba Dry Year Program Participation Agreement
- 2021 Coordinated Operating Agreement. The Coordinated Operating Agreement between Metropolitan and San Bernardino Valley District was approved by Metropolitan's Board in March 2021. The agreement will terminate on December 31, 2035 unless there is an extension of the SWP Contract.
- <u>2013 San Gabriel Valley MWD Exchange and Purchase Agreement.</u> The agreement between Metropolitan and San Gabriel Valley MWD was executed in September 2013.
- <u>2013 Board Approval of the San Gabriel Valley MWD Exchange and Purchase Agreement.</u> In August 2013, Metropolitan's Board authorized entering into the agreement with San Gabriel Valley MWD.

In-Region Storage and Supplies

- November 1974 Memorandum of Understanding and Agreement on Operation of Lake Skinner
- November 1994 Memorandum of Understanding on Operation of Domenigoni Valley Reservoir (now known as Diamond Valley Lake)
- Elderberry Forebay Contract for Conditions for Use
- June 2002 Division of Safety of Dams Certificate of Approval
- October 1991 Final EIR for the Eastside Reservoir Project (Diamond Valley Lake)
- 1995 amendment to Metropolitan's SWP contract to include Article 54, "Usage of Lakes Castaic and Perris"
- November 1974 Memorandum of Understanding and Agreement on Operation of Lake Skinner
- June 2002 Division of Safety of Dams Certificate of Approval
- Principles for groundwater storage adopted by the Metropolitan Board in January 2000
- Resolution for Proposition 13 Funds adopted by the Metropolitan Board in October 2000
- Agreement executed with the DWR for Interim Water Supply Construction Grant Commitment Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection (Proposition 13, Chapter 9, Article 4) providing for Metropolitan to administer $45 million in state Proposition 13 grant funds for groundwater reliability programs; October 2000
- Agreement executed for Long Beach Conjunctive Use Project, July 2002, amended in July 2003, October 2005, and November 2008
- Agreement executed for Live Oak Conjunctive Use Project, October 2002
- Agreement executed for Foothill Area Groundwater Storage Project, February 2003, amended in August 2006, April 2008, and February 2009
- Agreement executed for Chino Basin Programs, June 2003, amended in May 2004, August 2004, August 2005, May 2008, March 2009, September 2009, July 2010, and January 2015
- Agreement executed for Orange County Groundwater Storage Program, June 2003, amended in July 2004, December 2005, and July 2008
- Agreement executed for Compton Conjunctive Use Program, February 2005
- Agreement executed for Long Beach Conjunctive Use Project — Expansion in Lakewood, July 2005, amended in April 2006, August 2007, November 2008, and February 2010
- Agreement executed for Upper Claremont Basin Groundwater Storage Program, September 2005, amended in April 2008
- Agreement executed for Elsinore Basin Conjunctive Use Program, December 2006, amended in May 2008

These agreements are described in more detail in Appendix 3 to Metropolitan's 2020 UWMP.

If necessary, Metropolitan shall declare a water shortage emergency in accordance with CWC Chapter 3 (commencing with Section 350) of Division 1. In addition, Metropolitan shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

A.4.7. Financial Consequences of and Responses for Drought Conditions

A water shortage may be created by a reduction in water supply, an increase in water demand, or a combination of both. Metropolitan's shortage response actions include supply augmentation, demand management, and operational flexibility, all of which could impact Metropolitan financially. For example, exercising the options to take water from supply augmentation programs may increase costs. Similarly, operational changes could result in higher system costs and lower revenues from on-system hydropower generation, and an increase in conservation and outreach efforts would also increase costs. On the other hand, if core supplies from the SWP or the Colorado River were reduced, variable power costs to move water into the service area would likely decrease. Additionally, effective demand management during shortages tends to decrease Metropolitan's water sales when effective, thereby potentially reducing revenue for Metropolitan. From these various financial effects, there is a potential for expenditures exceeding revenues more than budgeted, thereby requiring unanticipated draws from reserves.

Variation in the amount of revenues is already part of Metropolitan's financial planning. Revenues vary according to regional weather and the availability of statewide water supplies. In dry years, local demands increase, and Metropolitan may receive higher than anticipated revenues due to increased sales volumes. In contrast, in wet years, demands decrease, and revenues drop due to lower sales volumes. In addition, statewide supply shortages such as those in 2009 and 2015 also affect Metropolitan's revenues. Such revenue surpluses and shortages could cause instability in water rates. To mitigate this risk, Metropolitan maintains financial reserves, with a minimum and target balance, to stabilize water rates during times of reduced water sales. The reserves hold revenues collected during times of high water sales and are used to offset the need for revenues during times of low sales. Metropolitan's practice of using reserves to buffer unexpected increases or decreases in budgeted revenue also applies to unexpected expenditure increases or decreases resulting from shortage responses.

Metropolitan uses its financial reserves to mitigate the impacts of water shortages. This policy applies to each of the six shortage levels described in this WSCP. Financial reserves create a buffer to reduce the financial impact of the water shortage. Other mitigation actions such as reducing operations and maintenance expenses, deferring capital projects, and rates/charges increases are part of Metropolitan's biennial budget and rate design cycle, are not used routinely to mitigate financial impacts of water shortage response actions.

Metropolitan's reserve policy provides for a minimum reserve requirement and target amount of unrestricted reserves at June 30 of each year. Funds in excess of the target amount are to be utilized for capital expenditures in lieu of the issuance of additional debt, or for the redemption, defeasance or purchase of outstanding bonds or commercial paper as determined by the Board. However, if the fixed charge coverage ratio (the amount necessary to cover all fixed costs) is at or above 1.2, amounts over the minimum may be expended for any lawful purpose of Metropolitan, as determined by the Board. Therefore, unrestricted reserves are intended to be available to address Metropolitan's shortage response actions, as well as the consequences of those actions, so long as its fixed charge coverage ratio is at or above 1.2.

A.4.8. WSCP Adoption and Refinement Procedures

WSCP Public Notice and Adoption

Metropolitan provided notice of the availability of the draft 2020 UWMP (including Appendix 11 which will also be a new Appendix 11 to its 2015 UWMP) and WSCP, and notice of the public hearing to consider adoption of both plans and Appendix 11 to the 2015 UWMP in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP were posted prominently on Metropolitan's website, mwdh2o.com, on February 1, 2021, more than 60 days in advance of the public hearing on April 12, 2021. The notice of availability of the documents was sent to Metropolitan's member agencies, as well as to cities and counties in Metropolitan's service area. In addition, a public notice advertising the public hearing in English and Spanish was published in 12 Southern California newspapers. The notification in English language newspapers was published on February 1 and 8, 2021. The notification was published on January 28-30, 2021 and February 1, 4-6, and 8, 2021 in Spanish language newspapers, satisfying the requirement for non-English language notification. Copies of: (1) the notification letter sent to the member agencies, cities and counties in Metropolitan's service area, and (2) the notice published in the newspapers are included in the 2020 UWMP Section 5. Table 5-3 in the 2020 UWMP provides a list of participating member agencies and other appropriate agencies that Metropolitan coordinated with in its regional planning, as well as the cities and counties that were notified about the preparation of its 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP. In addition, the list of newspaper publications is included in Table 5-4.

Metropolitan held the public hearing for the draft 2020 UWMP, draft Appendix 11 to the 2015 UWMP, and draft WSCP on April 12, 2021, at the Board's Water Planning and Stewardship Committee meeting, held online due to COVID-19 concerns. On May 11, 2021, Metropolitan's Board determined that the 2020 UWMP and the WSCP are consistent with the MWD Act and accurately represent the water resources plan for Metropolitan's service area. In addition, Metropolitan's Board determined that Appendix 11 to both the 2015 UWMP and the 2020 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003) which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolutions 9279, 9280, 9281, the Board adopted the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP and authorized their submittal to the State of California. Copies of Resolutions 9279, 9280, 9281 are included in the 2020 UWMP Section 5, and Resolution 9281 for the WSCP is attached to this WSCP as Attachment C.

Submission and Availability of Final 2020 UWMP, Appendix 11 to 2015 UWMP, and WSCP

In fulfillment of CWC Sections 10632(c) and 10645(a) and (b), Metropolitan's final 2020 UWMP, Appendix 11 to its 2015 UWMP, and its WSCP were posted on the mwdh2o.com website in May 2021, following their adoption by the Metropolitan board. This satisfies the requirement to make the plans available for public review and to make the WSCP available to Metropolitan's customers (which are its member agencies).

In fulfillment of CWC Sections 10632(c), 10635(c) and 10644(a)(1), Metropolitan also mailed copies of the final 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP (in electronic pdf format) to the California State Library and all cities and counties within Metropolitan's service area within 30 days of Board adoption.

In June 2021, in fulfillment of CWC Section 10621(f) and Sections 10644(a)(1), (2), and (b), Metropolitan's final 2020 UWMP, Appendix 11 to the 2015 UWMP, and WSCP were electronically submitted to the State of California through DWR's WUE data website https://wuedata.water.ca.gov/secure/.

WSCP Reevaluation and Improvement Procedures

The WSCP will be periodically re-evaluated to ensure that its shortage risk tolerance is adequate and the shortage response actions are effective and up to date based on lessons learned from implementing the WSCP. The WSCP will be revised and updated during the UWMP update cycle to incorporate updated and new information. For example, new supply augmentation actions will be added, and actions that are no longer applicable for reasons such as program expiration will be removed. However, if revisions to the WSCP are warranted before the UWMP is updated, the WSCP will be updated outside of the UWMP update cycle. In the course of preparing the Annual Assessment each year, Metropolitan staff will routinely consider the functionality the overall WSCP and will prepare recommendations for Metropolitan's Board of Directors if changes are found to be needed.

ATTACHMENTS

Attachment A – Water Surplus and Drought Management Plan

Attachment B – Water Supply Allocation Plan

Attachment C – WSCP Resolution 9281

List of Acronyms and Abbreviations

AF	Acre-feet
CRA	Colorado River Aqueduct
CUP	Conjunctive Use Programs
CVWD	Coachella Valley Water District
CWC	California Water Code
DWA	Desert Water Agency
DWR	California Department of Water Resources
IID	Imperial Irrigation District
IRP	Integrated Water Resources Plan
ICS	Lake Mead Intentionally Created Surplus
MAF	Million Acre-feet
MWD	The Metropolitan Water District of Southern California
MWD Act	Metropolitan Water District Act
PVID	Palo Verde Irrigation District
QSA	Quantification Settlement Agreement
SNWA	Southern Nevada Water Authority
SWP	State Water Project
TAF	Thousand Acre-Feet
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDM	Water Surplus and Drought Management

Attachment A

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

REPORT NO. 1150

AUGUST 1999

ACKNOWLEDGMENTS

The consensus reached in the Water Surplus and Drought Management Plan would not have been possible without the dedication and participation of the Rate Refinement Process Workgroup, comprises made by the General Manager, staff from Metropolitan's member agencies, Metropolitan staff, and the dedication and work of the consultants.

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WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

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EXECUTIVE SUMMARY

INTRODUCTION

The Water Surplus and Drought Management (WSDM) Plan for the Metropolitan Water District of Southern California (Metropolitan) is a ten-year plan that will be used to direct Metropolitan's resource operations to help attain the region's 100% reliability goal. The WSDM Plan recognizes the interdependence of surplus and shortage actions and is a coordinated plan that utilizes all available resources to maximize supply reliability. The overall objective of the WSDM Plan is to ensure that shortage allocation of Metropolitan's imported water supplies is not required.

The central effort in developing the WSDM Plan was a participatory process involving Metropolitan and its member agencies. Metropolitan staff and member agency representatives coordinated the Plan's development during a series of meetings of the Rate Refinement Team.

To lay a foundation for the WSDM Plan, participants in the Rate Refinement Process developed a set of proposed WSDM Principles and Implementation Goals which were subsequently adopted by the Metropolitan Board of Directors in September 1998. These Principles and Implementation Goals outline fundamental policies for guiding surplus and shortage management and establish a basis for dealing with shortages in an equitable and efficient manner.

WSDM PRINCIPLES AND IMPLEMENTATION GOALS

Guiding Principle

- Metropolitan will encourage storage of water during periods of surplus and work jointly with its Member Agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage.

Supporting Principles

- Maintain an ongoing coordinated effort among Metropolitan and its Member Agencies to encourage efficient water use, develop cost-effective local resource programs, and inform the public on water supply and reliability issues

- Encourage local and regional storage during periods of surplus and use of storage during periods of shortage

- Manage and operate Metropolitan's regional storage and delivery system in coordination with local facilities to capture and store surplus water in local groundwater and surface reservoirs

- Arrange for secure sources of additional water from outside the region for use during periods of shortage

- Call upon sources of additional water from outside the region and water stored locally to meet the needs of consumers and protect the economy during periods of shortage

WSDM Plan Implementation Goals

- Avoid mandatory import water allocations to the extent practicable

- Equitably allocate imported water on the basis of agencies' needs

  Considerations to create an equitable allocation of imported water may include:

  - Impact on retail consumers and economy
  - Reclamation/Recycling
  - Conservation
  - Population and economic growth
  - Investment in local resources
  - Change and/or loss of local supply
  - Participation in Metropolitan's Non-firm (interruptible) programs
  - Investment in Metropolitan's facilities

- Encourage storage of surplus supplies to mitigate shortages and improve water quality

SURPLUS AND SHORTAGE ACTIONS

The region's ability to implement a long-term WSDM Plan results from the significant investments Metropolitan and its member agencies have made in a variety of resources since 1991. These additional resources include increased local conservation and water recycling, improvements in the reliability of imported supplies, increased regional storage, and increased conjunctive use groundwater programs. Together these improvements allow a comprehensive approach to water management.

The growing variety of resources available to the region is transforming Metropolitan from an agency with relatively modest storage capacity to one that will have storage sufficient to manage many shortages without impacts to its member agencies or retail customers. To attain this level of reliability, all storage programs and facilities, along with conservation, recycling, and other programs, must be managed as an integrated set of regional resources. To accomplish this, the WSDM Plan establishes the linkage between surplus and shortage resource management actions.

When imported supplies exceed projected demands for imported water within Metropolitan's service area, Metropolitan can operate available storage facilities to maximize the benefits of stored water to its member agencies. A number of factors affect Metropolitan's ability to divert surplus water into storage. Some of these factors include facility outages, system capacity, water quality (including requirements for managing total dissolved solids), and varying supply and demand patterns. The WSDM Plan provides a description of storage options available to Metropolitan and a framework for storing water in these programs and facilities when surplus supplies are available.

Except in severe or extreme shortages (defined in the Introduction) or emergencies, Metropolitan's resource management will allow shortages to be mitigated without impacting retail Municipal and Industrial (M&I) customers. A list of resource management actions and their descriptions are provided below. This list emphasizes critical storage programs and facilities, and conservation programs that make up part of Metropolitan's response to shortages. The order in which these actions are presented does not imply the exact operational management of resources that would occur during a shortage, rather it represents a general framework and guide. In fact, several actions are likely to be taken concurrently. Many factors will dictate the exact order in which these actions will be taken during shortages. One action, however, will have an assigned prioritization: the curtailment of Full Service (firm) deliveries will be last. The following summarizes the drought actions:

- Draw on storage in the Eastside Reservoir Project
- Draw on out-of-region storage in Semitropic and Arvin-Edison
- Reduce/suspend long-term seasonal and groundwater replenishment deliveries
- Draw on contractual groundwater storage programs in the region
- Draw on State Water Project (SWP) terminal reservoir storage (per Monterey Agreement)
- Call for extraordinary drought conservation and public education
- Reduce Interim Agricultural Water Program (IAWP) deliveries
- Call on water transfer options contracts
- Purchase transfers on the spot market
- Implement the allocation of Metropolitan's imported supplies to its member agencies

For the ten-year period addressed by the WSDM Plan, 1999-2008, the majority of shortage contingencies will be managed by withdrawals from storage, groundwater management and options transfers. Shortages managed using these actions would not impact the quantity of water delivered to member agencies for consumptive uses. In fact, when coupled with other drought actions such as extraordinary conservation and reduction of agricultural deliveries, it is fully expected that an allocation of firm imported water supplies will not be necessary during the next ten years. Under this worse-case scenario, an approach to allocate Metropolitan's firm imported water supplies in a fair and equitable manner will be developed.

The overall policy objective of the allocation method will be to minimize the impacts to any one agency and the region as a whole. To meet that objective, the method of allocating firm imported supply will account for:

- Each agency's demands on Metropolitan,
- Each agency's local resources
- Each agency's total retail demands.

The WSDM Plan allocation method would address each of these supply and demand components and account for each agency's conservation and recycled water programs. A pricing structure will be coupled with the WSDM allocation method to accomplish two goals:

- Encourage conservation and water recycling
- Ensure that the regional impact of the shortage is as small as possible

To provide as much water as possible without changing wholesale prices, the allocation of all available supplies will be made at the prevailing rates for firm deliveries. In order to encourage conservation to the level of allocation, the rate for agency usage from 100-102% of its allocation will be the Full Service rate plus $175. Usage above 102% of allocated supply will be charged at three times the Full Service rate. Any substantial change in Metropolitan's water rate structure may require these rates to be revised.

During severe or extreme shortage conditions, public outreach will play a critical role in shaping consumer response. Public information campaigns will send clear signals if extraordinary drought conservation is required. An effective public information campaign requires a joint effort among Metropolitan and its member agencies. Under this Plan, the administration of the Public Information and Government Affairs program will be the responsibility of a Drought Program Officer (DPO). The DPO will be responsible for integrating the various activities in these areas, coordinating efforts with Metropolitan's Board of Directors and member agencies, and designing the region-wide messages for the general public and various target audiences. Important constituencies are residential users, industrial and institutional users, business interests, agricultural users, elected officials, officials of various agencies such as the Department of Water Resources, and the media.

INTEGRATED RESOURCES MANAGEMENT

Throughout the Integrated Resources Planning process and the development of the WSDM Plan, extensive analysis of resource management strategies focused on maximizing supply reliability while minimizing overall resource costs. Various management strategies were analyzed trader shortage scenarios based on historical hydrologic data. The WSDM Plan presents a resource management framework to guide Metropolitan's integrated approach to supply management.

The resource management framework does not dictate a scripted response to shortage or surplus. The framework recognizes the complexity and variety of conditions that require action. Supporting this framework are general rules that describe the actions to be taken in each stage of surplus or shortage. These rules depend on shortage stage, account for monthly delivery requirements, and depend on when various supplies would be available.

One of the fundamental trade-offs in dealing with supply shortages is the need to maintain flexibility while providing supply certainty to member agencies and consumers. A central focus of the WSDM Plan is the analysis of information about supplies and demands. When do various pieces of information about the supply/demand balance become more certain? When should this information impact policy-making and trigger various resource actions? The WSDM Plan addresses these questions and the actual implementation of the Plan during a shortage.

Appendix A of this report provides a ten-year simulation of projected demands and supplies showing an example of how the region can maintain 100% reliability.

INTRODUCTION

The Metropolitan Water District of Southern California (Metropolitan) provides water to a service area covering approximately 5,200 square miles. Over 16.5 million people live within the service area, which supports a $500 billion economy. Metropolitan provides supplemental supplies to twenty-seven member agencies, both retail and wholesale agencies, who in turn provide water to over three hundred cities and local agencies providing supplies at the retail level. In recent years Metropolitan supplemental deliveries have accounted for about one-half to two-thirds of the region's total water demands. With supplies from its Colorado River Aqueduct (CRA) and the State Water Project (SWP), Metropolitan delivers water for municipal and industrial (M&I) uses, agricultural uses, and augmentation of local storage.

As part of the implementation of the regional Integrated Resources Plan (IRP), Metropolitan and its member agencies have developed the Water Surplus and Drought Management (WSDM) Plan for Southern California. This ten-year plan will direct Metropolitan's resource operations to help attain the region's 100% reliability goal. Over this ten-year period, the WSDM Plan will be updated to account for changes impacting supplies from the Colorado River and California's Bay-Delta. In the past, Metropolitan has developed drought management plans that simply addressed shortage actions and primarily focused on issues of short-term conservation and allocation of imported water. The WSDM Plan recognizes the interdependence of surplus and shortage actions and is a coordinated plan that utilizes all available resources to maximize supply reliability. The overall goal of the WSDM Plan is to ensure that shortage allocation of Metropolitan's imported water supplies is no---At required.

Because it addresses both surplus and shortage contingencies, the WSDM Plans draws clear distinctions among the terms *surplus, shortage, severe shortage,* and *extreme shortage.*

> ***Surplus****: Supplies are sufficient to allow Metropolitan to meet Full Service demands, make deliveries to all interruptible programs (replenishment, long-term seasonal storage, and agricultural deliveries), and deliver water to regional and local facilities for storage.*
>
> ***Shortage****: Supplies are sufficient to allow Metropolitan to meet Full Service demands and make partial or full deliveries to interruptible programs, sometimes using stored water and voluntary water transfers.*
>
> ***Severe Shortage****: Supplies are insufficient and Metropolitan is required to make withdrawals from storage, call on its water transfers, and possibly call for extraordinary drought conservation and reduce deliveries under the IAWP.*
>
> ***Extreme Shortage****: Supplies are insufficient and Metropolitan is required to allocate available imported supplies.*

WSDM PRINCIPLES AND IMPLEMENTATION GOALS

The central effort in developing the WSDM Plan was a participatory process involving Metropolitan and its member agencies. Metropolitan staff and member agency representatives coordinated the Plan's development during a series of meetings of the Rate Refinement Team and the Integrated Resources Planning Workgroup. To lay a foundation for the WSDM Plan, participants in the Rate Refinement Process developed a set of "WSDM Principles and Implementation Goals."

Guiding Principle

- Metropolitan will encourage storage of water during periods of surplus and work jointly with its Member Agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage.

Supporting Principles

- Maintain an ongoing coordinated effort among Metropolitan and its Member Agencies to encourage efficient water use and cost-effective local resource programs and to inform the public on water supply and reliability issues

- Encourage local and regional storage during periods of surplus and use of storage during periods of shortage

- Manage and operate Metropolitan's regional storage and delivery system in coordination with local facilities to capture and store surplus water in local groundwater and surface reservoirs

- Arrange for secure sources of additional water from outside the region for use during periods of shortage

- Call upon sources of additional water from outside the region and water stored locally to meet the needs of consumers and protect the economy during periods of shortage

WSDM Plan Implementation Goals

- Avoid mandatory import water allocations to the extent practicable

- Equitably allocate imported water on the basis of agencies' needs

  Considerations to create an equitable allocation of imported water may include:
  - Impact on retail consumers and economy
  - Reclamation/Recycling
  - Conservation
  - Population and economic growth
  - Investment in local resources
  - Change and/or loss of local supply
  - Participation in Metropolitan's Non-firm (interruptible) programs
  - Investment in Metropolitan's facilities.

- Encourage storage of surplus supplies to mitigate shortages and improve water quality

REGIONAL RESOURCES AND DEMANDS

Southern California receives its water supplies from a variety of different sources, both local to the region and imported from outside the region. These sources are summarized below.

Local Supplies

Local supplies include groundwater pumping of local aquifers, surface reservoir production, recycled water, and supplies imported through wheeling arrangements or through the Los Angeles Aqueduct, which is owned and operated by the City of Los Angeles. Local supplies have, in the past, provided as much as 2.1 million acre-feet (maf) of water to meet the region's water demands. By far the largest component of local supplies is groundwater pumping, providing over 75% of historical local supplies.

Colorado River Supplies

The distribution and management of Colorado River water is governed by a complex body of laws, court decrees, compacts, agreements, regulations, and an international treaty collectively known as the "Law of the River." Metropolitan's entitlement is established by the fourth and fifth priorities of California's Seven Party Agreement, included in Metropolitan's 1931 and 1946 contracts with the Secretary of the Interior. These priorities provide 550,000 acre-feet (af) per year and 662,000 af per year, respectively. In addition, Metropolitan holds a surplus water contract for delivery of 180,000 af. The physical capacity of the CRA is slightly in excess of 1.3 maf per year, based on a pumping capacity of 1,800 cubic feet per second (cfs). Metropolitan's long-held objective is to maximize the availability of Colorado River water, up to the maximum capacity of the CRA, subject to environmental, contractual, legal, political, financial, and institutional constraints. A California 4.4 Plan is being developed among California parties that will help ensure that full CRA deliveries are maintained, while addressing the concerns of the other Colorado River basin states that rely on the river. The California 4.4 Plan includes core transfers (such as the IID/MWD conservation agreement and the proposed IID/SDCWA transfer), system conservation (such as the lining of the All American Canal), offstream storage (such as the Arizona groundwater storage program), dry year option transfers (such as PVID land fallowing), and river re-operations.

State Water Project

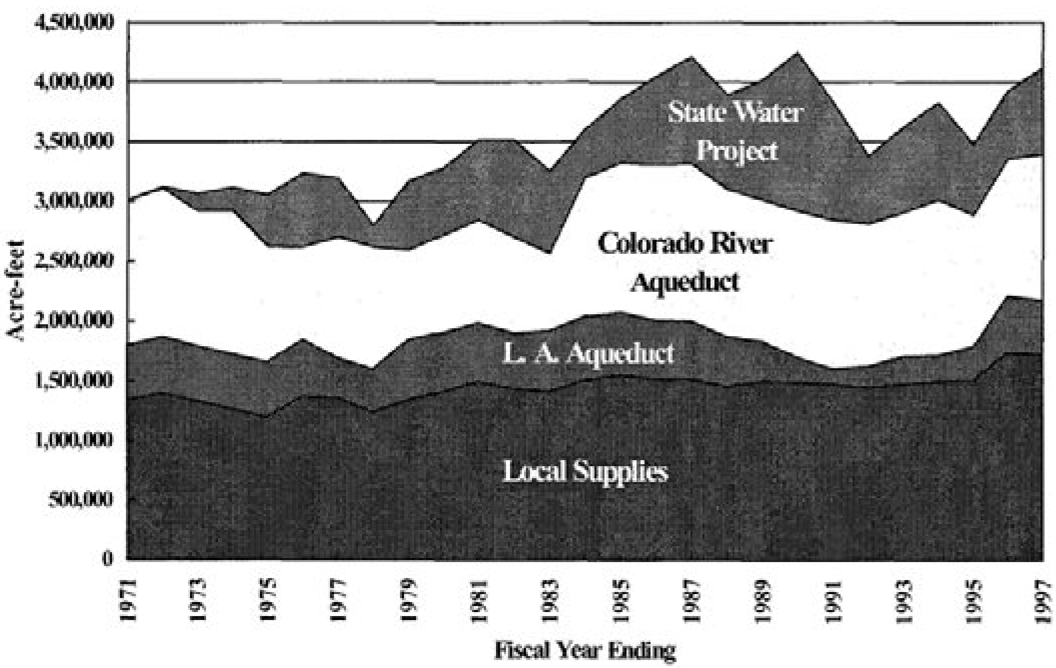
Metropolitan is one of 29 water agencies that have contracted with the State of California, through the Department of Water Resources (DWR), for water deliveries from the SWP system. Metropolitan's contracted entitlement is for 2.01 maf per year, or about 48 percent of the total contracted entitlement of 4.2 maf per year. SWP deliveries to Metropolitan are made via the SWP's California Aqueduct.

Initial SWP facilities, completed in the early 1970's, have produced average supply yields adequate to meet just over half of the total contracted entitlement. While it was intended that additional SWP facilities would be constructed as SWP contractor demands increased up to their contracted entitlements, few facilities have been constructed since that time.

The SWP obtains its supplies primarily from the Sacramento River Basin. About half of the total supply diverted from the Delta for the SWP is regulated flow from the Feather River (a tributary to the Sacramento River), while the other half is unregulated flow from runoff downstream of Sacramento River reservoirs and from other rivers that flow into the Delta. The Sacramento River watershed is subject to wide annual variations in total runoff. The Sacramento River Index (SRI), which measures runoff in the watershed, has averaged about 18 maf per year over the last 90 years. However, runoff varies widely from year to year. For example, the SRI measured 7.8 mafin 1994 and 32.5 mafin 1995.

Figure 1 shows the historical total regional supply production by type. As shown in Figure 1, water supplies were as high as 4.25 mafin 1990 and within two years dropped to 3.4 mar, a 20% decrease.

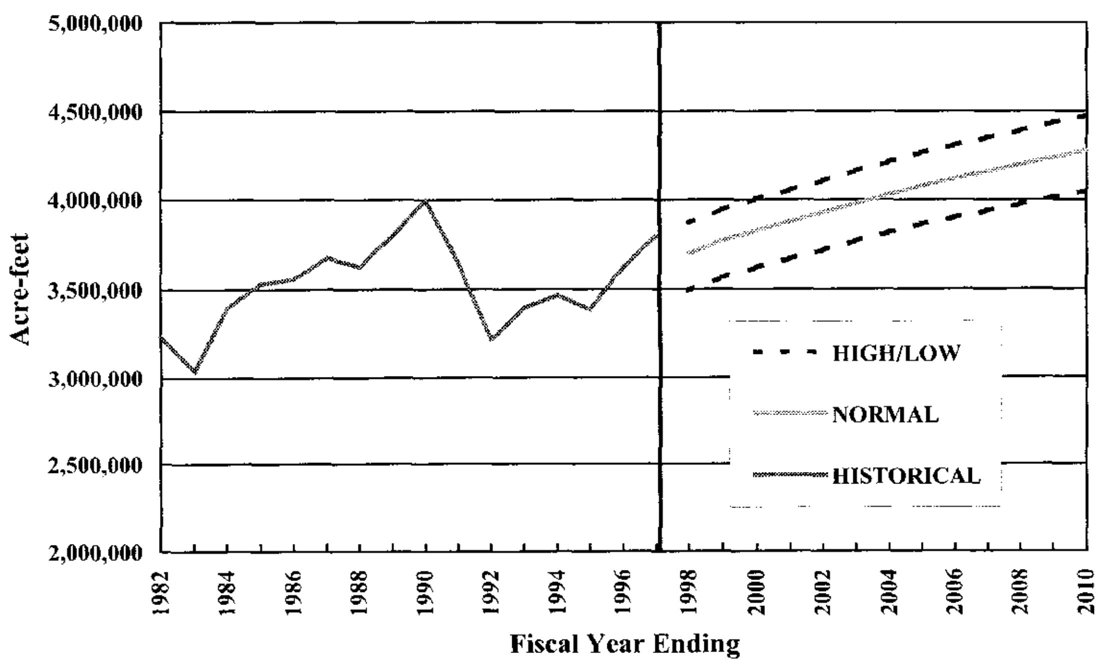
Figure 1. Historical Supply Production by Type of Supply



RETAIL DEMANDS

From 1982 through 1995, the region experienced retail water demands averaging 3.5 mar. In dry years retail demands are approximately 5 to 7% greater than normal years, while demands in wet years are about 6 to 8% below normal demands. Under normal weather conditions, assuming full implementation of conservation best management practices, total regional retail demands are projected to increase from about 3.7 mar in 1997 to almost 4.3 mar in 2010. Without conservation, demands in 2010 would be about 10 to 12% greater than projected. Increases in retail demand are driven by demographics and economics, including changes in population, housing, employment, and income. Figure 2 shows the historical and projected retail demands in Metropolitan's service area.

Figure 2. Regional Retail Water Demands



The historical variability in demands from 1982 to 1997 is mainly due to weather and the economy. In 1983, extreme wet weather caused a significant drop in retail demands. During the period from 1985 to 1990, hot and dry weather coupled with a strong economy resulted in increased demand from 3.5 maf to 4.0 maf, a 14% increase. In 1991, the 5th year of a prolonged drought, conditions forced many communities to implement mandatory supply reductions. These mandatory reductions coupled with extraordinary drought conservation caused a 10 to 15% decrease in retail demands for the region. In addition, the period between 1992 and 1995 was very wet (with the exception of 1994, which was dry), and was a period of severe economic recession. Southern California alone lost some 700,000 jobs from 1990 through 1995. The combination of wet weather, economic recession, and conservation resulted in demands decreasing by over 17%.

DEMANDS ON METROPOLITAN

For many member agencies, Metropolitan's water deliveries represent a supplemental supply. Most member agencies have local water supplies, but agencies differ in how much their supplies alone can meet their respective retail demands. Local supplies are often base-loaded (maximized subject to various constraints) and purchases from Metropolitan are used to meet remaining demands. In addition, to meeting consumptive demands, Metropolitan's deliveries are used to replenish local groundwater and surface reservoirs. To project demands on Metropolitan, projections of member agency's retail water demands and local water supplies are made. Local supplies are then subtracted from retail demands to get consumptive demands on Metropolitan. A projection of Metropolitan's long-term seasonal and replenishment deliveries are made based on safe groundwater yield and weather/hydrology.

Metropolitan forecasts its demands for three different broad categories: Full Service, Seasonal (reservoir storage and groundwater replenishment delivered for shift or long-term storage purposes and sold at a discount), and Agricultural (deliveries of water sold at a discount for agricultural use). Overall, demands on Metropolitan can vary -+ 11 to 18% from normal conditions due to weather and hydrology.

The following four figures show historical and projected demands on Metropolitan by category. Figure 3 shows Basic Water Deliveries, Figure 4 shows Seasonal Water Deliveries, Figure 5 shows Interim Agricultural Water Program (IAWP) Deliveries, and Figure 6 shows Total Water Deliveries for Metropolitan.

Figure 3. MWD Basic Water Deliveries

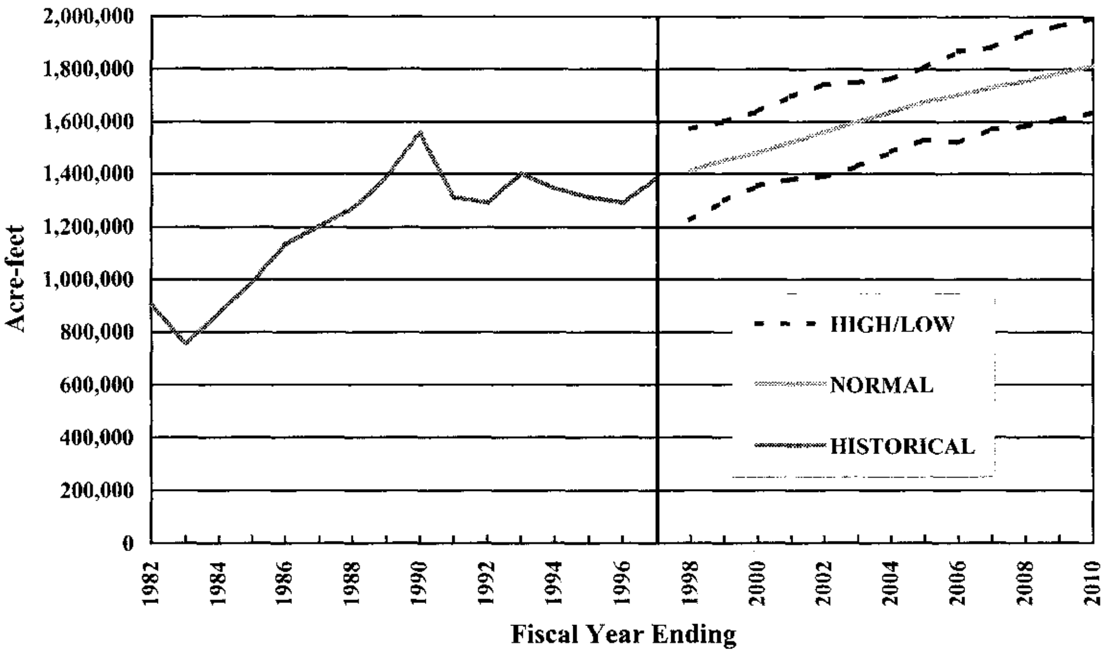


Figure 4. MWD Seasonal Water Deliveries

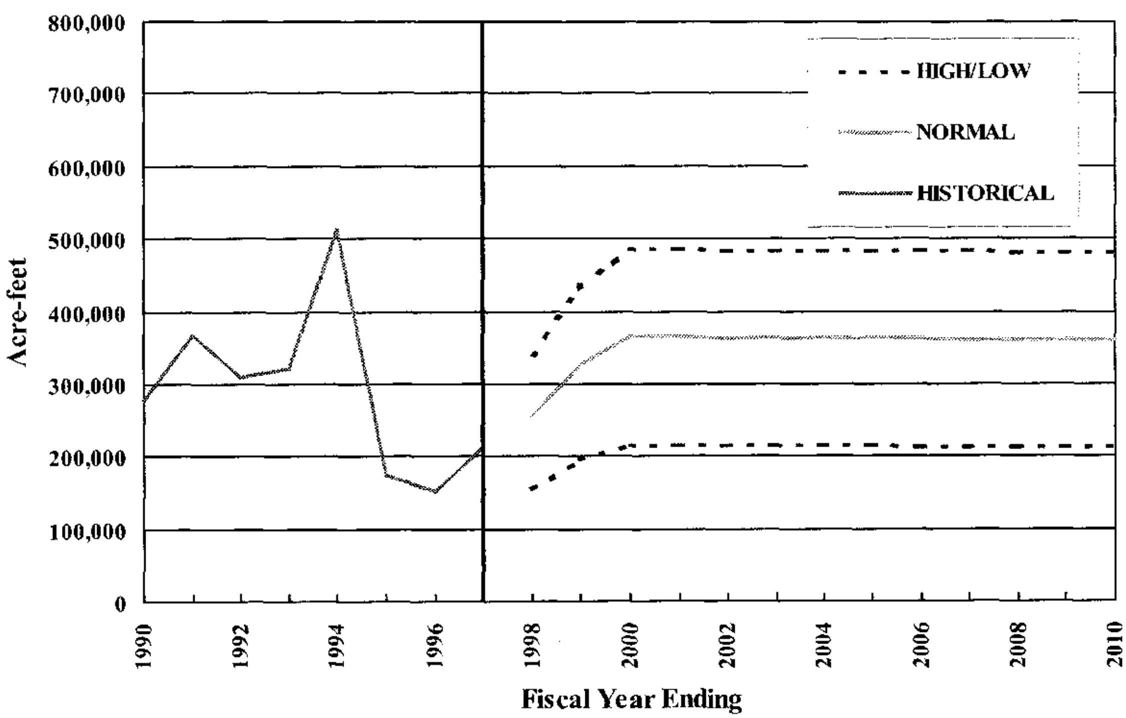


Figure 5. MWD Interim Agricultural Water Program (IAWP) Deliveries

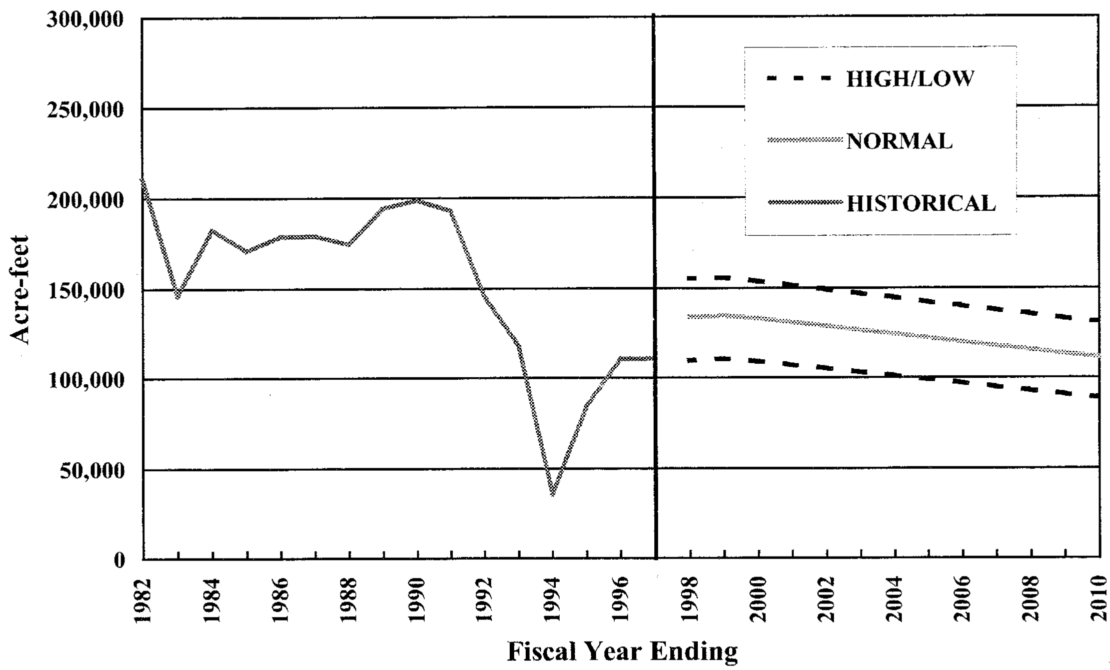
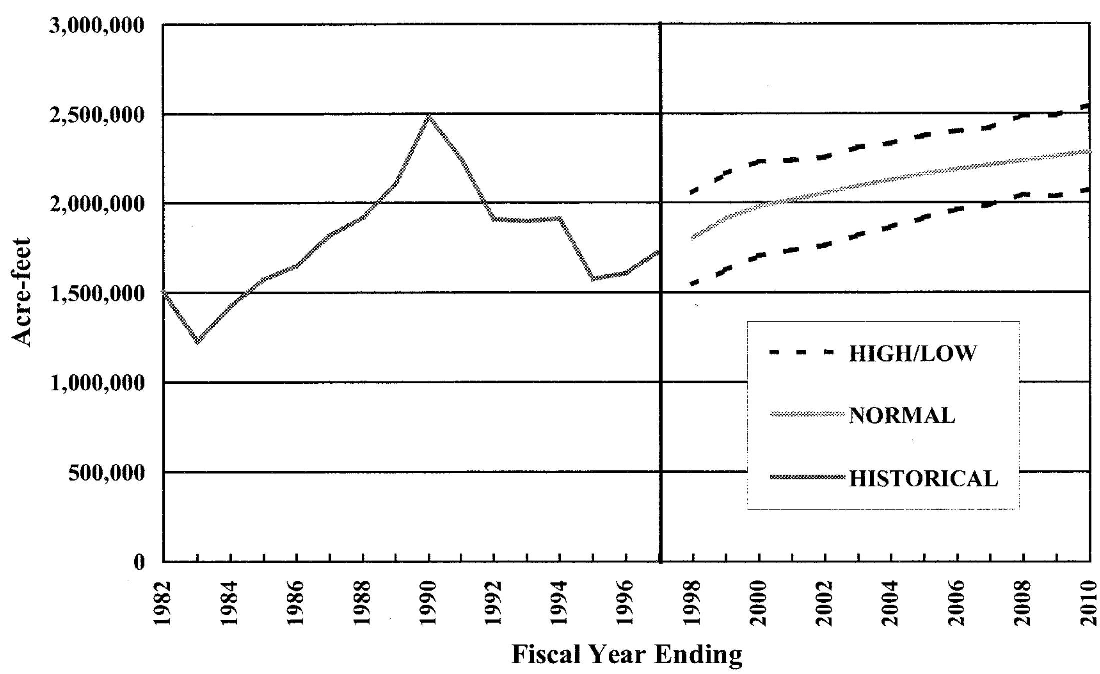


Figure 6. MWD Total Water Deliveries



INTEGRATED RESOURCES PLANNING

To ensure supply reliability under various drought conditions, Metropolitan and its member agencies developed an Integrated Resources Plan (IRP). The IRP, adopted by Metropolitan's Board of Directors in January 1996 and periodically updated, guides Metropolitan's resource and capital improvements investments. The region's ability to develop a long-term WSDM Plan results from the significant investments Metropolitan and its member agencies have made in resources since 1991. To date, these investments include:

- Local supplies: Metropolitan co-funded over 23 local projects and 200 conservation programs that will yield a total of 160,000 af per year.

- **Colorado River Aqueduct:** Metropolitan developed transfers and storage programs to help ensure a full aqueduct. The landmark Metropolitan/Imperial Irrigation District Conservation Program (IID), will result in a savings of 107,000 af per year. Storage programs in Arizona and California, combined with the IID savings, yield a total of 280,000 af of annual core, dry year options, and storage supply.

- **State Water Project:** Metropolitan and other parties negotiated the Bay-Delta Accord and the Monterey Amendment. The Bay-Delta Accord and subsequent efforts will increase the reliability of Metropolitan's entitlement deliveries. The Monterey Amendment provides access to 220,000 af of SWP storage.

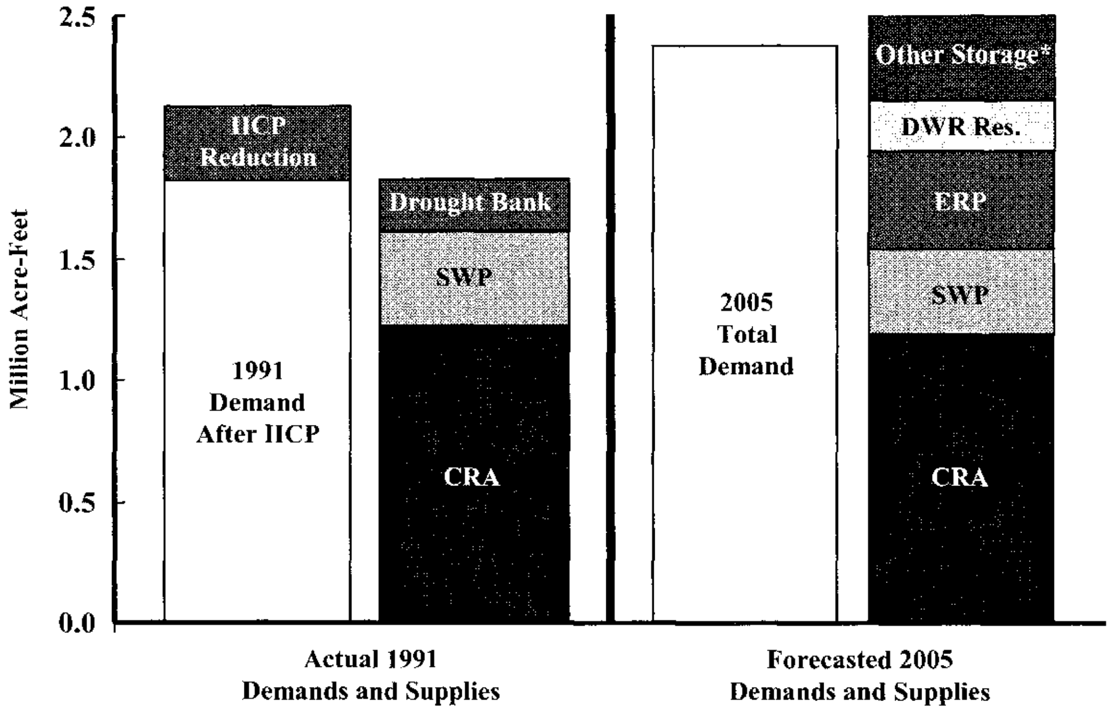
- **In-Basin Storage:** Metropolitan is constructing the Eastside Reservoir Project, with 800,000 af of storage (400,000 af of which is emergency storage for use in case of facility failure as a result of earthquake or other event).

- **Groundwater Conjunctive Use Storage:** Metropolitan developed a conjunctive use storage program in the North Las Posas Basin in Ventura County with an anticipated capacity of 210,000 af and a dry-year withdrawal rate of up to 70,000 af.

- **Transfers and Storage:** Metropolitan developed the Semitropic Storage Program, with 350,000 af of storage and dry-year withdrawals averaging about 60,000 af. Metropolitan also approved the Arvin-Edison Storage and Transfer Program, with 250,000 af of storage and dry-year withdrawals averaging about 70,000 af. Metropolitan is also exploring storage and transfer programs with the Coachella Valley Water District and the Cadiz Land Company.

As a result of these investments, it is anticipated that Metropolitan and its member agencies will be 100% reliable over the next 10 years even under a repeat of the 1991 drought condition. Figure 7 compares actual Metropolitan demands and supplies during 1991 (the last year in a multiyear severe drought) and projected demands and supplies in year 2005 (assuming a repeat of 1991 conditions). In 1991, the region faced shortages that required Metropolitan to allocate water under the Incremental Interruption and Conservation Plan (IICP). The reduction in deliveries came after demands had already been reduced as a result of local conservation. In addition, water had to be purchased from the Governor's drought emergency water bank. By the year 2005 with the investments made to date, Metropolitan's additional water supplies will be more than adequate to meet demands under a repeat of the 1991 drought event--even with increased demands due to growth.

Figure 7. Historical and Projected Metropolitan Supplies and Demands Under Drought Conditions



* Groundwater management, Semitropic Storage Program, and Arvin-Edison Storage Program

SURPLUS AND SHORTAGE RESOURCE ACTIONS

Metropolitan's investments in water resources, facilities, and programs has transformed it from an agency with relatively modest storage capacity to one that will have storage sufficient to manage many shortages without negative impacts to its member agencies or retail customers. To attain this level of reliability, storage programs and facilities, along with conservation, recycling, and other programs, must be managed as an integrated set of regional resources. To accomplish this, the WSDM Plan recognizes the linkage between surplus and shortage resource management actions.

SURPLUS ACTIONS

The combination of Metropolitan's regional storage facilities, such as Lake Mathews, Lake Skinner, the future Eastside Reservoir Project, and the storage capacity available to Metropolitan in Castaic Lake and Lake Perris as a result of the Monterey Amendment, allows Metropolitan great flexibility in managing its water resources. The development of storage programs both outside and within the service area provides even greater flexibility in storing surplus water. Each of the storage facilities and programs plays an important role in achieving Metropolitan's reliability goal.

When imported supplies exceed projected demands for imported water within Metropolitan's service area, Metropolitan can operate storage facilities to maximize stored water to benefit its member agencies. A number of factors affect Metropolitan's ability to divert surplus water into storage. Some of these factors include facility outages, system capacity, water quality (including requirements for managing total dissolved solids), and varying supply and demand patterns. This section provides a description of storage options available to Metropolitan and a framework for storing water in these programs and facilities when surplus supplies are available.

Storage of Colorado River Supplies

Metropolitan has participated in a number of programs to maximize the reliability of supplies from the Colorado River. The landmark Metropolitan/Imperial Irrigation District Conservation Program will result in a savings of 107,000 af per year. These supplies will increase the reliability of Metropolitan's entitlement of Colorado River water. Other programs yield shortage benefits by increasing amounts of water stored for use during shortages. Between August 1992 and July 1994, Metropolitan and the Palo Verde Irrigation District conducted a Test Land Fallowing Program. Approximately 20,000 acres of farmland in the Palo Verde Valley were not irrigated, saving 186,000 af of water which was stored in Lake Mead for later use by Metropolitan. With Arizona and Nevada water agencies, Metropolitan is participating in a Central Arizona Groundwater Storage Demonstration Program that has encouraged the storage of water. To date, 139,000 af of supplies have been stored in groundwater basins in Central Arizona. The Desert Coachella program is an exchange and storage program with agencies situated along the Colorado River Aqueduct. Metropolitan releases Colorado River water for storage in the Coachella Groundwater Basin. Metropolitan then exchanges these supplies for the participating agencies' SWP supplies. These programs serve as models for future programs that could increase the reliability of Colorado River supplies. Metropolitan continues to explore other possible options that would increase the reliability of supplies. The California 4.4 Plan is being developed among California parties to increase storage programs for Colorado River supplies. In addition to core transfers and conservation programs, the California 4.4 Plan includes offstream storage (such as the Arizona groundwater storage program), dry year option transfers (such as PVID land fallowing), and river re-operations. These programs, in conjunction with favorable supply determinations by the Secretary of Interior, will ensure the highest possible reliability of Colorado River supplies.

In addition to the programs mentioned above, the Colorado River system itself contributes to the high reliability of Metropolitan's Colorado River supplies. Currently, the average Colorado River runoff exceeds basin-wide demands by over 1.0 maf per year. The Colorado River system also contains a great deal of reservoir storage capacity. The total storage capacity in the Colorado River Basin is approximately 60 maf, almost four times the Colorado River's average annual flow. For much of 1997, system storage levels were at 80% or more of total capacity. These factors allow the Bureau of Reclamation, operators of the Colorado River system, to store significant supplies for use during shortages.

Storage of State Water Project Supplies

Total storage capacity is a critical factor in comparing the operations of the Colorado River system with the SWP. On average, both systems have similar amounts of water available on an annual basis. The SWP's watersheds in the Sacramento River Basin have produced about 18 maf per year over the long term, as represented by the Sacramento River Index (SRI.) Long-term runoff on the Colorado River has averaged more than 16 maf annually since 1906. However, the ability to carry over unused water from a wet year for use in a dry year differs substantially between the two systems. State Water Project storage facilities have storage capacity of about 4.5 maf, while system storage in the Colorado River Basin totals nearly 60 maf. This gives the operators of the Colorado River reservoirs much more flexibility in storing unused water from a wet year for use in a subsequent dry year.

When water from the SWP cannot be put to immediate use in Metropolitan's service area, the water may be stored for future use. Provided storage capacity is available, the water may remain in either Oroville Reservoir (as SWP storage for delivery to all contractors the following year) or San Luis Reservoir (as carryover storage assigned to Metropolitan). Through the carryover storage program, as amended by the Monterey Amendment, Metropolitan can place a maximum of 200,000 af per year of allocated supplies in SWP surface reservoirs. The program also allows for carryover storage in non-project facilities, including surface reservoirs and groundwater basins. In the case of carryover storage in San Luis Reservoir, SWP supplies allocated to but unused by a contractor may, under certain conditions, be assigned as carryover if storage capacity is available at the end of the calendar year. However, carryover water stored for a contractor has lower priority than storage of SWP water and consequently "spills" first as San Luis Reservoir fills.

Also, in a wet year such as 1995, low demands may allow DWR to operate San Luis Reservoir nearly full, eliminating any possibility of contractor carryover storage into the following year. As a result, carryover storage on the SWP may not be possible, and even when possible, is subject to spilling.

Due to these carryover storage limitations, Metropolitan has invested a great deal to expand its ability to store surplus SWP supplies. Metropolitan has entered into a number of water transfer and storage agreements. The Semitropic Water Banking and Exchange program allows Metropolitan to store up to 350,000 afin the groundwater basin underlying the Semitropic Water Storage District. The storage and withdrawal capacities of the program are shared with other participants in the storage program, with Metropolitan's share equaling 35%. Dry-year withdrawals will average about 60,000 af.

Metropolitan and the Arvin-Edison Water Storage District have developed a program that allows Metropolitan to store water in the groundwater basin in the Arvin-Edison service area. The program would allow the storage and withdrawal of 250,000 af of supplies over the next 25430 years. Dry-year withdrawals will average about 70,000 af.

Storage in Regional Facilities

In addition to the storage of Colorado River and SWP supplies outside the region, Metropolitan has established a number of programs for storing supplies within the region. Metropolitan owns and operates two main surface reservoirs, Lake Mathews and Lake Skinner, which have a combined storage of about 226,000 af. Only a small portion of this capacity is available for shortages, with the balance being used to regulate flows in Metr0Politan's delivery system. The Eastside Reservoir Project, currently under construction, will have a total capacity of 800,000 af, with approximately 400,000 af of operational drought and seasonal storage and 400,000 af of emergency storage. Through the Monterey Amendment, Metropolitan obtained the fight to use up to 220,000 af of water stored in the SWP terminal reservoirs. However, withdrawals from these terminal reservoirs must be replaced within five years.

Metropolitan and its member agencies have established the cyclic storage program to increase storage in groundwater basins within the service area. Regional groundwater basins offer an economical way for Metropolitan to improve supply reliability by storing water within the service area. This makes water readily accessible in times of need, either in emergency situations or during shortages. Some limitations are imposed by the fact that such water can generally only be used through pumping from the groundwater basin by an overlying member agency or local agency. Storage in groundwater basins takes place either by direct replenishment (spreading or injection), or through in-lieu means. Spreading (or injection) is desirable because direct measurement of the amount of stored water is a relatively simple, verifiable transaction. The main disadvantage to direct spreading is that spreading can occur only under certain conditions. For example, spreading cannot occur when spreading facilities are being used to capture local storm runoff for flood control purposes, or when the amount of local runoff precludes the need for imported water to replenish the basins. Also, spreading basins require frequent maintenance to assure maximum efficiency. These and other conditions can limit the ability to deliver water for spreading at a time when surplus supplies are available.

In-lieu replenishment allows most member agencies to participate in groundwater replenishment without needing direct access to replenishment facilities. Their wells, in effect, become their replenishment facilities. Both direct and in-lieu replenishment from 1986 through 1990 served the region well during the critical drought years from 1991 through 1993.

The overall objective of the various storage programs is to maximize the availability of imported water during times of need by storing surplus water in a strategic manner and utilizing the storage available within the region. Many factors affect the availability of storage capacity and Metropolitan's ability to move water to and from various facilities. After reviewing the full range of shortage actions available to Metropolitan, a framework for prioritizing the full range of surplus and shortage actions will be presented.

In addition to pricing incentives used to encourage local agencies to store water in groundwater basins, Metropolitan has developed a conjunctive use contractual storage program with the Calleguas MWD in the North Las Posas Basin. Metropolitan will fund the construction of wells which will be called upon to meet demands during dry years. This program will yield a dry year supply of about 70,000 af.

SHORTAGE ACTIONS

Except in severe or extreme shortages or emergencies, Metropolitan's management of available resources will allow shortages to be mitigated without negatively impacting retail M&I demands. Below is a list of drought actions that will be taken during periods of shortage. The goal of these actions is to avoid, to the extent practicable, the allocation of Metropolitan's firm supplies. The order in which these actions are presented does not imply the exact operational management of resources that would occur. In fact, several actions are likely to be taken concurrently. Many factors dictate the particular order in which actions will be taken during an actual shortage, although it is clear that the last action will be the curtailment of firm deliveries to the member agencies.

- Draw on storage in the Eastside Reservoir Project
- Draw on out-of-region storage in Semitropic and Arvin-Edison
- Reduce/suspend long-term seasonal and groundwater replenishment deliveries
- Draw on contractual groundwater storage programs in the region
- Draw on SWP terminal reservoir storage (per Monterey Agreement)
- Call for extraordinary drought conservation and public education
- Reduce IAWP deliveries
- Call on water transfer options contracts
- Purchase transfers on the spot market
- Implement an allocation of Metropolitan's imported supplies to its member agencies

Even with dedicated programs to meet the reliability goal for the region, proper management and operations of these resources is critical to ensure reliability. The prioritization of both surplus and shortage actions need to account for several important criteria. It is also important to recognize that these criteria will need to be balanced. The criteria include:

Location: Out-of-region storage is more vulnerable than in-basin-storage due to the risks of seismic events. To only maximize out-of-region storage will put reliability at risk.

Take capacity: Surface reservoirs generally have the ability to be filled and drawn down very quickly. Certain groundwater storage programs have limited take capacities--requiring several years at full take capacity to withdraw **all** available storage. Stored water will be balanced so that dry year supplies are maximized.

Cost: Programs vary with respect to their marginal operating costs. Program actions will be taken to maximize supply reliability while minimizing cost.

Flexibility: Not all storage programs and transfers offer the same flexibility to Metropolitan. Some programs can only meet specific overlying demands, while others can meet demands anywhere in the system.

DESCRIPTIONS OF RESOURCE ACTIONS

Draw on storage in the Eastside Reservoir Project: Withdrawals from the Eastside Reservoir Project would provide a flexible supply for meeting a shortage. Eastside Reservoir Project supplies can be drawn upon quickly. The amount of water drawn from the Eastside Reservoir Project before exercising other shortage actions will depend on the severity of the shortage and the overall condition of other resources available to Metropolitan.

Draw on out-of-region storage in Semitropic and Arvin-Edison programs: Out-of-region programs such as Semitropic and Arvin-Edison provide cost-effective shortage supplies. These supplies also provide flexibility, as they can be distributed as effectively as any SWP supplies coming into Metropolitan's service area. Exercising these programs relatively early in the order of actions reduces the risk of leaving supplies out-of-region. Based upon the ratio of storage capacity to take capacity, these programs will generally provide supplies over several years. This provides the rationale for calling on these programs relatively early in a shortage.

Reduce Long-Term Seasonal and Replenishment Deliveries, and call on cyclic storage accounts: Certain interruptible supply programs provide benefits during shortage. Reducing deliveries to interruptible programs established for storage purposes, while continuing expected levels of groundwater production, allows limited supplies to go toward meeting direct consumptive uses. In addition, calling on cyclic storage accounts can extend the replenishment needs for several years. Most replenishment supplies would be expected to be interruptible for a minimum of two years before agencies would be allowed to claim a local supply adjustment on such supplies. Some programs have longer interruption requirements. For example, most Groundwater Recovery Programs are governed by contracts that require supply production through a three-year interruption in service.

Draw on contractual groundwater storage programs: In-region contractual groundwater programs provide cost-effective supplies that would be drawn upon during shortages. These programs are also limited by their take capacities and generally have several years of withdrawals in storage. For this reason, these programs might be called upon before withdrawing heavily from surface reservoir storage.

Draw on SWP terminal reservoir storage: The storage available in the SWP terminal reservoirs provides a flexible and cost-effective shortage supply. Supplies withdrawn from this program must be replaced within five years of withdrawal. For this reason, the storage in these reservoirs would be reserved for more serious shortage conditions and would be utilized after the programs and facilities listed above were used to meet the shortage.

Call for extraordinary drought conservation: Voluntary conservation programs have historically been effective in reducing water demand during drought. However, voluntary conservation programs are not without impact to the retail customer and can be perceived as a failure of water agencies to properly plan for shortages. Therefore, the call for extraordinary drought conservation will only be taken with the consent of Metropolitan's Board of Directors.

Reduce agricultural deliveries: The Interim Agricultural Water Program (IAWP) offers interruptible water to southern California's agricultural industry at discounted rates. These supplies will be interrupted as part of Metropolitan's shortage actions. Metropolitan will work with IAWP participants to provide as much advance warning of interruption as possible. The IAWP reflects current policies toward agricultural water users. The policies underlying this program are due to be reviewed during the ten-year period of the WSDM Plan. The WSDM Plan will be changed accordingly.

Call on water transfer option contracts: Transfer options programs provide cost-effective supplies when the region is faced with reducing deliveries to meet consumptive demands. These programs might also be used to increase storage levels in Metropolitan storage facilities. Replenishment of these facilities reduces the risk of leaving available supplies outside the region and helps to protect the region during extended shortages.

Purchase transfers on the spot market: During the 1987-92 drought, the Drought Water Bank proved to be one mechanism for California to reduce the overall impacts of the shortage. However, the cost of spot market supplies may cause Metropolitan to use them as a last increment of supply before the region implements reductions in M&I deliveries. It is likewise possible that availability and cost will make spot market options more favorable under certain conditions. If this occurs then spot market supplies will be sought prior to calls on option transfers. However, participation in the spot market may be restricted to those agencies that have already taken significant actions in response to the shortage.

Implement allocation plan: As the final stage in responding to shortages, Metropolitan will implement an allocation plan to deliver reduced supplies to its member agencies. The issues of allocation and the methods of allocation are outlined in the following section.

ALLOCATION OF SUPPLY FOR M&I DEMANDS

The equitable allocation of supplies is addressed by the Implementation Goals established for the WSDM Plan, with the first goal being to "avoid mandatory import water allocations to the extent practicable." The second fundamental goal is to "equitably allocate imported water on the basis of agencies' needs." Factors for consideration in establishing the equitable allocation include retail and economic impacts, recycled water production, conservation levels, growth, local supply production, and participation and investment in Metropolitan's system and programs. In the event of an extreme shortage an allocation plan will be adopted in accordance with the principles of the WSDM Plan.

INTEGRATED RESOURCE MANAGEMENT STRATEGY

Throughout the Integrated Resources Planning process and the development of the WSDM Plan, extensive analysis of resource management strategies focused on maximizing supply reliability while minimizing overall resource costs. Various management strategies were analyzed under shortage scenarios based on historical hydrologic data. Certain strategies yield high reliability but incur very high costs. This is the case for strategies that utilize relatively costly transfer programs early in a shortage while maintaining high storage levels. If a shortage is short, this results in high transfer costs and shortage storage programs that are not fully utilized. Other strategies draw more heavily on storage early in a shortage and do not use options transfer programs. Later in a shortage, the yields from these transfer programs, combined with low yields from depleted storage facilities, might not make up for continuing or deepening shortages. Overall, such approaches may be inexpensive to pursue at the wholesale level but have high costs associated with retail level impacts. The resource management framework presented results from extensive analysis of various strategies for managing available resources under a variety of surplus and shortage conditions. Although the extent to which various actions are exercised may still vary depending on specific shortage conditions, the ordering presented does reflect Metropolitan's anticipated order of actions during shortages.

RESOURCE MANAGEMENT FRAMEWORK

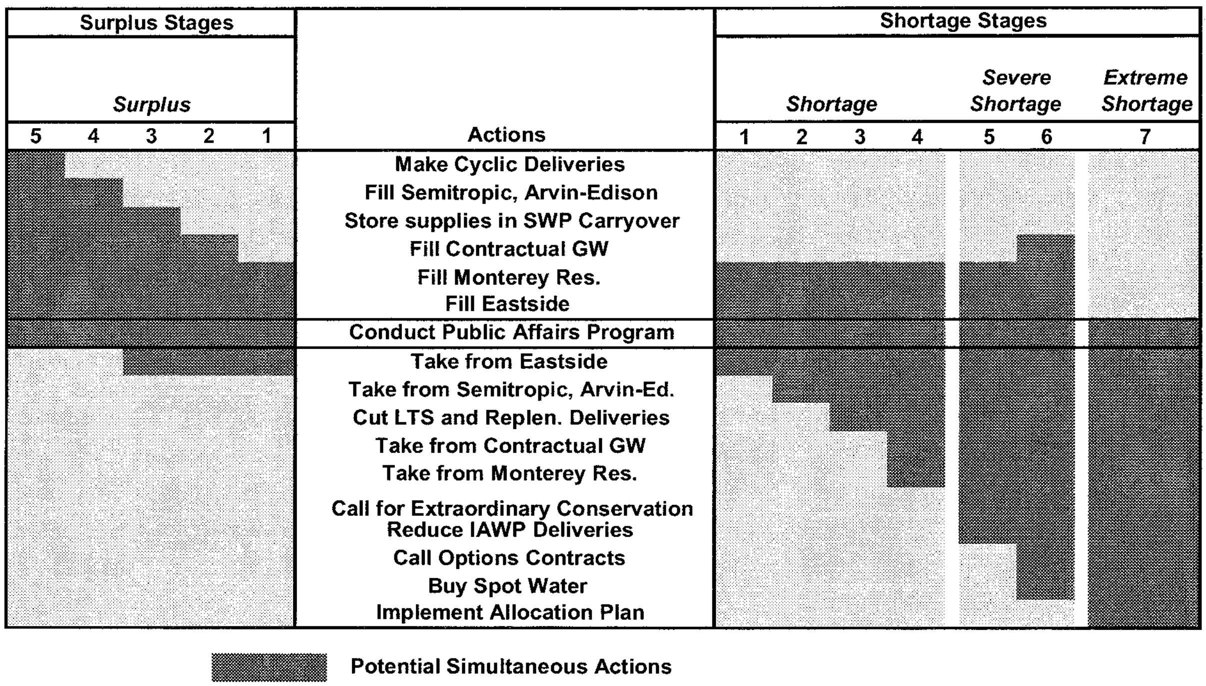
The analysis of surplus and shortage actions yields a water management framework that accounts for the degree or "stage" of surplus and shortage. These stages are defined by parameters such as storage levels and expected SWP supplies. Each stage has associated actions that could be taken as part of the response to prevailing shortage conditions. For example, Surplus Stage 1 might have as associated actions to place water in the highest-priority storage resources. Figure 8 shows the mapping between actions and stages. The darkly shaded diagonal area identifies actions that can be undertaken concurrently, while the lightly shaded areas show actions that will not be taken. For example, Metropolitan will not withdraw water from most storage resources during a surplus.

Figure 8 highlights several aspects of the WSDM Plan's approach to supply management. First and most importantly, it does not dictate a response to shortage or surplus. The framework recognizes the complexity and variety of conditions that could require various responses. Supporting this framework are general "rule curves" that dictate the extent to which particular actions are taken in various stages of surplus or shortage. For example, the rule curves indicate approximately how much water should be taken from the Eastside Reservoir Project before calling on supplies from the Semitropic or Arvin-Edison storage programs. If a shortage were greater than the desired initial withdrawal from the Eastside Reservoir Project, then Stage 2 actions would be taken. The rule curves for a particular resource would take into account shortage stage, monthly delivery requirements, and when various supplies are available.

Surplus and Shortage Stages are determined by the total amount of water that would be stored or produced by exercising the actions in that Stage. Overall storage levels in each stage are determined by the extent to which storage is increased or reduced by earlier actions. Therefore, each Stage is defined by supplies (stored or produced) and an approximate overall level of storage remaining in all resources. Up through Shortage Stage 4, the actions taken will not result in negative impacts to any consumptive uses. Shortage Stages 1 through 4 constitute shortage management without retail level impacts. The conservation efforts and reductions in IAWP deliveries in Shortage Stage 5 will result in retail impacts.

Action by the Metropolitan Board of Directors would be required before actions corresponding to Stages 5, 6, and 7.

Figure 8. Resource Stages and Actions Matrix



The Stages and Actions Matrix (Figure 8) is read from the center moving outward. Moving from the center to the left, are actions that Metropolitan will take during surplus conditions. For instance, in a Stage 3 Surplus, Metropolitan will be adding water to the Eastside Reservoir Project, the Monterey Reservoirs (if any water is due for repayment), Contractual Groundwater Programs, and carryover storage on the State Water Project. Moving from the center to the right are actions that Metropolitan will take during periods of shortage. For instance, in a Stage 3 Shortage, Metropolitan will be pulling water from the Eastside Reservoir Project, the Semitropic and Arvin Edison programs, and interrupting deliveries of Long-Term Seasonal and Replenishment program water. In addition, the Stages and Actions Matrix allows for surplus actions to be taken during shortages and vice versa, but these actions are strictly a result of prudent water management. For example, in a Stage 6 Shortage, Figure 8 shows Metropolitan potentially filling the Eastside Reservoir Project, the Monterey Reservoirs, and contractual groundwater programs while calling on spot transfers and buying spot water. Through these actions Metropolitan will be ensuring that water supply opportunities during a drought are realized--ultimately adding to the drought reserves of southern California.

Figure 8 also highlights the on-going efforts by Metropolitan and its member agencies in the conduct of public outreach and active conservation programs. Through all conditions, effective pubilc outreach and conservation programs are an integral part of Metropolitan's management of resources. In addition to ongoing conservation and water efficiency programs, Stage 5 of the Stages and Actions Matrix calls for participation of the citizens of southern California to take extraordinary conservation measures to cut water demand during droughts.

As with the listing of shortage actions earlier in the report, the Stages/Actions matrix in Figure 8 only highlights certain programs and response actions. However, unlike the discussion of actions earlier, Figure 8 is intended to convey Metropolitan's currently anticipated ordering for those actions listed. As the supply and demand outlooks, programs, and other factors continue to change, the analysis of the ordering of actions will continue during the ten-year period of the WSDM Plan.

SUPPLY CERTAINTY AND THE TIMING OF RESOURCE ACTIONS

One of the fundamental trade-offs in dealing with supply shortages is the need to maintain flexibility while providing supply certainty to member agencies and consumers. A central focus of the WSDM Plan is the analysis of information about supplies and demands. When do various pieces of information about the supply/demand balance become more certain? When should this information impact policy-making and trigger various resource actions? The WSDM Plan addresses these questions and the actual implementation of the Plan during a shortage.

Figure 9 shows a hypothetical shortage year. With respect to the supply and demand outlook, a typical shortage year will have periods of certainty and stability, and other periods of relative uncertainty and transition. Important supply components--such as the SWP, CRA, Los Angeles Aqueduct (LAA), and local supplies--are closely monitored through the early part of the year. These supplies and demands are fairly well-known through the April-September period. Storage is assessed in the post-summer period and decisions about certain programs, such as long-term (LT) seasonal deliveries could be made at this time.

Figure 9. Water Supply Outlook Throughout the Year

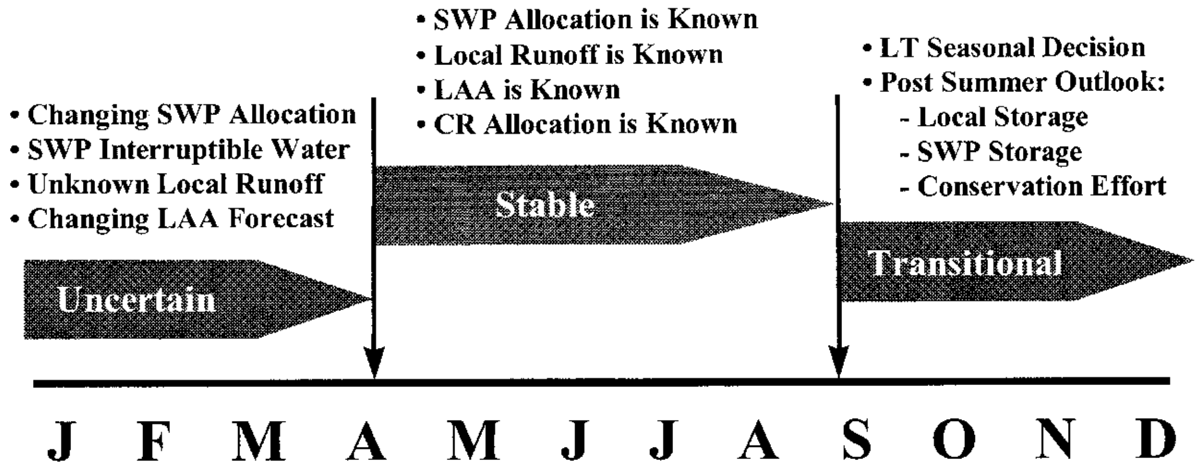
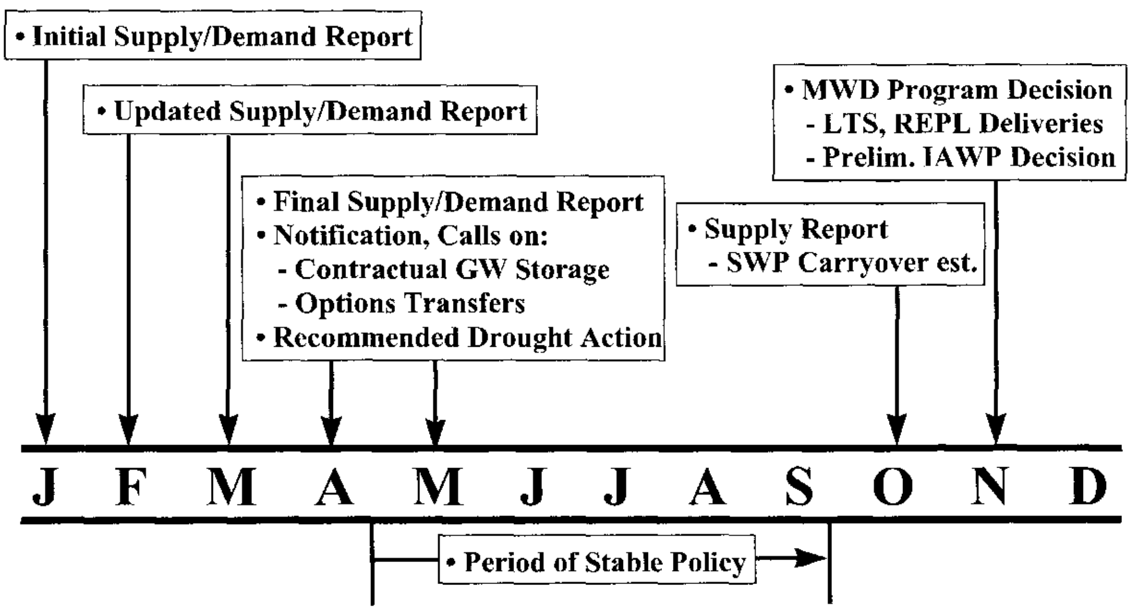


Figure 10 presents the annual schedule for actions taken in response to shortage conditions. Starting in January, an initial supply/demand report will be presented to the Metropolitan Board of Directors. SWP allocations are still only estimates in January and become more certain towards April and May. Demands for Metropolitan deliveries depend in part on how the winter hydrology develops and the condition of local supplies. These factors start to become known during the February-March period and will be reported to the Board in the Supply Report Update. By April-May, the outlook for imported supplies is known to a fairly high degree of certainty and a Final Supply Report will be produced. The May-September period will be one in which the import supply situation does not change drastically and drought policies can be implemented. Demands can be more or less than anticipated as a result of unusually hot or cool weather. At the end of summer, carryover SWP storage will be determined. October through December is a transitional period during which early assessments of available supplies for the following year will be made. During this period, Board actions would determine the management of various Metropolitan programs such as long-term seasonal (LTS) and IAWP deliveries. The following list presents major information and decision points during the year.

Month	Information/Action
January	Initial Supply/Demand Reports
February, March	Updated Supply/Demand Reports
April, May	Final Supply/Demand Report
	Notification on Contractual GW and Options Transfer Programs
	Recommended Drought Actions
May-September	Stable Policy Period
October	Supply and Carryover Storage Report
November	MWD Program Decisions - LT Seasonal, Replenishment, IAWP

Figure 10. One Year of a Hypothetical Shortage - Supply and Demand Reports and Response Actions



PUBLIC OUTREACH AND CONSERVATION

Mechanisms are already in place to implement most of the water management actions and programs that are addressed in the WSDM Plan. Under the majority of supply and demand conditions, the actions of Metropolitan's Board of Directors, the General Manager, the operational activities of Metropolitan, and its member agencies would constitute all actions necessary to mitigate the shortage. Several aspects of the WSDM Plan, however, require additional attention to the administration of programs and actions. In particular, a shortage contingency requires special programs in the areas of public and governmental affairs and conservation. Metropolitan maintains an on-going public information program to encourage efficient water use. Public outreach programs are conducted at all times under both surplus and shortage conditions (see Figure 8). The actions discussed in this section constitute special actions in times of shortage.

During shortage conditions, public outreach will play a critical role in shaping consumer response. Public information campaigns need to send clear signals if extraordinary drought conservation is to achieve needed reductions in demands. Given Metropolitan's diverse set of customers and the varying impacts that shortages can have on different consumer groups, an effective public information campaign will require a joint effort among Metropolitan and its member agencies. Under this Plan, the administration of the Public Information and Government Affairs programs will be the responsibility of a Drought Program Officer (DPO). The DPO will be responsible for integrating the various activities in these areas, coordinating efforts with Metropolitan's Board of Directors and member agencies, and designing the region-wide messages for the general public and various target audiences. Important constituencies that have been identified in the process are residential users, business interests, agricultural users, elected officials, officials of various agencies (such as the Department of Water Resources), and the media.

Many conservation programs, such as Metropolitan's ultra-low flush toilet rebate program, are driven by member agency requests. Based on history, Metropolitan expects member agency requests to increase during droughts. Metropolitan is committed to increasing overall conservation program funding to meet member agency requests during droughts and attain higher levels of savings. These programs will be implemented by Metropolitan and member and local agency conservation staff. As many of the short-term conservation objectives during a shortage would be dependent upon an effective public information program, the Drought Program Officer will also be responsible for monitoring the effectiveness of the augmented conservation programs. A monthly conservation reporting process will be implemented. Quarterly estimates of regional conservation will be developed to track the progress of various actions in mitigating the shortage.

APPENDIX A: RESOURCE AND STORAGE SIMULATION

The Water Surplus and Drought Management Plan (WSDM Plan) uses the Stages and Actions Matrix (Figure 8) as a guide for the operation of storage and transfers for the next ten years, 1999-2008**.** Metropolitan asserts that the investments that Metropolitan and its member agencies have made in water supply and storage, managed in a coordinated manner as presented in the WSDM Plan, will be sufficient to assure that retail firm water demands will be met 100% of the time through the year 2008. Metropolitan performed an extensive analysis of projected water demands, current and expected water supplies, along with hydrologic variations to support this assertion. Appendix A presents a summary of this analysis which includes statistical probabilities of actions under the WSDM Plan and two illustrative examples of how supply resources may be used in the future under worst-case drought events. Although the WSDM Plan is intended to be in effect through 2008, for the purposes of analysis the planning horizon was extended through 2010.

The WSDM Plan seeks to define the operational envelope for the Metropolitan system into the near future. Although the WSDM Plan only looks out ten years, it nonetheless involves the operation of some storage and water transfer projects that have not yet become fully operational. This makes the estimation of storage and transfers operations difficult. Compounding this problem is the lack of certainty around future demands, economic conditions, or even the weather over the next ten years. To manage these uncertainties, Metropolitan has developed a computer based simulation model called the Integrated Resources Planning Simulation Model or IRPSIM.

IRPSIM uses a modeling method known as sequentially indexed monte-carlo simulation. Simply put, the model looks at projected regional retail demand and supplies of water over the next twelve years and adjusts each, up or down, based on an assumed pattern of future weather. For instance, if Metropolitan expected the weather over the next twelve years (1999-2010) to be the same as the last twelve years (1987-1998), then IRPSIM would adjust the projected 1999 demands and supplies based on the historical 1987 hydrology, and adjust the projected 2000 demands and supplies using the historical 1988 hydrology, and so on. One obvious drawback to this approach is that Metropolitan does not know what future weather will be. Therefore, Metropolitan runs the models over and over again until all recorded hydrologies, 70 in all, have been tried. In this way, Metropolitan can look at probabilistic results of being in shortage year by year through 2010.

Although the projections of water supplies used in this analysis required certain assumptions to be made, they were based on most likely or probable outcomes. In most cases, projected water supplies represented projects that are currently operational, under construction, or in the final stages of negotiations. The following represents a summary of these assumptions:

- Local recycling and groundwater recovery: assumes currently operational projects with expected increases in supply yield as demand increases

- Conjunctive use groundwater storage: assumes Las Posas (under final stages of construction) and implementation of similar programs which are under negotiation (such as Raymond, Orange, and Chino Basins)

- Semitropic and Arvin-Edison storage: assumes use of both programs which are operational with water already stored

- Eastside Reservoir Project: assumes use of non-emergency storage from the reservoir currently under construction and an initial fill projected to start in approximately one year

- The Monterey Reservoirs: assumes use of State Water Project terminal reservoir supplies, Castaic and Perris Reservoirs, per the Monterey Amendment

- Colorado River Aqueduct: assumes a full aqueduct through the implementation of the California Plan (including lining of All American and Coachella canals, SD/IID water transfer/exchange, conjunctive use off-aqueduct storage, and river re-operations)

- State Water Project: assumes continuance of Bay-Delta Accord (with only current facilities)

One way of viewing the result of Metropolitan's WSDM Plan analyses is by summary statistics. Table A- 1 gives the probabilities of shortage actions over the next twelve years.

Table A-1. Probability of Shortage Stage[1] by Forecast Year

1999	13%	13%	11%	7%	3%	0%	O%
2000	13%	13%	11%	9%	3%	O%	0%
2001	19%	17%	13%	10%	6%	O%	0%
2002	19%	17%	13%	10%	4%	1%	0%
2003	19%	19%	14%	11%	4%	0%	0%
2004	20%	19%	16%	13%	4%	0%	0%
2005	21%	19%	17%	13%	6%	O%	O%
2006	21%	19%	19%	13%	6%	0%	0%
2007	23%	20%	19%	13%	4%	0%	0%
2008	26%	21%	19%	16%	6%	1%	0%
2009	26%	24%	19%	17%	6%	1%	0%
2010	26%	26%	19%	19%	6%	1%	O%

Table A-1 can be read in one of two ways, by column or row. The Stage 7 column indicates that there are no historical weather conditions that require allocation over the next twelve years. This is the single most important conclusion of the WSDM Plan analysis. The Stage 6 column indicates that only in a few years--2002, and 2008 through 2010--would Metropolitan need have a need for option or spot transfer water. Read by row, Table A-1 indicates that in the year 2008 there is a 21% likelihood of taking some water from the Eastside Reservoir Project, a 19% likelihood of taking water from Semitropic or Arvin-Edison storage programs, a 17% likelihood of interrupting long-term seasonal and replenishment deliveries for two years, and so on. It should be noted that these probabilities represent the best current estimates by Metropolitan, but are based entirely on historical weather conditions. Conditions that fall outside of historical ranges, either in duration or severity, are not represented by this data.

Another way to view the WSDM Plan analysis is by observing the operation of a single hydrology. Table A-2 provides an example of resource operations for the period 1999 through 2010 assuming a repeat of the 1923 through 1934 hydrology. The table provides descriptions of hydrologic conditions to aid in understanding the example.

[1] Stage 1 consists of withdrawal from the Eastside Reservoir Project. Stage 2 consists of the above plus withdrawals from the Semitropic and Arvin-Edison water storage and transfer projects. Stage 3 consists of the above plus an interruption of Long-Term Seasonal and Replenishment discount water. Stage 4 consists of the above plus withdrawal from contractual groundwater programs and the Monterey Reservoirs. Stage 5 consists of the above plus a call for extraordinary drought conservation and interruption in agricultural discount water. Stage 6 consists of the above plus calls on option contract water and purchases of water on the open market. Stage 7 consists of the above plus allocation of remaining shortages. For a full description of stages and action, see Surplus and Shortage Resource Actions section and Figure 8 above.

For instance, 1923 was considered to be a dry year in southern California (defined as less than 9 inches of rain at the Los Angeles Civic Center) and is categorized by the California Department of Water Resources (DWR) as a below normal year for State Water Project deliveries. In this example, 1923 weather increases southern California's demand for water and decreases imported State Water Project supplies. The Colorado River Aqueduct supplies are influenced by yet another hydrologic indicator, but for the next ten year Metropolitan expects the Aqueduct to be full.

Table A-2 indicates that retail water demands in 1999, assuming a 1923 hydrology, will be 3.979 million acre-feet (maf). Adding expected long-term seasonal and replenishment demands of 0.165 maf gives a regional total water demand of 4.144 maf. After subtracting local supplies of 2.192 maf, which are also adjusted for 1923 weather, Metropolitan expects to see a demand of 1.952 maf. In 1999, under a 1923 hydrology, Metropolitan expects to see 2.954 maf of supply. This is enough to meet all expected demands and put over 1.0 maf into storage.

The 1923 through 1934 hydrology is significant because it starts and ends dry with little recovery in the middle. However, even in these most adverse conditions the actions proposed by the WSDM Plan provides the region with enough water to avoid shortage allocation. Again the most important result of this example is read from the last line, which indicates that there are no remaining shortages through 2008

Table A-3 provides a second example of using the 1980 through 1991 hydrology. This hydrology contains the most significant drought in recent record, ending with a critically dry year on the State Water Project that is expected to yield a mere 0.389 maf. However, even under these conditions the WSDM Plan provides a method to avoid firm water allocation.

The analyses performed using the prioritized action of the Stages and Actions Matrix support Metropolitan's assertion that water supply reliability can be attained through the use of regional storage, interruption of discounted water supplies, and transfers. And, through the implementation of the WSDM Plan, Metropolitan does not expect to allocate firm water deliveries for at least the next ten years.

Table A-2. A Simulation of Water Supplies and Demands 1923-1934 Hydrology

Forecast Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hydrology Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
Hydrologic Conditions												
Southern California Year Type	Dry	Dry	Dry	Wet	Wet	Dry	Dry	Normal	Wet	Normal	Wet	Normal
Sacramento River Index D1630 Year Type	Below Normal	Critically Dry	Dry	Dry	Wet	Above Normal	Critically Dry	Dry	Critically Dry	Dry	Critically Dry	Critically Dry
Demands												
Retail Demand	3.979	4.152	4.149	4,018	4.005	**4.249**	4.237	4.223	4.280	4.280	4.407	4.500
Long-term/Replenishment Demand	0.165	0.182	0.226	0.188	0.149	0.176	0,213	0.203	0.164	0.175	0.141	0.163
Total Demand	4.144	4.334	4.375	4.205	4.154	4.425	4.450	4.426	4,443	4.455	4.548	4,663
Local Supplies												
Groundwater Production	1.529	1.545	1.537	1.288	1.299	1.575	**1.568**	1.434	1.307	1.439	1.318	1.454
L. A. Aqueduct Production	0.383	0,287	0.304	0.316	0.392	0.302	0,245	0.235	0.174	0,324	0.251	0.220
Recycling Production	0.152	0.162	0.174	0.186	0,197	0.207	0.217	0.230	0,242	0.254	0.266	0.277
Surface Production	0,128	0,089	0,076	0.116	0.154	0.147	0.108	0.094	0,133	0,136	0.151	0.145
Total Local Supply	2,192	2.084	2.091	1.905	2,043	2.231	2,139	1.993	1.856	2.153	1.986	2,097
Total MWD Demand	1.952	2.250	2,284	2,300	2.112	2.194	2.311	2.433	2.587	2.302	2.562	2.566
MWD Supply Sources												
Colorado River Aqueduct Supply	1.200	1.200	1.200	1.200	1.200	**1.200**	1.200	1.200	1.200	1.200	1.200	1.200
State Water Project Supply	1.754	0.812	0.783	1.280	1.678	1.438	0,764	1.163	0,589	0.843	0.559	0.620
MWD Cyclic Groundwater Deliveries	0.000	0.060	0.060	0.000	0.000	0,000	0.060	0,060	0.060	0.059	0.000	0.000
Eastside Reservoir	0.000	0.066	0.058	0.000	0.000	0.000	0,060	0.010	0.425	0.023	0.219	0.041
Arvin/Semitropic Groundwater Storage	0.000	0.111	0.115	0,000	0.000	0,000	0,119	0,000	0.115	0.117	0.059	0.041
Longterm Seasonal Demand Cuts	0.000	0,000	0,166	0.000	0.000	0.000	0.153	0.000	0.104	0,116	0.000	0.000
Cyclic Benefits	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000	0,000	0.060	0.060
Contractual Groundwater Storage	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0,000	0.095	0.000	0.095	0.084
DWR Reservoirs (Monterey Agreement)	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0.131	0.088
Voluntary Conservation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.206	0.210
MWD Ag Cuts	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.033	0.031
Central Valley Transfers	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.193
Storage Puts	1.003	0.000	0.097	0.180	0.549	0.438	0.045	0.000	0,000	0.056	0.000	0.000
Remaining Shortage	0,000	0,000	0.000	0,000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000

Table A-3. A Simulation of Water Supplies and Demands 1980-1991 Hydrology

Forecast Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hydrology Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
Hydrologic Conditions												
Southern California Year Type	Wet	Normal	Normal	Wet	Dry	Dry	Wet	Normal	Normal	Dry	Dry	Normal
Sacramento River Index D1630 Year Type	Above Normal	Dry	Wet	Wet	Wet	Dry	Wet	Dry	Critically Dry	Dry	Critically Dry	Critically Dry
Demands												
Retail Demand	3.781	4.170	3.930	3.647	4.308	4.250	4.151	4.281	4.380	4.550	4.663	4.497
Lon£1-term/Replenishment Demand	0.105	0.141	0.171	0.101	0.136	0.187	0.183	0.201	0.191	0.219	0.224	0.214
Total Demand	3.886	4.311	4.101	3.748	4.444	4.437	4.334	4.483	4.572	4.769	4.887	4.712
Local Supplies												
Groundwater Production	1.292	**1.440**	**1.381**	1.248	1.546	1.565	1.275	1.413	1.438	1.588	1.600	1.446
L. A. Aqueduct Production	0.462	0.372	0.499	0.529	0.516	O.367	0.472	0.400	0.326	0.278	0.213	0.223
Recycling Production	0.152	0.162	0.174	0.186	0.197	0.207	0.217	0.230	0.242	0.254	0.266	0.277
Surface Production	0.225	0.175	0.154	0.194	0.195	0.151	0.115	0.116	0.115	0.081	0.068	0.081
Total Local Supply	2.131	2.149	2.208	2.156	2.455	2.290	2.081	2.159	2.122	2.200	2,146	2.027
Total MWD Demand	1.755	2.162	1.894	1.591	1.989	2.147	2.253	2.324	2.450	2.569	2.741	2.684
MWD Supply Sources												
Colorado River Aqueduct Supply	1.200	1.200	1.200	1,200	1.200	1.200	1.200	1.200	**1.200**	1.200	1.200	1.200
State Water Project Supply	1.561	1.441	1.725	1.886	1.643	1.590	1.441	1.292	0.611	1.285	0.877	0.389
MWD Cyclic Groundwater Deliveries	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.060	0.060	0.060	0.060
Eastside Reservoir	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.199	0.024	0.222	0.209
Arvin/Semitropic Groundwater Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.115	0.000	0.122	0.104
Long-term Seasonal Demand Cuts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.000	0.164	0.154
Cyclic Benefits	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Contractual Groundwater Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.095	0.085
DWR Reservoirs (Monterey Agreement)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.216
Voluntary Conservation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.235
MWD Ag Cuts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032
Central Valley Transfers	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Storage Puts	1.006	0.260	0.344	0.240	0.200	0.200	0.388	0.168	0.000	0.000	0.000	0.000
Remaining Shortage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Attachment B

Water Supply Allocation Plan

December 2014 Revision

Metropolitan Water District of Southern California

Inside cover: Photo courtesy of Cora Edmonds/ArtXchange for the Healing Planet

Water Supply Allocation Plan

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List of Acronyms

AF – Acre-feet
CUP – Groundwater Conjunctive Use Program
CWD – County Water District
DWP – Drought Management Plan
IAWP – Interim Agricultural Water Program Reductions and Rates
IICP – Incremental Interruption and Conservation Plan
IRP – Integrated Resources Plan
GPCD – Gallons per Capita per Day
M&I – Municipal and Industrial
MWD – Municipal Water District
RUWMP – Regional Urban Water Management Plan
SWP – State Water Project
WSAP – Water Supply Allocation Plan
WSDM – Water Surplus and Drought Management

Definitions

Extraordinary Supplies- Deliberate actions taken by member agencies to augment the total regional water supply only when Metropolitan is allocating supplies through the WSAP.

Groundwater Recovery- The extraction and treatment of groundwater making it usable for a variety of applications by removing high levels of chemicals and/or salts.

In-lieu deliveries- Metropolitan-supplied water bought to replace water that would otherwise be pumped from the groundwater basins.

Seawater Barrier- The injection of fresh water into wells along the coast to protect coastal groundwater basins from seawater intrusion. The injected fresh water acts like a wall, blocking seawater that would otherwise seep into groundwater basins as a result of pumping.

Section 1: Introduction

Calendar Year 2007 introduced a number of water supply challenges for the Metropolitan Water District of Southern California (Metropolitan) and its service area. Critically dry conditions affected all of Metropolitan's main supply sources. In addition, a ruling in the Federal Courts in August 2007 provided protective measures for the Delta Smelt in the Sacramento-San Joaquin River Delta which brought uncertainty about future pumping operations from the State Water Project. This uncertainty, along with the impacts of dry conditions, raised the possibility that Metropolitan would not have access to the supplies necessary to meet total firm demands[1] and would have to allocate shortages in supplies to the member agencies.[2]

In preparing for this possibility, Metropolitan staff worked jointly with the member agency managers and staff to develop a Water Supply Allocation Plan (WSAP). The WSAP includes the specific formulas for calculating member agency supply allocations and the key implementation elements needed for administering an allocation should a shortage be declared. The WSAP became the foundation for the urban water shortage contingency analysis required under Water Code Section 10632 and was incorporated into Metropolitan's 2010 Regional Urban Water Management Plan (RUWMP).

Section 2: Development Process

Member Agency Input

Between July 2007 and February 2008, Metropolitan staff worked cooperatively with the member agencies through a series of member agency manager meetings and workgroups to develop a formula and implementation plan to allocate supplies in case of shortage. These workgroups provided an arena for in-depth discussion of the objectives, mechanics, and policy aspects of the different parts of the WSAP. Metropolitan staff also met individually with fifteen member agencies for detailed discussions of the elements of the recommended proposal. Metropolitan introduced the elements of the proposal to many nonmember retail agencies in its service area by providing presentations and feedback to a number of member agency caucuses, working groups, and governing boards. The discussions, suggestions, and comments expressed by the member agencies during this process contributed significantly to the development of this WSAP.

Board of Directors Input

Throughout the development process Metropolitan's Board of Directors was provided with regular progress reports on the status of this WSAP, with oral reports in September, October, and December 2007, an Information Board of Directors Letter with a draft of the WSAP in November 2007, and a Board of Directors Report with staff recommendations in January 2008. Based on Water Planning and Stewardship Committee discussion of the staff recommendations and further review of the report by

[1] Firm demands are also referred to as uninterruptable demands; likewise non-firm demands are also called interruptible demands.

[2] See Appendix A: Metropolitan Member Agencies.

the member agencies, refinements were incorporated into the WSAP for final consideration and action in February 2008. The WSAP was adopted at the February 12, 2008 Board of Directors meeting.[3]

The 12-Month Review Process

When the Board adopted the WSAP in February 2008, the decision specified a formal revisit of the WSAP commencing in February 2010. The scheduled revisit was meant to ensure the opportunity for Metropolitan staff and the member agencies to re-evaluate the WSAP and recommend appropriate changes to the Board of Directors.

In April 2009, the Board voted to implement the WSAP for the first time. The WSAP was implemented at a Level 2 allocation level, and was in effect for the period of July 1, 2009, through June 30, 2010. Since implementation of the 2009/10 WSAP began in July 2009, a number of practical issues relating to the WSAP were identified by staff and the member agencies for further consideration during the 12-Month Review Process. Metropolitan staff engaged with the member agencies in a formal review of the WSAP from January through May 2010. During the review process the member agency managers participated in a series of six workshops. The focus of these workshops was to facilitate in-depth discussion on WSAP-related issues and lessons learned since the WSAP was implemented in July 2009. The proposed adjustments to the WSAP developed during the review process were adopted at the August 17, 2010 Board of Directors meeting[4].

The Three-Year Review Process

The Board action to adopt of the WSAP in February 2008 also directed staff to review the WSAP formula three years after the February 2008 adoption. February 2011 marked the three-year anniversary since the adoption of the WSAP. Similar to the 12-Month Review Process, the purpose of the Three-Year Review Process was to provide an opportunity for Metropolitan staff and the member agencies to re-evaluate the plan and recommend appropriate changes for board consideration.

Metropolitan staff met with the member agencies in a formal review of the WSAP from February through August 2011. Staff and member agency managers participated in a series of eleven workshops. Proposed adjustments to the WSAP developed during the process were adopted at the September 13, 2011 Board of Directors meeting.[5]

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[3] A complete listing of member agency meetings and Board of Directors reporting activities is contained in Appendix B: Water Supply Allocation Plan Process Timeline.

[4] A complete listing of member agency meetings and Board of Directors reporting activities is contained in Appendix C: 12-Month Review Process and Results.

[5] A complete listing of member agency meetings and Board of Directors reporting activities is contained in Appendix D: Three-Year Review Process and Results.

2014 Review Process

In 2014, California was challenged with a third year of severe drought.[6] Metropolitan managed its operations through significant use of regional storage reserves. It was anticipated that end of year total dry storage reserves would approach levels similar to those when the WSAP was last implemented in 2009.

Following discussion at the June 2014 Water Planning and Stewardship Committee, Metropolitan staff convened a member agency working group to revisit the WSAP. The purpose of the working group was to collaborate with member agencies to identify potential revisions to the WSAP in preparation for mandatory supply allocations in 2015. There were eight working group meetings and three discussions at the monthly Member Agency Managers' Meetings.

The process focused on three areas of the WSAP: the Base Period, the Allocation Formula, and the Allocation enforcement mechanism. Proposed adjustments to the WSAP developed during the process were adopted at the December 9, 2014 Board of Directors meeting. [7]

[6] The Governor of California proclaimed a State of Emergency due to drought conditions on January 17, 2014 and, on April 24, 2014 issued an Executive Order proclaiming a continued State of Emergency noting drought conditions have persisted for the last three years and authorizing adoption and implementation of emergency regulations.

[7] A complete listing of member agency meetings and Board of Directors reporting activities is contained in Appendix E: 2014 Review Process and Results.

Section 3: Review of Historical Shortage Plans[8]

The WSAP incorporates key features and principles from the following historical shortage allocation plans but will supersede them as the primary and overarching decision tool for water shortage allocation.

Interruptible Water Service Program

As part of the new rate structure implemented in 1981, Metropolitan's Board of Directors adopted the Interruptible Water Service Program (Interruptible Program) which was designed to address short-term shortages of imported supplies. Under the Interruptible Program, Metropolitan delivered water for particular types of use to its member agencies at a discounted rate. In return for this discounted rate, Metropolitan reserved the right to interrupt delivery of this Interruptible Program water so that available supplies could be used to meet municipal and industrial demands.

Incremental Interruption and Conservation Plan

The ability to interrupt specific deliveries was an important element of Metropolitan's strategy for addressing shortage conditions when it adopted the Incremental Interruption and Conservation Plan (IICP) in December 1990. Reductions in IICP deliveries were used in concert with specific objectives for conservation savings to meet needs during shortages. The IICP reduced Interruptible Service deliveries in stages and provided a pricing incentive program to insure that reasonable conservation measures were implemented.

1995 Drought Management Plan

The 1995 Drought Management Plan (DMP) was a water management and allocation strategy designed to match supply and demand in the event that available imported water supplies were less than projected demands. Adopted by the Metropolitan Board of Directors in November 1994, the 1995 DMP was a short-term plan designed to provide for the 1995 calendar year only. The primary objective of the 1995 DMP was to identify methods to avoid implementation of mandatory reductions. The 1995 DMP included various phases and a step-by-step strategy for evaluating supply and demand conditions and utilizing Metropolitan's available options, with the final phase being implementation of the revised IICP.

1999 Water Surplus and Drought Management Plan

Metropolitan staff began work on the Water Surplus and Drought Management (WSDM) Plan in March 1997 as part of the Integrated Water Resources Plan (IRP), which was adopted by Metropolitan's Board of Directors in January 1996. The IRP established regional water resource targets, identifying the need for developing resource management policy to guide annual operations. The WSDM Plan defined Metropolitan's resource management policy by establishing priorities for the use of regional resources to achieve the region's reliability goal identified in the IRP. In April 1999, Metropolitan's Board of Directors adopted the WSDM Plan.

[8] A summary of the key elements in the following allocation plan is found in Appendix F: Summary of Historical Shortage Plans.

The WSDM Plan also included a set of principles and considerations for staff to address when developing specific allocation methods. The WSDM Plan stated the following guiding principle to be followed in developing any future allocation scheme:

> *"Metropolitan will encourage storage of water during periods of surplus and work jointly with its member agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage."*[9]

This principle reflects a central desire for allocation methods that are both equitable and minimize regional hardship to retail water consumers. The specific considerations postulated by the WSDM Plan to accomplish this principle include the following:[10]

- The impact on retail customers and the economy
- Allowance for population and growth
- Change and/or loss of local supply
- Reclamation/Recycling
- Conservation
- Investment in local resources
- Participation in Metropolitan's interruptible programs
- Investment in Metropolitan's facilities.

Section 4: Water Supply Allocation Formula

Based on the guiding principle and considerations described in the WSDM Plan, Metropolitan staff and the member agencies developed a specific formula for allocating water supplies in times of shortage. The formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level, and takes into account growth, local investments, changes in supply conditions and the demand hardening[11] aspects of non-potable recycled water use and the implementation of conservation savings programs. The formula, described below, is calculated in three steps: base period calculations, allocation year calculations, and supply allocation calculations.[12] The first two steps involve standard computations, while the third section contains specific methodology developed for this WSAP.

Base Period Calculations

The first step in calculating a water supply allocation is to estimate water supply and demand using a historical base period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the fiscal years (July through June) ending 2013 and 2014.[13]

[9] WSDM Plan, p. 1. Emphasis added.
[10] WSDM Plan, p. 2.
[11] Demand hardening is the effect that occurs when all low-cost methods of decreasing overall water demand have been applied (e.g., low-flow toilets, water recycling) and the remaining options to further decrease demand become increasingly expensive and difficult to implement.
[12] Detailed operational elements of these objectives and a numerical example are discussed in Appendix G: Water Supply Allocation Formula Example.
[13] Exceptions to this methodology are noted in the descriptions of base period calculations.

Base Period Local Supplies: Local supplies for the base period are calculated using a two-year average of groundwater production, groundwater recovery, Los Angeles Aqueduct supply, surface water production, and other imported supplies. Non-potable recycling production is not included in this calculation due to its demand hardening effect.

Base Period Wholesale Demands: Demands on Metropolitan for the base period are calculated using a two-year average of firm purchases and in-lieu deliveries to long-term groundwater replenishment, conjunctive use, cyclic, and supplemental storage programs.

Base Period Retail Demands: Total retail-level municipal and industrial (M&I) demands for the base period are calculated by adding the Base Period Wholesale Demands and the Base Period Local Supplies. This estimates an average total demand for water from each agency.

Base Period Mandatory Conservation Credit: Metropolitan allows a consultation process that enables member agencies to describe mandatory water use restrictions and/or rationing restrictions that were in place within their service areas during the Base Period. Restrictions may vary among agencies but include restricted water uses, fines, and water budget or penalty based rate structures that are enacted by the governing body of the member agency or retail agency. Following the consultation process, Metropolitan staff will recommend adjustments based on evidence of reduced GPCD. To qualify for an adjustment, GPCD reductions would have to be observed that are beyond those expected from the agency's ongoing conservation efforts and trends.

Allocation Year Calculations

The next step in calculating the water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population or economic growth and changes in local supplies.

Allocation Year Retail Demands: Total retail M&I demands for the allocation year are calculated by adjusting the Base Period Retail Demands for baseline inflation and growth.

Baseline Inflation Adjustment: Baseline inflation occurs when non-potable recycling or conservation is developed after the Base Period. The development of these supplies reduces actual demands for water in the Allocation Year. Because non-potable-recycling and conservation are excluded from the WSAP formula, the actual need for water in the Allocation year is overestimated. The Baseline Inflation Adjustment removes increases in non-potable recycling and conservation annually from the Base Period forward to better reflect the true need for water in the Allocation Year.

Growth Adjustment: The growth adjustment is calculated using the estimated actual annual rate of population growth at the county level, as generated by the California Department of Finance, whenever possible. For years without complete data, the growth rate is calculated using an average of the three most recent years available. Growth will be allocated based on historical per capita water use during the Base Period, with a cap equal to Metropolitan's IRP Target for Water Use Efficiency. For allocation years up to and including 2014, the cap will be 163 GPCD, and for allocation years 2015-2020 the cap will reduce linearly from 163 to 145 GPCD. On an appeals basis, member agencies may request that their adjustment be calculated using member agency level population growth. A weighted combination of actual population and actual employment growth rates may also be requested.

Allocation Year Local Supplies: Allocation Year Local Supplies include groundwater production, groundwater recovery, Los Angeles Aqueduct supply, surface water production, seawater desalination, and other imported supplies. Estimates of Allocation Year Local Supplies are provided by the member agencies upon implementation of a WSAP. If estimates are not provided, Metropolitan will use the sum of the Base Period Local Supplies and Base Period In-Lieu Deliveries as a default. Agencies may provide updated estimates at any time during the Allocation Year to more accurately reflect their demand for Metropolitan supplies.

Extraordinary Supplies: Under the WSAP formula, local supply production in the Allocation Year can either be designated as a "planned" supply, or as an "extraordinary" supply.[14] This is an important designation for a member agency because the two types of supplies are accounted for differently in the WSAP formula. Local supplies classified at Extraordinary Supply are only partially included (scaled depending on the WSAP Level) as local supplies. This has the effect of providing significantly more benefit to the member agency in terms of total water supply that is available to the retail customer.[15]

Allocation Year Wholesale Demands: Demands on Metropolitan for the allocation year are calculated by subtracting the Allocation Year Local Supplies from the Allocation Year Retail Demands.

Water Supply Allocation Calculations

The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2. The following table displays the elements that form the basis for calculating the supply allocation. Each element and its application in the allocation formula are discussed below.

Table 1: Shortage Allocation Index

(a) Regional Shortage Level	(b) Wholesale Minimum Percentage	(c) Maximum Retail Impact Adjustment Percentage
1	92.5%	2.5%
2	85.0%	5.0%
3	77.5%	7.5%
4	70.0%	10.0%

[14] Appendix H: Board Policy Principles on Determining the Status of Extraordinary Supply lists the key Board principles used in determining if a supply qualifies as an Extraordinary Supply.

[15] See Appendix G: Water Supply Allocation Formula Example for specific allocation formulae.

5	62.5%	12.5%
6	55.0%	15.0%
7	47.5%	17.5%
8	40.0%	20.0%
9	32.5%	22.5%
10	25.0%	25.0%

Regional Shortage Level: The WSAP formula allocates shortages of Metropolitan supplies over ten levels.

Wholesale Minimum Allocation: The Wholesale Minimum Allocation ensures a minimum level of Metropolitan supplied wholesale water service to each member agency.

Maximum Retail Impact Adjustment: The purpose of this adjustment is to ensure that agencies with a high level of dependence on Metropolitan do not experience disparate shortages at the retail level compared to other agencies when faced with a reduction in wholesale water supplies. The Maximum Retail Impact Percentage is prorated on a linear scale based on each member agency's dependence on Metropolitan at the retail level. This percentage is then multiplied by the agency's Allocation Year Wholesale Demand to determine an additional allocation.

Conservation Demand Hardening Credit: The Conservation Demand Hardening Credit addresses the increased difficulty in achieving additional water savings at the retail level that comes as a result of successful implementation of water conserving devices and conservation savings programs. To estimate conservation savings, each member agency will establish a historical baseline Gallons Per Person Per Day (GPCD) calculated in a manner consistent with California Senate Bill SBx7-7.[16] Reductions from the baseline GPCD to the Allocation Year are used to calculate the equivalent conservation savings in acre-feet. The Conservation Demand Hardening Credit is based on an initial 10 percent of the GPCD-based Conservation savings plus an additional 5 percent for each level of Regional Shortage set by the Board during implementation of the WSAP. The credit will also be adjusted for:

- The overall percentage reduction in retail water demand
- The member agency's dependence on Metropolitan

The credit is calculated using the following formula:

Conservation Demand Harding Credit = Conservation Savings x (10% + Regional Shortage Level Percentage) x (1 +((Baseline GPCD – Allocation Year GPCD)/Baseline GCPD)) x Dependence on MWD Percentage

[16] California Department of Water Resources, February 2011, "Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use. Available at: http://www.water.ca.gov/wateruseefficiency/sb7/docs/MethodologiesCalculatingBaseline_Final_03_01_2011.pdf

This provides a base demand hardening credit equal to 10 percent of conservation savings and increases the credit as deeper shortages occur, which is when conservation demand hardening has a bigger impact on the retail consumer. The credit also increases based on the percentage of an agency's demand that was reduced through conservation. This accounts for increased hardening that occurs as increasing amounts of conservation are implemented. Lastly, the credit is scaled to the member agency's dependence on Metropolitan to ensure that credits are being applied to the proportion of water demand that is being affected by reductions in Metropolitan supply.

Minimum Per-Capita Water Use Credit: This adjustment creates a minimum per capita water use threshold. Member agencies' retail-level water use is compared to two different thresholds. The proposed minimum thresholds are based upon compliance guidelines established under Senate Bill X7-7.

- 100 GPCD total water use
- 55 GPCD residential water use

Agencies that fall below either threshold under the WSAP will receive additional allocation from Metropolitan to bring them up to the minimum GPCD water use level. If an agency qualifies under both thresholds, the one resulting in the maximum allocation adjustment will be given.[17] To qualify for this credit, member agencies must provide documentation of the total agency level population and the percent of retail level demands that are residential; no appeal is necessary.

Total WSAP Allocation: The allocation to an agency for its M&I retail demand is the sum of the Wholesale Minimum Allocation, the Retail Impact Adjustment, the Conservation Demand Hardening Credit, and the Minimum Per-Capita Water Use Credit.[18]

Total Metropolitan Supply Allocations: In addition to the WSAP Allocation described above, agencies may also receive separate allocations of supplies for and seawater barrier and groundwater replenishment demands. Allocations of supplies to meet seawater barrier demands are to be determined by the Board of Directors independently but in conjunction with the WSAP. Separating the seawater barrier allocation from the WSAP allocation allows the Board to consider actual barrier requirements in the Allocation Year and address the demand hardening issues associated with cutting seawater barrier deliveries. According to the principles outlined for allocating seawater barrier demands, allocations should be no deeper than the WSAP Wholesale Minimum Percentage implemented at that time.

The WSAP also provides a limited allocation for drought-impacted groundwater basins based on the following framework:[19]

[17] See Appendix J: Per Capita Water Use Minimum Example for specific minimum per-capita water use credit formulae and example.
[18] See Appendix G: Water Supply Allocation Formula Example for specific allocation formulae.
[19] See Appendix L: Groundwater Replenishment Allocation for more information.

1. Metropolitan staff will hold a consultation with the requesting member agency and the appropriate groundwater basin manager to document whether the basin is in one of the following conditions:
    a. Groundwater basin overdraft conditions that will result in water levels being outside normal operating ranges during the WSAP allocation period; or
    b. Violations of groundwater basin water quality and/or regulatory parameters that would occur without imported deliveries
2. An allocation is provided based on the verified need for groundwater replenishment. The allocation would start with a member agency's ten-year average purchases of imported groundwater replenishment supplies (excluding years in which deliveries were curtailed). The amount would then be reduced by the declared WSAP Regional Shortage Level.

Section 5: WSAP Implementation

The WSAP will take effect if a regional shortage is declared by the Board of Directors. The following implementation elements are necessary for administering the WSAP during a time of shortage. These elements cover the processes needed to declare a regional shortage level as well as provide information pertaining to the allocation surcharge.

Allocation Period

The allocation period covers twelve consecutive months, from July of a given year through the following June. This period was selected to minimize the impacts of varying State Water Project (SWP) allocations and to provide member agencies with sufficient time to implement their outreach strategies and rate modifications.

Setting the Regional Shortage Level

Metropolitan staff is responsible for recommending a Regional Shortage Level for the Board of Directors' consideration. The recommendation shall be based on water supply availability, and the implementation of Metropolitan's water management actions as outlined in the WSDM Plan. Metropolitan staff will keep the Board of Directors apprised to the status of water supply conditions and management actions through monthly reports to the Water Planning and Stewardship Committee. To further facilitate staff in the development of a recommended regional shortage level, member agency requests for local supply adjustments shall be submitted by April 1st.

Metropolitan's Board of Directors, through the Water Planning and Stewardship Committee, is responsible for approving the final Regional Shortage Level at its April meeting. By the April meeting, the majority of the winter snowfall accumulation period will have passed and will allow staff to make an allocation based on more stable water supply estimates. Barring unforeseen large-scale circumstances, the Regional Shortage Level will be set for the entire allocation period, which will provide the member agencies an established water supply level for their planning.

Exit Strategy

While the Board ultimately has discretion to implement or lift and allocation at any point of time during the year; the WSAP includes a two-part exit strategy that is meant to streamline the WSAP implementation decision making process.

- If the Board decides to implement the WSAP, then any current WSAP allocation would remain in place until the end of the Allocation Year.
- If the Board decides not to implement the WSAP, then any current WSAP allocation would be terminated concurrent with the Board decision.

Allocation Appeals Process

An appeals process is necessary for the administration of any changes or corrections to an agency's allocation. Metropolitan's General Manager will designate, subsequent to a declaration of an allocation by the Board of Directors, an Appeals Liaison as the official point of contact for all information and inquiries regarding appeals. All member agency General Managers will be notified in writing of the name and contact information of the Appeals Liaison. Only appeals that are made through the Appeals Liaison and in accordance with the provisions outlined in Appendix N: Allocation Appeals Process will be evaluated. Basis for appeals claims can include but are not limited to:

- Adjusting erroneous historical data used in base period calculations
- Adjusting for population growth rates
- Determining if a local supply qualifies as Extraordinary Supply

Additional details and a checklist for the appeals process are available in Appendix N: Allocation Appeals Process and Appendix O: Appeals Submittal Checklist.

Allocation Surcharge

Member agency allocations are supported by an Allocation Surcharge. The Allocation Surcharge is charged to water use above the Member Agency allocation and is charged in addition to Metropolitan's standard rates for water service. Allocation Surcharges will only be assessed to the extent that an agency's total annual usage exceeds its total annual allocation. Any revenues collected through the Allocation Surcharge will be applied towards Metropolitan's Water Management Fund, which is used to in part to fund expenditures in dry-year conservation. No billing or assessment of allocation surcharges rates will take place until the end of the twelve-month allocation period.

Allocation Surcharge: The application of the Allocation Surcharge structure is a two tier structure that provides a lower level of Allocation Surcharge for minor overuse of allocations and a higher level of Allocation Surcharge for major overuse of allocations. The structure and applicable Allocation Surcharges are listed in Table 2.

Table 2: Allocation Surcharge			
Water Use	**Base Water Rate**[20]	**Allocation Surcharge**[21]	**Total Rate**
100% of Allocation	Tier 1	0	Tier 1
Between 100% and 115%	Tier 1	$1,480	Tier 1 + ($1,480)
Greater than 115%	Tier 1	$2,960	Tier 1 + ($2,960)

Qualifying Income-Based Rate Allocation Surcharge Adjustment:[22] Any Allocation Surcharges incurred by a member agency under the WSAP will be adjusted to reflect the extent to which retail customers within a member agency's service area are served under a "lifeline" or similar qualified discounted rate program based on income or ability to pay ("Income-Based Rate").

Any member agency who is assessed Allocation Surcharges under the WSAP may submit an acre-foot equivalent of water used by retail customers served under a qualifying Income-Based Rate.[23] This amount of water use would be multiplied by the percentage of retail-level reduction in allocation year demand necessary for that member agency to avoid exceeding its WSAP allocation. The monetary amounts resulting from these acre feet are subtracted from the total monetary amounts incurred by an agency for exceeding its allocation. In the case that the monetary amounts associated with the Income-Based Rate are greater than the total Allocation Surcharges an agency incurs, no Allocation Surcharges will be incurred. The end result of this adjustment is that the member agency will not be subject to Allocation Surcharges for the use of water by their retail customers served under a qualifying Income-Based Rate.

Growth Rate Allocation Surcharge Adjustment": In recognition of member agency differences in geography and climate, a Growth Rate Allocation Surcharge Adjustment will be given to any agency that exceeds its WSAP Allocation. The Allocation Surcharge reduction will be based on the difference in acre-feet between the Growth Adjustment applied at Metropolitan's IRP planning goal rate, and the greater of the following:

- The IRP planning goal rate adjusted for the member agency's ETo, or
- The member agency's certified and documented 20x2020 targeted GPCD

If both of these alternatives result in a lower growth adjustment than the IRP planning goal, no Allocation Surcharge reduction will be made.

[20] The base water rate shall be the applicable water rate for the water being purchased. In most cases, it will be the Tier 1 rate (plus Treatment Surcharge for treated water deliveries). However, it is possible that the water being purchased would be in the amount that would put an agency beyond its Tier 1 limit. In that case, the base water rate will be the Tier 2 rate (plus Treatment Surcharge for treated water deliveries).
[21] Allocation Surcharge is applied to water use in excess of an agency's WSAP allocation.
[22] See Appendix K: Qualifying Income-Based Rate Allocation Surcharge Adjustment Example for specific penalty adjustment formulae and example.
[23] Appropriate documentation and certification will be required.

Tracking and Reporting

Subsequent to a declared regional shortage by the Board of Directors, Metropolitan staff will produce monthly reports of each member agency's water use compared to its allocations based on monthly delivery patterns to be submitted by the member agency. In order to produce these reports, member agencies are requested to submit their local supply use on a monthly basis and certify end of allocation year local supply use. These reports and comparisons are to be used for the purposes of tracking and communicating potential underage/overage of an agency's annual allocations.

Key Dates for Water Supply Allocation Implementation

The timeline for implementation of an allocation is shown in Table 3. A brief description of this timeline follows:

January to March: Water Surplus and Drought Management reporting occurs at Metropolitan's Water Planning and Stewardship Committee meetings. These reports will provide updated information on storage reserve levels and projected supply and demand conditions.

April: Member agencies report their projected local supplies for the coming allocation year. This information is incorporated in staff analysis of storage reserves and projected supply and demand conditions in order to provide an allocation recommendation to the Board. Metropolitan's Board will consider whether an allocation is needed. A declaration of an allocation will include the level of allocation to be in effect for the allocation year. Likewise, member agencies will report their projected demands and local supplies needed to meet seawater barrier and groundwater replenishment requirements for the allocation year. Metropolitan's Board will consider whether allocations for seawater barrier demands and groundwater replenishment demands are needed independently from the WSAP allocation decision.**July 1st**: If the Board declared an allocation in April, then it will be effective starting July 1st. The allocation level will be held through June 30th, barring unforeseen circumstances. Member agencies will now be requested to submit their local supply use on a monthly basis and certify end of allocation year local supply use. Local production data must be reported to Metropolitan by the end of the month following the month of use (use in July must be reported by the end of August). This information will be combined with Metropolitan sales information in order to track retail water use throughout Metropolitan's service area. Each month Metropolitan will report on member agency water sales compared to their allocation amounts.

June 30th: The allocation year is complete.

July: Member agency local supplies must be certified for the month of June, the last month of the previous allocation year.

August: Metropolitan will calculate each member agency's total potable water use based on local supply certifications and actual sales data for the allocation year of July through June. Allocation surcharges will be assessed for usage above a given member agency's final adjusted allocation (reflecting the actual local supply and imported water use that occurred in the allocation year).

Table 3: Board Adopted Allocation Timeline					
Year	**Month**	**Year 1 Board Decision**	**Year 1 Allocation Year**	**Year 2 Board Decision**	**Year 2 Allocation Year**
Year 1	January				
	February				
	March				
	April	Declaration *			
	May				
	June				
	July		**Effective Period** Continuous Tracking of Member Agency Local Supply and Imported Water Use		
	August				
	September				
	October				
	November				
	December				
Year 2	January				
	February				
	March				
	April			Declaration *	
	May				
	June				
	July				**Effective Period** Continuous Tracking of Member Agency Local Supply and Imported Water Use
	August		Assess		
	September				
	October				
	November				
	December				
Year 3	January				
	February				
	March				
	April				
	May				
	June				

*Member agency projections of local supplies are due on April 1st to assist Metropolitan staff in determining the need for an allocation in the coming allocation year.

Appendix A: Metropolitan Member Agencies

Table 4: Member Agencies		
City of Anaheim	City of Glendale	City of San Marino
City of Beverly Hills	Inland Empire Utilities Agency	City of Santa Ana
City of Burbank	Las Virgenes MWD	City of Santa Monica
Calleguas MWD	City of Long Beach	Three Valleys MWD
Central Basin MWD	City of Los Angeles	City of Torrance
City of Compton	MWD of Orange County	Upper San Gabriel MWD
Eastern MWD	City of Pasadena	West Basin MWD
Foothill MWD	San Diego CWA	Western MWD
City of Fullerton	City of San Fernando	

Source: http://mwdh2o.com/WhoWeAre/Member-Agencies/

Appendix B: Water Supply Allocation Plan Process Timeline

July 2007

- City of Long Beach Water Department staff briefing
- Member Agency Managers/Member Agency Workgroup meeting
- Northern Managers Group meeting
    - Foothill MWD, City of Pasadena, City of Long Beach, Calleguas MWD, City of Los Angeles, West Basin MWD, City of Burbank, Three Valleys MWD, City of Glendale, Upper San Gabriel MWD

August 2007

- Central Basin MWD staff briefing
- Eastern MWD staff briefing
- San Diego CWA staff briefing
- Member Agency Managers/Member Agency Workgroup meeting
- Western MWD staff briefing
- City of Beverly Hills staff briefing

September 2007

- Member Agency Subgroup meetings
    - MWD of Orange County, San Diego CWA, West Basin MWD, Central Basin MWD
- MWD of Orange County staff briefing
- Member Agency Workgroup meeting
- Member Agency Workgroup meeting
- MWD Board of Directors Oral Report

October 2007

- Inland Empire Utilities Agency staff briefing
- Central Basin MWD Caucus Meeting (included sub-agencies)
- Three Valleys MWD staff briefing
- MWD of Orange County staff briefing
- West Basin MWD staff briefing
- MWD Board of Directors Oral Report

November 2007

- West Basin MWD Caucus Meeting (included sub-agencies)
- West Basin Water Users Association presentation
- Walnut Valley MWD staff briefing (sub-agency of Three Valleys MWD)
- Foothill MWD Managers Meeting (included sub-agencies)
- Central Basin MWD staff briefing
- City of Claremont City Council (sub-agency of Three Valleys MWD)
- MWD Board of Directors Information Letter with Draft Proposal

December 2007

- Northern Managers Group Meeting
- California Department of Public Health staff briefing
- City of Long Beach Water Department staff briefing
- Santa Ana River Watershed Project Authority presentation
- Foothill MWD Managers Meeting (included sub-agencies)
- MWD Board of Directors Oral Report

January 2008

- Northern Managers Group Meeting
- Water Replenishment District Board of Directors presentation
- Three Valleys MWD staff briefing
- Member Agency Conservation Coordinator’s Group presentation
- Member Agency Managers/Member Agency Workgroup meeting
- City of Chino Hills presentation (sub-agency of IEUA)
- Member Agency Workgroup meeting
- Hemet/San Jacinto Exchange Club presentation
- MWD Board of Directors Report with Staff Recommended Water Supply Allocation Plan

February 2008

- MWD of Orange County and Irvine Ranch WD staff briefing
- MWD Board of Directors Action Item
- San Gabriel Valley Water Association Meeting
- Orange County Water Policy Meeting
- SCAG Water Policy Task Force Meeting

Appendix C: 12-Month Review Process and Results

January 2010

- WSAP 12-Month Review Process workshop #1
    - Focused discussion of WSAP issues identified by Metropolitan staff and by member agencies since the July 2009 implementation began.

February 2010

- WSAP 12-Month Review Process workshop #2
    - Continuation of focused discussion
- WSAP 12-Month Review Process workshop #3
    - Continuation of focused discussion

March 2010

- WSAP 12-Month Review Process workshop #4
    - Continuation of focused discussion
- MWD Board of Directors information item
    - Review of potential modifications to the WSAP definition of Extraordinary Supply

April 2010

- WSAP 12-Month Review Process workshop #5
    - Recap of identified issues and discussion of Metropolitan staff proposals for adjustments to the WSAP
- Member Agency Managers Meeting
    - Update on the 12-Month Review Process
- WSAP 12-Month Review Process workshop #6
    - Discussion of WSAP issues related to groundwater replenishment
- Member Agency Managers conference call
    - Clarification of WSAP definition for Extraordinary Supply

May 2010

- Member Agency Managers Meeting
    - Discussion of proposed Extraordinary Supply policy principles and WSAP Local Supply certification process.
- Member Agency Managers conference call
    - Discussion of proposed Extraordinary Supply policy principles

June 2010

- MWD Board of Directors action item

July 2010

- MWD Board of Directors information item
    - Review of proposed adjustments to the WSAP developed in the 12-Month Review Process

August 2010

- MWD Board of Directors action item

Resulting Changes

- Removed references to Gains and Losses of Local Supply
  - Removed references in the WSAP to "gains and losses of local supplies" in order to better facilitate the accounting of historical base year and allocation year local supplies. This change did not affect the WSAP formula or allocations.
- Removed references to the Regional Shortage Percentage
  - Removed references to the "Regional Shortage Percentage" in the WSAP to reduce unintended confusion between calculation factors and shortage amounts. This change did not affect the WSAP formula or allocations.
- Included the Retail Impact Adjustment in all shortage levels
  - Included the Retail Impact Adjustment for Regional Shortage Levels 1 and 2. This change results in additional allocations to Metropolitan-dependent agencies under Level 1 and Level 2 regional shortages.
- Revised the accounting of Extraordinary Supplies
  - Revised the methodology for accounting of Extraordinary Supply in the WSAP formula by:
    - Removing the Base Period Local Supply threshold provision,
    - Removing the sliding-scale sharing mechanism from the formula, and
    - Including the full amount of the Extraordinary Supply in the calculation of the Retail Impact Adjustment.
- Included a Minimum Per Capita Water Use Threshold
  - Developed a minimum water use credit based on two GPCD water use thresholds. Member agencies would receive additional Metropolitan allocation for an acre-foot equivalent of GPCD below the minimum threshold. Member agency water use, on a gallon per capita per day (GPCD) basis, is compared to the following minimum thresholds established under Senate Bill X7-7 (Water Conservation Act of 2009)
    - 100 GPCD total use or
    - 55 GPCD residential indoor use
- Excluded Seawater Barrier from the WSAP Formula
  - Excluded seawater barrier supplies from the WSAP Base Period and Allocation Year local supply calculations. This allows the Board to determine allocations for seawater barrier demands separately from the WSAP.

Appendix D: Three-Year Review Process and Results

February 2011

- WSAP 3-Year Review Process workshop #1
  - Review of the existing WSAP policy formula; review of the process timeline; and focused discussion of WSAP issues identified by Metropolitan staff and by member agencies since the WSAP's adoption in February 2008

March 2011

- WSAP 3-Year Review Process workshop #2
  - Discussion of issues related to local supplies and baseline inflation due to adjustments for recycling in the WSAP formula
- WSAP 3-Year Review Process workshop #3
  - Continuation of prior workshop

April 2011

- WSAP 3-Year Review Process workshop #4
  - Discussion of issues and alternatives related to base period selection and baseline inflation in the WSAP formula
- WSAP 3-Year Review Process workshop #5
  - Discussion of recommendations to address baseline inflation in the WSAP formula

May 2011

- WSAP 3-Year Review Process workshop #6
  - Discussion of issues and alternatives for the growth adjustment methodology in the WSAP formula
- WSAP 3-Year Review Process workshop #7
  - Continuation of prior workshop

June 2011

- WSAP 3-Year Review Process workshop #8
  - Continuation of prior workshop, discussion of WSAP implementation exit strategy
- WSAP 3-Year Review Process workshop #9
  - Continuation of exit strategy discussion, discussion of baseline inflation due to conservation and related conservation demand hardening issues

July 2011

- WSAP 3-Year Review Process workshop #9
  - Continued discussion of baseline inflation and conservation issues, and discussion of sharing allocations between agencies with common local resources

August 2011

- WSAP 3-Year Review Process workshop #10
  - Discussion of WSAP Allocation Year timing vs. Tier 1-Tier 2 rate cycle timing, discussion of approaches for encouraging completion of WSAP local supply certifications
- Review WSAP at Member Agency Managers Meeting
  - Discussion of proposed WSAP adjustments to address baseline inflation issues, revise the growth adjustment methodology, and establish a WSAP exit strategy

September 2011

- MWD Board of Directors action item

Resulting Changes

- Baseline Inflation Adjustment
    - Removed non-potable recycling and conservation from the WSAP baseline
        - Increases in recycling and conservation will be subtracted annually from the Base Period forward
        - The annual population growth rate will be applied after deducting the annual increases in recycling and conservation
        - If an agency ends up in allocation penalty, a penalty reduction will be applied in an amount equal to the Code-Based and rate Structure conservation savings that were removed from the WSAP baseline
- Changed the Growth Adjustment methodology
    - Growth will be allocated at historical per capita rate capped at the 2010 Integrated Water Resource Plan (IRP) Target for Water Use Efficiency
        - For years up to and including 2014, the cap will be 163 GPCD
        - For years 2015-2020, the cap will reduce linearly from 163 to 145 GPCD
    - If an agency exceeds its allocation, a penalty reduction will be applied based on either:
        - The differential Evapotranspiration (ETo) of its service area compared to the MWD average, or
        - Certified and documented 20 x 2020 targeted GPCD
- Exit Strategy
    - Clarified the course of action for an existing WSAP allocation when Metropolitan's Board makes a declaration decision for the following WSAP year
        - If there is an allocation for the next year, then the current allocation stays in place
        - If there is no allocation for the next year, then the current allocation is lifted concurrent with the April decision

Appendix E: 2014 Review Process and Results

July 2014

- WSAP Workgroup Meeting #1
    - First meeting of the 2014 WSAP Review process; review of the existing WSAP policy and formula; review of the process timeline; began discussion of issues related to base period selection
- WSAP Workgroup Meeting #2
    - Discussion of base period selection

August 2014

- WSAP Workgroup Meeting #3
    - Continuation of prior workshop discussion; comparison of base period alternatives

September 2014

- WSAP Workgroup Meeting #4
    - Discussion of a base period proposal; discussion of replenishment issues in the WSAP; discussion of 2015 water supply scenarios
- Review WSAP at Member Agency Managers Meeting
    - Review of WSAP workgroup process; discussion on issues related to base period, demand hardening, and local resources development
- WSAP Workgroup Meeting #5
    - Review of base period recommendation; discussion of issues regarding agencies in mandatory conservation during a base period; discussion on replenishment in the WSAP

October 2014

- WSAP Workgroup Meeting #6
    - Continuation of prior workshop discussion; discussion of alternative methods for conservation demand hardening credit; discussion of new and existing local supplies
- Review WSAP at Member Agency Managers Meeting
    - Review of WSAP workgroup process; discussion of issues related to base period and demand hardening

November 2014

- WSAP Workgroup Meeting #7
    - Review and discussion of issues and potential methods for base period selection and adjustment, replenishment allocation, and conservation demand hardening credit; review of estimated effects of potential WSAP changes at the regional level
- WSAP Workgroup Meeting #8
    - Review of proposed recommendations for the WSAP based on workgroup discussion
- Review WSAP at Member Agency Managers Meeting
    - Review of proposed recommendations for the WSAP based on workgroup discussion

Resulting Changes

- Base Period Update to FY2013 and FY2014
  - Changed the WSAP Base Period from calendar years 2004-2006 to fiscal years ending July 2013 and 2014
  - Mandatory Conservation Adjustment
    - Agencies with mandatory conservation in effect during the base period (FY 2013 and/or FY 2014) may qualify for a demand hardening adjustment, adjustment is subject to a consultation process that includes consideration historical demand and GPCD information

- Modify Conservation Demand Hardening Credit
  - Replaced device calculation-based estimates of conservation savings with a GPCD-based method
    - Conservation savings are calculated by comparing GPCD from a historical baseline to the Allocation Year; the difference is converted to acre-feet using the Allocation Year population.
      - Baseline GCPD is 10-year average ending between 2004 and 2010, with gross water, using gross water use minus non-potable recycled water production and documented historical population
  - Replaced formula for calculating the credit for each Regional Shortage Level
  - Conservation Demand hardening credit will be based on an initial 10 percent of GPCD-based conservation savings plus an additional 5 percent for each level of Regional Shortage; the credit will also be adjusted for the overall percentage reduction in retail water demand and the member agency's dependence on Metropolitan.
- Allocation Surcharge
  - Replaced the WSAP Penalty Rate with an Allocation Surcharge based on the estimated cost of Turf Replacement conservation programs

Appendix F: Summary of Historical Shortage Plans

These five elements incorporated into the WSAP have, in four out of five instances, been used in previous shortage plans. Both the IICP and the 1995 DMP used a historical base period calculation, adjusted for growth, made local supply adjustments, and used conservation hardening credits in their formulations. The retail impact adjustment is the only feature of the WSAP that has not been used historically.

Table 5: Historical Shortage Plan Overview

Plan Element	1991 IICP	1995 DMP	WSAP
Historical Base Period	√	√	√
Growth Adjustment	√	√	√
Local Supply Adjustment	√	√	√
Conservation Hardening Credit	√	√	√
Retail Impact Adjustment			√

Appendix G: Water Supply Allocation Formula Example

The following example gives a step-by-step description of how the formula would be used to calculate an allocation of Metropolitan supplies for a hypothetical member agency. All numbers are hypothetical for the purpose of the example and do not reflect any specific member agency.

Step 1: Calculate Base Period Retail Demand

Base Period Local Supplies: Calculated using a two-year average of groundwater (gw), groundwater recovery (gwr), Los Angeles Aqueduct supply (laa), surface water (sw), seawater desalination (sd), and other non-Metropolitan imported supplies (os). For the purpose of this example, assume that the two year average is 59,000 af.

$$[(gw1+gwr1+laa1+sw1+sd1+os1) + (gw2+gwr2+laa2+sw2+sd2+os2)] \div 2 = 59{,}000 \text{ af}$$

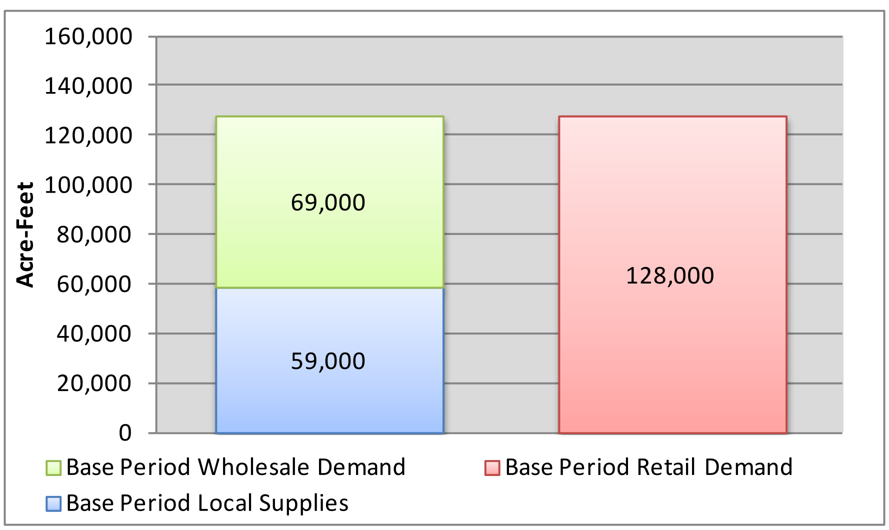
Base Period Wholesale Demands: Calculated using the same two-year time period as the Base Period Local Supplies. The Base Period Wholesale Demands include firm purchases (fp) and in-lieu deliveries to long-term groundwater replenishment (il), conjunctive use (cup), cyclic (cyc), and supplemental storage programs (ss). For the purpose of this example, assume that the two year average is 69,000 af.

$$[(fp^1++il^1+cup^1+cyc^1+ss^1) + (fp^2+il^2+cup^2+cyc^2+ss^2)] \div 2 = 69{,}000 \text{ af}$$

Base Period Retail Demands: Calculated as the sum of the Base Period Local Supplies and Base Period Wholesale Demand.

$$59{,}000 + 69{,}000 = 128{,}000 \text{ af}$$

Figure 1: Base Period Retail Demand Calculation



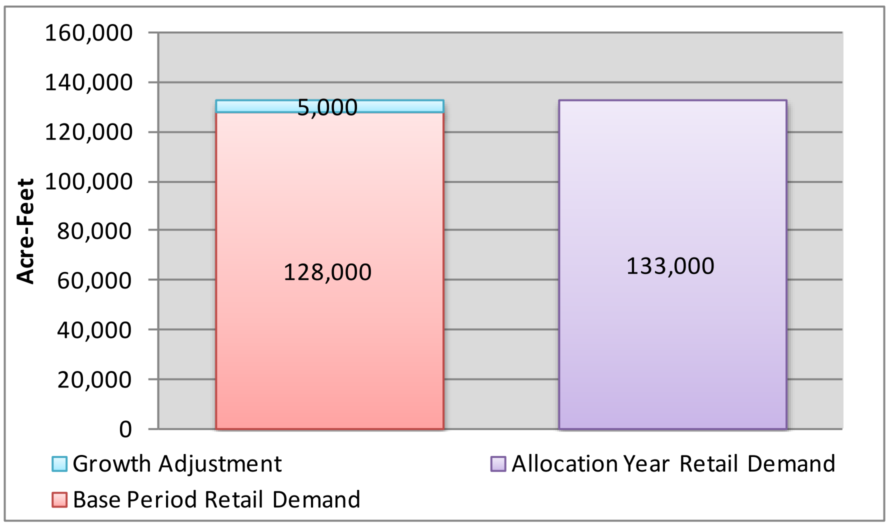
Calculate Adjustment for Base Period Mandatory Rationing (if applicable): The hypothetical agency used in this example is assumed not to qualify for the Base Period Mandatory Rationing Adjustment. A detailed discussion of the adjustment methodology can be found in Appendix I: Base Period Rationing Adjustment Example.

Step 2: Calculate Allocation Year Retail Demand

Allocation Year Retail Demand: Calculated by adjusting the Base Period Retail Demand for any baseline inflation and growth that occurred since the Base Period.

128,000 af + 5,000 af (net adjustment to retail demand) = 133,000 af

Figure 2: Allocation Year Retail Demand Calculation



Step 3: Calculate Allocation Year Wholesale Demand

Allocation Year Local Supplies: Estimates of Allocation Year Local Supplies are provided by the member agencies upon implementation of a WSAP. If estimates are not provided, Metropolitan will use the sum of the Base Period Local Supplies and Base Period In-Lieu Deliveries as a default. Agencies may provide updated estimates at any time during the Allocation Year to more accurately reflect their demand for Metropolitan supplies. For this example assume that the Allocation Year Local Supplies total 65,000 acre-feet.

Allocation Year Local Supplies = 65,000 af

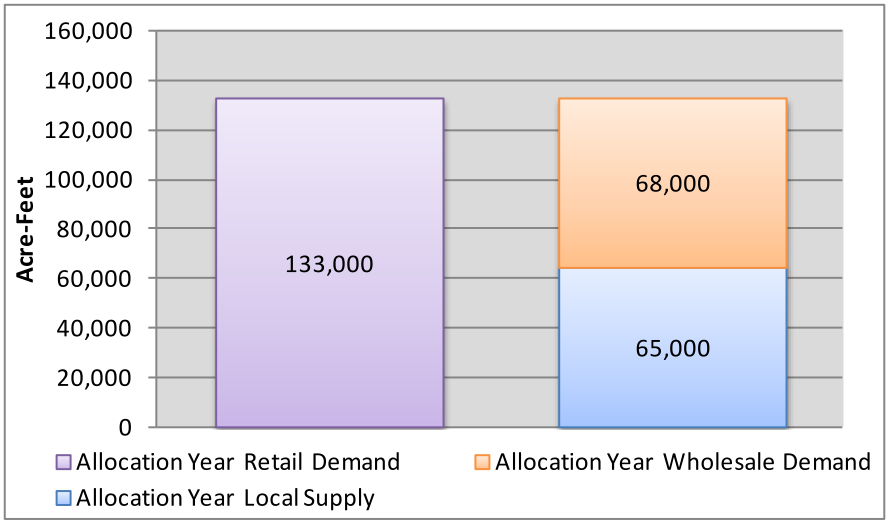
For this example assume also that this agency has an additional 5,000 acre-feet of supplies that meet the determinations for Extraordinary Supply. These supplies are withheld from the allocation formula except for in calculating the Retail Impact Adjustment Allocation.

Extraordinary Local Supplies = 5,000 af

Allocation Year Wholesale Demands: Calculated by subtracting the Allocation Year Local Supplies (65,000 af) from the Allocation Year Retail Demands (133,000 af).

133,000 af - 65,000 af = 68,000 af

Figure 3: Allocation Year Wholesale Demand Calculation



Step 4: Calculate the Wholesale Minimum Allocation

Wholesale Minimum Percentage: Calculate from Table 1 for Regional Shortage Level 4.

Table 1: Shortage Allocation Index		
(a) Regional Shortage Level	(b) Wholesale Minimum Percentage	(c) Maximum Retail Impact Adjustment Percentage
4	70.0%	10.0%

Wholesale Minimum Allocation: Calculated by multiplying the agency's Allocation Year Wholesale Demand (68,000 af) by the Wholesale Minimum Percentage (70%) from the Table 1 for Regional Shortage Level 4.

68,000 af * 70% = 47,600 af

Step 5: Calculate the Retail Impact Adjustment Allocation

Maximum Retail Impact Adjustment Percentage: Calculate from Table 1 for Regional Shortage Level 4.

Retail Impact Adjustment Allocation: Calculated first by determining the agency's dependence on Metropolitan by dividing the Allocation Year Wholesale Demand (68,000 af) minus the Extraordinary Supply (5,000 af) by the Allocation Year Retail Demand (133,000 af) and multiplying by 100.

[(68,000 af - 5,000 af)/ 133,000 af] * 100 = 47%

Next, this percentage dependence on Metropolitan (47%) is multiplied by the Maximum Retail Impact Percentage for Shortage Level 4 (10%).

47% * 10% = 4.7%

This percentage is now multiplied by the Allocation Year Wholesale Demand (68,000 af) for the Retail Impact Adjustment Allocation.

68,000 af * 4.7% = 3,221 af

Step 7: Calculate the Conservation Demand Hardening Adjustment

Calculate Baseline GPCD: To estimate conservation savings, each member agency will establish a historical baseline GPCD calculated in a manner consistent with California Senate Bill SBx7-7, using a 10 or 15-year average ending between 2004 and 2010, using gross water use minus non-potable recycle water production and documented historical population. For this example assume that the Baseline GPCD is 154 GPCD

Baseline GPCD = 154 GPCD

Calculate Allocation Year GPCD: Next, calculate the allocation year GPCD by converting the Allocation Year Retail Demand to GPCD and dividing by the Allocation Year Population from the WSAP. For this example the Allocation Year Retail Demand is 133,000 AF (see Step 2 above) and assume the Allocation Year Population is 905,000 persons. The resulting GPCD is 131 GPCD.

Allocation Year GPCD = 133,000 af/year * 325,851 gallons/af ÷ 365 days/year ÷ 905,000 persons = 131 GPCD

Calculate Reduction in GPCD: Subtract Allocation Year GPCD from Baseline GPCD to determine the GPCD Reduction.

GPCD Reduction = 154 GPCD – 131 GPCD = 23 GPCD

Calculate Conservation Savings: Convert the GPCD Reduction to the equivalent annual conservation savings in acre-feet, using the Allocation Year Population.

$$\text{Conservation Savings} = \frac{\text{((GPCD Reduction) x 365 days/yr x Population)}}{\text{325,851 gallons/af}}$$

Conservation Savings = 23 x 365 x 905,000 ÷ 325,851 = 23,316 af

Multiply by Regional Shortage Level Percentage: Multiply the Conservation Savings by 10 percent plus an additional 5 percent for each level of Regional Shortage (see Step 4 above). This example assumes a Regional Shortage Level of 4. This scales the hardening credit by the level of regional shortage, thereby increasing the credit as deeper shortages occur when demand hardening has a larger impact on the retail consumer.

23,316 af x (10% + (4 x 5%)) = 6,995 af

Multiply by Conservation Savings Percentage: Next, multiply by the percentage of an agency's demand that was reduced through conservation. This scales the hardening by the total percentage reduction to recognize that increased hardening occurs as increasing amounts of conservation are implemented.

Conservation Savings Percentage = 1 + ((Baseline GPCD – Allocation Year GPCD)/Baseline GPCD)

Conservation Savings Percentage = 1+ ((154 GPCD – 131 GPCD)/154 GPCD) = 115%

6,995 af x 115% = 8,044 af

Multiply by Dependence on MWD: Next, multiply by the agency's percentage dependence on MWD as shown in Step 5 above. This scales the credit to the member agency's dependence on MWD to ensure that credits are being applied to the proportion of water demand that is being affected by reductions in MWD's supply. For this example, dependence on MWD is 47%.

8.044 af x 47% = 3,781 af

Summary: The Conservation Demand Hardening Adjustment calculation is summarized by the following formula:

Conservation Demand Hardening Adjustment = Conservation Savings x (10% + Regional Shortage Level %) x (1+Conservation%) x Dependence on MWD %

Conservation Demand Hardening Adjustment = 23,316 af x (10% + (4 x 5%)) x (115%) x (47%) = 3,781 af

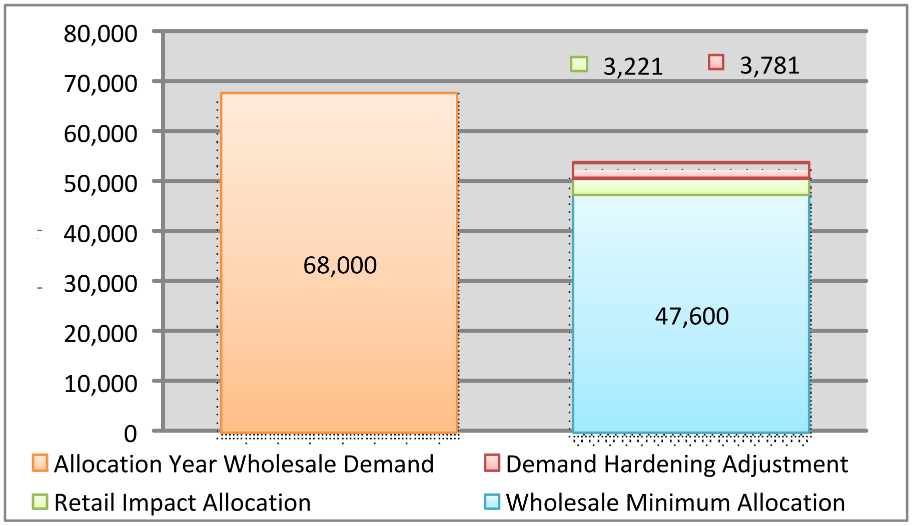
Step 8: Calculate the Low Per-Capita Adjustment Allocation: The hypothetical agency used in this example is assumed not to qualify for the Low Per-Capita Adjustment. A detailed discussion and example of the Low Per-Capita Adjustment calculation can be found in Appendix J: Per Capita Water Use Minimum Example.

Step 9: Calculate the total WSAP Allocation

WSAP Allocation: Calculated by adding the Wholesale Minimum Allocation (47,600 af), the Maximum Retail Impact Adjustment (3,221 af), the Demand Hardening Adjustment (3,781 af), and the Low Per-Capita Adjustment (0 af).

47,600 af + 3,221 af + 3,781 af + 0 af = 54,602 af

Figure 4: WSAP Allocation Regional Shortage Level 4



Step 10: Calculate total retail level reliability

Retail level reliability: Calculated by adding the WSAP Allocation (54,602 af), the Allocation Year Local Supply (65,000 af) and the Extraordinary Local Supply (5,000 af) and dividing by the Allocation Year Retail Demand (133,000 af).

(54,602 af + 65,000 af + 5,000 af) ÷ 133,000 af = 93.7%

Total Metropolitan Supply Allocations: In addition to the WSAP Allocation described above, agencies may also receive separate allocations of supplies for groundwater replenishment and seawater barrier demands. More information on the groundwater replenishment allocation is located in Appendix L: Groundwater Replenishment Allocation.

Appendix H: Board Policy Principles on Determining the Status of Extraordinary Supply

At the June 8, 2010 Water Planning and Stewardship Committee meeting Metropolitan's Board of Directors adopted the following policy principles to guide staff in determining the Extraordinary Supply status of future member agency supply programs.

No Negative Impacts to Other Member Agencies

A potential Extraordinary Supply for a member agency should not decrease the amount of Metropolitan water supply that would be available to the other member agencies in a WSAP. Programs that utilize Metropolitan supplies as a primary or in-lieu source or as a means of payback or future replenishment may have the effect of decreasing supplies, available to other agencies, if designated as Extraordinary Supply.

Provides Supply in Addition to Existing Regional Supplies

A potential Extraordinary Supply should provide a water supply that increases the overall water supplies that are available to the region in a WSAP. A program that is designed to move existing regional supplies from year to year would not qualify.

Specifically Designed Program or Supply Action

A potential Extraordinary Supply must be intentionally created and operated to provide additional supply yield. Normal variations in existing and planned local supply programs would not qualify.

Intended for Consumptive Use in a WSAP

A potential Extraordinary Supply should be designed with the primary intention to deliver water supply to a member agency only at a time when Metropolitan is allocating supplies. Programs designed to deliver water on a regular basis would not qualify. Exceptions for reasonable use of a supply program for emergency or other extenuating local circumstances should be considered.

Fully Documented Resource Management Actions

A potential Extraordinary Supply should have a full description as to the source, transmission, distribution, storage, and delivery of the water supply.

These principles are intended to identify deliberate actions taken by member agencies to augment supplies only when Metropolitan is allocating supplies through the WSAP. Production from existing local supplies, programs that are operated on an ongoing basis, and incidental increases in water supply would not qualify as Extraordinary Supply. The intent of the Extraordinary Supply designation is to recognize programs and actions that are additive to the total regional water supply as the region continues to confront the water supply challenges from drought and regulatory conditions. To that end, any supply actions taken after the initial implementation of the WSAP in July 2009 that utilize Metropolitan supplies either as a primary source, or to refill or replenish an incurred obligation or deficit at a future date would not qualify as Extraordinary Supply.

Appendix I: Base Period Mandatory Rationing Adjustment

Agencies that were under mandatory water use restrictions during the Base Period may have water use that is lower due to the mandatory actions already taken. Without adjusting for this, those agencies could be required to enforce even higher levels of restrictions under an allocation than those agencies that had not started mandatory restrictions.

To qualify for a Base Period Mandatory Rationing Adjustment, the member agency must provide Metropolitan staff with the following information:

- Time period when the mandatory conservation was in effect; it must be in effect during the Base Period
- A statement, with documentation, of how drought restrictions comply with the following Mandatory Conservation qualifications:
    - Governing Body-authorized or enacted
    - Includes mandatory demand reduction actions, restrictions or usage limitations including penalty-backed water budgets
    - Enforced by assessing penalties, fines, or rates based upon violating restrictions or exceeding usage limitations
- If the agency in question is a retail subagency, then the retailer's base period water demands during the Base Period in order to determine proportion to the member agency's total demand
- Historical data to construct GPCD base and trend for the consultation

Calculating the Base Period Rationing Adjustment involves following steps:

- Use the Baseline GPCD 10 or 15-year period selected by member agency for the Conservation Demand Hardening Adjustment calculation.
- Interpolate from the GPCD value of the midpoint of the Baseline GPCD period to the average GPCD of the two years preceding the agency's mandatory conservation
- Extrapolate to the WSAP Base Period (FY2013 and FY2014)
- Calculate the difference between estimated and observed GPCD for FY2013 and FY2014
- Convert to Acre-Feet and add to the member agency's Base Period Retail Demands

Appendix J: Per-Capita Water Use Minimum Example

This adjustment creates a minimum per capita water use threshold. Member agencies' retail-level water use under the WSAP is compared to two different thresholds. The minimum water use levels are based on compliance guidelines for total and residential water use established under Senate Bill X7-7.

Total Retail Level Use: 100 GPCD
Residential Retail Level Use: 55 GPCD

Agencies that fall below either threshold under the WSAP would receive additional allocation from Metropolitan to bring them up to the minimum GPCD water use level. To qualify for this credit, member agencies must provide documentation of the total agency level population and the percent of retail level demands that are residential; no appeal is necessary.

The following example gives a step-by-step description of how the Low Per-Capita Water Use Adjustment would be calculated for a hypothetical member agency. All numbers are hypothetical for the purpose of the example and do not reflect any specific member agency. This example was calculated using the following assumptions:

Allocation Year Retail Demand: 50,000 acre-feet
Allocation Year Local Supplies: 25,000 acre-feet;
Allocation Year Wholesale Demand: 25,000 acre-feet
Base Period Conservation: 5,000 acre-feet
Agency Population: 375,000
Percent of Retail Demands that are Residential: 60%

Step 1: Calculate Total Retail-Level Allocation Year Supplies

Table 6 shows the Allocation Year Local Supply, WSAP Allocation, and the total Allocation Year Supplies for the example agency at each Regional Shortage Level. The WSAP Allocation was calculated using the methodology detailed in Appendix G: Water Supply Allocation Formula Example and the assumptions listed above.

Table 6: Total Retail Level Allocation Year Supplies			
Regional Shortage Level	**Allocation Year Local Supply**	**WSAP Allocation**	**Total Allocation Year Supply**
1	25,000	23,594	48,594
2	25,000	22,188	47,188
3	25,000	20,781	45,781
4	25,000	19,375	44,375
5	25,000	17,969	42,969
6	25,000	16,563	41,563
7	25,000	15,156	40,156
8	25,000	13,750	38,750
9	25,000	12,344	37,344
10	25,000	10,938	35,938

Step 2: Calculate the Equivalent Total and Residential GPCD

The next step is to calculate the equivalent water use in gallons per capita per day (GPCD) for the Total Allocation Year Supply. The following equation shows the GPCD calculation under Regional Shortage Level 10.

$$35{,}938 \text{ af} * 325{,}851 \text{ gallons} \div 375{,}000 \text{ people} \div 365 \text{ days} = 85.6 \text{ GPCD}$$

The residential per-capita water use is calculated in the same manner. Based on the assumption that 60% of the agency demands are residential, the following equation shows the residential GPCD calculation under Regional Shortage Level 10.

$$35{,}938 \text{ af} * 60\% * 325{,}851 \text{ gallons} \div 375{,}000 \text{ people} \div 365 \text{ days} = 51.3 \text{ GPCD}$$

Step 3: Compare the Total and Residential GPCD to the Minimum Water Use Thresholds

The next step is to compare the total GPCD water use to the 100 GPCD total water use threshold. In a Regional Shortage Level 10, the WSAP results in an allocation that is 14.4 GPCD below the minimum threshold.

$$100 \text{ GPCD} - 85.6 \text{ GPCD} = 14.4 \text{ GPCD}$$

Likewise the residential GPCD water use is compared to the 55 GPCD residential water use threshold.

$$55 \text{ GPCD} - 51.3 \text{ GPCD} = 3.7 \text{ GPCD}$$

Step 4: Determine the Allocation Adjustment in Acre-Feet

The final step is to calculate the acre-foot equivalent of the GPCD that fell below the minimum threshold. In a Regional Shortage Level 10, the adjustment provides 6,068 acre-feet of additional allocation to the agency; the results for Shortage Levels 1-10 are shown in Table 7.

$$14.4 \text{ GPCD} \div 325{,}851 \text{ gallons} * 375{,}000 \text{ people} * 365 \text{ days} = 6{,}068 \text{ acre-feet}$$

Table 7: Total Per-Capita Water Use Adjustment				
Regional Shortage Level	**Allocation Year Supply**	**Equivalent GPCD**	**GPCD Below Threshold**	**Allocation Adjustment**
1	48,594	115.7	0	0
2	47,188	112.3	0	0
3	45,781	109.0	0	0
4	44,375	105.6	0	0
5	42,969	102.3	0	0
6	41,563	98.9	1.1	443
7	40,156	95.6	4.4	1,849
8	38,750	92.3	7.7	3,255
9	37,344	88.9	11.1	4,662
10	35,938	85.6	14.4	6,068

Again, this step is repeated for the residential water use. In a Regional Shortage Level 10, the adjustment provides 1,540 acre-feet of additional allocation to the agency; the residential water use results for Regional Shortage Levels 1-10 are shown in Table 8.

$$3.7 \text{ GPCD} \div 325{,}851 \text{ gallons} * 375{,}000 \text{ people} * 365 \text{ days} = 1{,}540 \text{ acre-feet}$$

Table 8: Residential Per-Capita Water Use Adjustment				
Regional Shortage Level	**Allocation Year Supply**	**Equivalent GPCD**	**GPCD Below Threshold**	**Allocation Adjustment**
1	29,156	69.4	0	0
2	28,313	67.4	0	0
3	27,469	65.4	0	0
4	26,625	63.4	0	0
5	25,781	61.4	0	0
6	24,938	59.4	0	0
7	24,094	57.4	0	0
8	23,250	55.4	0	0
9	22,406	53.3	1.7	697
10	21,563	51.3	3.7	1,540

Agencies that fall below either threshold under the WSAP would receive additional allocation from Metropolitan to bring them up to the minimum GPCD water use level. If an agency qualifies under both thresholds, the one resulting in the maximum allocation adjustment would be given. Under this example the agency would receive 6,068 acre-feet of additional allocation in a Regional Shortage Level 10.

Appendix K: Qualifying Income-Based Rate Allocation Surcharge Adjustment Example

The following example provides a step by step description of how the qualifying income-based rate allocation surcharge adjustment is calculated. To qualify for this adjustment, member agencies must provide documentation showing the amount of retail demands that are covered by a qualifying income-based rate; no appeal is necessary.

The following list summarizes the allocation year demands, local supplies, and allocation as calculated in Appendix G: Water Supply Allocation Formula Example for a hypothetical agency under a Level 4 Regional Shortage. For detailed instructions on how to calculate these figures, reference Appendix G: Water Supply Allocation Formula Example.

Allocation Year Retail Demand: 133,000 acre-feet
Allocation Year Local Supplies: 68,000 acre-feet;
Level 4 WSAP Allocation: 52,735 acre-feet

Step 1: Allocation Surcharge Calculation

(a) **Water Use above Allocation:** The first step in calculating the income-based rate Allocation Surcharge adjustment is to calculate the agency's total Allocation Surcharge under the WSAP. If the agency did not incur any Allocation Surcharge from the allocation year, the income-based rate allocation surcharge adjustment would not apply. For the purpose of this example, the agency used 61,000 acre-feet of MWD supplies in the allocation year. This represents 8,265 acre-feet of use above the water supply allocation.

WSAP Allocation	52,735 af
Actual MWD Water Use	61,000 af
Use Above WSAP Allocation	8,265 af

(b) **Total Allocation Surcharge:** In this example the agency used 115.7% of its water supply allocation. 7,910 of the 8,265 acre-feet of use above the allocation would be assessed the Allocation Surcharge at an amount of $1,480 per acre-foot and 354 of the 8,265 acre-feet of use above the allocation would be assessed the Allocation Surcharge at an amount of $2,960.

Between 100% and 115% of Allocation	7,910 af	$1,480/af	$11,706,800
Greater than 115% of Allocation	354 af	$2,960/af	$1,047,840
Total	8,265 af		$12,754,640

Step 2: Effective Income-Based Rate Cutback

(a) **Calculate Retail Cutback:** The second step in calculating the income-based rate allocation surcharge adjustment is to calculate the amount of supply cutback that would have been expected from qualifying income-based rate customers under the WSAP. Using the water supply allocation that was calculated above, the total retail level impact on the agency can be determined. In this example the agency receives a retail level cutback of 15,265 acre-feet, or 11.5% of their retail level demand.

WSAP Allocation + Allocation Year Local Supplies	117,735 af
Allocation Year Retail Demand	133,000 af
Effective Cutback	**15,265 af (11.5%)**

(b) Income-based Rate Customer Retail Cutback: To calculate the effective income-based rate cutback, the amount of demand covered by a qualifying income-based rate is multiplied by the effective retail level cutback. For this example assume that the agency has 10,000 acre-feet of qualifying demands.

Qualifying Income-Based Rate Demand	10,000 af
Effective Cutback Percentage	11.5%
Effective Income-Based Rate Cutback	**1,148 af**

(c) Income-based Rate Cutback Allocation Surcharge: Once the effective cutback has been calculated, the amount of Allocation Surcharge that is associated with qualifying income-based rate customers can be determined.

Between 100% and 115% of Allocation	794 af	$1,480/af	$1,175,120
Greater than 115% of Allocation	354 af	$2,960/af	$1,047,840
Total	**1,148 af**		**$2,222,960**

(d) Adjusted Allocation Surcharge Calculation: Finally, the Allocation Surcharge attributable to qualifying income-based rate customers is subtracted from the total Allocation Surcharge that was calculated above to determine the qualifying income-based rate adjusted allocation surcharge. In the case that the monetary amounts associated with the Income-Based Rate are greater than the total amounts an agency incurs, no Allocation Surcharge will be incurred.

Total Allocation Surcharge	$12,754,640
Qualifying Income-Based Rate Allocation Surcharge	$2,222,960
Qualifying Income-Based Rate Adjusted Allocation	**$10,531,680**

Appendix L: Groundwater Replenishment Allocation

Groundwater basins help provide vital local supplies that can buffer the region from short-term drought impacts. Longer droughts can result in reductions to the many sources of water that replenish groundwater basins, resulting in lower basin levels and potential impacts to the overlying consumptive demands. Limited imported deliveries under these conditions may help avoid impacts to the basins that may be drawn out of their normal operating range or subject to water quality or regulatory impacts. To this end, Metropolitan provides a limited allocation for drought impacted groundwater basins based on the following framework:

a) Staff hold a consultation with qualifying member agencies who have taken groundwater replenishment deliveries since 2010 and the appropriate groundwater basin managers to document whether their basins are in one of the following conditions:
    i. Groundwater basin overdraft conditions that will result in water levels being outside normal operating ranges during the WSAP allocation period; or
    ii. Violations of groundwater basin water quality and/or regulatory parameters that would occur without imported deliveries.
b) Provide an allocation based on the verified need for groundwater replenishment. The allocation would start with a member agency's ten-year average purchases of imported groundwater replenishment supplies (excluding years in which deliveries were curtailed). The amount would then be reduced by the declared WSAP Regional Shortage Level (5 percent for each Regional Shortage Level).
c) Any allocation provided under this provision for drought impacted groundwater basins is intended to help support and maintain groundwater production for consumptive use. As such, a member agency receiving an allocation under this provision will be expected to maintain groundwater production levels equivalent to the average pumping in the Base Period. Any adjustments to a member agency's M&I allocation due to lower groundwater production would be reduced by deliveries made under this provision.
d) Agencies for which this allocation does not provide sufficient supplies for the needs of the groundwater basin may use the WSAP Appeals Process to request additional supply (subject to Board approval). The appeal should include a Groundwater Management Plan that documents the need for additional supplies according to the following tenets:
    i. Maintenance of groundwater production levels;
    ii. Maintenance of, or reducing the further decline of, groundwater levels;
    iii. Maintenance of key water quality factors/indicators;
    iv. Avoidance of permanent impacts to groundwater infrastructure or geologic features; and
    v. Consideration of severe and/or inequitable financial impacts.

Final amounts and allocations will be determined following the consultations with groundwater basin managers and member agencies.

Appendix M: Water Rates, Charges, and Definitions

Table 9: Water Rates and Charges Dollars per acre-foot (except where noted)			
Rate	Effective 1/1/2014	Effective 1/1/2015	Effective 1/1/2016
Tier 1 Supply Rate	$148	$158	$156
Tier 2 Supply Rate	$290	$290	$290
System Access Rate	$243	$257	$259
Water Stewardship Rate	$41	$41	$41
System Power Rate	161	$126	$138
Tier 1	$593	$582	$594
Tier 2	$735	$714	$728
Treatment Surcharge	$297	$341	$348
Full Service Treated Volumetric Cost			
Tier 1	$890	$923	$942
Tier 2	$1,032	$1,055	$1,076
Readiness-to-Serve Charge (millions of dollars)	$166	$158	$153
Capacity Charge (dollars per cubic foot second)	$8,600	$11,100	$10,900

Definitions:

(1) **Tier 1 Supply Rate -** recovers the cost of maintaining a reliable amount of supply.

(2) **Tier 2 Supply Rate** - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

(3) **System Access Rate** – recovers a portion of the costs associated with the delivery of supplies.

(4) **System Power Rate** – recovers Metropolitan's power costs for pumping supplies to Southern California.

(5) **Water Stewardship Rate** – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

(6) **Treatment Surcharge** – recovers the costs of treating imported water.

(7) **Readiness-to-Serve Charge -** a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

(8) **Capacity Charge** – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Source: http://www.mwdh2o.com/WhoWeAre/Management/Financial-Information

Appendix N: Allocation Appeals Process

Step 1: Appeals Submittal

All appeals shall be submitted to the Appeals Liaison in the form of a written letter signed by the member agency General Manager. Each appeal must be submitted as a separate request, submittals with more than one appeal will not be considered. The appeal request is to include:

- A designated member agency staff person to serve as point of contact.
- The type of appeal (erroneous baseline data, loss of local supply, etc.).
- The quantity (in acre-feet) of the appeal.
- A justification for the appeal which includes supporting documentation.

A minimum of 60 days are required to coordinate the appeals process with Metropolitan's Board process.

Step 2: Notification of Response and Start of Appeals Process

The Appeals Liaison will phone the designated member agency staff contact within 3 business days of receiving the appeal to provide an initial receipt notification, and schedule an appeals conference. Subsequent to the phone call, the Liaison will send an e-mail to the Agency General Manager and designated staff contact documenting the conversation. An official notification letter confirming both receipt of the appeal submittal, and the date of the appeals conference, will be mailed within 2 business days following the phone contact

Step 3: Appeals Conference

All practical efforts will be made to hold an appeals conference between Metropolitan staff and member agency staff at Metropolitan's Union Station Headquarters within 15 business days of receiving the appeal submittal. The appeals conference will serve as a forum to review the submittal materials and ensure that there is consensus understanding as to the spirit of the appeal. Metropolitan staff will provide an initial determination of the size of the appeal (small or large) and review the corresponding steps and timeline for completing the appeals process.

Steps 4-7 of the appeals process differ depending upon the size of the appeal

Small Appeals

Small appeals are defined as those that would change an agency's allocation by less than 10 percent, or are less than 5,000 acre-feet in quantity. Small appeals are evaluated and approved or denied by Metropolitan staff.

Step 4: Preliminary Decision

Metropolitan staff will provide a preliminary notice of decision to the member agency within 10 business days of the appeals conference. The preliminary decision timeline may be extended to accommodate requests for additional information, data, and documentation. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the preliminary decision and the rationale for approving or denying the appeal.

Step 5: Clarification Conference

Following the preliminary decision the Appeals Liaison will schedule a clarification conference. The member agency may choose to decline the clarification conference if they are satisfied with the preliminary decision. Declining the clarification conference serves as acceptance of the preliminary decision, and the decision becomes final upon approval by Metropolitan's executive staff.

Step 6: Final Decision

Metropolitan staff will provide a final notice of decision to the member agency within 10 business days of the clarification conference, pending review by Metropolitan's executive staff. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the final decision and the rationale for the decision. A copy of the letter will also be provided to Metropolitan executive staff.

Step 6a: Board Resolution of Small Appeal Claims

Member agencies may request to forward appeals that are denied by Metropolitan staff to the Board of Directors through the Water Planning and Stewardship Committee for final resolution. The request for Board resolution shall be submitted to the Appeals Liaison in the form of a written letter signed by the member agency General Manager. This request will be administered according to Steps 6 and 7 of the large appeals process.

Step 7: Board Notification

Metropolitan staff will provide a report to the Board of Directors, through the Water Planning and Stewardship Committee, on all submitted appeals including the basis for determination of the outcome of the appeal.

Large Appeals

Large appeals are defined as those that would change an agency's allocation by more than 10 percent, and are larger than 5,000 acre-feet. Large appeals are evaluated and approved or denied by the Board of Directors.

Step 4: Preliminary Recommendation

Metropolitan staff will provide a preliminary notice of recommendation to the member agency within 10 business days of the appeals conference. The preliminary decision timeline may be extended to accommodate requests for additional information, data, and documentation. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the preliminary recommendation and the rationale for the recommendation. A copy of the draft recommendation will also be provided to Metropolitan executive staff.

Step 5: Clarification Conference

Following the preliminary recommendation the Appeals Liaison will schedule a clarification conference. The member agency may choose to decline the clarification conference if the satisfied with preliminary recommendation. Declining the clarification conference signifies acceptance of the preliminary recommendation, and the recommendation becomes final upon approval by Metropolitan's executive staff.

Step 6: Final recommendation

Metropolitan staff will provide a final notice of recommendation to the member agency within 10 business days of the clarification conference, pending review by Metropolitan executive staff. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the final recommendation and the rationale for the recommendation. A copy of the final recommendation will also be provided for Metropolitan executive review.

Step 7: Board Action

Metropolitan staff shall refer the appeal to the Board of Directors through the Water Planning and Stewardship Committee for approval.

Appendix O: Appeals Submittal Checklist

Appeal Submittal

- ☐ Written letter (E-mail or other electronic formats will not be accepted)
- ☐ Signed by the Agency General Manager

Mailed to the appointed Metropolitan Appeals Liaison

Contact Information

- ☐ Designated staff contact
    - o Name
    - o Address
    - o Phone Number
    - o E-mail Address
- ☐ General Manager
    - o Name
    - o Address
    - o Phone Number
    - o E-mail Address

Type of Appeal

- ☐ State the type of appeal
    - o Erroneous historical data used in base period calculations
        - Metropolitan Deliveries
        - Local Production
        - Growth adjustment
        - Conservation savings
    - o Exclusion of physically isolated areas
    - o Extraordinary supply designation
    - o Groundwater Replenishment Allocation
    - o Base Period Mandatory Rationing Adjustment
    - o Other

Quantity of Appeal

- ☐ State the quantity in acre-feet of the appeal

Justification and Supporting Documentation

- ☐ State the rationale for the appeal
- ☐ Provide verifiable documentation to support the stated rationale
    - o Examples of verifiable documentation Include, but are not limited to:
        - Billing Statements
        - Invoices for conservation device installations
        - Basin Groundwater/Watermaster Reports
        - California Department of Finance economic or population data
        - California Department of Public Health reports

Attachment C

Resolution Adopting the Water Shortage Contingency Plan

Resolution 9281

**RESOLUTION
OF THE BOARD OF DIRECTORS
OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
ADOPTING THE WATER SHORTAGE CONTINGENCY PLAN**

WHEREAS, the Urban Water Management Planning Act requires urban water suppliers providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt, in accordance with prescribed requirements, a water shortage contingency plan;

WHEREAS, the Urban Water Management Planning Act specifies the requirements and procedures for adopting such Water Shortage Contingency Plans;

WHEREAS, the Urban Water Management Planning Act requires urban water suppliers to conduct an annual water supply and demand assessment (Annual Assessment) each year and to include in their water shortage contingency plans the procedures they use to conduct the Annual Assessment;

WHEREAS, the procedures used to conduct an Annual Assessment include, but are not limited to, the written decision-making process that an urban water supplier will use each year to determine its water supply reliability;

WHEREAS, The Metropolitan Water District of Southern California's (Metropolitan's) water shortage contingency plan provides that by June of each year, Metropolitan staff will present a completed Annual Assessment for approval by Metropolitan's Board of Directors or by the Board's authorized designee with expressly delegated authority for approval of Annual Assessment determinations;

and

WHEREAS, the Board of Directors of The Metropolitan Water District of Southern California has duly reviewed, discussed, and considered such Water Shortage Contingency Plan and has determined the Water Shortage Contingency Plan to be consistent with the Urban Water Management Planning Act and to be an accurate representation of the planned actions during shortage conditions for The Metropolitan Water District of Southern California.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of The Metropolitan Water District of Southern California that, on May 11, 2021, this District hereby adopts this Water Shortage Contingency Plan for submittal to the State of California and expressly authorizes the General Manager of The Metropolitan Water District of Southern California to approve the Annual Assessment each year.

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of a resolution adopted by the Board of Directors of The Metropolitan Water District of Southern California, at its meeting held on May 11, 2021.

Judy Abdo

Secretary of the Board of Directors
of The Metropolitan Water District
of Southern California

Appendix 5

LOCAL PROJECTS

(From 2020 IRP local supply survey and Member Agency Coordination)

Table A.5-1
Recycled Water Projects

Existing Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
City of Anaheim		
Anaheim GWRS Purchases	120	2011
Anaheim Water Recycling Demonstration Project	110	2014
City of Burbank		
Burbank Recycled Water System Project	1,300	1967
Burbank Recycled Water System Expansion Project - Phase I	850	1995
Burbank Recycled Water System Expansion Project - Phase II	960	2009
Calleguas Municipal Water District		
Camrosa Water Reclamation Facility Project	1,600	1997
City of Camarillo Recycled Distribution System	1,502	1955
Conejo Creek Diversion Project	9,000	2003
Lake Sherwood Reclaimed Water System	420	1997
Oak Park/North Ranch Recycled Water Distribution System	1,300	1994
Oxnard Advanced Water Purification Facility Project Phase I	5,000	2015
Simi Valley Recycled Water Project	90	2001
VCWWD No. 1 WWTP Recycled Water Distribution System	1,100	2003
Central Basin Municipal Water District		
Albert Robles Center for Water Recycling & Environmental Learning	10,000	2020
Century/Rio Hondo Reclamation Program	5,000	1992
Cerritos Reclaimed Water System	1,750	1978
Cerritos Reclamation Extension Project	260	1993
Lakewood Water Reclamation Project	500	1989
Montebello Forebay Groundwater Recharge Project	54,500	1962
Eastern Municipal Water District		
Eastern Recycled Water System Expansion Project	5,000	2012
Original Customers, Reach 1 Phase I & Reach 2	28,950	1966
Rancho California Reclamation Expansion Project - Rancho Division	5,250	1993
Rancho California Reclamation Project - Rancho Division	225	1989
Reach 1 Phase II	1,700	2000
Reach 16 Phase I	707	2006
Reach 16 Phase II	Not Provided	Not Provided
Reach 3 & Reach 7	4,830	2012
Foothill Municipal Water District		
La Cañada Flintridge Country Club Controlled Access Irrigation	90	1962
City of Glendale		
Glendale Water Reclamation Project	400	1986
Glendale Water Reclamation Expansion Project	500	1992
Glendale Verdugo-Scholl and Brand Park Project	1,760	1995

Existing Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Inland Empire Utilities Agency		
Ely Basin Groundwater Recharge	14,000	1999
IEUA Regional Recycled Water Distribution System	13,500	1998
Regional Sewage Service Contract	3,500	1972
Las Virgenes Municipal Water District		
Calabasas Project	900	Not Provided
Calabasas Reclaimed Water System Extension Project	700	1989
Las Virgenes Reclamation Project	2,700	1984
Las Virgenes Valley Project	500	Not Provided
City of Long Beach		
Alamitos Barrier Reclaimed Water Project	3,025	2005
Leo J. Vander Lans Water Treatment Facility Expansion Project	3,475	2018
Long Beach Reclamation Project	1,700	1986
Long Beach Recycled Water System Expansion Phase I	2,750	2004
Original Customers	400	1980
THUMS	1,429	1981
City of Los Angeles		
Burbank Deliveries to Los Angeles	9	2018
Central City/Elysian Park Project Phase I - Taylor Yard Park	150	2009
Downtown Water Recycling Project	2,116	2018
Griffith Park South Water Recycling Project	450	2019
Hansen Area Water Recycling - Hansen Dam Golf Course	500	2015
Hansen Area Water Recycling Phase I Project	2,115	2008
Harbor Water Recycling Project	5,000	2005
Los Angeles Greenbelt Project	1,766	1993
North Atwater Area Water Recycling Project	50	2015
Original Deliveries from West Basin Reclamation Program	740	1996
Sepulveda Basin Water Reclamation Project Phase IV	445	2010
Sepulveda Basin Water Reclamation Project Phases I - III	1,500	2007
South Gardena Lateral	95	2019
Van Nuys Area Water Recycling Project	150	2011
Municipal Water District of Orange County		
Capistrano Valley Non-Domestic Water System	565	1989
Capistrano Valley Non-Domestic Water System Expansion Project	1,011	2006
El Toro Recycled Water System	260	1998
El Toro Recycled Water System Expansion Project - Phase I	1,050	2015
El Toro Recycled Water System Expansion Project - Phase II	350	2019
Green Acres Reclamation Project - Coastal MWD & Orange County	2,480	1991
GWRS Initial Expansion	30,000	2015
GWRS Phase I	74,880	2008

Existing Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Irvine Reclamation Expansion Project - Post 2003 Michelson & Los Alisos Dual Distribution System	8,500	2008
Irvine Reclamation Expansion Project - Pre 2003 Michelson & Los Alisos Dual Distribution System	1,500	Not Provided
Irvine Reclamation Project - Post 1983 Michelson System	10,000	1986
Irvine Reclamation Project - Pre 1983 Michelson System	6,000	1967
Moulton Niguel Reclamation Project - Phases I & II	470	1968
Moulton Niguel Reclamation Project - Phases III & IV	9,276	1993
San Clemente Recycled Water System Expansion Project	1,000	2015
San Clemente Water Reclamation Project	500	1990
San Clemente Water Reclamation Project - Municipal Golf Course	200	1957
Santa Margarita - Irvine Ranch Recycled Water Purchase Agreement	321	2001
Santa Margarita Advanced Purified Water Project	300	2018
Santa Margarita Chiquita Water Reclamation Project	2,772	2005
Santa Margarita Oso Water Reclamation Expansion Project	3,600	1988
Santa Margarita Oso Water Reclamation Project	1,200	1978
South Laguna Reclamation Expansion Project	0	1991
South Laguna Reclamation Project	860	1985
Trabuco Canyon Reclamation Expansion Project	800	1992
Trabuco Canyon Reclamation Project	280	1987
City of Santa Ana		
Green Acres Reclamation Project - Santa Ana	320	2008
City of Santa Monica		
Santa Monica Urban Runoff Recycling Facility	210	2005
San Diego County Water Authority		
4S Ranch WRF/ Olivenhain MWD	1,145	2003
Camp Pendleton Marine Corps Base Recycled Water System	1,950	1997
Connection #1 - North City Water Reclamation Plant/City of San Diego	465	2003
Connection #2 - North City Water Reclamation Plant/City of San Diego	25	2003
Del Mar San Elijo WRF/ San Elijo JPA	130	2000
Del Mar San Elijo WRF/ San Elijo JPA additional verifiable expansions	20	2000
Encina Basin Phases I & II - Carlsbad WRF/ Carlsbad MWD	2,315	1993
Encina Basin Phases I & II - Carlsbad WRF/ Carlsbad MWD additional verifiable expansions	135	1993
Encina Basin Phases I & II - Gafner WRF/ Leucadia CWD	260	1993
Encina Basin Phases I & II - Gafner WRF/ Leucadia CWD additional verifiable expansions	15	1993
Encina Basin Phases I & II - Meadowlark WRF (via Mahr Reservoir)/Vallecitos WD	2,425	1993
Encina Basin Phases I & II - Meadowlark WRF (via Mahr Reservoir)/Vallecitos WD additional verifiable expansions	140	1993

Existing Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Fallbrook Public Utility District Water Reclamation Project	1,200	1990
Fallbrook Public Utility District Water Reclamation Project Verifiable Expansions	500	Not Provided
Hale Avenue Resources Recovery Facility (HARRF)/City of Escondido	993	2004
Hale Avenue Resources Recovery Facility (HARRF)/City of Escondido additional verifiable expansions	127	2004
Hale Avenue RRF/City of Escondido HGWRP/Rincon MWD	648	2004
Hale Avenue RRF/City of Escondido HGWRP/Rincon MWD Verifiable Expansions	1,352	2004
Northwest Quadrant/Meadowlark WRF/Vallecitos WD	728	2009
Oceanside Water Reclamation Project	200	1992
Oceanside Water Reclamation Project Additional Verifiable Expansion	4,840	1992
Olivenhain SEJPA1-Quail Gardens	110	2000
Olivenhain SEJPA1-Quail Gardens additional verifiable expansions	13	2000
Olivenhain SEJPA2-Village Park, Manchester/Phase I	210	2000
Olivenhain SEJPA2-Village Park, Manchester/Phase I additional verifiable expansions	26	2000
Otay Recycled Water System Phases I & II	7,062	1991
Padre Dam Reclaimed Water System Phase I	850	1998
San Diego Northern Recycled Water Distribution System	12,619	1998
San Diego Northern Recycled Water Distribution System - deliveries to Poway	645	2009
San Diego Southern Recycled Water Distribution System	1,154	2006
San Dieguito San Elijo WRF/ San Elijo JPA	620	2000
San Dieguito San Elijo WRF/ San Elijo JPA additional verifiable expansions	80	2000
San Vicente Recycled Water System	230	1996
San Vicente Recycled Water Treatment Upgrades	340	2010
Santa Fe ID San Elijo WRF/ San Elijo JPA	530	2000
Santa Fe ID San Elijo WRF/ San Elijo JPA additional verifiable expansions	70	2000
Santa Maria Recycled Water System	400	1999
Santee Lakes Existing Project	65	1959
Santa Fe Valley WRF/Rancho Santa Fe CSD	153	2003
Woods Valley Ranch Water Reclamation Facility Phase I	47	2005
Three Valleys Municipal Water District		
City Industry Regional Recycled Water Project - Rowland Portion	1,017	2008
City Industry Regional Recycled Water Project - Walnut Valley Portion	2,135	2008
Pomona Recycled Water Distribution System	1,500	1973
Rowland Non-Potable Water System	340	1985
Walnut Valley Recycled Water System	1,100	1986
Walnut Valley Recycled Water System Expansion Project	500	1993

Existing Projects	**Ultimate Yield/Capacity (Acre-Feet)**	**Online Date**
City of Torrance		
Torrance Recycled Water Purchases	7,800	1995
Upper San Gabriel Valley Municipal Water District		
City of Industry Recycled Water Distribution System	8,500	1983
County Sanitation Districts of Los Angeles County Deliveries	4,475	1978
Direct Reuse Project - Phase I	1,600	2003
Direct Reuse Project - Phase IIA Rosemead Extension	720	2011
Direct Reuse Project - Phase IIA Whittier Narrows Project	2,258	2006
Direct Reuse Project - Phase IIB Industry (Packages 1 - 4)	1,963	2011
Rose Hills Expansion	530	2015
South El Monte Recycled Water Expansion Project (Packages 1 - 5)	72	2019
West Basin Municipal Water District		
West Basin Water Recycling Program Phase I - IV	29,460	1995
West Basin Water Recycling Program Phase V	8,000	2013
Western Municipal Water District of Riverside County		
Corona Reclaimed Water Distribution System	4,750	2007
Elsinore Valley Horsethief Canyon Recycled Water System	400	1985
Elsinore Valley Railroad Canyon Recycled Water System	1,000	1984
Elsinore Valley Wildomar Recycled Water Project	300	2014
Jackson Street Recycled Water Pipeline Project - Phase 1	820	2018
Rancho California Reclamation Expansion Project - Rancho Division	750	1993
Rancho California Reclamation Project - Santa Rosa Division	225	1989
Riverside Recycled Water Program Phase	260	1997
Western Water Recycling Facility	900	1940
Western Water Recycling Facility Upgrade Project	1,300	2014

Under Construction Projects	**Ultimate Yield/Capacity (Acre-Feet)**	**Online Date**
Central Basin Municipal Water District		
CBMWD Recycled Water System Expansion Phase 1 (Gateway Cities)	500	2022
City of Los Angeles		
Los Angeles Groundwater Replenishment Project Initial Phase	7,000	2024
Los Angeles Groundwater Replenishment Project Second Phase	4,000	2026
North Hollywood Area Water Recycling Project	300	2025
Pershing Drive Recycled Water Pipeline Project	750	2022
Sepulveda Basin Sports Complex Water Recycling Project Phases I & II	350	2021
Terminal Island Recycled Water Expansion Project	8,000	2025
Westside Area Water Recycling Project	150	2021

Under Construction Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Municipal Water District of Orange County		
GWRS Final Expansion	29,150	2023
Santa Margarita Water District Trampas Canyon RW Reservoir	5,000	2020
San Diego County Water Authority		
East County Advanced Water Purification Program	12,882	2025
Escondido Membrane Filtration Reverse Osmosis Facility (Hale Avenue Resources Recovery Facility (HARRF)/City of Escondido)	3,280	2025
Oceanside Pure Water and Recycled Water Expansion Phase I Project	6,000	2025
Oceanside Pure Water and Recycled Water Expansion Phase I Project Additional Verifiable Yield	720	2025
San Diego Pure Water North City Phase I	33,600	2025
City of Santa Monica		
Advanced Water Treatment	1,100	2021
Santa Monica Urban Runoff Recycling Facility Upgrades	350	2021
Upper San Gabriel Valley Municipal Water District		
La Puente Valley County Water District Recycled Water Project	60	2024

CEQA Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
City of Anaheim		
Anaheim South Recycled Water Project	850	2027
Central Basin Municipal Water District		
West San Gabriel Recycled Water Expansion Project (Montebello Hills)	240	2020

Conceptual Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Calleguas Municipal Water District		
Camarillo Water Reclamation Plant Effluent Transfer Pipeline	1,120	2025
City of Camarillo Recycled Distribution System Expansion	2,583	2025
Oxnard Advanced Water Purification Facility Project - Phase II	5,000	2025
Oxnard Aquifer Storage and Recovery Completion	Not Provided	2024
Oxnard Aquifer Storage and Recovery Wells #2 and #3	Not Provided	2024
VCWWD No. 1 WWTP Recycled Water Distribution System Expansion Phase I	500	2025
Central Basin Municipal Water District		
City of Monterey Park Recycled Water Expansion Project	750	Not Provided
East Los Angeles Recycled Water Expansion Project	500	Not Provided
La Mirada Recycled Water Expansion Project	900	Not Provided

Conceptual Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
City of Compton		
Recycled Water Feasibility Study	262	2025
Eastern Municipal Water District		
Purified Water Replenishment, Phase I	4,000	2023
Purified Water Replenishment, Phase II	8,000	2035
Rancho Indirect Potable Reuse Project	4,000	2025
Foothill Municipal Water District		
Descanso Gardens MBR Plant	Not Provided	Not Provided
City of Glendale		
Public Works Yard Recycled Water Main Extension Project	80	Not Provided
Inland Empire Utilities Agency		
IEUA Regional Recycled Water Distribution System Expansion Ph I & II	33,000	Not Provided
Las Virgenes Municipal Water District		
Pure Water Project	3,100	2030
City of Los Angeles		
Airport Police Facility Water Recycling Project	39	2024
Extension to ConRAC Water Recycling Project	10	2024
Forest Lawn Tank	450	2024
Harbor Connection to Joint Pollution Control Plant	3,500	2023
Harbor Extension On Gaffey	4,500	2023
Harbor Extension on Port of LA Right-of-Way	1,000	2022
Second Dominguez Gap Connection and Harbor Potable Backup	6,661	2021
Terminal Island Recycled Water Expansion Project	1,000	2021
Municipal Water District of Orange County		
Moulton Niguel Reclamation Project - Phase V	2,000	2025
Santa Margarita Chiquita Water Reclamation Expansion Project	3,000	Not Provided
Santa Margarita Recycled Water Conversion Projects	2,420	Not Provided
City of Pasadena		
Pasadena Non-Potable Water Project - Ph I	700	Not Provided
Pasadena Non-Potable Water Project - Ph II: Southern Extension I	400	2023
Pasadena Non-Potable Water Project - Ph III: Southern Extension II	900	2027
Pasadena Non-Potable Water Project - Ph IV: Annandale Extension	280	2030
Pasadena Non-Potable Water Project - Ph V: Northwestern Extension	390	2033
Pasadena Non-Potable Water Project - Ph VI: Northeastern Extension	390	2036
San Diego County Water Authority		
Additional Planned - Carlsbad WRF/ Carlsbad MWD	495	2025
Connection #1 - North City Water Reclamation Plant/City of San Diego (Extension 153)	489	2030
East County Advanced Water Purification Program Expansion	2,803	2045
Escondido Potable Reuse Project	5,000	2035

Conceptual Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Hale Avenue Resources Recovery Facility (HARRF)/City of Escondido Additional Planned Expansions	6,800	2025
Indirect Potable Recharge	900	2020
Joint RW Transmission Project with SFID and OMWD/TBD (Bridges)	400	2030
Lilac Hills Ranch WRF/VCMWD	294	2035
Los Flores and Santa Margarita Basin Injection Project	1,320	2020
Lower Moosa Canyon Water Reclamation Facility Treatment Process Upgrade and Reclamation System	700	2020
Meadowlark Water Reclamation Facility Direct Potable Reuse	2,200	2030
Meadowood Water Reclamation Facility	143	2025
North County One Water Program - Carlsbad MWD	3,500	2035
North County One Water Program - Olivenhain MWD	2,500	2035
North County One Water Program - Poway	2,000	2035
North County One Water Program - San Dieguito WD	2,000	2035
North County One Water Program - Santa Fe ID	3,000	2035
North County One Water Program - Vallecitos WD	5,500	2030
North District Recycled Water Project Phase I	4,400	2030
North Village Water Reclamation Facility	105	2040
Olivenhain - SEJPA 1 (Gardenview Rd)	44	2030
Olivenhain SEJPA 3 (Manchester Avenue Phases I and II)	40	2025
Rancho Cielo Project	100	2030
Ray Stoyer Expansion	317	2025
San Diego Pure Water Phases II	59,360	2035
Welk Water Reclamation Facility	140	2025
Woods Valley Ranch Water Reclamation Facility Phase II	184	2020
Woods Valley Ranch Water Reclamation Facility Phase III	168	2030
City of Santa Monica		
Santa Monica Connection	100	Not Provided
Three Valleys Municipal Water District		
Los Angeles County Fairplex Recharge	1,000	2020
Pomona Recycled Water Distribution System Expansion	1,000	2020
Recharge in Chino Basin	2,405	2025
Western Municipal Water District of Riverside County		
Corona Reclaimed Water Distribution System Expansion	1,760	2020
Demineralization of Recycled Water	550	2026
Elsinore Valley Horsethief Canyon Recycled Water System Expansion	500	2022
Indirect Potable Reuse Project	5,700	2035
Jackson Street Recycled Water Pipeline Project - Phase 2	2,550	Not Provided
Riverside Habitat, Parks & Water Project (RHPWP)	10,000	2025

Table A.5-2
Groundwater Recovery Projects

Existing Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
City of Beverly Hills		
Beverly Hills Desalter Project	2,600	2003
Maple Wells (Shallow Wells)	350	2020
City of Burbank		
Burbank Operable Unit/Lockheed Valley Plant	11,000	1996
Calleguas Municipal Water District		
Round Mountain Water Treatment Plant	1,000	2014
Tapo Canyon Groundwater Treatment Plant	1,000	2010
Central Basin Municipal Water District		
Juan Well Filter Facility	900	2001
Water Quality Protection Plan	5,807	2007
Eastern Municipal Water District		
Menifee Basin Desalter Project	3,360	2002
Perris I Desalter	4,500	2006
Foothill Municipal Water District		
Glenwood Nitrate Water Reclamation Project	1,600	1993
Olive Avenue IX GAC Groundwater Treatment Plant	2,000	2004
City of Glendale		
Glendale Operable Unit	7,700	2001
Verdugo Park Water Treatment Plant	1,000	1997
Inland Empire Utilities Agency		
Chino Basin Desalination Program Phase I	9,600	2000
Chino Basin Desalination Program Phase II & III	12,800	2006
Las Virgenes Municipal Water District		
Westlake Wells-Tapia WRF Intertie Project	150	2000
Municipal Water District of Orange County		
Capistrano Beach Desalter Project	1,300	2007
Deep Aquifer Treatment System	8,000	2002
El Toro Groundwater Remediation Project	4,000	2007
Garden Grove Nitrate Blending Project	4,000	1990
Irvine Desalter Project	6,700	2007
IRWD Wells 21 & 22 Desalter	6,400	2013
Mesa Water Reliability Facility	8,941	2001
San Juan Basin Desalter Project Phase I	4,800	2004
Tustin 17th Street Desalter	3,200	1996
Tustin Main St Treatment Plant	2,000	1989
San Diego County Water Authority		
Mission Basin Desalter Facility Phases I & II	2,800	1994

Existing Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Richard A. Reynolds Groundwater Desalination Facility	3,600	2000
Richard A. Reynolds Groundwater Desalination Facility Expansion	2,600	2017
Three Valleys Municipal Water District		
Cal Poly Pomona Water Treatment Plant	250	2016
Harrison Groundwater Treatment Facility	981	2008
Towne Groundwater Treatment Plant & Well 3 Treatment Facility	4,678	1997
City of Torrance		
Robert W. Goldsworthy Desalter	2,400	2002
Robert W. Goldsworthy Desalter Expansion	2,600	2019
West Basin Municipal Water District		
C. Marvin Brewer Desalter	1,524	1993
Western Municipal Water District of Riverside County		
Arlington Basin Groundwater Desalter Project	6,100	1990
Chino Basin Desalination Program Phases II & III	12,800	2006
Existing Groundwater Threshold	9,500	2001
Temescal Basin Desalting Facility Project	10,000	2001

Under Construction Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Calleguas Municipal Water District		
North Pleasant Valley Regional Desalter	3,800	2020
Eastern Municipal Water District		
Perris II Desalter	5,400	2021
San Diego County Water Authority		
Fallbrook Groundwater Desalter Project	3,100	2025

CEQA Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Calleguas Municipal Water District		
Los Robles Golf Course Groundwater Utilization Project	930	Not Provided

Conceptual Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
City of Beverly Hills		
La Brea Subbasin Groundwater Development	1,700	2023
City of Burbank		
Deliveries from North Hollywood Operable Unit's offline wells	Not Provided	2022

Existing Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Calleguas Municipal Water District		
Moorpark Desalter Project	5,000	2030
Santa Rosa Basin Desalter	1,000	2025
Simi Groundwater Basin Reverse Osmosis Desalter	830	2025
Simi Valley Desalter Project	5,500	2025
Eastern Municipal Water District		
Perris North Basin Groundwater Contamination Prevention and Remediation Program	6,750	2023
City of Los Angeles		
West Coast Basin Brackish Water Reclamation	8,000	2024
San Diego County Water Authority		
Middle Sweetwater River Basin Groundwater Well System	1,000	2035
Otay Mesa Lot 7 Groundwater Well System	400	2035
Rancho del Rey Brackish Groundwater Development	500	2035
San Dieguito River Basin Groundwater Recovery and Treatment Project	1,120	2025
San Marcos Groundwater Basin Supply Options	2,000	2030

Table A.5-3
Seawater Desalination Projects

Existing Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
San Diego County Water Authority		
Claude "Bud" Lewis Carlsbad Desalination Plant - Carlsbad MWD	2,500	2015
Claude "Bud" Lewis Carlsbad Desalination Plant - SDCWA	50,000	2015
Claude "Bud" Lewis Carlsbad Desalination Plant - Vallecitos WD	3,500	2015

CEQA Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
Municipal Water District of Orange County		
Doheny Ocean Desalination Project	16,800	2025
Huntington Beach Seawater Desalination Project	56,000	2027
West Basin Municipal Water District		
West Basin Seawater Desalination Project	21,500	2030

Conceptual Projects	Ultimate Yield/Capacity (Acre-Feet)	Online Date
San Diego County Water Authority		
Otay Mesa Conveyance and Disinfection System Project (Purchase)	6,700	2030

Appendix 6

CONSERVATION ESTIMATES AND WATER SAVINGS FROM CODES, STANDARDS, AND ORDINANCES

Appendix 6
CONSERVATION ESTIMATES AND WATER SAVINGS FROM CODES, STANDARDS, AND ORDINANCES

Background

Unlike traditional water supplies, which can be directly measured, conservation reduces water demand in ways that may only be indirectly quantified. Demand is reduced through changes in consumer behavior and savings from water-efficient fixtures. There are numerous approaches for estimating and projecting conservation savings, and many of them are utility-specific to meet the unique needs of different water agencies. Metropolitan estimates savings from the extensive existing conservation programs that it funds directly, as well as savings produced by plumbing codes. Metropolitan also incorporates the savings due to the impacts of price on consumers in its demand forecasts. These conservation savings estimates are incorporated into Metropolitan's long-term planning documents such as the Integrated Water Resources Plan (IRP) and its Urban Water Management Plan (UWMP).

Conservation savings are commonly estimated from a base-year water-use profile. Beginning with the 1996 IRP, Metropolitan identified 1980 as the base year for estimating conservation because it marked the effective date of a new plumbing code in California. Among other changes, the new code required toilets in new construction to be rated at 3.5 gallons per flush or less. Between 1980 and 1990, Metropolitan's service area saved an estimated 250 TAF per year as the result of this 1980 plumbing code and unrelated water rate increases. Within Metropolitan's planning framework, these savings are referred to as "pre-1990 savings." Metropolitan's conservation accounting combines pre-1990 savings and estimates of more recently achieved savings from the following sources of conservation:

- Active Conservation – Water saved directly as a result of conservation programs by water agencies. Active conservation is unlikely to occur without agency action.
- Code-Based Conservation – Water saved as a result of changes in water efficiency requirements for plumbing fixtures in plumbing codes. Sometimes referred to as "passive conservation," this form of conservation would occur as a matter of course without any additional action from water agencies.
- Price-Effect Conservation – Water saved by retail customers attributable to the effect of changes in the real (inflation-adjusted) price of water. Because water has a positive price elasticity of demand, increases in water price will decrease the quantity of water demanded.

Metropolitan's Conservation Estimate

In September 19, 2014, Governor Brown signed SB 1420 (Wolk, D-Davis), which added Section 10631(e)(4) to the Water Code. This Section provided that "water use projections may display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans" if that information is available and applicable to an urban water supplier. SB 606 (Hertzberg) amended Water Code Section 10631(e)(4), which is now Section 10631(d)(4) and applies only to retailers. This Section now requires that water use projections, where available, must "display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area."

Metropolitan's conservation estimate is a comprehensive representation of Metropolitan's active conservation activities. It includes a combination of: (1) fixture/program-related savings, and (2) an estimate of code-based plumbing code conservation savings from a 1990 base year. In addition, price-effect savings are calculated using Metropolitan's MWD-EDM, a statistical model used to forecast retail water demands. Potential savings from public outreach and education programs are not included in Metropolitan's conservation estimate.

Distinguishing between active, code-based, and price-effect conservation can be complex when, for example, active programs for fixtures are implemented concurrently with conservation-related plumbing codes. Metropolitan's conservation estimate combines active, code-based, and price-effect conservation savings using methods that avoid double counting. Currently, 96 devices and programs are accounted for in estimating active conservation. These devices are spread across residential, landscape, commercial, industrial, and institutional sectors. There are eight fixtures tied to Code-based conservation estimate.

Metropolitan's conservation estimate is developed in cooperation with its 26 member agencies and falls into three general categories:

- Single-family residential (SFR),
- Multi-family residential (MFR), and
- Commercial, industrial, and institutional (CII).

Active Conservation

Estimated savings for active conservation account for programs administered by Metropolitan and its member agencies since 1990. These savings are calculated by combining counts of active program activity – numbers of devices and/or program implementations – with device-related water savings factors. These factors include:

- Savings per device/implementation
- Device life expressed in years
- Decay rate expressed as percent decay per year

Device savings estimates reflect the key assumptions outlined above. Devices may be represented more than once due to different implementation methods or savings factors. Assumptions are periodically reviewed to ensure they represent the best available savings estimates. Device-specific savings are adjusted to account for performance decay rates, or device life, but not both. For example, a residential premium high-efficiency toilet (PHET) saves about 9.4 gallons per day when replacing a 1.6 gallons per flush toilet. Lifetime savings would assume a physical life of 20 years and no performance decay.

Code-Based Conservation

Code-Based conservation accounts for water saved as a result of changes in water efficiency requirements for plumbing fixtures in plumbing codes. Plumbing code conservation is the impact of plumbing codes and other ordinances on water demand. Metropolitan's Code-Based conservation estimate represents plumbing code conservation with demographically-driven stock models. The stock models are device- or fixture- specific and are based on the same demographic data used in Metropolitan's retail demand projection. Each stock model considers the stocks and flows of conserving and non-conserving water devices, providing estimates of the impacts of plumbing codes on device saturation and overall savings.

Metropolitan's Code-based conservation estimate accounts for the following:

- New Construction: Water fixtures installed due to new construction are assumed to be in compliance with the plumbing codes in effect when the new construction occurs. For instance, a house built in 1997 would meet the efficiency standards set by California's 1992 plumbing code. Therefore, new construction is assumed to result in measurable savings from 1990, which is the baseline for conservation savings calculations. Estimates and projections of the number of fixtures added through new housing units and offices are based on growth in housing units or employment.
- Natural Replacement: Natural replacement accounts for the savings that accrue when fixtures are replaced with more efficient models due to remodeling, failure, or for other reasons. Metropolitan's savings estimate represents this effect with a "natural replacement rate" that is expressed as a percentage of existing fixtures that are replaced in a given year. Natural replacement rates vary by device and are linked to the expected life of the device. Devices with short lifespans will be replaced more frequently and thus have higher natural replacement rates. A simple percentage is used to account for this natural turn-over in non-conserving fixtures because it is difficult to back-calculate the age of the fixtures in pre-1990 construction.
- Fixtures Up for Renewal: As water-conserving fixtures reach their useful lives and become defective or inefficient, they may be replaced with water conserving fixtures due to plumbing codes. The water savings from the device is then considered "renewed" savings, which is tracked in Metropolitan's savings estimate. For example, a fixture that was installed through an active conservation program provides water savings that otherwise would not have been realized without plumbing codes. However, subsequent adoption of efficient plumbing codes means that when the fixture reaches the end of its life, it will be replaced by the same or more water-efficient model.

Stock Models

The number of efficient fixtures for each stock model is the sum of fixtures from active programs, new construction, natural replacement, and fixtures up for renewal. Table A.6-1 below shows the fixtures and devices that are assigned stock models based on existing plumbing codes.

Table A.6-1
Stock Models

Residential	CII
Toilets	Toilets
Showerheads	Urinals
Faucet Aerators	Pre-Rinse Spray Heads
Washing Machines	Washing Machines

The Stock Models generate separate annual estimates of devices and fixtures for tracking active conservation savings, while also accounting for the impacts of active programs on the overall device saturation rate. As a result, increased levels of active conservation lead to lower levels of plumbing code conservation. This helps avoid double counting in Metropolitan's conservation savings estimate.

Plumbing Code Assumptions

Plumbing code savings are determined by the device-specific assumptions used in the stock models, presented in Table A.6-2. The stock models are driven by projections of housing and employment consistent with the demand projections. Initial device counts and growth in the number of devices are determined by the combination of demographic information and the following assumptions:

- Devices per Household or Per Employee: This factor represents the average number of devices per household or per employee and is multiplied by the demographic projections to develop estimates of total number of devices or "stock." Devices per household and employee can vary by agency and change over time.
- Plumbing Code Compliance Rate: The plumbing code compliance rate is expressed as a percent and serves two purposes: (1) it indicates the presence of a plumbing code in a specific year, and (2) it determines the overall compliance rate with the plumbing code. This allows plumbing code effects to be phased in over several years.
- Natural Replacement Rate: This represents the rate at which existing non-conserving devices are converted to conserving devices due to remodeling or device failure. It has a strong impact on the saturation rate of devices that existed prior to plumbing codes, such as pre-1992 toilets.
- Device Life: The stock models also account for device life for water-efficient devices installed after 1990. This allows the stock model to track devices installed through active conservation as they reach the end of their life and are replaced due to plumbing codes. The stock models use the same device life specified in the savings assumptions.

Table A.6-2
Plumbing Code Assumptions

Stock Model	Device per Household/ Employee	Compliance Rate	Natural Replacement Rate	Plumbing Code Year
Res. Toilets	2	99%	2%	1994/2014
Res. Shower Heads	1.8	95%	10%	1994
Res. Aerators	3.5	90%	33%	1994
Res. Washing Machine	0.74	100%	6.7%	2018
CII Toilets	0.27*	100%	2%	1994/2014
CII Urinals	0.06	100%	4%	1994
CII Pre-Rinse Spray Heads	0.0055*	95%	16.7%	2006
CII Washing Machine	0.0073*	100%	5%	2007

* Varies over time and by agency (based on CUWCC BMPs savings factors)

These assumptions are derived from California Urban Water Conservation Council (CUWCC) conservation reports, American Water Works Association Research Foundation's 1999 end use study, Metropolitan's Orange County Saturation Study, and other sources. In the residential sector, devices per household combine single family and multifamily trends.

Model Water Efficient Landscape Ordinance

The California Water Commission adopted an updated Model Water Efficient Landscape Ordinance (MWELO) on July 15, 2015. The MWELO promotes efficient landscapes in new developments and retrofitted landscapes. The MWELO increases water efficiency standards for new and retrofitted landscapes through more efficient irrigation systems, greywater usage, onsite storm water capture, and by limiting the portion of landscapes that can be covered in turf. Local agencies had until December 1, 2015 to adopt the MWELO or to adopt a Local Ordinance which must be at least as effective in conserving water as MWELO. Local agencies working together to develop a Regional Ordinance had until February 1, 2016 to adopt, but they are still subject to the December 2015 reporting requirements. Local agencies were required to report on the implementation and enforcement of local ordinances by December 31, 2015.

Metropolitan's modeling of Code-based conservation includes a calculation of savings that would result from 50 percent of new households having efficient outdoor water use consistent with MWELO. The 50 percent compliance rate for new households is a conservative estimate based on an assessment of the efficacy of the current MWELO ordinance.

Price Savings Assumptions

Price-effect savings are calculated by comparing MWD-EDM demand projections with price increases to demand projections with constant 1990 water rates. The difference is the price-effect savings measured from a 1990 base. Price-effect savings increase as prices rise over time; they also increase as the household and employment base grow. A price increase applied to 1,000 households will generate more water savings than the same price increase applied to 500 households.

Un-metered Water Use Savings

A final category of savings tracked by Metropolitan is a product of other conservation efforts. MWD-EDM projects un-metered water use as a fixed percentage of total retail M&I demand. As conservation savings lowers residential and CII demands, it lowers un-metered use by the same percent. For instance, if conservation reduces M&I demands by 10 percent in 2020 (compared to demands before conservation), un-metered water use is also reduced 10 percent. This reduction is based on the assumption that un-metered use varies according to overall demand and that reducing overall use also reduces un-metered use. The reduction in un-metered water use is captured in the MWD-EDM model and included as a conservation source.

The total conservation savings are shown in Table A.6-3.

Table A. 6-3 Conservation Savings (acre-feet)

	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Active Savings	0	26,000	59,000	94,000	133,000	152,000	144,000	93,000	55,000	35,000	25,000	17,000	0
Code-Based Savings	0	83,000	177,000	244,000	291,000	370,000	472,000	560,000	623,000	665,000	701,000	731,000	757,000
Price Savings	0	31,000	62,000	94,000	125,000	156,000	187,000	205,000	229,000	258,000	293,000	333,000	379,000
Un-metered Water Savings	0	9,000	18,000	26,000	35,000	44,000	52,000	53,000	54,000	55,000	56,000	57,000	58,000
Pre-1990 Savings	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Total	**250,000**	**399,000**	**566,000**	**708,000**	**834,000**	**972,000**	**1,105,000**	**1,161,000**	**1,211,000**	**1,263,000**	**1,325,000**	**1,388,000**	**1,444,000**

Note: Metropolitan's conservation savings projection includes savings from Metropolitan's Conservation Credits Program, code-based conservation, price effect conservation, and pre-1990 device retrofits. The projection does not include savings from the implementation of future active conservation programs.

Appendix 7

DISTRIBUTION SYSTEM WATER LOSSES

Appendix 7
DISTRIBUTION SYSTEM WATER LOSSES

California Water Code Section 10631(d)(3) requires urban retail suppliers to quantify distribution system water loss for each of the five years preceding the plan update, based on water system balance methodology developed by the American Water Works Association (AWWA). For the 2020 UWMP, Metropolitan is voluntarily reporting its distribution system water loss. Metropolitan followed the AWWA Water Audit methodology to track all sources of treated water and uses of treated water within its system. The AWWA Water Audit methodology quantifies real and apparent water system losses in an agency's distribution system.

For its voluntary reporting of distribution system water losses, Metropolitan included its water balance audit for calendar years 2015 through 2019. The results of Metropolitan's audit showed that the average water losses for its treated distribution system over the last five years from 2015 to 2019 is approximately 7.8 TAF. The water loss estimates are presented in Tables A.7-1 through A.7-5.

In addition to the distribution system losses described in the AWWA tables, Metropolitan estimates that 41.6 TAF was lost from reservoir evaporation occurring in Lake Mathews, Lake Skinner, and Diamond Valley Lake during calendar year 2019.

Table A.7-1
Metropolitan's Distribution System Water Loss (AF)
Calendar Year 2015

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for: Metropolitan Water District of Southern California
Reporting Year: 2015 | 1/2015 - 12/2015
Data Validity Score: 95

Own Sources (Adjusted for known errors) 791,352.381	System Input 791,352.381	Water Exported 0.000			Billed Water Exported	Revenue Water 0.000
		Water Supplied 791,352.381	Authorized Consumption 781,504.700	Billed Authorized Consumption 780,724.000	Billed Metered Consumption (water exported is removed) 780,724.000	Revenue Water 780,724.000
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 780.700	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 10,628.381
					Unbilled Unmetered Consumption 780.700	
			Water Losses 9,847.681	Apparent Losses 2,001.800	Unauthorized Consumption 0.000	
					Customer Metering Inaccuracies 1,951.800	
					Systematic Data Handling Errors 50.000	
Water Imported 0.000				Real Losses 7,845.881	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

Table A.7-2
Metropolitan's Distribution System Water Loss (AF)
Calendar Year 2016

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for: Metropolitan Water District of Southern California

Reporting Year: 2016 | 1/2016 - 12/2016

Data Validity Score: 95

Own Sources (Adjusted for known errors) 754,436.090	System Input 754,436.090	Water Exported 0.000			Billed Water Exported	Revenue Water 0.000
		Water Supplied 754,436.090	Authorized Consumption 746,636.500	Billed Authorized Consumption 745,890.600	Billed Metered Consumption (water exported is removed) 745,890.600	Revenue Water 745,890.600
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 745.900	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 8,545.490
					Unbilled Unmetered Consumption 745.900	
			Water Losses 7,799.590	Apparent Losses 1,914.700	Unauthorized Consumption 0.000	
					Customer Metering Inaccuracies 1,864.700	
					Systematic Data Handling Errors 50.000	
Water Imported 0.000				Real Losses 5,884.890	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

Table A.7-3
Metropolitan's Distribution System Water Loss (AF)
Calendar Year 2017

AWWA Free Water Audit Software: Water Balance

WAS v5.0
American Water Works Association.
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Water Audit Report for:	Metropolitan Water District of Southern California
Reporting Year:	2017 · 1/2017 - 12/2017
Data Validity Score:	95

Own Sources (Adjusted for known errors) 850,417.043	System Input 850,417.043	Water Exported 0.000			Billed Water Exported	Revenue Water 0.000
		Water Supplied 850,417.043	Authorized Consumption 843,331.300	Billed Authorized Consumption 842,488.800	Billed Metered Consumption (water exported is removed) 842,488.800	Revenue Water 842,488.800
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 842.500	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 7,928.243
					Unbilled Unmetered Consumption 842.500	
			Water Losses 7,085.743	Apparent Losses 2,156.200	Unauthorized Consumption 0.000	
					Customer Metering Inaccuracies 2,106.200	
					Systematic Data Handling Errors 50.000	
Water Imported 0.000				Real Losses 4,929.543	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

Table A.7-4
Metropolitan's Distribution System Water Loss (AF)
Calendar Year 2018

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for: Metropolitan Water District of Southern California
Reporting Year: 2018 | 1/2018 - 12/2018
Data Validity Score: 95

Own Sources (Adjusted for known errors) 770,999.499	System Input 770,999.499	Water Exported 0.000			Billed Water Exported	Revenue Water 0.000
		Water Supplied 770,999.499	Authorized Consumption 766,774.500	Billed Authorized Consumption 766,008.500	Billed Metered Consumption (water exported is removed) 766,008.500	Revenue Water 766,008.500
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 766.000	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 4,990.999
					Unbilled Unmetered Consumption 766.000	
			Water Losses 4,224.999	Apparent Losses 1,965.000	Unauthorized Consumption 0.000	
					Customer Metering Inaccuracies 1,915.000	
					Systematic Data Handling Errors 50.000	
Water Imported 0.000				Real Losses 2,259.999	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

Table A.7-5
Metropolitan's Distribution System Water Loss (AF)
Calendar Year 2019

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for: Metropolitan Water District of Southern California
Reporting Year: 2019 | 1/2019 - 12/2019
Data Validity Score: 95

Own Sources (Adjusted for known errors) 706,766.917	System Input 706,766.917	Water Exported 0.000			Billed Water Exported	Revenue Water 0.000
		Water Supplied 706,766.917	Authorized Consumption 700,559.700	Billed Authorized Consumption 699,859.800	Billed Metered Consumption (water exported is removed) 699,859.800	Revenue Water 699,859.800
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 699.900	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 6,907.117
					Unbilled Unmetered Consumption 699.900	
			Water Losses 6,207.217	Apparent Losses 1,799.600	Unauthorized Consumption 0.000	
					Customer Metering Inaccuracies 1,749.600	
					Systematic Data Handling Errors 50.000	
Water Imported 0.000				Real Losses 4,407.617	Leakage on Transmission and/or Distribution Mains *Not broken down*	
					Leakage and Overflows at Utility's Storage Tanks *Not broken down*	
					Leakage on Service Connections *Not broken down*	

Appendix 8

METROPOLITAN's EMERGENCY STORAGE OBJECTIVE

Appendix 8
METROPOLITAN'S EMERGENCY STORAGE OBJECTIVE

Metropolitan established its original criteria for determining emergency storage requirements in the October 1991 Final Environmental Impact Report for the Eastside Reservoir, which is now named Diamond Valley Lake. Emergency storage requirements are based on the potential of a major earthquake that would damage all supply aqueducts isolating Southern California from its imported water sources. The emergency storage criteria developed within the Eastside Reservoir EIR were again discussed in the 1996 Integrated Water Resources Plan. Metropolitan's Board approved both of these documents.

In 2019, Metropolitan and its member agencies completed a process to update the emergency criteria and methodology for determining the regional planning estimate of emergency storage under Metropolitan's Emergency Storage Objective. This planning estimate of emergency storage represents the amount of water that Metropolitan would store for the region to prepare for a catastrophic earthquake that would damage the aqueducts that transport imported water supplies to Southern California, including: the Colorado River Aqueduct, both the East and West branches of the California Aqueduct, and the Los Angeles Aqueduct. These emergency supplies, stored in Metropolitan and DWR existing surface reservoirs within the region, will allow Metropolitan to deliver reserve supplies to the member agencies to supplement their local production during a catastrophic earthquake or other disaster. This helps avoid severe water shortages during periods when the imported water aqueducts may be out of service.

The Emergency Storage Objective considers a six- and twelve-month outage period for the imported supply aqueducts, based on latest seismic information and estimates of repair duration for the different aqueducts. It also accounts for the operational flexibility of Metropolitan's distribution system, a retail water demand cutback ranging from 25 to 35 percent considering the level of conservation that the region achieved during the recent drought, and an aggregated loss of 10 to 20 percent of local supplies accounting for factors that could affect local production during emergency conditions.

Under this update, Metropolitan's Emergency Storage Objective was set to 750,000 acre-feet, as this level of storage would prevent severe water shortages to the region given new information on expected recovery durations. While the emergency storage would allow Metropolitan to deliver reserve supplies to the member agencies to meet their water needs during a catastrophic event, it is not intended to set a basis or a policy for allocating or apportioning storage for any individual member agency.

Included in this appendix is a copy of the Board Information Letter to Metropolitan's Water Planning and Stewardship Committee dated May 14, 2019. This Board Information Letter and the attached draft white paper review the history, policy, and criteria for evaluating a regional planning estimate for emergency storage and describe the more than year-long coordination process between Metropolitan and its member agencies in developing the region's estimate for Emergency Storage Objective.

- **Board of Directors**
  Water Planning and Stewardship Committee

5/14/2019 Board Meeting

9-3

Subject

Update of Metropolitan's Emergency Storage Objective

Executive Summary

In February 2018, The Metropolitan Water District of Southern California (Metropolitan) and its member agencies embarked on a process to evaluate regional storage including how the storage programs performed during this post decade of drought and revisiting the size and management of Metropolitan's emergency storage reserve. This process aims to maximize the potential for optimizing performance and operations of Metropolitan's storage programs. As part of the process, a Workgroup comprised of Metropolitan staff and representatives from member agencies evaluated Metropolitan's emergency storage objective.

Metropolitan, in coordination with the Workgroup, completed the attached draft White Paper on emergency storage, which summarizes the progress to date in estimating a planning objective for the region's emergency storage.

Details

The White Paper reviews the history, policy, and criteria for evaluating a regional planning estimate for emergency storage. This evaluation prepares for major earthquake or other damage to the aqueducts that import water to Southern California. The emergency storage would allow Metropolitan to deliver reserve supplies to the member agencies to supplement local production. This would help avoid severe water shortages while one or more of the imported water aqueducts may be out of service.

The White Paper also describes the mechanisms the Workgroup employed, including: (1) updated emergency criteria, and (2) a revised methodology to evaluate emergency storage.

Updating emergency criteria involved revising the outage durations based on the latest seismic information, and revisiting retail water demands and locally available supplies within the service area. It also accounted for the member agencies' unique situations in identifying practicable ranges of reduction of retail water demands through conservation and production levels of local water supplies during an imported supply emergency outage.

The proposed emergency storage volume considers various combinations of criteria to determine an envelope of acceptable scenarios designed to prevent severe shortages during the outage. Under this approach, the Workgroup focused on a range of values from 520,000 to 830,000 acre-feet (AF). With input from the Workgroup, staff recommends increasing the emergency storage objective to 750,000 AF. This recommended volume would be distributed amongst the available capacities of in-region Department of Water Resources and Metropolitan surface reservoirs.

The recommended emergency storage volume of 750,000 AF is an increase from the current planning target of 630,000 AF. A longer outage period based on damage restoration analysis and a consideration of lower local supply production attributed to this recommended increase in emergency storage.

The emergency storage volume presented in the White Paper represents a planning estimate for the amount of water that Metropolitan would store for the region in preparation for a catastrophic earthquake or other disaster. It is not intended to set a basis or a policy for allocating or apportioning storage for any individual member agency. Staff will review and incorporate additional Board and Workgroup feedback in finalizing the White Paper. Staff will transmit the final White Paper to the Board and the member agencies.

Staff proposes to revisit the emergency storage periodically, and incorporate the analysis into the Integrated Water Resources Plan update process. In addition, a detailed review of the spatial distribution of storage and operation of the distribution system will be part of Metropolitan's continued efforts to evaluate the storage portfolio. This next phase of evaluating Metropolitan's regional storage portfolio is expected to be completed by spring of 2020.

Policy

By Minute Item 50358, dated January 12, 2016, the Board adopted the 2015 Integrated Water Resources Plan Update, as set forth in Agenda Item 8-3 board letter.

By Minute Item 50473, dated May 10, 2016, the Board adopted the 2015 Urban Water Management Plan, as set forth in Agenda Item 8-6 board letter.

Fiscal Impact

None

Bradley M. Coffey 5/1/2019

Brad Coffey *Date*

Manager, Water Resource Management

[signature] 5/1/2019

Jeffrey Kightlinger *Date*

General Manager

Attachment 1 – Draft White Paper on Metropolitan's Emergency Storage Objective (May 2019)

Ref# wrm12661707

2018 Evaluation of Regional Storage Portfolio
DRAFT Evaluation of Metropolitan's Emergency Storage Objective

SUMMARY

In February 2018, the Metropolitan Water District of Southern California (Metropolitan) and its member agencies embarked on a process for the Evaluation of Regional Storage Portfolio (ERSP) to maximize potential for performance and operations of Metropolitan's storage programs. As part of the ERSP process, a Workgroup comprised of Metropolitan staff and representatives from member agencies evaluated Metropolitan's Emergency Storage Objective (Emergency Storage).

This White Paper provides a summary of the history, policy, and criteria for evaluating a regional planning estimate for the Emergency Storage. This evaluation assumes major earthquake damage to the aqueducts that transport imported water supplies to Southern California. The Emergency Storage allows Metropolitan to deliver reserve supplies to the member agencies to supplement local production. This helps avoid severe water shortages during periods when the imported water aqueducts may be out of service.

This White Paper describes: (1) updating the emergency criteria, and (2) revising the methodology for calculating the Emergency Storage.

In the review and update of emergency criteria, the Workgroup considered the 2015 Integrated Water Resources Plan (IRP) and centered on the following:

- A retail water demand cutback of 25 to 35 percent appears reasonable, based on the level of conservation that the region achieved during the recent drought; and
- A six-and 12-month aggregated loss of 10 to 20 percent of local production reported in the IRP seems reasonable. This allows a contingency for some damage to local facilities and accommodates variable durations of local repairs.

The Workgroup discussion also led to a new concept of an "envelope of solutions" to estimate an appropriate Emergency Storage for the region. The envelope concept shifts from a single equation and volume for determining emergency storage. Instead, it considers various combinations of criteria to determine a range of acceptable scenarios for Emergency Storage. The prior methodology assumed a single region-wide scenario of conservation and local production loss. This envelope concept underscores member agencies' unique situations while taking into account their inputs in identifying practicable ranges of decreases in retail water demands and local production. The Workgroup focused on an acceptable range of Emergency Storage values from 520,000 to 830,000 acre-feet (AF).

Based on input from the process, staff recommends the following:

- The Emergency Storage Objective should increase from 630,000 AF to 750,000 AF. This level of storage would prevent severe water shortages to the region given new information on expected recovery durations.
- Metropolitan should revisit the Emergency Storage Objective periodically, possibly following the completion of any new IRP with the latest information on damage scenarios, local supplies, imported water demand, and attainable conservation.

DETAILED REPORT

Background

Metropolitan's need for Emergency Storage is based on the potential for major earthquake damage to the Colorado River Aqueduct, California Aqueduct, and Los Angeles Aqueduct. Metropolitan coordinates with the member agencies in setting the emergency criteria, which forms the basis for establishing the Emergency Storage. These criteria assume that damage from such a catastrophic event could render the aqueducts that transport imported water supplies to Southern California out of service, isolating the region from its imported water supplies. Metropolitan's objective is to provide regional emergency storage that could allow Metropolitan to deliver supplies to all its member agencies during this period of outage. The Emergency Storage allows Metropolitan to continue deliveries to its member agencies to supplement local water production and release from local storage. This helps avoid severe water shortages during periods when aqueducts are out of service. In addition to Emergency Storage, Metropolitan may draw from dry-year storage during an emergency, if necessary and available.

Metropolitan's emergency planning criteria were previously established and reported in the following documents:

1. Final Environmental Impact Report for the Eastside Reservoir (now named the Diamond Valley Lake) dated October 1991, which was adopted by the Board on September 24, 1991;
2. Southern California's 1996 Integrated Water Resources Plan, which was adopted by the Board on January 9, 1996;
3. Reports on Metropolitan Water Supplies dated February 2002 and March 2003;
4. 2006 IRP Implementation Report, which was presented to the Board on September 11, 2006 and transmitted on October 9, 2006;
5. Metropolitan's Emergency Storage Requirement, a written report presented to the Board on May 11, 2010; and
6. The 2015 Urban Water Management Plan dated June 2016, which was adopted by the Board on May 10, 2016.

Metropolitan's Current Emergency Criteria

Metropolitan's current emergency criteria provide for a six-month water supply at 75 percent of member agencies' retail demand under normal hydrologic conditions. Metropolitan's emergency plan outlines that under catastrophic loss of water supply the following actions will be implemented, which serve as the criteria for determining Metropolitan's Emergency Storage:

1. any existing interruptible water deliveries would be suspended;
2. firm supplies to member agencies would be restricted by a mandatory cutback of 25 percent from normal year retail demand levels;
3. water stored in the surface reservoirs and groundwater basins under Metropolitan's interruptible program would be made available;
4. full local groundwater production, recycled water, and local surface emergency storage reserve production would be sustained; and
5. Metropolitan would draw on its emergency storage as well as other available storage.

These emergency planning criteria were the basis for the current Metropolitan's Emergency Storage planning level of 630, 000 AF.

Review and Update of Metropolitan's Emergency Criteria

The following sections detail the updated assumptions and changed conditions since the last evaluation of Emergency Storage in 2010. These include demand and supply forecasts developed for the 2015 IRP, updated studies on the potential for seismic damage and outage periods for the imported supply aqueducts, and flexibility improvements within Metropolitan's distribution system implemented as a result of recent drought and supply challenges. This new information is critical to the review and update of the emergency criteria, which forms the basis for revising the Emergency Storage.

Outage Period Criteria

The outage period pertains to the amount of time the regional aqueducts that deliver imported water to Southern California may be out of service. This outage period is derived from the estimated restoration timelines based on the nature of potential damage to the aqueduct coupled with the operational ability to deliver supplies to the area served by that specific aqueduct. During an emergency outage period, Metropolitan's member agencies will depend on previously stored imported and local supplies to supplement continued local production in meeting reduced levels of retail demands. It is acknowledged that some areas could be more impacted because they are primarily or exclusively fed by an imported aqueduct which is assumed to sustain damage. However, Metropolitan's objective is to continue building and operating its system with flexibility to respond to various potential damage scenarios.

Recent Seismic Studies

In August 2015, Metropolitan, Los Angeles Department of Water and Power (LADWP), and California Department of Water Resources (DWR) formed the Seismic Resilience Water Supply Task Force (Task Force) for the purpose of collaborating on studies and mitigation measures to improve the reliability of imported water supplies to Southern California. The specific goals of the Task Force included:

- Revisiting historical assumptions regarding potential aqueduct outages;
- Establishing a common understanding about individual agency aqueduct vulnerability assessments, projected damage scenarios, and planning assumptions; and
- Discussing ideas for improving the resilience of Southern California's imported water supplies through multi-agency cooperation.

Through exchange of information and ideas between the three agencies and experts from the industry and academia, the Task Force assessed potential aqueduct damage and restoration timeline for a M 7.8 earthquake on the San Andreas Fault. This scenario assumes severe damage to the Colorado River Aqueduct (CRA), the California Aqueduct, and the Los Angeles Aqueduct (LAA). A complete description of probable seismic damages and repair durations is presented in Metropolitan's *"Seismic Resilience Water Supply Task Force Report No. 1536"* dated June 2017 (http://www.mwdh2o.com/PDF_About_Your_Water/Report1536_Final.pdf).

Table 1 presents a summary of the estimated outage duration under the earthquake scenario based on the nature of damage for each of the aqueducts.

Table 1
Estimated Outage Duration for Imported Supply Aqueducts (M 7.8 earthquake)

Aqueduct	Estimated Outage Duration
Colorado River Aqueduct	2 to 6 months (recovery of 80% CRA capacity) 3 to 5 years (recovery of 100% CRA capacity)
California Aqueduct: East Branch	12 to 24 months
California Aqueduct: West Branch	6 to 12 months
Los Angeles Aqueduct	18 months

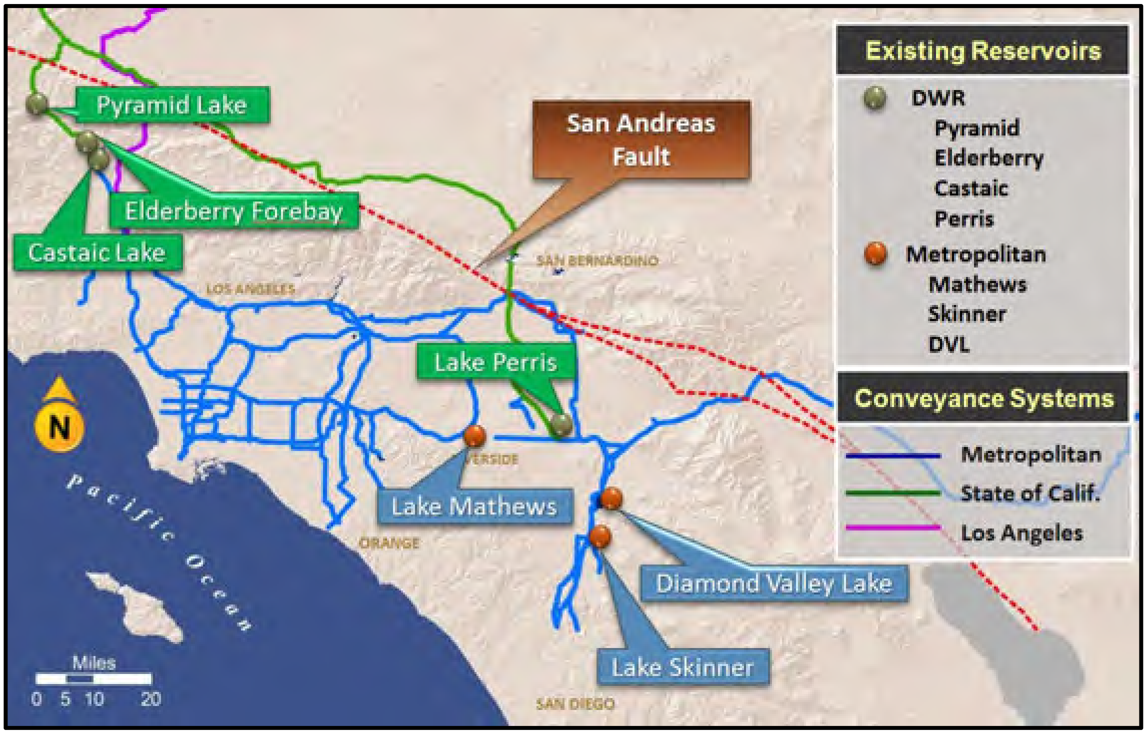
Operational Flexibility

Metropolitan's integrated system provides operational flexibility. The flexibility in Metropolitan's distribution system was demonstrated during the unprecedented drought of 2014-2016. Facing consecutive years of low SWP supplies, Metropolitan pushed CRA and Diamond Valley Lake (DVL) supplies to areas that Metropolitan normally serves only with SWP supplies or at higher blend of SWP. Figure 1 illustrates Metropolitan's operations during that period of extraordinary drought when SWP supplies were at a historic low. Metropolitan can utilize much of the same operational flexibility in its distribution system to facilitate movement of stored supplies during a prolonged outage. This flexibility combined with retail demand reduction through additional conservation and local production at appropriate levels will allow the region to meet its demands in most areas during emergency outages. Although it is not possible for Metropolitan to predict the specific damage to the system in an event of a catastrophic emergency, it seeks to ensure the most flexibility possible throughout the system to respond to different damage scenarios.

Figure 1
Metropolitan Operations during Extraordinary Drought Actions (2014-16)

During an emergency outage, previously stored imported supplies will be withdrawn to meet the region's supplemental water needs. Emergency Storage is used first and dry-year storage is then used, if necessary and available. Figure 2 shows the locations of existing DWR and Metropolitan surface reservoirs in various parts of the region.

Figure 2
Existing DWR and Metropolitan Surface Reservoirs
South of the San Andreas Fault



Metropolitan can draw from emergency supplies stored in Castaic Lake, Elderberry Forebay, and Pyramid Lake during an outage to serve the western areas that previously received SWP water. A limited quantity of CRA supplies could also be available to these areas when 80 percent of the CRA capacity is restored within six months to supplement emergency water needs in this area. Metropolitan can also supply up to 50 cfs of water from Greg Avenue Pump Station to the far western portion of its service area while repairs to the three aqueducts are being completed. This operational flexibility is also useful in the event that stored water was not adequate within the Castaic/Pyramid system.

Metropolitan can draw from emergency supplies stored in DVL, Lake Skinner, Lake Mathews, and Perris Lake during an outage to serve the eastern areas that previously received CRA and SWP water. When the CRA is restored to 80 percent of capacity within six months, it could provide up to 960,000 acre-feet per year (AFY) of imported water to the region. This volume is more than the 15-year historic average (2003 to 2017) CRA delivery of approximately 885,000 AFY and more than the 2015 IRP CRA delivery target of 900,000 AFY for a normal year. During outages, portions of the eastern area are expected to continue to receive treated CRA and/or stored emergency supplies through Weymouth. Some areas that normally receive SWP water from the East Branch may be served by delivering DVL water to Mills through the Inland Feeder/Lakeview Pipeline intertie. Metropolitan recognizes that there are currently no options to supply the Rialto Pipeline from emergency storage reservoirs during an outage of the East Branch of the California Aqueduct. However, water stored in Silverwood Lake (which is not included in Metropolitan's Emergency Storage portfolio) could be available to supply the Rialto Area as soon as repairs to damaged penstocks and pipelines downstream of Silverwood Lake are completed. This could likely require less time than repairs to the East Branch north of Silverwood Lake. In addition, other potential options to supply the Rialto region include several conceptual pump back operations and increased groundwater storage and extraction capacity for emergencies.

Metropolitan will continue to deliver treated water from stored emergency supplies during an outage and from imported supplies upon service restoration. Four of Metropolitan's five water treatment plants have redundant power feeds from the power provider. A project is currently underway to also equip the fifth plant with a redundant power feed. All five water treatment plants have backup emergency generators that support all treatment processes with the exception of ozone. Disinfection using chlorine would occur when the plants are reliant on generator power for treatment operations during a loss of utility power. Metropolitan maintains a minimum 30 day supply of chlorine in the region.

Updated Outage Criteria

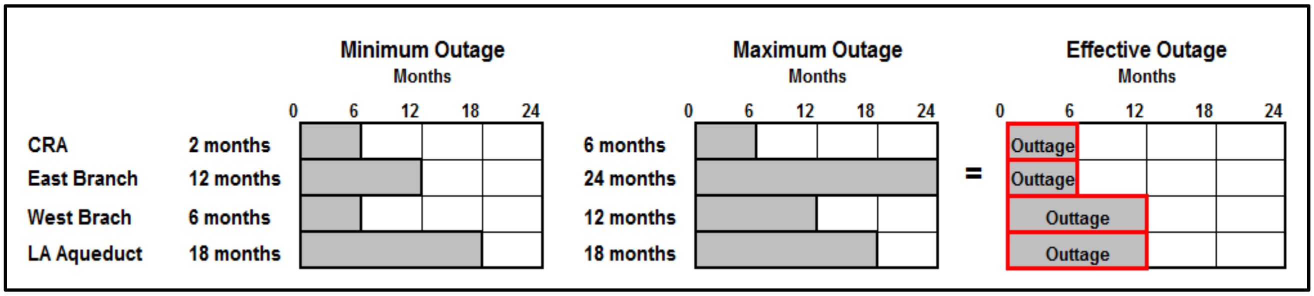
In updating the emergency outage criteria, the Workgroup considered both the duration of aqueduct repair based on the nature of potential seismic damage and recently demonstrated operational flexibilities of Metropolitan's distribution system.

Figure 3 shows the range of outage durations for the CRA, California Aqueduct East and West Branches, and the LAA. The effective outage period is then derived by accounting for the estimated durations of repair for each regional aqueduct coupled with the operational ability to deliver supplies to the area served by that specific aqueduct. In updating the outage period, the Workgroup considered the following operational assumptions:

- The estimated outage duration and repair of LAA under the earthquake scenario is 18 months. However, when the West Branch comes back in service within 12 months, it can supply water to LADWP through LA-35 while the LAA repairs continue.
  - ***Assumed outage period: 12 months for member agencies receiving supplies from West Branch and LAA.***
- The estimated outage duration and repair time of East Branch is 12 to 24 months. However, when 80 percent of the CRA capacity comes back in service within 6 months, CRA supplies would be available to many Metropolitan member agencies that normally receive SWP supplies. Thus, some areas that are normally served with water imported through the East Branch may be served with water imported through the CRA, using delivery of DVL water to Mills and several other options that should be evaluated in the Rialto area discussed above.
  - ***Assumed outage period: 6 months for member agencies receiving supplies from CRA and East Branch (with the exception of Rialto agencies).***

Using these assumptions, the effective new outage criteria presented in Figure 3 calls for storing supplemental supplies for 12 months in the West Branch and LAA areas (supplied by emergency storage in Castaic, Pyramid, and Elderberry) and 6 months in the CRA and East Branch areas (supplied by emergency storage in Perris, Skinner, Mathews, and DVL). In addition to the 12-month stored emergency supplies, West Branch areas could also be served with limited amounts of CRA supplies within 6 months to help meet demands in areas normally served with SWP supplies and higher blend areas. It is not possible to predict the specific damage to the system as a result of a catastrophic event. Therefore, system flexibility is important to ensure all supplies may be moved, if necessary and possible.

Figure 3
Updated Emergency Outage Criteria



Retail Demand Cut Back Criteria

Demand Projection

The first step in calculating the Emergency Storage is to determine the total amount of emergency retail water demand at the member agency level. The Emergency Storage is intended to reflect estimated supplemental water demands on Metropolitan during an emergency outage now updated to a period of 6 or 12 months. Thus, the aggregate of emergency retail demand is used to determine the aggregate supplemental demands on Metropolitan during such emergency, which excludes non-firm deliveries. Those deliveries are assumed to be suspended during an outage, as shown in Table 2.

Calculations of the emergency retail demand are provided for the year 2018 based on forecasts reported in the 2015 IRP. The retail demands in Table 2 were calculated at the member agency level. The numbers shown in this table represent the aggregate total retail demand (M&I and agricultural), replenishment, and seawater barrier demands over the emergency outage period considered. The total retail demands are based on forecasts from the Southern California Association of Government's (SCAG) 2012 Regional Transportation Plan/Sustainable Community Strategy and from the San Diego County Association of Government's (SANDAG) Series 13: 2050 Regional Growth Forecast (October 2013) forecast. The SCAG and SANDAG regional growth forecasts are the core assumptions in the econometric demand modeling for Metropolitan's 2015 IRP.

Table 2
Firm Retail Demands (Average Year)
(Acre-Feet)

	2018 Demands for 6-months and 12-months(1)
Total Retail Demand	2,735,617
Replenishment	(197,103)
Seawater Barrier	(52,000)
Firm Retail Demand	**2,486,514**

Note: (1) Retail demands are assessed for the 6-month outage period for member agencies receiving supplies from CRA and East Branch, and 12-months for member agencies receiving supplies from West Branch and LAA (see Attachment A).

Reduced Retail Demands during Emergency Outage

The next step in calculating the emergency storage demand on Metropolitan is to subtract a percentage reduction, or cutback, in water use from the retail demands. For illustrative purposes, Table 3 below shows the resulting reduction in retail demands during emergency outage after a cutback of 25 percent is imposed on the 2018 average condition retail demands. The retail demands in Table 3 are calculated at the member agency level. The numbers represent the aggregated total over the emergency outage period considered.

The assumption of a 25 percent retail demand cutback is a planning criterion that is consistent with previous Metropolitan studies that showed overall outdoor water use at approximately 30 percent. That cutback criterion is also consistent with the Public Policy Institute of California (PPIC) report *(Building Drought Resilience in California's Cities and Suburbs, June 2017)* based on lessons learned during drought. A higher level of austerity, public awareness, and a likely emergency declaration during an outage may support a higher cut back through additional conservation actions.

Table 3
Retail Level Emergency Demands (Average Year)
(Acre-Feet)

	2018 Demands for 6-months and 12-months[1]
Firm Retail Demand	2,486,514
25% Reduction (Cutback)	(621,629)
100% IAWP Reduction	N/A
Retail Demand during Emergency	**1,864,885**

Note: (1) Retail demands are assessed for the 6-month outage period for member agencies receiving supplies from CRA and East Branch, and 12-months for member agencies receiving supplies from West Branch and LAA (see Attachment A).

Local Production Level Criteria

The next step in calculating the Emergency Storage is to determine the amount of local supplies (local production of in-region supplies and release from local storage) available to meet retail demands at the member agency level. The local production represents the member agencies' highest potential production from the various types of supplies available within their service areas with consideration to each member agency's supply, capacity, and demand limitations. For this evaluation, the year 2018 forecast from the 2015 IRP is initially used to estimate the local production for the 6-month and 12-month emergency outage periods. In addition, Metropolitan also considered the factors that could limit each member agency's local supplies production. These include:

- Supply limitation – Considers all supplies available during an emergency outage (including additional groundwater rights, allowable over pumping in the basin, or similar mechanism if available and needed)
- Capacity limitation – Considers all available local production capacity (including extra well capacities to produce the any additional groundwater supplies if available and needed)
- Demand limitation – Considers the projected demand during the outage period (to determine the needed supplies from local and supplemental sources)

The Unused Local Production represents the aggregated production of individual member agencies above what is needed to meet their demands. In contrast, the Effective Local Production is the aggregated amount of locally available supplies that are produced to meet the reduced retail demands during an emergency outage. The Effective Local Production is derived by subtracting Unused Local Production from the aggregate total local production. For planning purposes in determining the Emergency Storage for the region, the Effective Local Production is calculated with the assumption that locally available supplies will be used only within the producing member agency's service areas and not be used or exported to meet the demands of other agencies. However, in real emergency outages, it is likely that member agencies would implement region-wide and inter-agency coordination for the most efficient operation and use of available supplies.

As part of evaluating the Effective Local Production, Metropolitan also assessed the additional local groundwater that could be theoretically produced and local surface storage that could be reasonably available during an emergency outage. This evaluation revealed that additional groundwater supplies, while theoretically available, could not be produced due to one or a combination of limiting factors. The local surface storage, on the other hand, includes all reasonably available surface water storage that the member agency could produce and use within its service area during extended shortages. The Local Surface Storage in Table 4 includes SDCWA's calculated Emergency Storage Requirement of 20,000 AF (as reported to their Water Planning Committee in July 18, 2018) and a portion of its carryover storage. Under the Carryover Storage Policy Guidelines, included in SDCWA's Water Shortage Contingency Plan Appendix A dated August 2017, SDCWA will maintain a carryover target volume of 70,000 AF and a maximum of 100,000 AF to be utilized over five consecutive dry-years. During an emergency outage, the region will most likely draw supplies from all reasonably available storage to meet demands. This evaluation reasonably assumes that in addition to its emergency storage, one-fifth of SDCWA's 70,000 AF target carryover storage, amounting to 14,000 AF, would be available for a catastrophic emergency outage based on the low likelihood that that all carryover supplies would have been withdrawn over multiple dry-years.

Table 4 shows the aggregate total for each type of locally available supplies over the emergency outage period considered. For illustrative purposes for 2018, Table 4 also presents the local production at 100 percent, 90 percent, and 80 percent. The LAA production is excluded from this calculation because the Emergency Storage assumes the loss of all imported water supplies. The member agency local production data is included as Attachment A.

Table 4
Effective Local Production
(Acre-Feet)

	2018 Local Production for 6-months and 12-months[1]		
	At 100%	At 90%	At 80%
Groundwater	832,000	748,800	665,600
Surface Water	54,935	49,442	43,948
Local Surface Storage[2]	34,000	30,600	27,200
Recycling and GW Recovery	353,797	318,417	283,038
Seawater Desalination	25,319	22,787	20,255
Los Angeles Aqueduct	0	0	0
Other	13,100	11,790	10,480
IRP Targets[3]	18,087	18,087	18,087
Subtotal Local Production	1,331,238	1,199,923	1,068,608
Unused Local Production	(152,021)	(86,449)	(31,056)
Effective Local Production	**1,179,216**	**1,113,474**	**1,037,551**

Note: (1) Local production are assessed for the 6-month outage period for member agencies receiving supplies from CRA and East Branch, and 12-months for member agencies receiving supplies from West Branch and LAA 9 (see Attachment A).
(2) Local Surface Storage is comprised of emergency storage plus reasonably available storage above emergency.
(3) Conservation and locally available supply targets from the 2015 IRP for Year 2018.

Emergency Demands on Metropolitan

The final step in calculating the Emergency Storage is to subtract the Effective Local Production from the retail demands during an emergency outage for each member agency. The resulting difference represents the supplemental water demands on Metropolitan during an outage period This is the Emergency Storage planning level for the region. Table 5 shows the aggregated totals at varying local production levels for 2018. The table below illustrates that the emergency demand on Metropolitan, and in effect the Emergency Storage, increases as Effective Local Production decreases under the 90 percent and 80 percent scenarios.

Table 5
Emergency Demands on Metropolitan
(Acre-Feet)

	Local Production		
	At 100%	**At 90%**	**At 80%**
Retail Demand during Emergency	1,864,885	1,864,885	1,864,885
Effective Local Production	(**1,179,216**)	(**1,113,474**)	(**1,037,551**)
Metropolitan Emergency Demand	**685,666**	**751,411**	**827,334**

Sensitivity Analysis

A sensitivity analysis of retail cutback and loss of local supplies were conducted. To explore the sensitivities of the Emergency Storage from these two criteria, Metropolitan evaluated various percentages of demand cut backs and levels of local production. Table 6 shows the resulting Emergency Storage at various combinations of retail demand cutback and local production levels. This matrix of emergency storage values presents retail demand cut backs of 0 percent, 25 percent, 35 percent, and 50 percent and local production levels of 100 percent, 90 percent, and 80 percent.

Table 6
Range of Potential Emergency Storage Objectives for Year 2018
(Acre-Feet)

Local Production Level	Retail Demand Cutback			
	0%	25%	35%	50%
100%	1,176,600	685,700	513,300	294,000
90%	1,286,600	751,400	570,700	332,300
80%	1,417,900	827,300	636,300	377,300

Envelope Concept for Metropolitan's Emergency Storage Objective

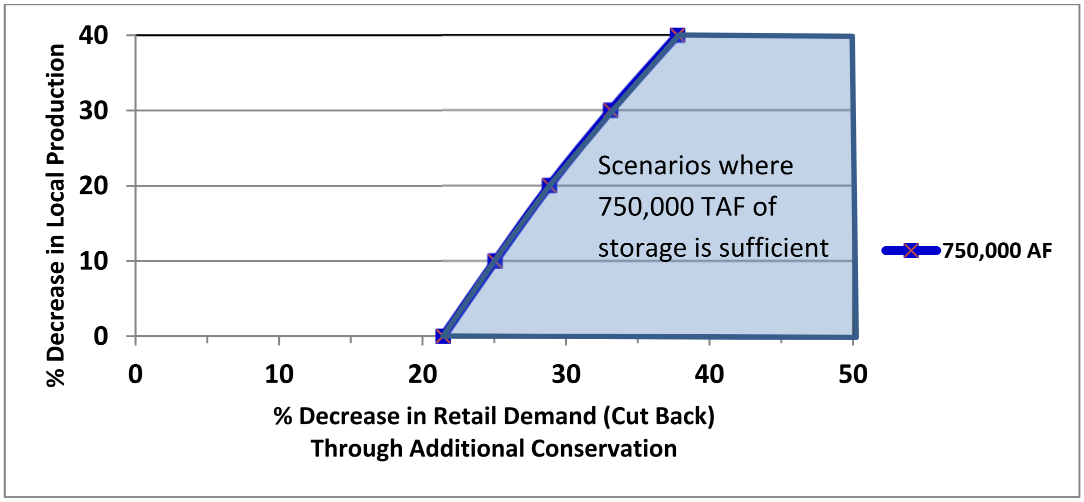
Rather than considering a specific region-wide scenario of conservation and local production loss, the Workgroup discussion led to the development of a range of emergency storage values that could provide reliability during the outage period. The concept of an envelope of solutions emerged, with the idea that an envelope of solutions will yield an appropriate Emergency Storage for the region. The Emergency Storage, in turn, could be achieved through various combinations of (1) retail demand cutback from achievable conservation and (2) local production level taking into account potential damages to local facilities. This envelope concept underscores member agencies' individual and unique situations while taking into account their inputs in identifying practicable ranges of decreases in retail demand and local production.

For the retail demand cut back, most member agencies considered the 25 to 35 percent range to be reasonable. This range is based on the level of conservation that the region was able to achieve during the recent drought. For the local production, several member agencies expected some damage to local facilities during the earthquake. In addition, Metropolitan acknowledges that retail demand cutback may also lead to reduction of non-potable recycled water use. Thus, for local production, the Workgroup focused on a range from 80 percent to 100 percent of the member agencies' reported local production in the 2015 IRP. This would allow contingency planning for uncertainties in damage to local facilities and accommodate different durations of local repairs. This is a modification from the previous assumption of full local production at the IRP level during an outage period.

As indicated in Table 6, a scenario using the criteria of 25 percent retail demand cut back and 100 percent local production level yield an estimated Emergency Storage of 686,000 AF for year 2018. However, the Workgroup focused on an envelope of alternatives for Emergency Storage that could provide reliability during the outage period. The same table matrix of values above highlights the range from 520,000 to 830,000 AF. Within this range, an Emergency Storage of 750,000 AF is recommended. This level of storage would prevent severe water shortages in the region with practicable ranges of reduced demands through conservation and plausible levels of local production during an emergency outage. Figure 4 shows that the

Emergency Storage would be sufficient to cover various combinations of practicable ranges of decreases in retail demand and local production.

Figure 4
Emergency Storage Objective derived from the Envelope Concept



Allocation of Emergency Storage in Regional Reservoirs

Once the Emergency Storage is determined, it can then be allocated to the various surface reservoirs within the region, previously illustrated in Figure 2, south of the San Andreas Fault. The total storage capacity of existing DWR and Metropolitan surface reservoirs and the allocation to emergency storage, seasonal, regulatory, and drought carryover needs are shown in Table 7 through 11. For the DWR reservoirs, the values in the tables reflect the normal maximum operating and dead pool storages indicated in the DWR report *"California State Water Project, Volume III, Storage Facilities, Bulletin 200"* dated November 1974. For this evaluation, recreational waters in DWR reservoirs are assumed to be available for emergency use during outage periods. On a short-term basis for operational purposes, storage at any specific reservoir may be below these planning levels. When this happens, the emergency storage is shifted temporarily to any of the other existing reservoirs.

Department of Water Resources Surface Reservoirs

Table 7 below shows the five major reservoirs owned and operated by DWR in or near Metropolitan's service area. Castaic Lake, Elderberry Forebay, and Pyramid Lake are located on the West Branch of the California Aqueduct. Silverwood Lake and Lake Perris are on the East Branch of the California Aqueduct. The total storage capacity of these five reservoirs is approximately 721,600 AF. When cost allocation factors from DWR Bulletin 132 Appendix B, Table B-2 are applied to the operational storage capacities, Metropolitan's share of storage in the reservoirs is equivalent to 644,400 AF.

Table 7
Allocation of Storage Capacities in DWR Reservoirs
(Acre-Feet)

Reservoir	Total Storage Capacity	Dead Storage	Storage Paid by Others	Storage Paid by Metropolitan
Pyramid Lake	169,900	4,800	7,000	158,100
Castaic Lake	323,700	18,600	12,500	292,600
Elderberry Forebay	28,200	800	1,100	26,300
Silverwood Lake	73,000	4,000	24,300	44,700
Lake Perris	126,800	4,100	0	122,700
Total	**721,600**	**32,300**	**44,900**	**644,400**

Source: California Department of Water Resources (1974). California State Water Project, Volume III, Storage Facilities, Bulletin 200, pages 294, 340, 367, 407, and 408.

From 2005 to 2017, DWR temporarily lowered the maximum storage elevation in Lake Perris because of seismic safety issues. This elevation change resulted in reduction of storage available to Metropolitan in Lake Perris, which was taken into account in past emergency storage evaluations. In 2018, the seismic retrofit of Lake Perris was completed, which restored storage to its full capacity. For purposes of the emergency storage analysis provided herein, it is assumed that 122,700 AF could be available to Metropolitan from Lake Perris. Furthermore, the Monterey Amendment, executed by the DWR and most of the State Water Contractors in 1995 and 1996, addresses the allocation of SWP water in times of shortage and deals with a number of other issues that facilitate more water management flexibility for Contractors.

Table 8 shows the distribution of Metropolitan's emergency storage in DWR reservoirs. Of the total 644,400 AF of storage in DWR Reservoirs that is for Metropolitan use, almost 381,000 AF of this amount is allocated to emergency storage and the remaining 263,600 AF is for seasonal, regulatory, and dry-year storage.

Silverwood Lake capacity does not add to the total Emergency Storage Capacity because of its location outside of major earthquake faults assumed for the emergency storage calculation methodology. However, Silverwood Lake could be available after a seismic event upon restoration of any damaged distribution system components downstream of the lake. It is expected that the portion of the distribution system downstream of the lake could be restored more expeditiously after an event due to its relatively short length, accessibility of the pipelines, and redundancies in the system.

Table 8
Allocation of Emergency Storage in DWR Reservoirs
(Acre-Feet)

Reservoir	Metropolitan Storage Capacity	Seasonal, Regulatory and Dry-Year Storage	Emergency Storage Capacity
Pyramid Lake	158,100	0	158,100
Castaic Lake	292,600	153,900	138,700
Elderberry Forebay	26,300	0	26,300
Silverwood Lake	44,700	44,700	0
Lake Perris	122,700	65,000	57,700
Total	**644,400**	**263,600**	**380,800**

Metropolitan Surface Reservoirs

Table 9 shows the allocation of storage resources in Metropolitan's three major surface reservoirs, Lake Mathews, Lake Skinner, and DVL. These three reservoirs provide approximately 1,036,000 AF of total storage capacity to Metropolitan's service area.

Lake Mathews has available storage of approximately 178,500 AF and distributes CRA water to Riverside, Orange, Los Angeles, and San Bernardino counties. Lake Skinner has approximately 43,800 AF of available storage and receives CRA and SWP water for distribution to Riverside and San Diego counties. DVL is Southern California's largest reservoir with approximately 810,000 AF of total capacity, with 798,500 AF of available capacity to meet demands and provide emergency water supplies.

Table 9
Allocation of Storage Capacities in Metropolitan Reservoirs
(Acre-Feet)

Reservoir	Total Storage Capacity	Dead Storage	Available Capacity
Lake Mathews	182,000	3,500	178,500
Lake Skinner	44,000	200	43,800
Diamond Valley Lake	810,000	11,500	798,500
Total	**1,036,000**	**15,200**	**1,020,800**

Table 10 shows the components of storage, including emergency, seasonal, regulatory, and dry-year storages, for all of Metropolitan's reservoirs. Under the recommended Emergency Storage of 750,000 AF, out of the roughly 1,021,000 AF of available Metropolitan storage capacity, approximately 369,200 AF are reserved for emergency storage, with the remaining storage capacity available for seasonal, regulatory, and dry-year storage.

Table 10
Allocation of Emergency Storage in Metropolitan Reservoirs
(Acre-Feet)

Reservoir	Available Capacity	Emergency Storage Objective at 750 TAF	
		Seasonal, Regulatory and Drought Storage	Emergency Storage
Lake Mathews	178,500	100,000	78,500
Lake Skinner	43,800	10,000	33,800
Diamond Valley Lake	798,500	541,600	256,900
Total	**1,020,800**	**651,600**	**369,200**

Emergency Storage Capacities in DWR and Metropolitan Reservoirs

The Emergency Storage presented in this white paper is evaluated based on regional aggregation of retail demands and locally available supplies within the service area. The resulting Emergency Storage is assumed to be distributed amongst the available capacities within the existing DWR and Metropolitan surface reservoirs. During an outage, Metropolitan delivers supplement water to member agencies from previously stored emergency supplies, and dry-year supplies if necessary and available, based on the most effective operation of the distribution system under emergency conditions.

Table 11 presents the storage of emergency supplies in DWR Reservoirs, Lake Mathews, and Lake Skinner to be fixed quantities, with any remaining need reflected as changes in DVL's emergency storage allocation under the recommended 750,000 AF of Emergency Storage.

Table 11
Allocation of Emergency Storage in Existing Reservoirs(1)
(Acre-Feet)

Reservoir	Emergency Storage Objective at 750 TAF
Pyramid Lake	158,100
Castaic Lake	138,700
Elderberry Forebay	26,300
Lake Perris	57,700
Lake Mathews	78,500
Lake Skinner	33,800
Diamond Valley Lake	256,900
Total	**750,000**

Note: (1) This allocation provides operational guidance but does not create a minimum emergency storage volume in any single reservoir.

Conclusion

This white paper summarizes the progress to date of the Workgroup coordination process to estimate a planning objective for the region's emergency storage, as part of Metropolitan's ERSP. Evaluating the Emergency Storage involves the regional aggregation of retail water demands and locally available supplies within the service area. It also accounts for the member agencies' unique situations in identifying practicable ranges of additional conservation actions that could yield decreases in retail demand and levels of local production that could be accomplished during emergency outage.

Under the new envelope concept, the Workgroup focused on an acceptable range of regional emergency storage values from 520,000 to 830,000 AF. **Based on feedback to date, staff recommends an Emergency Storage of 750,000 AF.** This level of storage would prevent severe water shortages for the region with practicable ranges of water demand reduction achievable conservation actions and plausible levels of local production. This recommended regional emergency storage is assumed to be distributed amongst the available capacities within the existing DWR and Metropolitan surface reservoirs, as shown in Table 11.

The Emergency Storage presented in this white paper is a regional planning objective. It is an estimate for the amount of Metropolitan water that the region targets to store in preparation for a catastrophic earthquake event. This evaluation of Emergency Storage is not intended to set a basis or a policy for allocating or apportioning storage for each individual member agency.

The Workgroup proposes that this storage objective be revisited periodically, possibly following the completion of a new IRP. Metropolitan also considers spatial distribution for the purpose of determining generally where to store its emergency water. However, specific operations during an emergency will depend on the actual conditions at that time. Since member agency demands for supplemental water will be met through deliveries of supplies from storage, evaluation of spatial distribution of storage and most effective operation of the distribution system will be accomplished as part of Metropolitan's continued efforts and coordination within the ERSP's storage portfolio evaluation or other regional planning processes.

Attachment A

2018 Member Agency Total Retail Demand and Local Production
(Source data for Tables 2, 3, and 4)

	Total Retail Demand	Groundwater	Surface Production	Recycling + GW Recovery Reclamation	Other Imports	Seawater Desal	Local Surface Storage	IRP Target	
Agencies at 6 month Outage									
Foothill MWD	9,204	3,970	200	120	0	0	0	67	
Pasadena	16,217	6,000	0	0	0	0	0	118	
San Marino	2,700	2,250	0	0	0	0	0	20	
Three Valleys MWD	63,226	21,650	3,100	4,384	0	0	0	447	
Upper San Gabriel MWD	106,945	74,163	4,500	4,354	0	0	0	625	
Anaheim	34,253	23,932	0	39	0	0	0	249	
Fullerton	14,315	10,376	0	0	0	0	0	104	
MWDOC	310,510	107,945	2,000	93,163	0	0	0	1,651	
Santa Ana	19,074	13,478	0	160	0	0	0	139	
Eastern MWD	126,051	40,400	1,550	25,112	0	0	0	890	
Western MWD	147,318	73,700	2,750	21,295	0	0	0	1,064	
IEUA	143,302	74,800	16,240	28,573	0	0	0	969	
San Diego County Water Authority	315,373	5,900	24,595	19,956	0	25,319	34,000	2,204	
Agencies at 12 month Outage									
Central Basin MWD	296,066	182,300	0	55,972	0	0	0	1,590	
Compton	7,766	6,400	0	0	0	0	0	56	
Long Beach	68,633	28,700	0	10,118	0	0	0	452	
Torrance	28,420	2,700	0	9,150	0	0	0	207	
West Basin MWD	179,750	34,600	0	33,621	0	0	0	1,173	
Santa Monica	13,732	8,200	0	145	0	0	0	100	
Burbank	27,819	300	0	13,985	0	0	0	159	
Glendale	30,319	1,500	0	8,984	0	0	0	221	
Los Angeles	566,486	77,794	0	11,681	0	0	0	4,070	
San Fernando	3,150	3,143	0	0	0	0	0	23	
Calleguas MWD	164,638	27,700	0	7,483	13,100	0	0	1,198	
Beverly Hills	11,938	0	0	700	0	0	0	87	
Las Virgenes MWD	28,413	100	0	4,804	0	0	0	207	
MWD TOTAL	**2,735,617**	**832,000**	**54,935**	**353,797**	**13,100**	**25,319**	**34,000**	**18,087**	**1,331,238**

Note: Member agency local production are approximation for year 2018 based on 2015 IRP and are estimated for the outage periods indicated.
This table shows individual member agency estimates used to develop Metropolitan's Emergency Storage Objective for the region.
For agencies along the Rialto Pipeline, see discussion on pages 5-6 related to system limitations for receiving CRA supplies.
Local surface storage includes all reasonably available surafce storage that the member agency could produce and use within its service area. Includes SDCWA's calculated ESP storage requirement reported to their Water Planning Committee in July 2018 and a portion of their target carryover storage as discussed in page 9.

Appendix 9

SEISMIC RISK ASSESSMENT AND MITIGATION PLAN

Appendix 9
SEISMIC RISK ASSESSMENT AND MITIGATION PLAN

Beginning January 2020, CWC Section 10632.5 mandates UWMPs to include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. For Metropolitan, this required assessment and plan are accomplished as part of developing its resilience strategy and are presented in detail in Metropolitan's seismic resiliency reports attached to this appendix.

Over its nearly 90-year history, Metropolitan has been proactive in mitigating seismic risks posed to its expansive infrastructure, as well as improving its ability to maintain (or quickly restore) water deliveries following a major earthquake. This ability to mitigate seismic risks and maintain (or quickly restore) water deliveries following a seismic event is referred to as "seismic resilience." Metropolitan's holistic strategy for seismic resilience follows a "defense in depth" multi-layered approach for managing risk. Metropolitan's Seismic Resilience Strategy has three primary objectives:

1. Provide a diversified water supply portfolio, system flexibility, and emergency storage
2. Prevent damage to water delivery infrastructure in probable seismic events and limit damage in extreme events
3. Minimize water delivery interruptions through a dedicated emergency response and recovery organization

Metropolitan's Seismic Resilience Strategy is implemented through four components that encompass the various internal functions that promote the organization's seismic resilience objectives. These components are supplemented by Metropolitan's commitment to inter-agency coordination when preparing and responding to a seismic event and other emergencies. The strategy is shown below in Figure A.9-1.

Figure A.9-1
Seismic Resiliency Strategy

A brief description of the components of Metropolitan's Seismic Resilience Strategy and examples of their implementation are provided below.

Planning

The goals of the planning component are to develop and maintain a diversified water resource portfolio; provide a flexible system that allows for operational changes to handle variations in water supply, planned or unplanned system outages; and to maintain adequate emergency storage supplies. Metropolitan has developed a diverse water resource portfolio through the enactment of various exchange and water banking programs. These water supply programs are described in detail in Section 3 and Appendix 3. In addition to existing supply programs, development of the Regional Recycled Water Program would provide Metropolitan with an additional water resource and would be strategically located on the coastal side of the San Andreas Fault. Metropolitan also strives for regional seismic resilience by incentivizing local agencies to develop increased conservation, recycling, storage, and other water management programs.

As Metropolitan expanded its system over the years, it has continually improved the flexibility of the system to handle changes in water supply or pipeline or facility outages. One example of Metropolitan's system flexibility is the Common Pool service area, which can be supplied by the Jensen, Weymouth, or Diemer water treatment plants. Additionally, Metropolitan has constructed its system such that most of the service area can be supplied by either Colorado River or State Water Project supplies.

Metropolitan's imported water supplies from the CRA and SWP East and West Branches cross the San Andreas Fault (SAF) Zone prior to reaching Metropolitan's service area. A major earthquake on the SAF has the potential of damaging all three aqueducts and disrupting imported supplies for up to six months. Metropolitan constructed Diamond Valley Lake (DVL) on the coastal side of the fault to mitigate the potential impacts of a major SAF earthquake to its service area. Completion of DVL nearly doubled Metropolitan's available surface water storage in the region and, along with other local reservoirs, is used to maintain 6 to 12 months of emergency water storage supply. Water from DVL can supply four of Metropolitan's five regional water treatment plants.

Engineering

The goal of the engineering component is to assess and mitigate seismic risk to individual facilities, and the system. This is accomplished through Metropolitan's Seismic Resilience of Structures Program, the Seismic Resilience of Pipelines Program, the Dam Safety Program, and special seismic assessments.

Seismic Resilience of Structures

Metropolitan's program to increase the seismic resilience of structures is an ongoing program with the goal of protecting life safety and critical infrastructure to minimize water delivery interruptions following a seismic event. The initial program focused on evaluating the seismic risk of above ground structures (e.g., water treatment plants) constructed prior to 1990 and upgrading structures to mitigate the risk when found to be seismically deficient. The program has recently expanded to include post-1990 structures due to the progress made on the initial list of structures. Examples of seismically upgraded facilities include the Colorado River Aqueduct pump plant buildings, the Weymouth East and West Wash Water Tanks, and the Diemer and Jensen Administration Buildings.

Seismic Resilience of Pipelines

Metropolitan's conveyance and distribution system has been built in conformance with standards and practice at the time of design. In keeping with the goals of the Seismic Resilience Strategy, Metropolitan is developing seismic design criteria for new pipelines based on current state of practice, geotechnical and seismicity criteria, operating conditions, and asset management strategies. The planned design approach for new pipelines will be to establish performance criteria, identify seismicity and ground conditions along the alignment, and design the pipeline to resist damage from ground shaking and deformation. Specialized pipe joints and sections can be designed to accommodate ground deformation from fault displacement or liquefaction. For existing pipelines, seismic resilience will be incorporated as a component of pipeline rehabilitation projects. Metropolitan will evaluate each upgrade individually to balance risk, performance, and cost. Metropolitan's Casa Loma Siphon Barrel No. 1 Seismic Upgrade Project is an example of the organization incorporating seismic design in the rehabilitation of existing pipelines. The existing siphon, which crosses a segment of the San Jacinto Fault Zone and is subject to long-term subsidence, will be replaced with earthquake-resistant ductile iron pipe. The pipe joints are designed to accommodate ground displacement without failure to allow for continued service following an earthquake.

Dam Safety Program

Metropolitan has an ongoing Dam Safety Initiatives Program that has initiated several plans to improve Metropolitan's dam seismic safety and earthquake readiness. These initiatives are being coordinated with the California Division of Safety of Dams (DSOD) and Office of Emergency Services and include the following:

- Ongoing preparation of Emergency Action Plans, including inundation maps
- Performing training exercises at the dam site to test processes during a seismic event
- Providing training and guidance on overall dam safety
- Reviewing operation and maintenance methods for reservoir drawdown and operations after a seismic event
- Updating guidelines and procedures on protection against seismic risk
- Establishing a strong communications system on seismic information
- Performing structural strengthening of dams, including rehabilitation and improvement of spillways and inlet/outlet towers such as Lake Skinner Outlet Tower
- Improving dam safety instrumentation, monitoring, and reporting capabilities

Special Seismic Assessments

Metropolitan conducts special seismic assessments to increase understanding of the vulnerability of the organization's assets and operations to various seismic hazards. The studies focus on hazards specific to individual facilities or the system as a whole and identify options to mitigate the risks posed by the hazards. In addition, the studies support emergency response training and planning for future earthquake events by estimating the magnitude of damage that may occur from various seismic events. The following is a list of some of the reports that Metropolitan has completed:

- Liquefaction Susceptibility Mapping for the Metropolitan Water District of Southern California's Feeder System (Report No. 1625), Carollo Engineers, Inc., 2019.

- Colorado River Aqueduct – San Gorgonio Pass Seismic Event Vulnerability Study (Report No. 1484), GeoPentech, July 2014.
- Potential Effects of Southern California Seismic Events on Metropolitan Water Deliveries (Report No. 1335), Metropolitan Facility Planning staff, January 2009.

Operations

The goal of the operations component is to maintain effective emergency planning and response capabilities. This is accomplished through maintaining an effective Emergency Response Organization, conducting routine emergency response training exercises, and maintaining emergency construction capabilities.

Metropolitan's Emergency Response Organization (ERO) is comprised of over 200 predesignated employees who work in the Emergency Operations Center (EOC), the Incident Command Posts, or the field during emergencies. ERO staff has completed specialized training that meets State and Federal requirements. Metropolitan's emergency response structure follows the National Incident Management System (NIMS) and the State of California's Standardized Emergency Management System (SEMS).

In addition to specialized NIMS training, Metropolitan staff routinely participate in emergency response training exercises that are often based on a postulated seismic event. In 2019, Metropolitan started a new five-year emergency exercise plan that will allow all member agencies to participate in at least one of Metropolitan's annual emergency exercises. The first of these exercises was a tabletop exercise for the Orange County member agencies on August 29, 2019, which focused on a hypothetical incident at the Diemer Water Treatment Plant.

Metropolitan has conducted over 100 exercises since February 2018. This included two large functional emergency exercises for the EOC and multiple tabletop exercises, workshops, and seminars for the 12 Incident Command Posts located at the water treatment plants, conveyance and distribution facilities, and other strategic locations in Metropolitan's service area.

Metropolitan maintains the necessary staffing, materials, and equipment to respond to two simultaneous pipeline breaks. The Machine Shop and Coating Shop at La Verne are available to fabricate pipe sizes up to 12 feet in diameter, and Metropolitan's construction forces have the necessary equipment and expertise to make the repairs in-house. In addition, Metropolitan has upgraded its satellite phones to ensure communication ability following a seismic event and is in the process of installing high frequency radios at all Incident Command Posts and the Emergency Operations Center.

Reporting

Metropolitan has committed to providing annual updates to its Board of Directors on the organization's Seismic Resilience Strategy and its progress toward identified short-term and long-term goals. The organization has also committed to providing a formal report on a five-year interval summarizing accomplishments related to seismic resilience and changes in directives to the Seismic Resilience Strategy.

Inter-Agency Coordination

Improving the region's seismic resilience requires that member agencies understand the seismic risks to the imported water supplies so that they may appropriately plan on the local level. Opportunities for inter-agency coordination are provided through the Local Resources Program where Metropolitan incentivizes the development of local groundwater, recycling, and other supply resources to offset imported demands. As stated previously, Metropolitan provides member agencies the opportunity to participate in emergency response exercises. As part of a recent study, Metropolitan developed maps that define the relative liquefaction susceptibility of the region inclusive of the conveyance and distribution system and has made these maps available to member agencies. Recently, the organization updated the emergency storage goals through several workshops in coordination with member agencies.

Metropolitan is also a member of the Seismic Resilience Water Supply Task Force, along with the California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP). As the owners of the three conveyance facilities that provide imported water to the region, Metropolitan, DWR, and LADWP have recognized the importance of coordinating responses following a major seismic event that disrupts the imported water supplies. Each agency has provided an overview of the seismic risk to their respective systems and are in the process of developing a Water Mutual Assistance Agreement to formalize the coordination efforts following a major earthquake that disrupts service to the imported water supplies.

Metropolitan's Seismic Resilience Reports

The various components of Metropolitan's resilience strategy summarized above are described in detail in Metropolitan's Seismic Resilience Report First Biennial Report (February 2018) and Seismic Resilience Report 2020 Update (February 2020) presented as part of this appendix. These reports are also available on Metropolitan's website:
http://mwdh2o.com/AboutYourWater/Planning/Seismic-Resilience-Report/

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REPORT

SEISMIC RESILIENCE

FIRST BIENNIAL REPORT

The Metropolitan Water District of Southern California
700 N. Alameda Street, Los Angeles, California 90012

Report No. 1551
February 2018

SEISMIC RESILIENCE
FIRST BIENNIAL REPORT

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February 2018

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Additional copies: The Seismic Resilience Report is located on the Seismic Resilience SharePoint site. To obtain a copy of this document, please contact the Engineering Services Group.

Disclaimer

Extensive efforts have been made to ensure that the material contained in this document is accurate as of the date of publication. There are many factors, however, related to the content and applicability of this document which are beyond the control of MWD. In addition, the contents of this publication will be periodically updated, so the reader should inquire about any such changes in addition to reading this document. Finally, the reader is encouraged to seek appropriate technical and/or legal advice when specific facts or circumstances arise that raise questions concerning the applicability or interpretation of the policies and procedures discussed herein.

PUBLICATION HISTORY:

Initial Release (First Biennial Report)	*February 2018*

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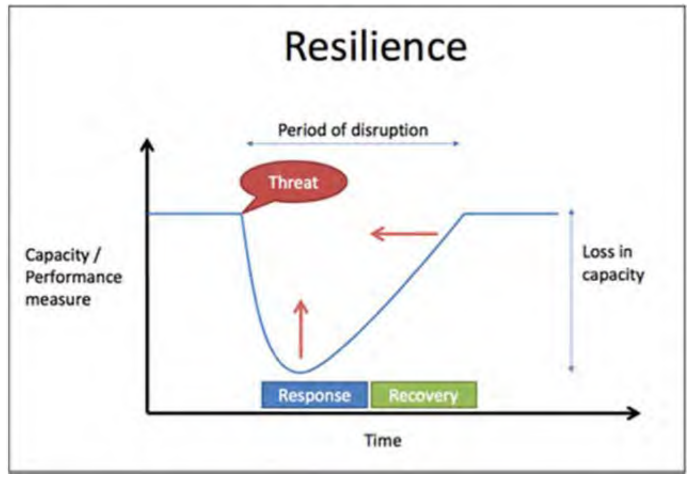
EXECUTIVE SUMMARY

The ability to maintain, or quickly restore, water deliveries after a seismic event.

--Definition of "Seismic Resilience" for a water agency

An interruption in a key lifeline service such as water delivery can be devastating to a community's recovery after an earthquake. As the agency responsible for delivering imported water to over 19 million people in one of the world's most seismically active regions, The Metropolitan Water District of Southern California (Metropolitan) has made substantial efforts to minimize the impact of a major earthquake on the people and businesses within its service area. In 2017, Metropolitan refined and formalized its approach for addressing seismic resilience by fully integrating its planning, engineering, operations, and reporting functions.



This report documents Metropolitan's integrated Seismic Resilience Strategy, reports on key historic achievements, and communicates near-term goals aimed at further enhancing the seismic resilience of Metropolitan's infrastructure and water deliveries.

Seismic Resilience

"Resilience" is broadly defined as the ability of a system to absorb and rebound from shocks. The more resilient a system is, the smaller the impact will be that any given shock will have on the system, and the shorter the duration of recovery will be. Using the broad definition of resilience as a baseline, Metropolitan defines "seismic resilience" as the ability to maintain (or quickly restore) water deliveries following a seismic event. The more prepared a water agency is for earthquakes, and the more effective its emergency response capabilities are, the less impact the event will have on water deliveries to its customers.

Metropolitan's Seismic Resilience Strategy

Metropolitan's Seismic Resilience Strategy is a multi-faceted approach to prepare for and respond to seismic events. It involves close, formal coordination within the Metropolitan organization and with other owners of imported water conveyance systems that cross the Southern San Andreas Fault.

Coordination within Metropolitan and its member agencies focuses on diversifying water resources; enhancing operational flexibility; providing adequate emergency water supplies; and identifying and addressing infrastructure and system vulnerabilities. This coordination also involves development of effective emergency response capabilities.

The coordination with other owners of imported water conveyance systems is through a multi-agency task force. The members of this task force, which includes the California Department of Water Resources

(DWR) and the Los Angeles Department of Water and Power (LADWP) as well as other State and water industry organizations, work together to evaluate the unique seismic vulnerabilities of Southern California's imported water systems.

In addition to the coordination elements, Metropolitan's Seismic Resilience Strategy includes a reporting component to increase transparency and accountability. Each year, Metropolitan staff will update its Board of Directors on recent achievements and near-term goals. Every two years, a written report will be prepared to document these items.

Water is recognized as a critical resource, but having sufficient water available following an earthquake is essential. Seismic resilience has a goal that in most scenarios, water will be available for the vast majority of people and business affected by the event and for essential post-earthquake activities such as fire suppression.

Conclusion

Metropolitan's strategy for seismic resilience has evolved over time and has benefited from the lessons learned from major seismic events around the world. Because of this strategy, significant improvements in the overall seismic resilience of Metropolitan's water system have been made in each of the following key areas: water resource diversity, operational flexibility, emergency water storage capacity, resilience of existing infrastructure, and emergency response capabilities.

Metropolitan has also established a number of near-term goals within each of the planning, engineering, and operations components of seismic resilience that will further enhance this multi-layered approach.

Metropolitan's refined Seismic Resilience Strategy approach will maintain a clear and effective focus on long-term efforts, clearly communicate program achievements and goals to the Board, and provide member agencies with more clarity regarding projected seismic performance of Metropolitan's infrastructure.

SECTION 1 INTRODUCTION

Purpose

The Metropolitan Water District of Southern California (Metropolitan) owns and operates a complex conveyance, treatment, and distribution system that serves a 5,200-square-mile service area within an active seismic region. Over its nearly 90-year history, Metropolitan has been proactive in mitigating seismic risks posed to this expansive infrastructure, as well as improving its ability to maintain (or quickly restore) water deliveries following a major earthquake. This ability to mitigate seismic risks and maintain (or quickly restore) water deliveries following a seismic event is referred to as “seismic resilience.” Metropolitan’s strategy for seismic resilience follows a “defense in depth” multi-layered approach for managing risk: providing a diversified water resource portfolio, system flexibility, emergency water storage, robust emergency response capabilities and performing cyclical assessments of facilities and addressing identified vulnerabilities.

Over the last 20 years, Metropolitan has made significant progress in a number of key areas related to seismic resilience (see Appendix 1):

1. Increasing water supply resilience, flexibility, and emergency storage
2. Addressing the susceptibility of above-ground structures to damage from seismic events
3. Developing effective and robust emergency response capabilities

Recognizing the need for continuous improvement, Metropolitan recently re-assessed the various activities that enhance seismic resilience to refine, expand, and formalize its overall approach. The resulting Seismic Resilience Strategy is a fully integrated approach toward minimizing regional water delivery interruptions and restoring interrupted regional deliveries quickly after an earthquake.

The specific goals of the refined Seismic Resilience Strategy are to:

- Improve the integration of planning, engineering and operations activities focused on seismic resilience through regular collaborative meetings and integrated reporting
- Expand current programs to identify and address any additional seismic vulnerabilities
- Re-visit existing seismic performance objectives in light of advancements in the knowledge of earthquake hazards, earthquake engineering, and mitigation capabilities
- Document Metropolitan’s seismic resilience activities to facilitate knowledge transfer and coordination
- Improve accountability by communicating seismic resilience goals and accomplishments to Metropolitan’s Board of Directors and member agencies on an annual basis
- Enhance member agency planning efforts for emergency response and facility improvements by providing more clarity regarding the projected seismic performance of Metropolitan’s infrastructure

This document describes Metropolitan’s Seismic Resilience Strategy, summarizes key historical achievements, and communicates near-term goals that will further increase the seismic resilience of Metropolitan’s system.

Seismic Resilience Strategy Structure

Metropolitan's Seismic Resilience Strategy (see **Figure 1-1**) is a multi-faceted approach that involves coordination among key functions within Metropolitan as well as formal coordination with other owners of imported water conveyance systems that cross the Southern San Andreas Fault.

Figure 1-1: Seismic Resilience Strategy Structure and High Level Goals

As shown in the figure, the coordination within Metropolitan and its member agencies focuses on the activities of planning, engineering/design, operations/emergency response, and reporting. These efforts are complemented by the efforts of the multi-agency Seismic Resilience Water Supply Task Force (Task Force). This Task Force includes the California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) as well as other State and water industry organizations and focuses on the unique seismic vulnerabilities of Southern California's imported water supplies.

The purpose of Metropolitan's Seismic Resilience Strategy is to enable Metropolitan to restore water deliveries to its member agencies promptly after seismic events by maintaining a diversified supply portfolio, system flexibility, and emergency storage; minimizing damage to infrastructure; and supporting a robust emergency response and recovery capability. This integrated, comprehensive approach will maintain focus on effective long-term efforts, clearly communicate program achievements and goals to the Board, and provide more clarity to member agencies regarding projected regional seismic performance to enhance local facility and emergency response planning efforts.

Report Organization

This report is organized as follows:

- *Section 2 – Background.* Provides context regarding inherent seismic risks within Southern California, a definition of seismic resilience, and a summary of how Metropolitan's seismic resilience strategy developed over time.
- *Section 3 – Planning Component.* Describes planning activities that address seismic resilience through Metropolitan's diverse water supply portfolio and adaptive management approach to managing resources, including establishing emergency storage.
- *Section 4 – Engineering Component.* Describes technical programs that identify and mitigate the seismic vulnerability of Metropolitan's infrastructure and systems.
- *Section 5 – Operations Component.* Describes the emergency response organization, training exercises, and post-event capabilities that serve to minimize the disruption of water deliveries following earthquakes.
- *Section 6 – Reporting Component.* Explains the purpose and timing of the integrated reporting component.
- *Section 7 – Seismic Resilience Water Supply Task Force Component.* Describes the purpose of the collaborative task force, recent progress, and planned activities.
- *Section 8 – Seismic Resilience Performance Objectives and Near-Term Goals.* Summarizes existing objectives of the various components of seismic resilience, describes areas where new objectives are being considered, and provides high-level goals planned to be achieved by December 2019.

List of Abbreviations and Acronyms

BCP	Business Continuity Plan
CIP	Capital Investment Plan
CRA	Colorado River Aqueduct
DATs	Damage Assessment Teams
DSOD	Division of Safety of Dams
DVL	Diamond Valley Lake
DWR	California Department of Water Resources
EAP	Emergency Action Plan
EOC	Emergency Operations Center
ERO	Emergency Response Organization
FEMA	Federal Emergency Management Agency
ICCs	Incident Command Centers
IRP	Integrated Water Resources Plan

IT	Information Technology
ITP	IT Continuity Plan
LAA	Los Angeles Aqueduct
LADWP	Los Angeles Department of Water and Power
LRP	Local Resources Program
M	Magnitude
MARS	Member Agency Response System
MCE	Maximum Considered Earthquake
Metropolitan	The Metropolitan Water District of Southern California
MOU	Memorandum of Understanding
M_W	Moment Magnitude
MWD	The Metropolitan Water District of Southern California
NIAC	National Infrastructure Advisory Council
NIMs	National Incident Management System
O&M	Operation and Maintenance
OCC	Operations Control Center
PCCP	Prestressed Concrete Cylinder Pipe
PGA	Peak Ground Acceleration
SCE	Southern California Edison
SEMS	Standardized Emergency Management System
ShakeOut	Great Southern California ShakeOut Scenario
SWC	Security Water Center
SWP	State Water Project
Task Force	Seismic Resilience Water Supply Task Force
UBC	Uniform Building Code
UCERF3	Uniform California Rupture Forecast Version 3
USGS	United States Geological Survey
WSAP	Water Supply Allocation Plan
WSDM	Water Surplus Drought Management

SECTION 2 BACKGROUND

Seismic Risk

Within Southern California, there are a number of known active faults with varying levels of activity that are capable of generating significant earthquakes and causing widespread damage to infrastructure. Modern era earthquakes that occurred within or close to Metropolitan's primary service area with a magnitude above 6.3 (M6.3) are listed in Appendix 2. In 2015, the United States Geologic Survey (USGS) released the Uniform California Earthquake Rupture Forecast Version 3 (UCERF3), which provides a forecast for the likelihood of rupture for particular earthquake faults within California. UCERF3's forecast of the likelihood of a M6.7 earthquake or greater in the next 30 years on each active fault in Southern California is shown in **Figure 2-1**. As indicated in the figure, the Southern San Andreas Fault was identified as having the highest likelihood (19%) of a M6.7 earthquake or greater in the next 30 years. UCERF3 further states that the there is a 93% chance of a M6.7 or greater earthquake occurring on one of the faults within Southern California within the next 30 years, and a 36% chance of a M7.5 or greater earthquake occurring within the next 30 years.

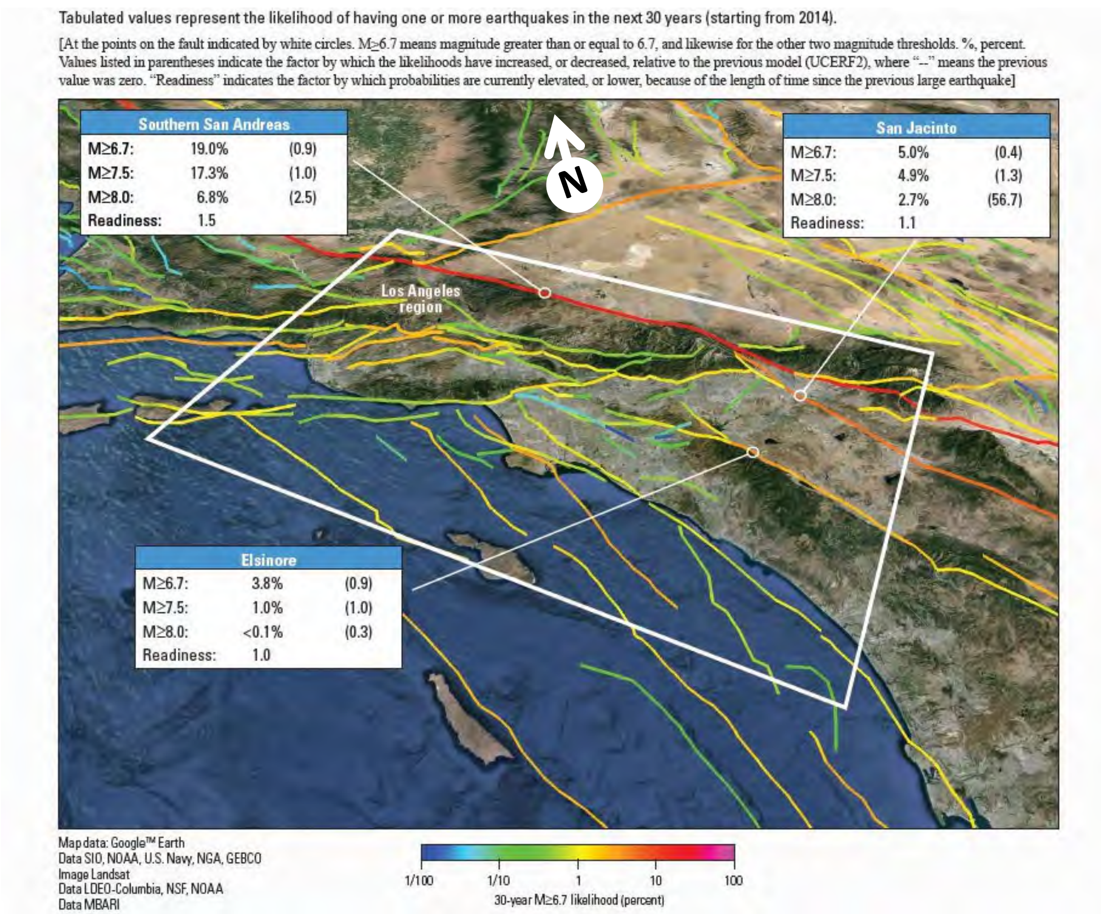


Figure 2-1: Likelihood of M6.7 or greater earthquake in the next 30 years (Source: UCERF3)

As shown in **Figure 2-2**, a significant portion of Metropolitan's infrastructure, including the Colorado River Aqueduct (CRA) and several treated water pipelines, is located near or crosses active faults.

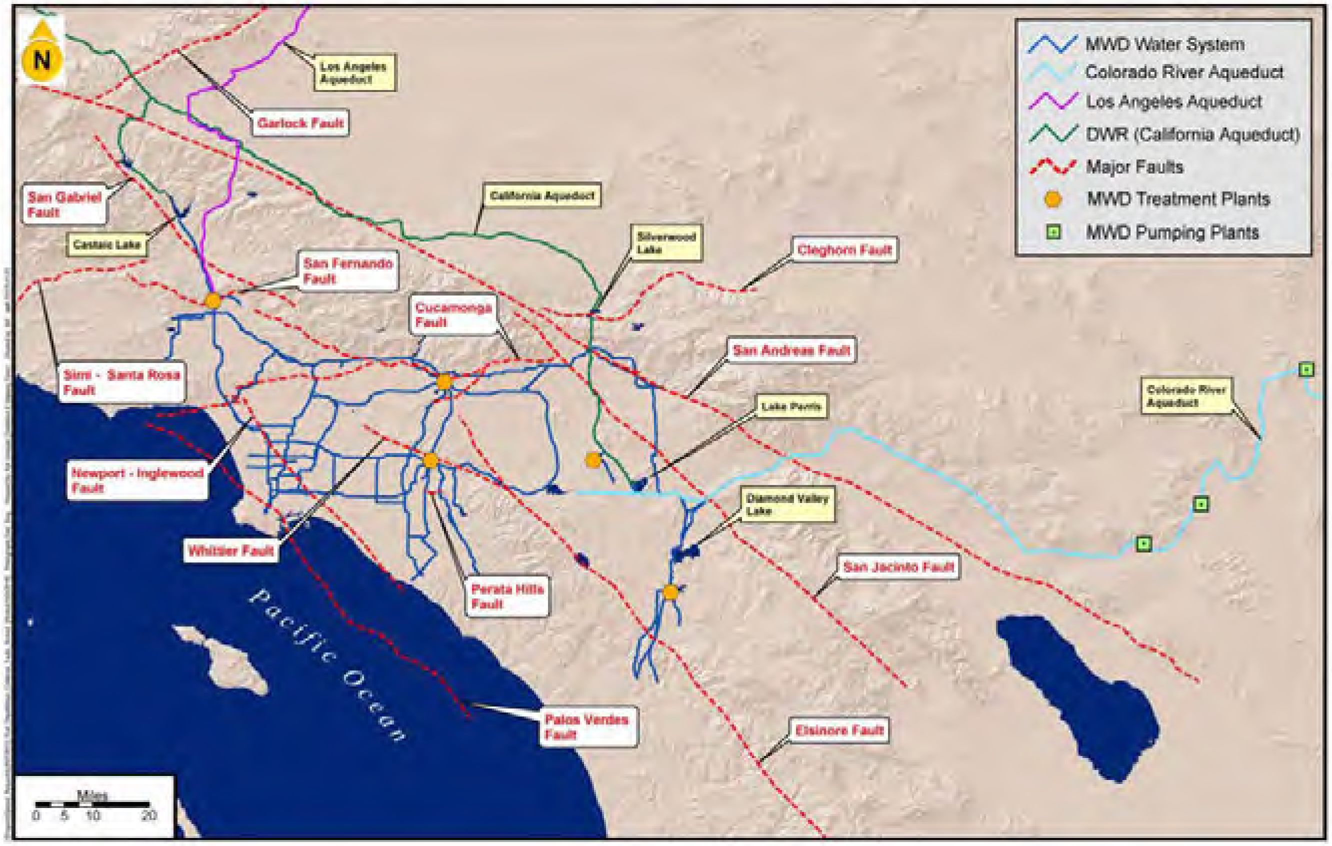


Figure 2-2: Major Earthquake Faults in Southern California

The risk of earthquake damage to Metropolitan's infrastructure from these active faults is manifested through different seismic hazards, including seismically induced ground shaking, seismically induced ground failure, and surface fault displacement.

- Seismically induced ground shaking can damage buildings, structures, aqueducts, pipelines, and tunnels. The intensity and duration of shaking at a particular location is dependent on a number of factors, including the earthquake magnitude, the distance from the earthquake epicenter, and local soil conditions.

Examples of typical effects of seismically induced ground shaking. The photograph on the left shows a damaged building from the 1994 M6.7 Northridge Earthquake. The building has essentially fallen backwards, and what was once a straight wall now appears curved. The photograph on the right shows the collapsed portion of a freeway overpass from the same earthquake.

- Seismically induced ground failure includes liquefaction, landslide, and seismic settlement. Liquefaction occurs when prolonged shaking causes saturated (water-bearing) soils to consolidate and lose their bearing capacity. This can compromise the support of structures that are constructed in these zones, including buildings and pipelines. Prolonged shaking can also lead to displacement of large areas of soil or rock, resulting in hazardous landslides and rock falls. The integrity of buildings and pipelines constructed in landslide zones can be compromised if the supporting ground experiences seismically induced failure; rockfalls can also result in structural damage due to the impacts of large boulders on structures. Seismic settlement is similar to liquefaction, except that the soil is not saturated.


Examples of seismically induced ground failures include liquefaction (left photo) and landslides (right photo) from the 2011 M6.3 Christchurch, New Zealand Earthquake and the 2016 M7.8 Kaikoura, New Zealand Earthquake, respectively.

- Surface fault displacement is usually only observed in large magnitude earthquakes but can result in devastating structural damage. The 1972 Alquist-Priolo Earthquake Fault Zoning Act prohibits construction of buildings in California within 50 feet of a known active fault trace. Therefore, surface fault displacement is generally not an issue for Metropolitan's buildings constructed after the early 1970s. However, several components of Metropolitan's conveyance and distribution infrastructure cross known active faults, including the CRA, various pipelines, and power transmission lines. These facilities are subject to damage from surface fault displacement.

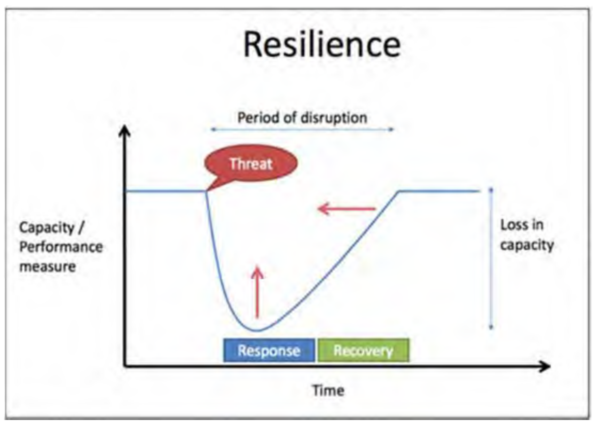

Examples of surface fault displacement. The photograph on the left shows railroad tracks displaced as a result of the 1952 M7.5 Kern County Earthquake. The photograph on the right shows a field that shifted as a result of the 2010 M7.1 earthquake in Canterbury, New Zealand.

Seismic Resilience

General

According to the National Infrastructure Advisory Council (NIAC), infrastructure resilience is "the ability to reduce the magnitude and/or duration of disruptive events." The effectiveness of a resilient infrastructure or enterprise depends upon its ability to "anticipate, absorb, adapt to, and rapidly recover from a potentially disruptive event." [ref. "*Critical Infrastructure Resilience Final Report and Recommendations*," September 8, 2009]**.** This event may be man-made, such as a cyber-attack, or a natural disaster, such as a drought, flood, or earthquake.

"Seismic resilience" (see **Figure 2-3**) narrows the focus of infrastructure resilience to only earthquakes. Using the definition of "infrastructure resilience" presented above, Metropolitan has defined seismic resilience for water agencies as the ability to reduce the magnitude and/or duration of water delivery interruptions resulting from seismic events. Rather than striving to make an entire water system "earthquake-proof," seismic resilience involves setting reasonable performance goals that provide sufficient benefits that justify the corresponding investments required by both an agency and its ratepayers. Metropolitan's seismic resilience performance objectives are summarized in Section 8 of this report.



Source: http://www.iparametrics.com/solutions/infrastructure-resilience.html

Figure 2-3: Resilience -- the ability to reduce the magnitude and/or duration of disruptive events

Applicability to Metropolitan

For over a decade, Metropolitan has had a well-defined approach to system reliability that addressed overall system resilience in five key areas: Water Supply Reliability, System Capacity, Infrastructure Reliability, System Flexibility and Emergency Response.

Seismic resilience is an essential aspect of Metropolitan's overall reliability strategy. Water deliveries are extremely crucial following earthquakes for fire suppression, for the general welfare of local residents, and for the regional economy that relies on imported water. Metropolitan's approach to seismic resilience has evolved over time to become one that is highly effective and recognized within the water industry [ref. "*Water Supply in Regard to Fire Following Earthquake*," Charles Scawthorn, Pacific Earthquake Engineering Research Center, November 2011]**.**

Metropolitan's Historical Approach to Seismic Resilience

"The aqueduct is being built for the future as well as the present, and must stand and give adequate service for an indefinitely long time."

From the "Design" Chapter of "The Great Aqueduct" book by Julian Hinds, 1938.

"It was desirable that faults be crossed at right angles, to minimize damage in the event of movement, and that some flexible type of conduit on or near the surface be used so that if repairs become necessary they will be as simple as may be…"

From "Major Problems of Aqueduct Location" by Julian Hinds, Nov. 24, 1938 Engineering News-Record.

Since its inception, and particularly during the design and construction of the CRA, Metropolitan has recognized the potential vulnerability of water infrastructure to disruptions by earthquakes. This section provides a brief overview of Metropolitan's historical approach to seismic resilience, focusing on major earthquake events in the past and lessons learned from these events.

The 1906 M7.8 San Francisco earthquake struck the coast of Northern California at 5:12 a.m. on April 18. Severe shaking was felt from Eureka on the North Coast to the Salinas Valley. Broken gas lines resulted in fires that lasted for several days due to a lack of fire supply. As a result, about 3,000 people died and over 80% of the city of San Francisco was destroyed.

The 1933 M6.7 Long Beach earthquake took place on March 10 at 5:54 P.M. Damage to buildings was widespread and between 115 and 120 people died. The earthquake highlighted the need for earthquake-resistant design for structures in California.

Post-1906 San Francisco and 1933 Long Beach Earthquakes (1930-1970)

Conveyance and Distribution System: The majority of Metropolitan's conveyance and distribution system was constructed between the 1930s and the 1970s. Historical documents regarding the planning and design of this infrastructure describe a philosophy of "permanence," which may be considered as a forerunner to "resilience." This philosophy not only took into account decades of wear and tear, routine hazards, and large storms, but also provided for seismic resilience.

Despite having no provisions within design codes, Metropolitan took proactive measures to address seismic resilience while designing the CRA. Metropolitan geologists and engineers took into account the ground shaking and deformation that had occurred along the San Andreas Fault system during the 1857 Fort Tejon earthquake and lessons learned from 1906 San Francisco earthquakes, and supplemented their understanding of regional active faults through geologic mapping and analysis of stereo aerial photographs. This led to the aqueduct being designed to cross active faults near the ground surface in inverted siphons and cross fault traces at right angles. The designers also opted for a more flexible siphon design in fault regions than the rigid monolithic concrete construction used elsewhere on the CRA, and provided extra hydraulic grade at three siphons crossing active faults (Appendix 3). These provisions were intended to minimize the adverse effects of seismically induced ground movement and to simplify access for repairs.

Metropolitan's dams are inspected on a regular basis.

<u>Water Treatment Plants</u>: Metropolitan's water treatment plants were also designed with features that enhance seismic resilience, beginning with the F. E. Weymouth Water Treatment Plant in 1940, and followed by the Robert B. Diemer Water Treatment Plant in 1963. The plants are modular in design and incorporate redundancy of key components. They are also situated strategically to maximize gravity flow to a majority of the distribution system.

Photo of the 120-inch Froriep Vertical Turning Lathe (above) and the 5-inch G&L Horizontal Boring Mill (below) in the La Verne Machine shop.

<u>Dams and Reservoirs</u>: Metropolitan began a Safety of Dams program many years before formal reporting was required by the California Division of Safety of Dams (DSOD). Staff regularly inspects Metropolitan's dams for vulnerabilities, documents their findings, and reports these findings to DSOD.

<u>La Verne Shops and Construction Equipment</u>: The La Verne Shops were built in the 1940s to support the construction and maintenance of Metropolitan's initial infrastructure. The shops were expanded in the 1960s as Metropolitan's system grew along with its service area. These specialized shops provide support for routine maintenance activities and are also vital for responding to emergency events impacting Metropolitan and member agency facilities. The stockpiling of key materials and the ability to roll pipe and fabricate or repair specialty equipment greatly enhances seismic resilience. Many of Metropolitan's pumps, piping, valves, and related equipment are too large to be routinely stocked by vendors.

Post-1971 San Fernando Earthquake (1971-1990)

The San Fernando earthquake struck the greater Los Angeles region in the early morning of February 9, 1971. The M6.5 earthquake caused severe property damage over $500 million and the loss of life directly attributable to the earthquake reached 58.

There were over 145 post-earthquake ignitions, typically caused by severed gas lines. Metropolitan experienced widespread damage at the Jensen plant, including a severe break to a 72" influent conduit and damage to the new finished water reservoir (shown below).

<u>Earthquake Committee</u>: Following the San Fernando Earthquake in 1971, Metropolitan formed an Earthquake Committee to investigate damaged structures at the Joseph Jensen Water Treatment Plant and to recommend enhanced seismic design criteria and site improvements to mitigate the seismic risk from potential future events.

The recommended modifications, such as the addition of stone columns to prevent liquefaction, are believed to have contributed to improved seismic performance of the Jensen plant in the 1994 Northridge Earthquake (see Section 4 of this report).

The Earthquake Committee also evaluated other facilities and recommended additional improvements that resulted in the upgrade of several key structures throughout Metropolitan's system. The Committee's efforts evolved over time into the current formal approach, with its emphasis on improving the seismic resilience of structures.

<u>Emergency Response Plan:</u> This period also saw Metropolitan adopt its Emergency Response Plan and establish a formal Emergency Response Organization (ERO). These steps led to regular emergency response training for staff, and eventually to staging formal emergency response exercises. As part of this effort, Metropolitan coordinated with its member agencies to establish the Member Agency Response System (MARS). Engineering Damage Assessment Teams (DATs) were also created to rapidly assess damage and help prioritize and initiate repair efforts.

<u>La Verne Shops and Construction Equipment</u>: The La Verne Shops were further expanded in the 1980s to support a major rehabilitation of the main pumps on the Colorado River Aqueduct. The additional fabrication capacity increased Metropolitan's ability to respond to emergency events.

<u>Local Projects Program</u>: To decrease reliance upon imported water, Metropolitan established the Local Projects Program in 1982 to provide financial incentives to member agencies for the development of recycled water projects throughout the region. A more diversified water portfolio helps the region's overall water supply reliability, which improves seismic resilience for the entire service area.

Post-1989 Loma Prieta and 1994 Northridge Earthquake (1990-2010)

During this period, Metropolitan greatly enhanced seismic resilience by performing seismic risk assessments, updating seismic design criteria, strengthening dozens of at-risk structures, encouraging development of local water resources, increasing emergency storage supplies, and enhancing emergency response capabilities.

The M6.9 Loma Prieta earthquake occurred in Northern California on October 17, 1989, at 5:04 p.m. . The shock was centered approximately 10 miles (16 km) northeast of Santa Cruz on a section of the San Andreas Fault System.

The earthquake was responsible for 63 deaths and over 3,750 injuries. The Loma Prieta segment of the San Andreas Fault System had been relatively inactive since the 1906 San Francisco earthquake until two moderate foreshocks occurred in June 1988 and again in August 1989.

As a result of this event, there were more 916 documented water system pipe breaks. This resulted in the loss of water pressure in the Marina District of San Francisco and difficulty in fighting fires.

Seismic Design Criteria: During the Inland Feeder Project, criteria were developed for new pipelines that cross seismic faults. The refined fault-crossing strategy includes using steel pipelines with welded joints; crossing fault-zones at right angles, and burying the pipes at relatively shallow depth to enable easy access for repair; and locating the pipelines where they can drain into channels or streams if damaged at fault crossings. Metropolitan also began considering the benefits of exceeding minimum code requirements for essential structures.

Seismic Upgrade Program: Dozens of pre-1990 structures were upgraded during this period. The benefit of upgrading seismically vulnerable facilities was demonstrated during the Northridge Earthquake in 1994. Structures that were upgraded at the Jensen plant, which was near the earthquake's epicenter, experienced only minor damage. The only significant damage consisted of rupture of an inlet 84-inch steel pipeline. The Jensen plant was off-line for less than 72 hours while the broken pipeline was repaired, and limited water deliveries were maintained during the repairs. Appendix 4 summarizes damage to Metropolitan infrastructure from the 1971 San Fernando and 1994 Northridge earthquakes.

Local Resources Program: In 1995, Metropolitan established the Local Resources Program (LRP). The LRP combined the Local Projects Program, which provided financial incentives for recycled water projects, with the Groundwater Recovery Program, which provided financial incentives to encourage the development of local groundwater recovery projects. The present LRP has been highly successful in reducing the region's dependence upon imported water.

Diamond Valley Lake (DVL): DVL was completed in 1999 to increase operational flexibility and reliability by providing seasonal storage, drought protection, and dedicated emergency supplies. Seismic resilience was a major factor in both the siting and design of the reservoir. DVL was specifically constructed south and west of the San Andreas Fault, and it was designed to withstand a major event on that fault in order to mitigate for the potential interruption of Southern California's imported water supplies. This 810,000 acre-foot reservoir, combined with other storage programs, provides a 6-month emergency water supply for Metropolitan's service area.

The M6.7 Northridge earthquake occurred on January 17, 1994, at 4:31 a.m. and had a duration of approximately 10-20 seconds.

The death toll was 57, with more than 8,700 injured. Property damage was estimated to be between $13 and $50 billion. LADWP reported a total of 1,405 pipe repairs and that water pressure had dropped to zero in some areas.

Metropolitan experienced damage at the Jensen Plant including a rupture of an 84" diameter pipeline. Crews worked around the clock and restored service within 72 hours. The ability to roll pipe in the La Verne shops expedited these emergency repairs.

Although Metropolitan's response was very good, a task force was formed to develop recommendations for further improvement (Ref. Report 1087, "Northridge Earthquake Assessment Report").

Special Seismic Risk Assessments: During this period, Metropolitan broadened the scope of seismic risk assessments, from focusing on isolated structures to assessing entire facilities, such as the Diemer plant, and overall systems, such as the CRA. These efforts included seismic vulnerability assessments, facility reliability assessments, and system flexibility studies. These special seismic risk assessments led to several capital projects to structurally upgrade facilities, provided input into Metropolitan's emergency response planning to reduce the time to restore service, and identified options to improve system flexibility to help maintain water deliveries during planned and unplanned outages.

Emergency Response Planning: Following the Northridge Earthquake, Metropolitan revised its Emergency Response Plan and associated programs and established a Member Agency Coordinator function. Metropolitan also began conducting training exercises in coordination with member agencies and other external agencies and three functional exercises based on postulated seismic events were conducted during this period. In addition, the EOC was relocated from the Sunset Headquarters Building to Eagle Rock, and Incident Command Centers (ICCs) were established at each of the water treatment plants. Recognizing that seismic events can impact business functions as well as infrastructure, staff developed a formal Business Resumption Plan. Over time, this evolved into the present Business Continuity Plan (BCP) and IT Continuity Plan (ITP).

Emergency Response Construction Capabilities: In 2008**,** Metropolitan enhanced its ability to respond to emergency events by initiating a long-term project to refurbish and upgrade the La Verne Shops. Metropolitan can roll pipe and conduct simultaneous repairs on two large-diameter pipelines. Retaining in-house fabrication functions is important, as there are few firms in the western U.S. with similar capabilities. In recent years, private firms with machine shop and fabrication capabilities have tended to increase the amount of work outsourced to offshore facilities, instead of retaining it locally. These firms have little ability to respond expeditiously to emergency needs.

Post-2010 Chile, 2011 Christchurch and 2011 Great East Japan Earthquakes (2010-Present)

<u>Seismic Resilience Strategy Defined:</u> The recent earthquakes in Chile, New Zealand, and Japan demonstrated the importance of seismic resilience, and have resulted in extensive discussions among industry experts and public agencies on strategies to achieve greater levels of seismic resilience beyond the conventional measures of prevention and protection. This was particularly true for the 2011 Christchurch, New Zealand Earthquake, although it was the smallest of the three. The reason was the widespread damage that occurred in the downtown section of Christchurch, despite the fact that the infrastructure was designed and constructed in accordance with modern building codes. While the majority of buildings did not fall, and most people were able to exit safely, many of the downtown structures were unsuitable for occupation and had to be demolished. In addition, many of the buried utilities were damaged and had to be abandoned in place. The combined loss of structures and utilities resulted in a long-term reduction to the population within the city.

A M6.3 earthquake occurred in Christchurch, New Zealand on 22 February 2011 at 12:51 p.m. The earthquake was centered 6 miles south-east of the center of Christchurch, which at the time was New Zealand's second-most populous city. The earthquake caused widespread damage across Christchurch, killing 185 people in the nation's fifth-deadliest disaster.

In December 2014, Los Angeles Mayor Eric Garcetti released Resilience by Design which provided recommendations to addresses Los Angeles' greatest earthquake vulnerabilities, including taking steps to secure imported water supplies.

Concurrent with the infrastructure industry's focus on resilience, Metropolitan re-assessed its existing programs and developed a more integrated, comprehensive approach to seismic resilience. One improvement was to incorporate the concept of performance-based design during seismic evaluations. In addition to the evaluation of structures based on design-level earthquakes to prevent damage, performance-based design evaluates the effects of more extreme events to anticipate structural damage. Another improvement was to embrace the significant technological advancements that can improve seismic resilience, including computer modeling techniques, seismic resistant products, and recent industry research. These improvements have allowed Metropolitan to develop an enhanced strategy for seismic resilience moving forward.

During this period, Metropolitan also formed a collaborative Task Force to address the unique vulnerabilities of the major aqueducts that cross the San Andreas Fault. In 2017, Metropolitan fully integrated the various seismic resilience efforts currently underway throughout the organization. The resulting Seismic Resilience Strategy is described in detail in Sections 3 through 7 of this report.

Metropolitan's Comprehensive, Integrated Seismic Resilience Strategy

The enhanced Seismic Resilience Strategy has the following objectives for Metropolitan and for the entire southern California region:

- Provide a diversified water supply portfolio, system flexibility, and emergency storage
- Prevent damage to water delivery infrastructure in probable seismic events and limit damage in extreme events
- Minimize water delivery interruptions through a dedicated emergency response and recovery organization

This strategy is built upon improved collaboration within Metropolitan and formal collaboration with LADWP and DWR, which also import water to Southern California.

Figure 2-4: Detailed Breakdown of Metropolitan's Seismic Resilience Strategy

As shown in **Figure 2-4**, Metropolitan's enhanced Seismic Resilience Strategy includes four components within Metropolitan and a fifth component that involves formal coordination between Metropolitan, LADWP, and DWR.

1. The **<u>Planning component</u>** develops diversified water resources, system flexibility, and emergency water storage through Metropolitan's Integrated Water Resources Plan (IRP) and System Overview Studies. The goal of Metropolitan's IRP is to develop a diverse water supply portfolio that will be able to maintain a reliable water supply under any conditions, including a major seismic event.
2. The **<u>Engineering component</u>** addresses design concepts, vulnerability studies, and seismic resilience projects executed under Metropolitan's Capital Investment Plan (CIP). The Engineering component includes evaluating the seismic resilience of structures, monitoring dams, special seismic assessments, and enhancing pipeline seismic resilience. These efforts are all aimed at improving the seismic resilience of the treatment plants and distribution system through facility upgrades and operational flexibility improvements.
3. The **<u>Operations component</u>** involves Metropolitan's emergency response organization, training exercises, and construction capabilities. Their objectives are to effectively prepare for and respond to emergency events so that impacts to water deliveries are minimized and interrupted deliveries are restored quickly.
4. The **<u>Reporting component</u>** involves documenting the Seismic Resilience Strategy, tracking progress of seismic resilience activities, and annual reporting of near-term goals and recent accomplishments to Metropolitan's Board. This component is aimed at facilitating knowledge transfer, increasing accountability, and improving the transparency of seismic resilience goals and achievements to the Board and member agencies. The reporting component also supports the planning efforts of member agencies by communicating potential outage durations of Metropolitan facilities during emergency events.
5. The **<u>Seismic Resilience Water Supply Task Force component</u>** involves Metropolitan's formal collaboration with DWR, LADWP, the State of California, and other water industry organizations to address the unique seismic vulnerabilities of Southern California's imported water supplies. The two primary objectives of this task force are to 1) enable the agencies to coordinate emergency response efforts, and 2) identify practical mitigation options for reducing the magnitude and duration of disruptions to the region's imported water supplies following a large earthquake on the San Andreas Fault.

SECTION 3 PLANNING COMPONENT

As a supplemental supplier to the Southern California water community, Metropolitan faces many challenges in meeting the region's needs for water supply reliability and quality. One of the challenges is the ability to maintain water deliveries within the region following a major seismic event. In general, Metropolitan's planning efforts focus on meeting demands during dry and critical periods. However, during the original planning for Diamond Valley Lake (DVL), Metropolitan considered a scenario and a plan to meet demands if imported supplies were interrupted due to a seismic event, including development of a significant increase in storage dedicated to meeting emergencies.

Historically, Metropolitan has provided 50 to 60 percent of the water used in its service area from the Colorado River (via the Colorado River Aqueduct) and from the Sacramento-San Joaquin River Watershed (via the State Water Project). In addition to relying on imported supplies, Metropolitan and its member agencies have developed other sources, including groundwater, surface water, recycled water, desalination of seawater, and an aggressive water conservation and water use efficiency program. These investments, and Metropolitan's ongoing efforts in several different areas, coalesce toward the goal of long-term regional water supply reliability.

Metropolitan's Integrated Water Resources Plan (IRP) is the foundation for planning and developing a diverse water supply and emergency storage. The fundamental goal of the IRP is for Southern California to develop a water supply portfolio that will be able to maintain a reliable water supply. Maintaining this reliability includes investments prior to major seismic events, when there could be extended outages of imported water conveyance systems. To meet this fundamental IRP goal of a diversified water portfolio, Metropolitan believes in investing in the reliability of imported supplies, incentivizing its member agencies to develop increased water conservation, recycling, storage, and other resource-management programs. A significant part of imported water supply reliability is preparing for recovery periods following seismic events. With the commencement of the IRP process in 1993, Metropolitan formalized this process as a long-term strategy and official policy.

Metropolitan's success in improving water supply reliability by diversifying its water resource portfolio, and by the application of adaptive resource management approaches has also increased seismic resilience. At a system level, the Planning component of seismic resilience has several facets:

- Diversified water supply portfolio
- System flexibility
- Emergency storage

Diversified Water Supply Portfolio

Metropolitan has undertaken a number of planning initiatives over the years in order to maintain a diversified water portfolio. These initiatives include the IRP, periodic IRP updates, the Water Surplus and Drought Management (WSDM) Plan, and the Water Supply Allocation Plan (WSAP). Collectively, these initiatives provide policy framework guidelines and resource targets for Metropolitan to ensure regional water supply reliability, along with additional resilience for seismic events. In addition to Metropolitan's efforts to coordinate regional supply planning through its inclusive IRP process, Metropolitan's member agencies also conduct their own planning analyses and may develop projects independently of Metropolitan.

2015 IRP Update

The 2015 IRP Update was a refinement of Southern California's water management strategy, with seismic resilience continuing to be a key component. The 2015 IRP Update called for increasing the targets for conservation and local supply development and an emphasis on the importance of protecting and maintaining existing local supplies. The more that conservation and local supplies can contribute to the baseline each year, the more imported water Metropolitan can divert into storage to prepare for droughts of unknown duration or potential seismic events. Further developing a diverse water supply portfolio also contributes to increased seismic resilience.

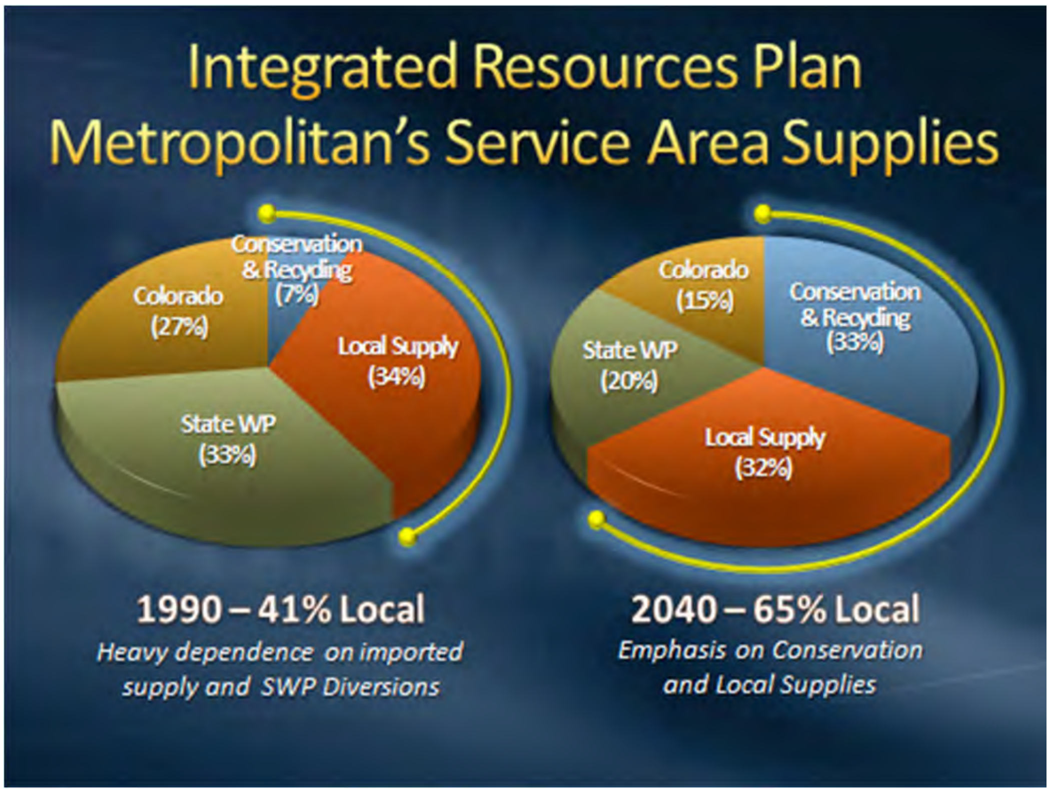


Figure 3-1: Integrated Resource Plan, Metropolitan's Service Area Supplies

Metropolitan's Service Area Supplies under the IRP

In 1990, about 41 percent of regional water demands were met with local resources and conservation. By 2040, about two-thirds will be met by local resources and increased conservation and recycling, as shown in **Figure 3-1**. Metropolitan's strategy is to maintain rather than increase traditional levels of imported supplies. The long-term portfolio approach looks to local solutions to sustain the region's continued growth. Increased flexibility to draw upon a wide range of sources from an ever more diverse water supply portfolio results in greater resilience to the potential impacts of seismic events on Southern California's water supply infrastructure.

Water Surplus and Drought Management (WSDM) Plan

Diversifying the region's water supplies and developing adequate and healthy water storage reserves have proven to be the backstop for water supply reliability. These actions have also contributed to improved seismic resilience for the region. Stored water reserves provide certainty for meeting the needs of the region's vast service area when traditional sources of supply are challenged by drought, climate change, seismic events, and other risks. It is critical that these storage resources be developed, managed and enhanced.

Metropolitan's WSDM Plan, which defines a regional water management strategy for Metropolitan and its member agencies, has focused on using storage to manage water supplies and enhance reliability since 1999. The WSDM Plan includes the following guiding principle: Metropolitan will encourage storage of water during periods of surplus and work jointly with its member agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage.

Water Supply Allocation Plan

When continued drought, earthquakes, or other natural disasters lead to shortages of supplies, Metropolitan distributes a limited amount of water through its Water Supply Allocation Plan (WSAP). First developed in 2008, Metropolitan's WSAP takes a basic premise --to fairly distribute a limited amount of water supply-- and applies it through a detailed methodology to reflect a range of local conditions and needs of the region's retail water consumers. In particular, under severe drought conditions or a potential seismic event that impacts imported conveyance systems, it may be necessary and prudent to call for greater reductions in the use of limited water supplies and to reduce reliance on storage reserves. The WSAP has 10 levels of water supply allocations, each corresponding to a five percent reduction of supply. A Level 2 allocation, for example, represents a reduction of approximately 10 percent in overall water supply available to each member agency. The level of WSAP reduction implemented would correlate to the severity of the seismic event.

System Flexibility

Metropolitan develops its facilities to meet demands; however, in the course of developing a reliable system to meet demands, some flexibility has been incorporated into the system. This flexibility helps Metropolitan accommodate changes in water supply, demands, and water quality. System flexibility also helps mitigate the impacts of planned and unplanned outages. Metropolitan's system flexibility has two key components:

- Operational flexibility: the ability to respond to changes in regional supply, water quality, or member agency demands
- Delivery flexibility: the ability to maintain partial to full deliveries during planned and unplanned single-facility outages

Metropolitan has found that for planned and unplanned outages of Metropolitan facilities, system flexibility at the regional and local levels is key to minimizing the effects of these outages. Water supply reliability and water demand-driven projects increase Metropolitan's system flexibility, which in turn can also increase seismic resilience. For example, the construction of DVL and the Inland Feeder provided significantly increased water supply reliability through the potential for dramatically increased storage of imported supplies within the service area. These projects increased water supply reliability and system flexibility, and also greatly improved seismic resilience as the storage was purposely located on the coastal side of major faults that are crossed by the SWP, CRA, and Los Angeles Aqueduct (LAA). A significant amount of storage in DVL is dedicated to emergency storage. This water is not used except in emergency conditions such as following a major seismic event. Additionally, the Diemer and Jensen plants (and associated feeders) were constructed as water demand-driven projects that also significantly improved delivery flexibility and seismic resilience within Metropolitan's distribution system.

Emergency Storage

Over the past two decades, Metropolitan has developed a large regional storage portfolio that includes both dry year and emergency storage capacity (summarized in Appendix 5). Storage generally takes two forms: surface reservoirs and groundwater basin storage. In late 2011, heading into the most recent drought cycle, Metropolitan had developed over 5.5 million acre-feet of storage capacity and had successfully stored over 2.7 million acre-feet.

Additionally, Metropolitan has long discussed and executed plans to maintain a reliable supply of water in the face of any type of water supply condition, including following major seismic events that could impact imported water conveyance systems. The development of its diverse resource mix has enhanced the flexibility of Metropolitan's conveyance and distribution system. Metropolitan established criteria for determining emergency storage requirements in the October 1991 Final Environmental Impact Report for the Eastside Reservoir, which is now DVL. These criteria were again discussed in the 1996 IRP. Both of these documents were approved by Metropolitan's Board. Additionally, Metropolitan's emergency storage requirements were summarized in a 2008 Board Report entitled "Water Surplus and Drought Management Plan on water supply and demand as of October 30, 2008."

Emergency storage requirements are based on the potential of a major earthquake causing damage to one or more of the aqueducts that convey Southern California's imported supplies (SWP, CRA, and LAA) into the region. The adopted criteria assume that damage from such an event could render the aqueducts out of service for six months. As a result, Metropolitan has based its planning on a 100 percent reduction in these imported supplies for a period of six months.

Metropolitan's WSDM Plan shortage stages guide Metropolitan's management of available supplies and resources during an emergency to minimize impacts of the catastrophe. This emergency plan outlines that under catastrophic loss of water supply the following actions will be taken:

1. Interruptible water deliveries would be suspended
2. Firm supplies to member agencies would be restricted by a mandatory cutback of 25 percent from normal year retail demand levels
3. Water stored in surface reservoirs and groundwater basins under Metropolitan's program would be made available

4. Full local groundwater production, recycled water, and local surface emergency storage reserve production would be sustained
5. Metropolitan would draw on its emergency storage as well as other available storage

Under the emergency criteria, retail demands would be met through existing surface storage, local production, and storage in surface reservoirs owned and operated by Metropolitan and by DWR. The total amount of storage available for emergency needs in Metropolitan's storage facilities, including DVL, Lake Mathews, and Lake Skinner, is currently 292,100 acre-feet (February 2018). The amount of emergency storage available to Metropolitan in DWR's reservoirs, including Lake Perris, Castaic Lake, Silverwood Lake, and Pyramid Lake, is an additional 334,300 acre-feet (February 2018).

SUMMARY

Through its IRP, Metropolitan has established a fundamental goal that Southern California will have a reliable water supply system for present and future generations, even if imported water supplies are disrupted due to a major seismic event. This reliability is achieved through Metropolitan's development of local water supplies, emphasis on water conservation, and establishment of emergency storage on the coastal side of major earthquake faults that are crossed by the SWP, CRA, and LAA. These reliability actions enable Southern California to continue water deliveries during the period when imported supply aqueducts are out of service due to damage from a major seismic event. In addition, Metropolitan's planning efforts to diversify the water supply and increase overall system flexibility over time have also contributed to providing resilience against potential in-basin earthquakes.

Metropolitan will continue to evaluate its water resource planning programs in terms of how they may further enhance seismic resilience and coordinate these efforts with the Engineering and Operations functions that are described in Sections 4 and 5 of this report.

SECTION 4 ENGINEERING COMPONENT

Metropolitan manages a number of strategies and component studies that evaluate facilities and systems against earthquake hazards. Mitigation options are then developed and executed when practical. These strategies include evaluating the seismic resilience of structures; special seismic assessments that address multiple facilities and systems; and other specialized efforts that address the seismic resilience of dams and reservoirs and the mitigation of geotechnical hazards.

Seismic Resilience of Structures

The purpose of evaluating the seismic resilience of structures is to prevent seismic damage to water delivery infrastructure from probable events and to limit damage due to extreme events in order to minimize water delivery interruptions. For occupied structures, the goal is to protect life safety and critical functions. Metropolitan applies a systematic approach to evaluate older structures that were constructed in accordance with earlier codes, and where necessary, to upgrade structures with seismic deficiencies. The criteria applied to the seismic evaluations incorporate current code provisions and up-to-date industry standards. In general, structures are upgraded to maintain seismic performance levels that are comparable to the levels of a new facility. Additional details are provided in Appendix 6, "Seismic Design Frequently Asked Questions."

Over the past two decades, this effort was primarily aimed at improving the seismic resilience of above-ground facilities and structures constructed prior to 1990. For example, the original pump houses at the five CRA pumping plants were determined to be vulnerable to significant damage in a design-level earthquake. A design-level earthquake is a probable event that is defined by the Building Code as the basis for seismic design of structures. To address this vulnerability, which could have impacted deliveries from the CRA over an extended period, new buttress walls were constructed in 1996.

Construction of new buttress walls at Hinds Pumping Plant

Procedure for Seismic Evaluation of Structures

A seismic risk-reduction program identifies seismic deficiencies of structures and quantifies the associated risks through an effective evaluation process, enabling limited resources to be allocated strategically to projects that address key vulnerabilities and to maximize improvements in seismic resilience of the water delivery system.

Metropolitan's procedure for the seismic evaluation of structures includes the following steps:

1. **Preliminary evaluation of all high-risk structures**

   The preliminary evaluation of existing structures is a high-level assessment to quickly determine if a structure is seismically deficient. Typically, this evaluation involves drawing review, visual inspection, and simplified calculations. If a potential seismic deficiency is identified, the structure is categorized as seismically deficient and the preliminary evaluation is complete.

2. **Prioritization of structures with seismic deficiencies**

   Structures identified as seismically deficient are then prioritized in preparation for a detailed evaluation. Structures built after 1990 were designed and constructed in accordance with the 1988 or later versions of the Uniform Building Code (UBC), which provides reasonable assurance of withstanding a design-level earthquake without catastrophic structural failure. Therefore, structures built before the early 1990's are given priority for the detailed evaluations, with consideration of life safety and the importance of the facility in water deliveries.

3. **Detailed evaluation to develop retrofit options**

   Structures identified with at least one potential seismic deficiency via the preliminary evaluation are thoroughly assessed to confirm any deficiencies. Feasible retrofit options are developed during this step to mitigate the identified deficiencies, and more advanced procedures such as finite element modeling and comprehensive structural calculations may also be applied. The analysis methodology, its results, findings, and recommendations are then summarized in a report that includes rough order-of-magnitude construction costs.

4. **Final retrofit design to strengthen deficient structures**

   The recommendations from the detailed evaluation form the basis for requesting approval from the Board of Directors to proceed with a seismic upgrade project. A project team consisting of design engineers and a project manager considers all feasible retrofit options developed during the detailed evaluation and recommends one option for the final retrofit design. In this process, the project team considers adequacy for seismic resistance, cost, constructability, operational impacts, and environmental impacts to select the preferred option. The selected option is then developed into bidding documents that include detailed design drawings and specifications for the retrofit work.

5. **Periodic reevaluation of strengthened structures**

   The seismic design provisions in building codes are constantly evolving, which reflects lessons learned from recent earthquakes and new findings in regional seismicity. Metropolitan periodically re-evaluates its facilities to ensure that system reliability is not compromised due to newly discovered vulnerabilities. Factors that may trigger a re-evaluation of a previously upgraded structure include:

   - Substantial increase of seismic hazard level at the site
   - New discovery of site seismicity
   - New discovery of potential seismic deficiencies in the structure
   - Significant deterioration of existing materials in the structure

Progress to date

A comprehensive inventory list of Metropolitan's above-ground structures is used to track the progress of the evaluation and seismic upgrades of structures. To date, Metropolitan has completed preliminary evaluations of all 311 pre-1990 above-ground structures (see **Figure 4-1**). Upgrades of many critical structures have also been completed, including the five pumping plants along the Colorado River Aqueduct, the Jensen Administration Building, and the Lake Mathews Outlet Tower.

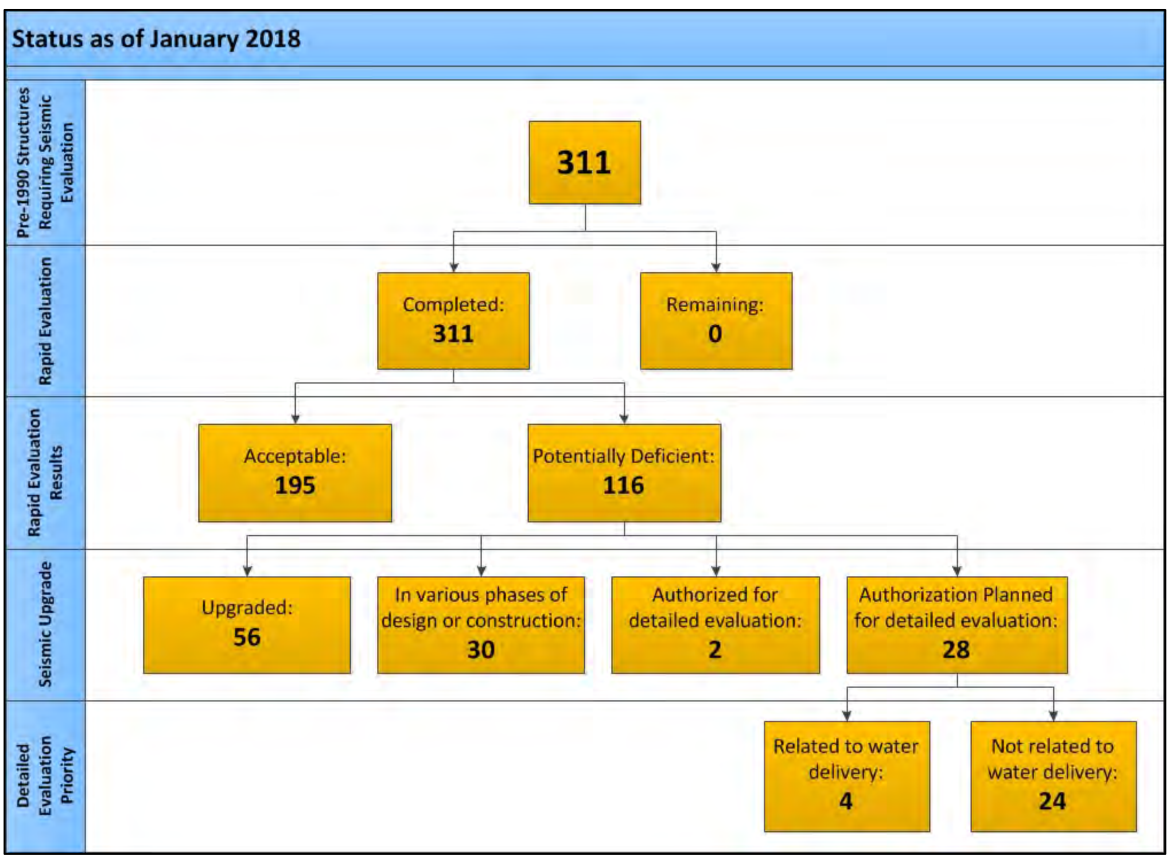


Figure 4-1: Status of Seismic Assessments and Upgrades of Pre-1990 Structures

As shown in the figure, of the 116 structures identified as potentially deficient, 56 have been upgraded and 32 are authorized for study, design or construction. The remaining 28 structures will proceed through Metropolitan's CIP evaluation process to obtain authorization for the detailed evaluations. Since 1998, Metropolitan has invested over $200M in seismic upgrades of its key structures.

Expanded Approach for Achieving Seismic Resilience of Structures

In 2017, the strategy for achieving the seismic resilience of structures was modified to further enhance the seismic resilience of the delivery system. The refined strategy moved beyond assessing only Pre-1990 above-ground structures to include the following:

- Fully and partially buried structures
- Seismic anchorage and bracing of non-structural components such as equipment, pipes, and ducts.
- Structures constructed between 1990 and 2000 (prior to the adoption of UBC1997)

For the first two items, it was recognized that fully and partially buried structures, while less vulnerable to seismic hazards than above-ground structures, are nevertheless important to maintaining system reliability. Similarly, the seismic resilience of non-structural components, such as equipment and piping, is also important for minimizing operational downtime after an earthquake.

The third item, relating to UBC1997, is included in the expanded effort since seismic design codes have been modified such that some structures designed and constructed after 1990 also warrant an assessment. Recorded ground motions in the 1994 Northridge Earthquake, for example, revealed that the design seismic force specified in building codes at the time were underestimated for sites located close to faults. This near-fault effect was incorporated into the subsequent code (UBC 1997). As a result, certain structures designed between 1990-2000 prior to the adoption of UBC 1997 may be vulnerable to a major earthquake.

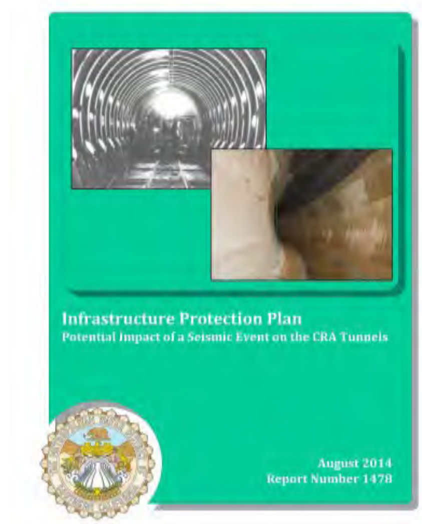
Moving forward, the near-term focus is to complete the detailed evaluations and seismic retrofit projects that have been authorized to date. Long-term goals include:

- Continue assessment of seismic design criteria to incorporate updated seismic resilience strategy
- Document a systematic approach to improve seismic resilience of non-structural components
- Conduct preliminary evaluations for critical fully or partially buried structures
- Conduct preliminary evaluation of post-1990 structures.

Special Seismic Assessments

Special seismic assessments are performed to complement the original seismic resilience of structures evaluations. These special assessments include seismic vulnerability evaluations, general reliability assessments, and system flexibility studies.

Seismic Vulnerability Evaluations. Seismic vulnerability evaluations identify potential impacts of credible earthquake scenarios on individual facilities and the system as a whole. For these studies, staff review current and readily available seismic hazard data from public, academic, state, and federal sources, as well as input from geotechnical consultants, to screen each facility or system (e.g., the CRA) for its level of exposure to seismic hazards (i.e., surface displacement, ground shaking, liquefaction, and landslides) during a major seismic event. Based on the potential level of exposure and the resulting damage to Metropolitan facilities, the time to restore service are estimated. These studies then evaluate the impact of the damage on Metropolitan's water delivery capability and identify areas with limited backup capability to provide water while the facility is out of service. Improvements that could reduce the loss of service, and/or reduce the time to restore service, are then identified and prioritized.



The 2014 Potential Impact of a Seismic Event on the CRA Tunnels validated historic assumptions regarding potential outage durations for the CRA tunnels.

Findings from these evaluations can lead to capital improvements to strengthen facilities, improve system flexibility, and/or provide input into Metropolitan's emergency response planning to improve the seismic resilience of the distribution system.

To date, Metropolitan has completed over ten seismic vulnerability studies. A few examples are listed below, while a complete list with a brief summary of each study is included in Appendix 7.

- *Seismic Risk Assessment of Local Water Production Facilities in the Service Area of Metropolitan Water District of Southern California,* January 14, 1991, Dames & Moore
- *Probable Maximum Loss Analysis for Metropolitan Water District of Southern California*, September 1998, EQE International
- 2009 Report No. 1335: *Effects of Southern California Seismic Events on Metropolitan Water District Deliveries*
- 2014 Report No. 1490: *Colorado River Aqueduct Seismic Vulnerability Investigations – Summary Report*
- 2017 Report No. 1533: *Seismic Risk Assessment – Conveyance and Distribution System Tunnels*

General Reliability Assessments. The vulnerability of Metropolitan's facilities to damage from major seismic events is also evaluated through general reliability assessments. The objective of these assessments is to examine the vulnerability of facilities to unplanned service interruptions from the following hazards and events:

Seismic activity	Fire
Hydraulic surge	Corrosion
Vehicle impact	Wind-blown projectiles
Equipment malfunction	Third-party construction
Erosion/Scour/Flooding	Vandalism

The assessments are based on compiling data collected from several sources and evaluating the information to identify vulnerabilities that may damage a facility and impact water deliveries. The sources of information include prior reliability studies conducted for the facility; the facility's piping and instrumentation diagrams, electrical single-line drawings and plant layout drawings; interviews with Water System Operations and Engineering Services staff; reviews of corrective maintenance reports, reviews of CIP projects; and field inspections of the facilities.

The general reliability assessments focus on the following when relating to seismic activities:

- Assessing the ability of individual equipment and piping within the facilities to withstand an earthquake
- Reviewing potential soil stability issues that might affect earthquake vulnerability with Metropolitan's geotechnical staff
- Reviewing the ability of existing critical structures (i.e., tanks, treatment basins and pump house buildings) to withstand a seismic event

After identifying potential vulnerabilities to specific hazards and events, staff categorize the vulnerabilities based on the potential service impacts and identify options to mitigate the vulnerability and improve reliability. Mitigation steps include conducting capital projects to rehabilitate, replace, or upgrade equipment and facilities; performing operation and maintenance (O&M) activities for minor equipment modifications; creating procedures for designing, operating or maintaining the facility; and refining Metropolitan's emergency response plan. These options are prioritized based on their potential impact on the operation of the facility and are considered for evaluation and action. The cost and benefit of options that involve capital projects are evaluated through the normal CIP evaluation process.

Metropolitan has completed a total of eight general reliability assessments to date, including assessments of the CRA, all five water treatment plants, the conveyance system, and portions of the distribution system. A few examples are listed below, while a complete list with a brief summary of each study is presented in Appendix 7. As the understanding of earthquake probability and seismic forces continues to increase, these studies will be periodically updated.

- 2006 Report No. 1227: *Distribution System Reliability Assessment*
- 2006 Report No. 1255: *Weymouth Water Treatment Plant Reliability Assessment*
- 2006 Report No. 1297: *Colorado River Aqueduct Reliability Assessment*

System Flexibility Studies. System flexibility studies identify:

1. The impacts of regional facility outages on water deliveries to member agencies
2. Areas with limited flexibility to serve water, which may impact deliveries during an outage
3. Options to improve system flexibility (e.g., interconnections with other agencies, local resource development, or isolation valves).

These studies postulate outages to Metropolitan and DWR facilities, assign a reasonable duration to the outage based on past experience, and then evaluate the impact of the assumed outage on water deliveries through the following steps:

1. Identify service connections affected by an outage
2. Evaluate Metropolitan options to deliver water to the affected service connections

3. Evaluate member agency backup options (e.g., wells, treatment plants, surface storage, interconnections with other agencies) to deliver water to affected service connections
4. Quantify the impact of each outage in terms of loss of retail service to affected service connections, and identify service connections and/or regions with limited or no backup capability
5. Identify options to mitigate the impact of the outage and improve system flexibility to respond to planned and unplanned outages

The results of these studies support member agencies' efforts to improve local system reliability in the event of a planned or unplanned outage of a Metropolitan facility; support joint efforts of Metropolitan and its member agencies in evaluating the reliability benefits of potential projects; and support Metropolitan's efforts to identify options to improve operational flexibility.

Two significant system flexibility studies have been completed to date:

- **System Reliability Study (2006).** This study evaluated the flexibility of Metropolitan's overall distribution system. The study examined the impact of single failures in the system to the ability to deliver water to member agencies and identified existing backup options to deliver water during the outage. Specific types of failures considered in the study included individual facility failures (e.g., the CRA, a treatment plant, a reservoir) and failures in each isolatable segment of the distribution system (e.g., pipelines). Over 250 different postulated events were considered, and the impact on delivery to each service connection was evaluated for each event. The study considered the capabilities both within Metropolitan's system as well as the member agencies' to mitigate impacts of an outage. The study did not, however, consider multiple failures that might be associated with an earthquake, due to the almost unlimited number of combinations of failures that would have to be considered. Metropolitan and member agency discussions regarding this study and local and regional obligations led to a clarification about Administrative Code 4503 "Suspension of Deliveries" that is included in Appendix 8.
- **Mills Water Supply Reliability Study (Report No. 1337).** One of the findings of the 2007 Integrated Area Study was that the supply of raw water to the Mills plant had a lesser degree of redundancy than Metropolitan's other water treatment plants. The Mills Water Supply Reliability Study was undertaken to evaluate conditions that could interrupt the normal raw water supply to the Mills plant, such as earthquakes, and develop options to improve the redundancy and flexibility of supply to the plant.

Seismic Resilience of Dams and Reservoirs

The seismic stability of Metropolitan's dams is safeguarded by a robust and proactive comprehensive dam safety strategy managed by the Safety of Dams Team. The core responsibilities of the Safety of Dams Team are to perform inspections, interpret and analyze collected surveillance and monitoring data, evaluate dam structures and appurtenant works, report the findings, and serve as Metropolitan's liaison with the California Department of Water Resources, Division of Safety of Dams (DSOD).

Metropolitan owns and operates 20 facilities that are under the jurisdiction of DSOD, as listed in Table 4-1. There are a total of 24 individual dams/reservoirs, as some of these facilities have multiple dams.

Table 4-1: Current Metropolitan Jurisdictional Dam and Reservoir Facilities

Dam/Reservoir Name	Dam Type
Cajalco Creek Detention Basin	Flood Control
Copper Basin Reservoir	Surface Water Reservoir
Diamond Valley Forebay	Hydraulic Structure
Diamond Valley Lake	Surface Water Reservoir
Diemer Mixing & Settling Basin No. 8	Hydraulic Structure
Diemer Ozone Contactor Basins	Hydraulic Structure
Diemer Treated Water Reservoir	Hydraulic Structure
Garvey Reservoir	Surface Water Reservoir
Gene Wash Reservoir	Surface Water Reservoir
Goodhart Canyon Detention Basin	Flood Control
Lake Mathews	Surface Water Reservoir
Lake Skinner	Surface Water Reservoir
Live Oak Reservoir	Surface Water Reservoir
Mills Reclamation Basin No. 14	Hydraulic Structure
Mills Treated Water Reservoir No. 1	Hydraulic Structure
Mills Treated Water Reservoir No. 2	Hydraulic Structure
Orange County Reservoir	Surface Water Reservoir
Palos Verdes Reservoir	Surface Water Reservoir
Skinner Treated Water Reservoir	Hydraulic Structure
Weymouth Treated Water Reservoir	Hydraulic Structure

Metropolitan's Comprehensive Dam Safety Management Program

Metropolitan's comprehensive dam safety strategy is comprised of six key elements:

1. Regular detailed inspections
2. Surveillance monitoring and performance reporting
3. Cyclical facility assessments
4. Emergency preparedness
5. Inundation map preparation
6. Execution of capital projects

Regular Detailed Inspections

Regular detailed inspections are essential to preserve the integrity of a dam and are necessary for early problem detection and remediation. All Metropolitan dams are regularly inspected by Metropolitan staff at specific intervals using a formal, multilayered process:

- Daily or weekly observations
- Monthly inspections of dam and reservoir facilities with the highest DSOD designated hazard classification, with at least semi-annual inspections of all other facilities
- Detailed mandatory annual inspections conducted in the presence of DSOD staff

Upon completion of the annual DSOD inspections, DSOD prepares and provides a summary inspection report that summarizes their findings and may identify recommended remedial work, which is cataloged as action items that are corrected promptly.

Surveillance Monitoring and Performance Reporting

All Metropolitan dams and reservoirs incorporate instrumentation that measures specific performance parameters such as dam or structural movement, water levels, and seepage, as well as other parameters such as shaking due to earthquakes. Collected data are retained as part of the required annual DSOD inspection report.

In terms of seismic resilience, data from surveillance monitoring and performance reporting contribute to the Cyclic Facility Assessments described below by identifying changes in specific parameters, such as dam or reservoir movement or increased seepage, that may indicate a condition that could affect the ability of the dam or reservoir to withstand an earthquake.

Cyclical Facility Assessments

Cyclic facility assessments were initiated at Metropolitan in 2004 and are generally repeated about every 10 years. These assessments use the most up-to-date data and evaluation criteria to identify potential vulnerabilities in dam embankments, dam structures, foundations, outlet facilities and spillways and develop mitigation options, if necessary. If a potential vulnerability or deficiency is identified, a rehabilitation or remediation project may be included in Metropolitan's CIP.

An example of a facility assessment that evolved into a project under Metropolitan's CIP is the Lake Mathews Outlet Tower. The outlet tower, which is critical for water deliveries to a large portion of Metropolitan's service area, was constructed in 1938 and modified in 1961 to increase its height by 30 feet. A facility assessment conducted in 1994 determined that the modified tower was vulnerable to significant damage from ground shaking. A project was authorized to evaluate and address this vulnerability, resulting in a new seismically resilient Outlet Tower being constructed in 2005.

New and Old Outlet Towers at Lake Mathews (2008)

Emergency Preparedness

Metropolitan has a comprehensive Emergency Action Plan (EAP) for each of its dam and reservoir facilities. The EAP identifies potential emergency conditions that could occur at a dam or reservoir facility and describes procedures to be implemented to minimize loss of life and property damage. EAPs serve to provide guidance to responders, local agencies, and stakeholders in evaluating potential hazards, determining the severity of the emergency, and establishing communication protocols. Required content of dam EAPs are provided in the Federal Emergency Management Agency's (FEMA) Federal Guidelines for Dam Safety, Emergency Action Planning for Dams (FEMA 64, July 2013).

Inundation Map Preparation

Inundation maps illustrate worst-case flooding that would result in the complete draining of a full reservoir. Inundation maps show lateral and longitudinal extent of flooding, flood wave arrival times, maximum flood wave depths, total flooding duration, and peak flood flow rates. Inundation maps are a required component of dam and reservoir EAPs and are used by local emergency response agencies for emergency planning purposes.

Metropolitan's current cycle of inundation mapping updates is planned to be completed by 2018 for all dam and reservoir facilities.

Execution of Capital Projects

Dam and reservoir facility vulnerabilities or deficiencies that are identified during detailed inspections or from cyclical assessments are proposed for rehabilitation or remediation through Metropolitan's CIP. Past examples of facility rehabilitation or remediation projects include the Lake Mathews Outlet Facilities, described earlier, and the Seismic Upgrade of the Diemer Finished Water Reservoir.

Currently, several dam and reservoir related capital projects are in progress, including the final design of the outlet valve replacements at Copper Basin and Gene Wash Reservoirs and the construction of the Palos Verdes Reservoir floating cover replacement and tower seismic upgrades. Planned future projects include floating cover replacements and facility upgrades for the Mills Finished Water Reservoir Nos. 1 and 2 and Garvey Reservoir.

Pipeline Seismic Resilience

Metropolitan's pipelines are exposed to a number of geohazards of varying risk, including fault zone crossings, permanent ground deformation from causes such as liquefaction or landslides, and ground shaking during seismic events. While Metropolitan's pipelines have always been constructed in conformance with standards of practice at the time of design, there haven't been code requirements to address seismic risk. In addition, until recently, there have not been mitigation options for large diameter pipelines.

The photograph on the left shows a pipe joint pullout due to liquefaction from 1995 in Kobe, Japan. (photo courtesy of D. Ballantyne, *Understanding the Seismic Vulnerability of Water Systems*, Regional Water Providers Consortium Board, October 2013)

The photograph on the right shows pipe damage at a fault crossing (photo courtesy of D. Ballantyne, *Understanding the Seismic Vulnerability of Water Systems*, Regional Water Providers Consortium Board, October 2013)

There are currently several seismic resistant pipeline options, such as earthquake resistant ductile iron pipelines with special seismic resistant joints (see **Figure 4-2**), that are becoming available in diameters suitable for use by Metropolitan.

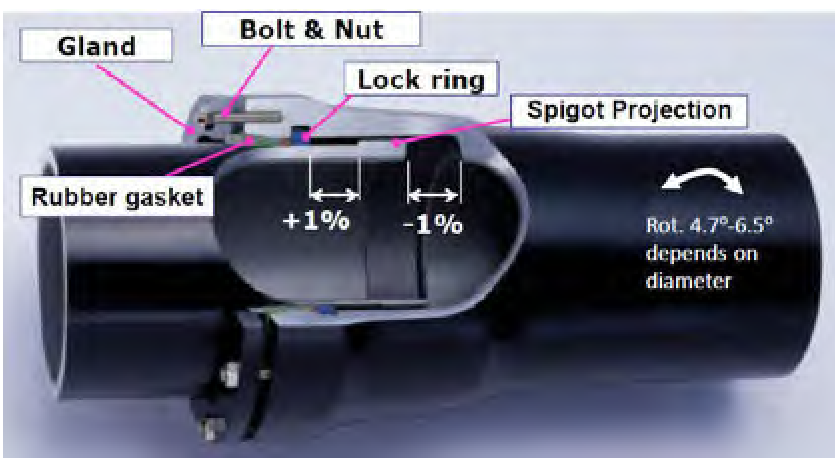


Figure 4-2: Example of Seismic Resistant Pipe (courtesy of Kubota Corp. and JFE)

As mentioned previously, Metropolitan is now formalizing a strategy to achieve significant improvements in seismic resistance of the distribution system over time. This approach takes advantage of up-to-date seismicity data, modern computer modeling techniques, recently developed seismic resistant products, extensive industry research, and updated codes.

The seismic resilience strategy for pipelines has three components:

1. Part 1 – Conducting vulnerability assessments of the existing distribution system
2. Part 2 – Identifying potential mitigation measures for existing pipelines
3. Part 3 – Establishing design and performance criteria for new pipelines and rehabilitation projects

Parts 1 and 2 are described below in more detail. Part 3 for new pipelines will be developed in conjunction with several new large-diameter pipeline projects that are planned over the next 5 to 10 years.

Part 1 –Vulnerability Assessment of Existing Pipelines: Due to the relatively good performance of large-diameter pipelines within Metropolitan's distribution system during previous earthquakes, Metropolitan is focusing on the most vulnerable existing pipelines to establish the need and priority of future mitigation work as well as integrating seismic mitigation into planned rehabilitation programs for aging pipelines. This approach is currently being followed for the PCCP Rehabilitation Program. It is anticipated that there will be relatively few cases where it would be considered cost-effective to upgrade a pipeline solely to enhance seismic resilience.

Vulnerability assessments of pipelines within the distribution system follow the same multi-step approach used for traditional risk assessments. The initial steps entail gathering available geologic, seismologic, and geodetic data, and then identifying seismic hazards along a pipeline route, such as fault zone crossings, liquefaction zones, and landslide hazards. Three simulated earthquake scenarios are considered in the evaluation: a frequent seismic event, moderate event, and a severe event. The hazard assessment provides a bounded solution that includes the expected probable and maximum probable damage for each earthquake scenario.

The resulting damage to the pipeline due to the three design seismic scenarios provides an insight into the corresponding consequences of disruption. These consequences include life-safety impacts, delivery impacts, and societal/environmental impacts.

Preliminary screening is then performed to identify the most vulnerable pipelines that warrant further analysis. Depending on the nature of the seismic hazard, Metropolitan may perform a preliminary assessment using a simplified analysis based on probable ground strain and pipeline material properties. However, in some cases, a more detailed finite element model is required to fully determine the behavior of the pipe and the surrounding support strata under seismic shaking. This comprehensive analysis includes soil-structure interaction, rupture modeling, and permanent pipeline deformation.

For any pipelines that do not meet the performance objectives, mitigation measures are considered. The order and timing of projects to mitigate risks as part of the overall rehabilitation strategy are evaluated and prioritized for inclusion in Metropolitan's CIP.

Part 2 – Mitigation Measures for Existing Pipelines: Where mitigation is recommended to minimize the consequences of service disruption, the general design goals are to design pipe segments and joints that can withstand projected vertical and horizontal movement. In most cases, a simplified analysis will provide sufficient insight into seismic performance; however, in some cases, it may be necessary to analyze the pipeline and connecting structures using a more comprehensive computer model.

Existing continuous welded steel pipe with adequate wall thickness and joint welds typically perform well under significant ground shaking. Where mitigation of existing pipelines is required to achieve acceptable seismic performance, Metropolitan may use specialized earthquake resistant joints as an option. Where these joints cannot achieve acceptable seismic performance, other options may include stiffening of the joints and pipe section; and enlarged vault sections to isolate the pipe from maximum ground deformation. Metropolitan may also evaluate alternate alignment options to relocate existing pipes, if feasible, to avoid areas of known fault crossings or expected permanent ground deformation that may result in significant disruption. Where these options are not feasible and seismic risk is not within acceptable limits, Metropolitan may consider installation of isolation valves or addition of a vault with a removable pipe spool to allow quick insertion of a bulkhead to facilitate shutdown and repair of the damaged section of pipe

Part 3 – Design Guidelines for New Pipelines: The guidelines for new pipelines will be similar in concept to existing pipelines and will be developed in conjunction with several new large-diameter pipeline projects that are planned over the next 5 to 10 years.

SECTION 5 OPERATIONS COMPONENT

Metropolitan is prepared to respond to all types of emergencies through its Emergency Management and Business Continuity Operating Policy A-06. Key elements of this policy include IT Disaster Recovery, Business Continuity and Emergency Response functions. This section focuses on the Emergency Response functions due to specific steps in this area that pertain to seismic resilience.

Emergency Response Organization

Metropolitan maintains a dedicated Emergency Operations Center (EOC) that can be activated at any time to manage Metropolitan's response to a large disaster, including seismic events. The EOC is equipped with multiple modes of communication and coordinates directly with Metropolitan's Operations Control Center (OCC) and Security Watch Center (SWC), as well as with numerous external agencies. For example, the EOC would coordinate with DWR and LADWP, as well as other related agencies, in the event of one or more aqueducts being damaged by an earthquake on the San Andreas Fault, as further explained in the next section.

Metropolitan also has Incident Command Centers (ICCs) located at various facilities. These ICCs can also be activated at any time to manage localized emergencies, and will coordinate directly with the EOC during a major disaster. Metropolitan also has Damage Assessment Teams (DATs) that that can be called upon by the ICCs to conduct investigations at incident sites. The DATs consist of engineers who can assess damage and initiate engineering responses, including recommendations for short-term repairs or work-arounds and potential designs for permanent, long-term repairs.

The Emergency Response Organization (ERO), illustrated in **Figure 5-1**, is comprised of over 200 pre-designated employees who work in the EOC, the ICCs, or in the field during emergencies. ERO staff has completed specialized training that meets State and Federal requirements.

Metropolitan's emergency response structure follows the National Incident Management System (NIMS) and the State of California's Standardized Emergency Management System (SEMS).

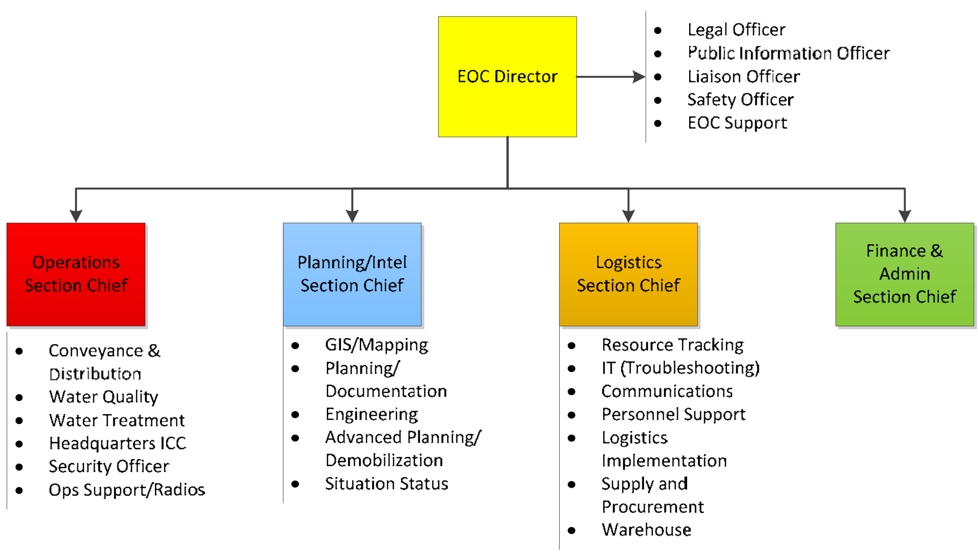


Figure 5-1: Metropolitan's Emergency Response Organization

Photographs from recent emergency exercises at the EOC

Emergency Response Training Exercises

In addition to training emergency response staff on NIMS procedures, Metropolitan regularly conducts emergency response training exercises which have often been based upon a postulated seismic event. Examples include:

- “Resilient Grid“ Functional Exercise, 19 Oct 2017
- “Can you hear me now?” Full Scale Communications Exercise, 08 Apr 2017
- “Desert Shake” Functional Exercise – 04 Nov 2015 (Metropolitan and seven other agencies)
- “Oh Susana!” Functional Exercise – 05 Nov, 2013 (Metropolitan and four other agencies)
- “Golden Guardian” Functional Exercise – 20 Jun 2012
- “California Rolling” Mini Functional Exercise – 08 Oct 2008
- “Hollywood Havoc” Functional Exercise – 04 April 2007
- “Mayhem at Mathews” Tabletop Exercise – 15 Mar 2006 (Metropolitan and four other agencies)

In 2017, Metropolitan completed a five-year exercise plan that allowed all of its member agencies to participate in at least one of Metropolitan’s annual emergency exercises during that period. Metropolitan also conducts approximately 50 tabletop and functional exercises each year. This includes three large-scale emergency exercises per year for the EOC and for each of the 12 ICCs. There are also monthly communication drills (includes Member Agency Response System (MARS) two-way radio, internal Metropolitan radio system, WebEOC updates, mass notification system, and satellite phones) with member agencies, ICCs, Treatment Plant Control Centers, and DWR facilities. These regular exercises, as well as monthly radio and communications tests with member agencies and other outside agencies, help Metropolitan to continually improve its readiness.

Emergency Response Construction Capabilities

Metropolitan maintains the capability to perform rapid repair of damaged facilities such as large pipelines for up to two simultaneous repairs. The machine, fabrication, coating, and valve shops at the La Verne

Shops are used extensively to support system-wide maintenance; to provide emergency services within Metropolitan, for member agencies, and for DWR; and to perform fee-for-service work that supports member agencies and the State Water Project. The fabrication shop can roll pipe on a 24-hour-per-day basis. In 2015, Metropolitan expanded the La Verne Shops to enable the fabrication of two pipe sections up to 12 feet (3.7 meters) in diameter simultaneously, and has been developing standardized pipeline repair drawings and shoring drawings to expedite repair operations.

Metropolitan also maintains stockpiles and materials on hand, and has its own construction equipment and crews ready to mobilize if necessary. Pre-selected urgent repair contractors can also provide additional construction support in case of an emergency. Maintaining these manufacturing and construction capabilities supports Metropolitan's efforts to efficiently operate and maintain its infrastructure and to quickly repair components or systems that may be damaged.

Pipe being rolled at Metropolitan's La Verne Shops

Metropolitan construction crews

42" x 30" adapter flange being drilled at Metropolitan's La Verne Shops

Stocks of steel plate allow Metropolitan to roll pipe of various diameters and wall thicknesses

SECTION 6 REPORTING COMPONENT

The reporting component of Metropolitan's seismic resilience strategy focuses on the following areas:

1. Record Keeping: Tracking progress and maintaining a record of expenditures
2. Annual Updates: Providing annual updates to Metropolitan's Board of Directors
3. Formal Reporting: Preparing a formal Seismic Resilience Biennial Report

Record Keeping

The Record Keeping component involves tracking progress on key seismic activities and maintaining a detailed record of all investments and expenditures related to seismic upgrade projects.

Key seismic resilience activities include the planning, engineering, operations, and Task Force component near-term goals identified in Section 8. Specific activities include:

- Special planning studies related to seismic resilience
- Seismic evaluations of structures, facilities, and regions
- Designs for seismically upgrading structures/systems and related construction activities
- Emergency response training exercises
- Development of new seismic performance objectives
- Joint efforts with external agencies through the Task Force

For each of these activities, progress will be tracked and reported on at regular intervals. In addition, the cumulative cost of capital investments in seismic upgrade projects will be tracked and reported on annually.

Annual Updates

Staff will update Metropolitan's Board of Directors on an annual basis. The annual update will focus on current seismic resilience issues, recent Metropolitan and Task Force accomplishments, and near-term goals.

Formal Reporting

The biennial report will summarize seismic resilience objectives, goals, and accomplishments; consolidate key reference material; and provide a high-level summary of the various activities related to seismic resilience throughout Metropolitan. Specific areas of emphasis will include:

- Knowledge Transfer: The biennial report will provide a convenient, comprehensive source for seismic resilience information. The report will contain key information for all seismic resilience efforts throughout Metropolitan, and will include a list of all formal Metropolitan reports on seismic issues. Individuals can use this information to familiarize themselves with Metropolitan's seismic resilience history, issues, and goals, which will make them more effective in supporting seismic resilience efforts.

- Accountability: Through annual reporting to the Board, seismic resilience programs will maintain a higher degree of visibility, focus and momentum on projects and studies that will help Metropolitan meet target goals.
- Transparency: The sharing of seismic resilience studies, projects, and performance objectives will benefit the facility planning efforts of member agencies. Seismic risk, mitigation, and projected duration of outages are complex issues that deserve adequate discussions between Metropolitan and member agencies to facilitate decisions and investments that best serve the public.

This summary report will be updated every two years.

SECTION 7 SEISMIC RESILIENCE WATER SUPPLY TASK FORCE

The City of Los Angeles has recently increased its focus on seismic risks and public safety. In December 2014, the city released the report, "Resilience by Design," which highlighted Los Angeles' earthquake vulnerabilities and laid out strategies to protect lives; improve the capacity of the city to respond to earthquakes; prepare the city to recover quickly from earthquakes; and protect the economy of Los Angeles and all of Southern California.

A concern noted in "Resilience by Design" is the importance of water infrastructure and the unique dependence of the region upon imported water supplies, all of which cross the San Andreas Fault. The report included a recommendation to fortify the imported water aqueducts by creating a Seismic Resilience Water Supply Task Force (Task Force) with the LADWP, Metropolitan, and DWR.

In August 2015, the three agencies formed the Task Force for the purpose of collaborating on studies and mitigation measures to improve the seismic resilience of imported water supplies to Southern California. The Task Force is comprised of managers and staff from the planning, engineering, and operations functional groups of each agency, and includes executive management on a steering committee. The Task Force also coordinates with other agencies and utilities.

The Task Force created a structure (**Figure 7-1**) that includes functional sub-teams that will focus on aqueduct assessments and mitigation, emergency response, and public relations in the near-term. The Task Force also recognized the benefit of long-term collaboration regarding 'non-aqueduct' assessments and mitigation, and agreed to discuss such issues as they arise.

The initial Task Force goals include:

- Establishing a common understanding about individual agency aqueduct seismic vulnerability assessments, projected damage scenarios, and planning assumptions
- Revisiting historical assumptions regarding potential aqueduct outages due to seismic events
- Discussing opportunities for improving the seismic resiliency of Southern California's imported water supplies through multi-agency cooperation

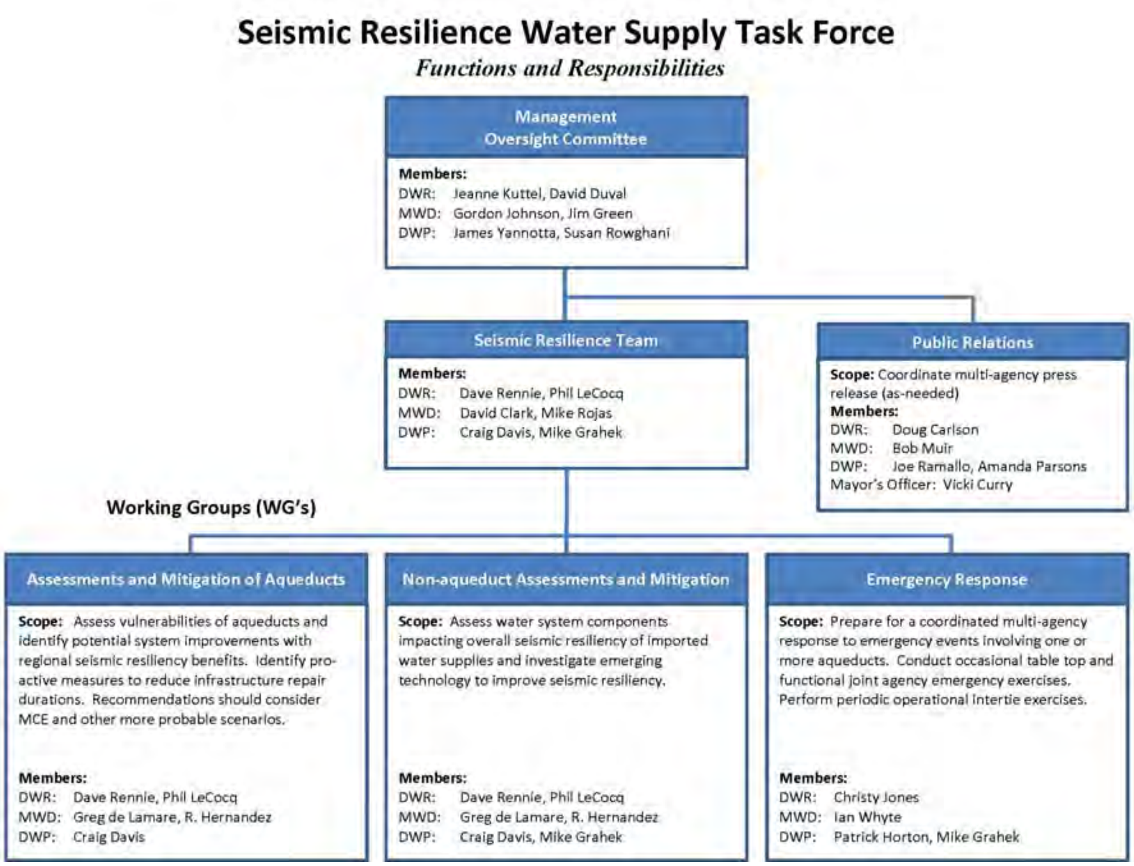


Figure 7-1: Seismic Resilience Water Supply Task Force

One of the initial activities for the Task Force was to conduct a workshop that would allow the three agencies to establish a common understanding about each agency's seismic vulnerabilities; revisit historical planning assumptions; and identify action items that would lead to increased seismic resilience moving forward. The workshop is summarized below.

2016 Aqueduct Workshop

On March 30, 2016, the Task Force held an Aqueduct Workshop at Metropolitan's Headquarters Building in Los Angeles. The purpose of this workshop was to discuss potential damage to Southern California's imported water aqueducts from a major seismic event on the San Andreas Fault. The discussion focused specifically on the Great Southern California ShakeOut Scenario (ShakeOut) of a M7.8 earthquake, developed by the U.S. Geological Survey (USGS) and many partners. The workshop format allowed for a candid exchange of information and ideas between staff from the three agencies, along with LADWP's Seismic Resilience and Sustainability Program's Expert Panel that included experts from industry and academia.

Participants were asked to consider preparations for, and response to, the ShakeOut Scenario from a regional perspective. Specifically, participants were asked, "If all aqueducts were owned and operated by a single agency, then what steps should be taken now to mitigate potential damage, and what would the priority of repairs be following a major seismic event to most rapidly restore imported water deliveries to the region?" This focus on actions that would best serve the region led to productive discussions and practical recommendations for the three agencies to improve the resilience of imported water supplies.

The assembled team concluded that for a M7.8 ShakeOut Scenario event on the southern portion of the San Andreas Fault, the recovery times would exceed historic planning assumptions:

- Restoration of full aqueduct capacities could take more than six months
- Restoration of partial aqueduct flows could take at least two months

The March 30, 2016 Task Force Workshop at Metropolitan's Headquarters Building

When considering this specific scenario from a regional perspective, the participants concluded that residents within Metropolitan's service area would be best served if the three agencies:

- Implement recently identified mitigation projects on the Colorado River Aqueduct and Los Angeles Aqueduct
- Prioritize known vulnerabilities on the Colorado River Aqueduct, Los Angeles Aqueduct, and the State Water Project
- Execute an agreement to allow for a coordinated response to emergency events
- Share resources when responding to emergency events
- Focus initial repair efforts on the State Water Project's West Branch and the Colorado River Aqueduct*

(*This is based on a ShakeOut-type event; it is recognized DWR will also have a priority to serve other customers on the East Branch)

LADWP's Seismic Resilience and Sustainability Program's Expert Panel noted the significance of the nation's largest municipal utility, largest water wholesaler, and largest state-owned water agency joining together to address a major hazard for the first time, and encouraged the Task Force to continue working together long into the future. The assembled team agreed that Southern California could become better prepared for seismic events and that the Task Force should continue to facilitate coordinated vulnerability assessments, evaluate mitigation options, and develop agreements that allow coordinated emergency responses to major seismic events. It was clear that common issues could be studied more efficiently together and there was a consensus for the Task Force to continue to maintain the momentum achieved through this workshop. Although the regional challenge of achieving a greater level of seismic resiliency is significant, the consensus was that it would be achievable through the continued, dedicated efforts of the Task Force.

Future Task Force Activities

To continue the momentum built during the collaborative workshop, the Task Force agreed to conduct conference calls every two months and to initiate a repeating 5-year cycle of planning, executing, and reporting on collaborative goals, activities and accomplishments. This approach is aimed at providing effective management of long-range actions and ensuring task force stability.

The first cycle has included preparation of a detailed report that summarized the 2016 Workshop and identified goals for the period between April 2017 and March 2022. The second cycle will report on progress achieved between 2017 and 2022, and will identify goals for the period between 2022 to 2027.

The high-level goals for 2018 to 2019 are included in Section 8 of this report.

SECTION 8 SEISMIC RESILIENCE PERFORMANCE OBJECTIVES AND NEAR-TERM GOALS

This section summarizes Metropolitan's established performance objectives for the various components of seismic resilience, along with corresponding near-term goals. The goals listed are those that are anticipated to be completed in calendar years 2018 and 2019.

Established Performance Objectives and Near-Term Goals:

- System Level
- Facility Level
- Emergency Response
- Task Force

Other Near-term Goals:

- Establish Additional Performance Objectives
- Develop a Standard Approach for Evaluating Non-Structural Elements
- Enhance Member Agency Planning Efforts
- Seek Funding for Identified Projects
- Support California WaterFix

Established Performance Objectives and Near-Term Goals

Seismic resilience performance objectives are summarized in this section along with the corresponding near-term goals.

System Level

System-level seismic resilience performance objectives and near-term goals focus on two areas: System Flexibility and Regional Supply Interruption/Emergency Storage.

System Flexibility

There are two primary components of system flexibility that contribute to seismic resilience:

1. Operational flexibility - the ability to accommodate short-term changes in regional supply, water quality, or member agency demands, and
2. Delivery flexibility - the ability to maintain deliveries to member agencies during single regional facility planned or unplanned outages.

Metropolitan will continue to develop a demand-driven, flexible regional system aimed at meeting demands, while reducing the impacts of regional infrastructure outages. Regional delivery flexibility improvements will be achieved through demand-driven projects.

System Flexibility Goal	
2019 Goal:	Conduct Rialto Pipeline Alternative Supply Needs study
This study will identify potential near-term and long-term options to meet municipal and industrial (M&I) demands supplied exclusively from the Rialto Pipeline system in the event of a disruption of supplies from the California Aqueduct, East Branch.	

Emergency Storage

Performance Objectives: Metropolitan's objectives for emergency storage include maintaining a six-month supply of water to account for interruption of imported water supplies (assuming a 25% reduction at the retail level).

Emergency Storage Goals	
2019 Goal:	Complete a re-evaluation of Metropolitan's emergency storage needs
This study will re-evaluate Metropolitan's emergency storage requirement based on updated assumptions on potential outage durations for the State Water Project and the Los Angeles Aqueduct. The latest projections for the worst case scenario are that Metropolitan's Colorado River Aqueduct can be repaired within 6 months, LADWP's Los Angeles Aqueduct within about 18 months, the West Branch of the SWP within 6-12 months and the East Branch of the SWP within 12-24 months.	
2019 Goal:	Complete a comprehensive evaluation of Metropolitan's storage programs
This comprehensive evaluation will review all existing storage programs within Metropolitan	

Facility Level

Facility-level seismic resilience performance objectives and near-term goals are categorized based on functionality of facilities: essential facilities related to water delivery; supporting facilities with permanent staff, such as administration buildings; and supporting facilities without permanent staff, such as warehouse facilities.

Essential Facilities (related to water delivery)

Performance Objectives: Performance objectives for essential facilities include maintaining operation with minimum interruption after design-level events and controlling structural damage to facilitate recovery after extreme events.

Essential Facility Goals	
Goal 1:	Complete construction of approved seismic upgrade projects
• Carbon Creek Pressure Control Structure (2018) • Ten Control Structures along the Allen McColloch Pipeline (2018) • Diemer Administration (Control) Building (2019) • Five CRA Pumping Plant Switch Houses (2019)	
Goal 2:	Conduct studies, and complete design of approved upgrade projects
• Define the scope and approach for assessing potential seismic-induced damage to Metropolitan's water conveyance and distribution pipelines (2018) - The purpose of the damage assessment is to estimate the number and severity of pipeline breaks and leaks during major earthquakes, and identify pipelines with the greatest risk for seismic damage. The results of the study will provide input into Metropolitan's emergency response planning activities, and will help prioritize future pipeline seismic resilience enhancements. • Design of seismic upgrade for Weymouth West Wash Water Tank (2018) • Design of seismic upgrade for Diemer West Filter Building (2018) • Complete evaluation of options, design, and award of construction contract to strengthen the CRA Whitewater Tunnel No. 2 (2019) - This work will include strengthening shallow tunnel sections near the portals, improving tunnel access at the west portal, prequalifying tunnel repair contractors, stockpiling steel sets, and pre-designing tunnel repair elements. • Investigate options to improve emergency raw water bypass capabilities at Skinner, Weymouth, Jensen and Mills Water Treatment plants (2019) • Vulnerability study of CRA electric transmission and distribution systems (2019) • Design of seismic upgrade for the original portion of the Water Quality Lab in La Verne and the Weymouth Administration Building (2019)	

Supporting Facilities with Permanent Staff

Performance Objectives: Performance objectives for support facilities with permanently assigned staff include controlling structural damage to prevent casualties and severe injuries under design-level events and maintaining structural stability to prevent catastrophic collapse under extreme events.

Supporting Facilities (with permanent staff) Goals	
Goal 1:	Expedite construction of approved seismic upgrade projects
• Headquarters Building seismic upgrades (award construction contract in 2018)	
Goal 2:	Complete approved studies and seismic upgrade designs
• Seismic upgrade to Field Engineering Building at La Verne (2019)	

Supporting Facilities without Permanent Staff

Objectives: Performance objectives for support facilities without permanently assigned staff include controlling structural damage to facilitate recovery after design-level events and maintaining structural stability to prevent catastrophic collapse under extreme events.

Goals: Metropolitan's near-term goal for improving the seismic resilience of support facilities without permanently assigned staff is to continue exploring opportunities of integrating seismic upgrade work of these relatively minor structures with future capital projects at the facility. At this time, no specific goals have been identified in this area.

Emergency Response

Objectives: Metropolitan's objective is to maintain an effective emergency response organization and support facilities to ensure Metropolitan is prepared to respond to significant earthquakes. Regular training is conducted to ensure staff is prepared for actual events. Metropolitan maintains shop and construction crew capabilities to complete the repair of two simultaneous large diameter pipeline breaks within seven days. This capability is augmented by Metropolitan's ability to re-deploy its contractors and to call upon other agreements to repair four additional large diameter pipe breaks simultaneously within seven days (as well as repair other facility damages). These capabilities ensure Metropolitan is prepared to respond to significant earthquakes.

Emergency Response Goals	
Goal 1:	Prepare and conduct emergency exercises
• Conduct a joint agency workshop to prepare a draft Joint Agency Response Plan (2018) • Conduct high-level training for DWR, LADWP, and MWD staff on the Joint Agency Response Plan (2019) • Run a functional exercise on the Joint Agency Response Plan (2019)	
Goal 2:	Execute a MOU to allow for a coordinated emergency response
• Prepare draft MOU and submit for review (2018) • Secure LADWP, Metropolitan, and DWR approval for the MOU (2019)	

Task Force

Task Force Goals	
2018 Goals:	Collaborative LADWP, Metropolitan, and DWR Goals
• Discuss the applicability of lessons learned from seismic events in Japan, Chile, New Zealand, and Mexico • Compare each agency's approach to conducting seismic assessments • Meet with Southern California Edison (SCE) and Southern California Gas Co. to discuss the potential vulnerabilities of aqueduct power systems • Conduct workshop to explore potential aqueduct interties	
2019 Goals:	Collaborative LADWP, Metropolitan, and DWR Goals
• Establish a leadership structure for a coordinated response to major events • Finalize a three-agency database of available emergency response resources • Conduct a three-agency table top emergency exercise • Develop a ShakeOut Scenario Response and Restoration Plan • Conduct a second three-agency functional emergency exercise that includes energy utilities	

Other Near-Term Goals

Additional seismic resilience goals Metropolitan plans on achieving during 2018 and 2019 include:

1. **Develop a Standard Approach for Evaluating Non-Structural Elements (2019)**

   The Seismic Upgrade Program was expanded from its focus on pre-1990 above-ground structures to include post-1990 structures, partially buried structures, and non-structural components in essential facilities. The existing approach to evaluating pre-1990 structures is also applicable to the post-1990 and partially buried structures. However, a standard approach needs to be developed for evaluating the non-structural components within existing facilities, which involves equipment anchorages and bracing for piping, ducts, and cable trays.

2. **Establish Additional Performance Objectives (2019)**

   Metropolitan intends to establish seismic resilience performance objectives in the following areas:

   a) New pipelines

   b) Retrofit of existing Metropolitan pipelines, typically concurrent with rehabilitation projects

   c) New and existing tunnels

   Metropolitan is now in the process of developing a more comprehensive strategy for incorporating seismic mitigation into the design of its pipelines and tunnels. Although it is possible to clearly define performance objectives for above-ground structures, this process is more complicated for pipelines and tunnels for two reasons: 1) The performance of a pipeline or tunnel subjected to seismic forces is less well-defined than with structures, and 2) The performance needs of specific pipelines, pipeline segments, or tunnels vary widely due to Metropolitan's supply flexibility and the varied reliance on imported water by member agencies. Metropolitan will explore these issues in greater detail as it moves ahead with major capital programs, including the PCCP Rehabilitation Program. It is expected that by December 2019, Metropolitan will have established an approach for addressing seismic vulnerabilities during pipeline and tunnel rehabilitation projects, and for new pipeline and tunnel design efforts.

3. **Investigate the Potential for Developing a Model to Prioritize Pipeline Rehabilitation (2019)**

   The prioritization model will seek to optimize the sequence of pipeline repairs to achieve the greatest risk reduction for every dollar invested. The prioritization model would take into account multiple risk factors including seismic risk exposure, pipeline condition, consequence of failure in terms of damage to key facilities (e.g., hospital), difficulty of repairs, system flexibility, and cost of repairs.

4. **Enhance Member Agency Planning Efforts (2019)**

   Development of the following documents will support member agency planning efforts regarding new facilities and emergency response programs:

   a) Summary of seismic performance objectives by facility class; examples of recent seismic upgrade projects; and identification of open items

   b) Summary of projected outage durations for Metropolitan facilities under "Operational", "Design", and "MCE" earthquake scenarios

5. **Seek Approval for Detailed Seismic Studies (Ongoing)**

   Under the ongoing Seismic Upgrade Program, Metropolitan will assess the options for seismic upgrades to 28 structures identified as seismically deficient. These projects will be considered for inclusion in Metropolitan's Capital Investment Plan.

6. **Support California Water Fix (Ongoing)**

   Metropolitan will continue supporting the California WaterFix to increase seismic resilience of the Bay-Delta portion of the State Water Project.

Appendix 1

Key Seismic Resilience Achievements

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Metropolitan has made significant improvements in the overall seismic resilience of its water system over the past few decades. These achievements include:

1971	Earthquake Committee formed to assess damage and recommend improvements
1976	Metropolitan's Emergency Response Plan formally adopted
1983	Member Agency Response System (MARS) established
1993	Incident Command Centers (ICCs) established at each treatment plant and a formal engineering response chart adopted for the Damage Assessment Teams (DATs)
1995	Formal Business Resumption Plan developed
1996	Seismic upgrade of CRA Pump Houses completed
1999	Construction of Diamond Valley Lake completed
2004	South slope stability improvements completed at Diemer
2005	Construction of new Lake Mathews Tower completed
2010	Jensen Administration Building seismic upgrade completed
2010	Construction of the Inland Feeder completed
2011	Seismic upgrade of Mills Electrical Buildings 1 & 2 completed
2013	Seismic upgrade of Diemer Finish Water Reservoir completed
2013	Diemer East Wash Water Tank seismic upgrade completed
2014	Seismic upgrade of Weymouth Filter Buildings 1 and 2 completed
2014	CRA seismic assessment confirmed historical assumptions for duration of worst-case outage of the CRA
2015	Seismic upgrade of Jensen Washwater Tanks 1 & 2 completed
2015	Seismic upgrade of Weymouth East Wash Water Tank completed
2015	Task Force formed to enhance seismic resilience of imported water supplies
2017	Seismic upgrade of Diemer East Filter Building completed

Note: Metropolitan has invested over $250M in seismic upgrade projects since 1998.

The California Department of Water Resources has also taken steps to improve the seismic resilience of Southern California's imported water systems, including:

1997	Construction of new Outlet Tower at Silverwood Lake completed
2018	Lake Perris Dam improvements completed

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Appendix 2

Modern Era Earthquakes over M6.3 Within or Near Metropolitan's Primary Service Area

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Southern California has experienced at least six earthquakes within or near Metropolitan's service area and with magnitudes greater than M6.3 during the past hundred years.

Date	**Event Location**	**Fault**	**Magnitude**
April 21, 1918	San Jacinto	San Jacinto	6.7
Mar. 10, 1933	Long Beach	Newport-Inglewood	6.4
Feb. 9, 1971	San Fernando	Sierra Madre	6.5
June 28, 1992	Landers	San Andreas	7.3
Jan. 17, 1994	Northridge	Northridge Thrust	6.7
Oct, 16, 1999	Hector Mine	Lavic Lake Fault	7.1

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Appendix 3

Provision for CRA Uplift

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MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

COLORADO RIVER AQUEDUCT

TECTONIC ALLOWANCE ORIGINAL INTENTION INVESTIGATION

1 March 2016

Purpose and Objective

Historic documents have mentioned that the designers of the Colorado River Aqueduct (CRA) incorporated "measures in their engineering designs to minimize the impacts on the flow through the CRA due to future vertical displacements across the key fault traces mapped at that time. **The measures included an additional 0.8 m (2.5 ft) of drop beyond that required by siphon losses at… three fault crossings**" (Report 1484). "In each siphon [Big Morongo and San Andreas] approximately 2.5 feet of additional grade was allowed to provide for adjustment in slope if future movement should occur" (Contract Number 149).

Figure 1 shows the location of each of the siphons in question.

The question was raised regarding the specifics of how this was accomplished. This document will describe investigation into whether this allowance was incorporated, the mechanism by which this allowance was included, summarize historical records suggesting such an allowance, and recommend field investigations which can confirm this analysis.

Figure 1
Overview Map

Observances of Tectonic Allowance

Record drawings for the Colorado River Aqueduct were explored to identify any occurrences or explanation for design Hydraulic Grade Line (HGL) at the Big Morongo Siphon, San Andreas Siphon and Casa Loma Siphon. The first observance of the allowance is found in the hydraulic profiles prepared as a part of the original record drawings of the Colorado River Aqueduct in 1935. Selected copies are included at the end of this document.

A discontinuity is observed in the HGL, dropping by a notated 2.5 feet at the beginning of the Big Morongo Siphon, San Andreas Siphon, and Casa Loma Siphon. The HGL is highlighted in red on Figure 1, with the 2.5-foot drop circled.

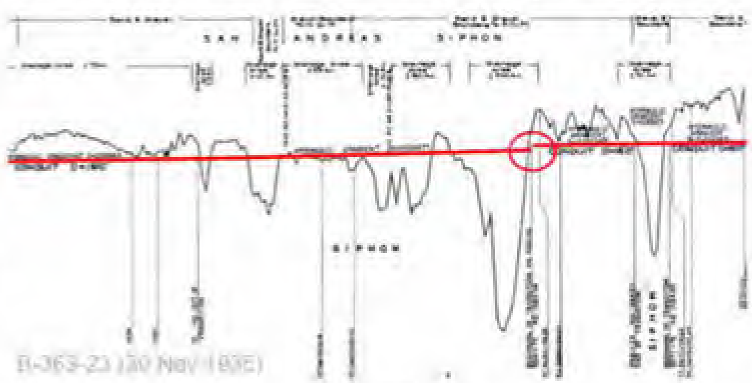

Figure 1
Original 1935 San Andreas Siphon Plan and Profile

A second observance of the allowance is found in the record drawings associated with the late 1950's construction of the second barrel for the CRA siphons (Specification Numbers 504 and 509). As before, selected copies are included at the end of this document. The plan and profiles found in the second barrel siphon record drawings show two parameters corresponding to hydraulic grade at the downstream transition structures, as follows:

- "HG. El.", assumed to be an acronym for Hydraulic Grade Elevation, and assumed to refer to the pressure head at design flow
- "WS El.", assumed to be an acronym for Water Surface Elevation, and assumed to refer to the water surface under free-surface flow conditions at design flow

In the siphon, the HGL is observed to be above the soffit of the pipeline, indicating the pipeline is designed to be under pressurized flow. Upon entering the transition structure, the HGL is below the top of the transition structure walls as free surface flow is designed for.

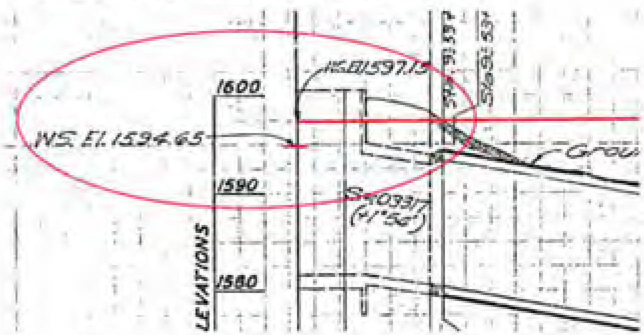

Figure 2
Big Morongo Siphon Second Barrel Plan and Profile

As shown on Figure 2, the Water Surface Elevation line in the outlet transition structure is depicted 2.5 feet below the Hydraulic Grade Elevation line, as circled in red. For other transition structures, the Hydraulic Grade Elevation line meets the Water Surface Elevation line, as shown on Figure 3 for Thousand Palms Siphon.

A second barrel was not constructed at Casa Loma Siphon according to the original plans, so no corresponding record drawing was identified.

Staff from the Hydraulics team confirmed via calculation that the headloss depicted by the HGL is consistent with the major and minor losses shown in the record drawings for the design flows.

A third observation of the allowance is found in the hydraulic profiles. While not called out numerically as on the previous two sources, the hydraulic profiles depict a slope offset at the Big Morongo and San Andreas Siphons of a much greater magnitude than those observed for other siphons. This is depicted in two figures on the following page.

It is understood that the design philosophy for each siphon was to size the losses across each siphon to maintain the free surface flow HGL across the siphon. This can be graphically observed in Figure 4 as shown by the red dashed line highlighting the HGL matching the canal or conduit slope upstream and downstream of the siphon.

At Big Morongo and San Andreas siphons, an offset of 2.5 feet is observed between the slope upstream of the siphon and the slope downstream of the siphon. Figure 5 highlights this in blue for Big Morongo Siphon.

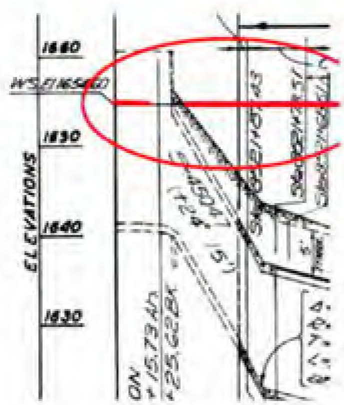

Figure 3
Thousand Palms Siphon Second Barrel Plan and Profile

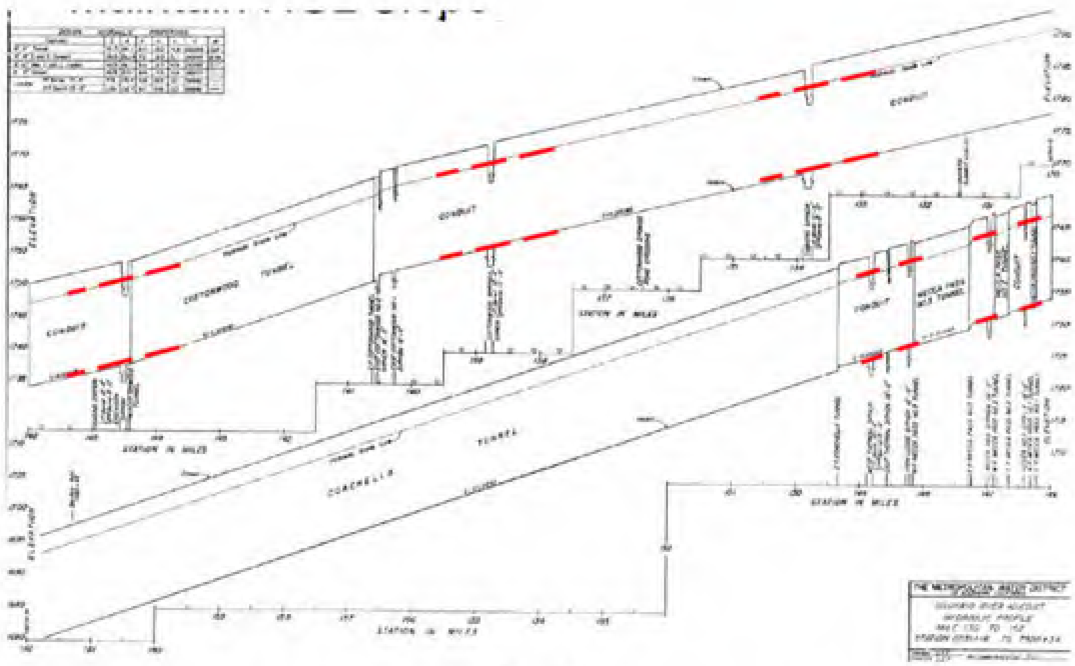

Figure 4
Siphon HGL Slope Consistent with Aqueduct Slope

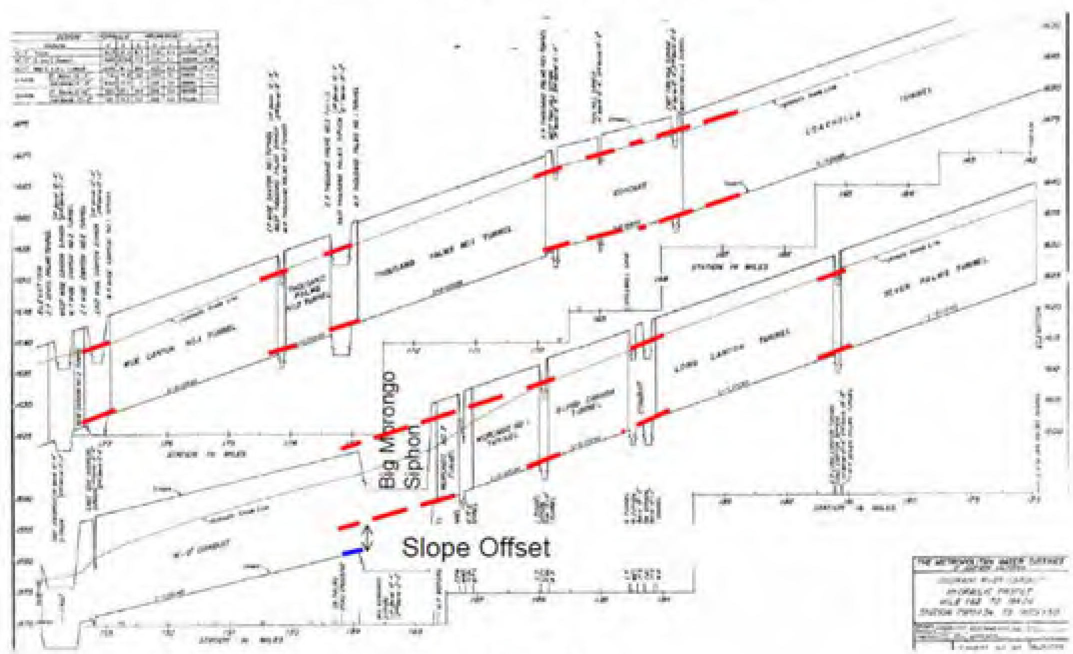

Figure 5
Siphon HGL Slope at Big Morongo Siphon

March 2016 3 CRA Tectonic Uplift Allowance

This last set of observances of the 2.5-foot allowance may provide a suggestion of the designer's thoughts on the effect of the allowance. The Hydraulic Grade Line observed on the profiles gradually drops relative to the invert elevation though the Morongo Number 1 Tunnel and the Morongo Number 2 Tunnel, and in the conduit immediately upstream of the San Andreas Siphon. While dimensions nor elevations are called out on this profile, the depth at the outlet to the Morongo Number 2 Tunnel can be measured on the drawing as 8.9 feet, and the depth at the entrance to the San Andreas Siphon can be measured on the drawing as 7.8 feet.

Previous Surveys

Based on the contract document, construction on Big Morongo Siphon and San Andreas Siphon was started on 5 Feb 1935 and concluded on 16 Sep 1936, with work activities completed by May 1936.

In February and March 1935, a construction staking survey was conducted. Included in the survey notes are an adjustment to the slopes consistent with the markups included in the contract documents (Contract 149). This timing is consistent with the start of construction.

In August 1937, after construction of the CRA, the as-built survey was conducted to set brass caps on the transition structure as permanent benchmarks. Benchmarks established include:

- a manhole at Station 9316+46
- the outlet transition structure for Big Morongo Siphon at Station 9353+15
- the outlet transition structure for East San Andreas Siphon at Station 9581+25 (referred to as "Outlet Siphon" in survey notes)
- the inlet transition structure for San Andreas Siphon at Station 9591+75
- a manhole at Station 9595+00
- the outlet transition structure for San Andreas Siphon at Station 9625+75
- the outlet transition structure for West San Andreas Siphon at Station 9651+75 (referred to as "small siphon" in survey notes)

These are recorded in Field Book 2740. No mention is made within the survey notes of any measurement of invert elevations of the pipeline or transition structure, so any inferences made to the invert elevation require the assumption that the transition structure dimensions are consistent with the planned dimensions appearing on the construction plans (19.17 feet for the Big Morongo Siphon outlet transition structure 18.96 feet for the Big Morongo Siphon inlet transition structure and both San Andreas Siphon transition structures).

In 1998, the Casa Loma Siphon first barrel was surveyed as a part of an as-built survey prepared for construction of concrete encasement between Stations 11073+45 and 11073+93 related to work on the Inland Feeder. The survey notes mention replacement of the pipeline, but do not appear to include any survey of invert elevations.

In 2008, the San Jacinto Diversion Structure, which originated as the inlet transition structure to the Casa Loma Siphon first barrel, was surveyed as a part of establishing NAVD 1988 elevations in the area. While the survey notes do not include invert elevations, they do include the weir elevation, which can be used to estimate the invert elevation based on the record drawings.

In 2014, a settlement study was conducted by Survey at San Andreas Siphon and Big Morongo Siphon to determine the difference in elevation between the inlet and outlet transition structures. The survey only measured the relative difference between the benchmarks set on the inlet and outlet transition structures of each siphon in the August 1937 survey. The difference in elevation between the inlet and outlet structure benchmarks is presented in the table below, suggesting no changes in relative ground movement in the intervening eight decades.

Table 1 1934 and 2014 Survey Comparison

Siphon	May 2014 Survey (feet)	August 1935 Survey (feet)	Difference (feet)
Big Morongo	7.90	7.90	0.00
San Andreas	6.64	6.68	-0.04

Source: Survey Field Book 2740 and Survey Note 1001-29 042

As with the previous surveys, no measurement was made of the invert elevations, so it is not possible to verify that the slope of the canal includes the 2.5-foot slope offset upstream of the siphon directly from survey measurements.

However, using the derived measurements developed as a part of IMDC (ultimately from the design drawings), the slope offset can be calculated. If the difference in elevation between the invert elevations at the inlet and outlet transition structures is 2.5 feet greater than that calculated based on the design slope for the siphon, then the survey data would confirm the tectonic allowance is included in the slope offset. Based on the notes included in the contract document and the slopes appearing on the hydraulic profiles, a slope of 0.00077 was used for design of the lengths of the CRA siphons. The table below presents the calculation, including several other siphons for comparison.

Table 2 Slope Offset Calculation

Siphon Name	Transition Structure Invert Elevation: Upstream (ft-msl '88)	Transition Structure Invert Elevation: Downstream (ft-msl '88)	Drop per Survey (feet)	Drop per Slope (feet)	Slope Offset (feet)
Cottonwood Spring Siphon	1,759.21	1,758.60	0.61	0.46	0.15
End Wash Siphon	1,740.23	1,740.12	0.11	0.45	-0.34
Iron Ledge Siphon	1,729.36	1,728.93	0.43	0.23	0.20
East Thermal Siphon	1,728.27	1,727.90	0.37	0.14	0.23
West Fan Hill Siphon	1,657.67	1,657.03	0.64	0.42	0.22
Thousand Palms Siphon	1,645.53	1,643.93	1.60	1.46	0.14
Whitehouse Canyon Siphon	1,593.82	1,593.27	0.55	0.40	0.15
Big Morongo Siphon	1,591.85	1,584.31	7.54	4.94	2.60
East San Andreas Siphon	1,574.16	1,573.69	0.47	0.27	0.20
San Andreas Siphon	1,573.22	1,566.84	6.38	2.62	3.76

Notes:
(1) Design slope of 0.00077 does not appear on most siphons on most hydraulic profiles, but was checked on the individual plan and profiles for all of the siphons listed in this table

As shown in Table 2, most of the siphons exhibit a deviation in surveyed slope from the design slope of between 0.1 and 0.2 feet. Big Morongo Siphon and San Andreas Siphon slope offsets of more than 2.5 feet each, showing that the slope across each of these siphons is greater than that required to meet the design slope for the siphon of 0.00077. It should be noted that the slope offset for San Andreas Siphon is calculated as 3.76 feet, 1.26 feet greater than the 2.5 feet suggested by the allowance. This may suggest the suggested mechanism for accomplishing the allowance is incorrect, or there may be other factors at play here.

While survey data has not explicitly measured the invert elevations at any point following the construction of these siphons, this calculation is based on the assumption that the siphon transition structures were constructed consistent with the construction plans. If the internal height of the transition structures is in doubt, survey of the invert elevations of the transition structures could be of value.

Field Observations

Given the lack of level sensors along the CRA, Water Supply Operations (WSO) staff have conducted several field investigations of depths along the CRA during periods of constant flow. These field investigations generally consist of one or two staff recording single measurements of depth at several manholes and transition structures between Hinds Pumping Plant and San Jacinto Tunnel.

Under the design flow of 1,605 cfs, the normal depth is designed as 12.96 feet in the most frequently used cut and cover conduit cross-sections, and 13.17 feet in the most frequently used tunnel sections. Figure 1 presents results from the field investigation conducted on 20 March 2013, with flow conditions near design flows.

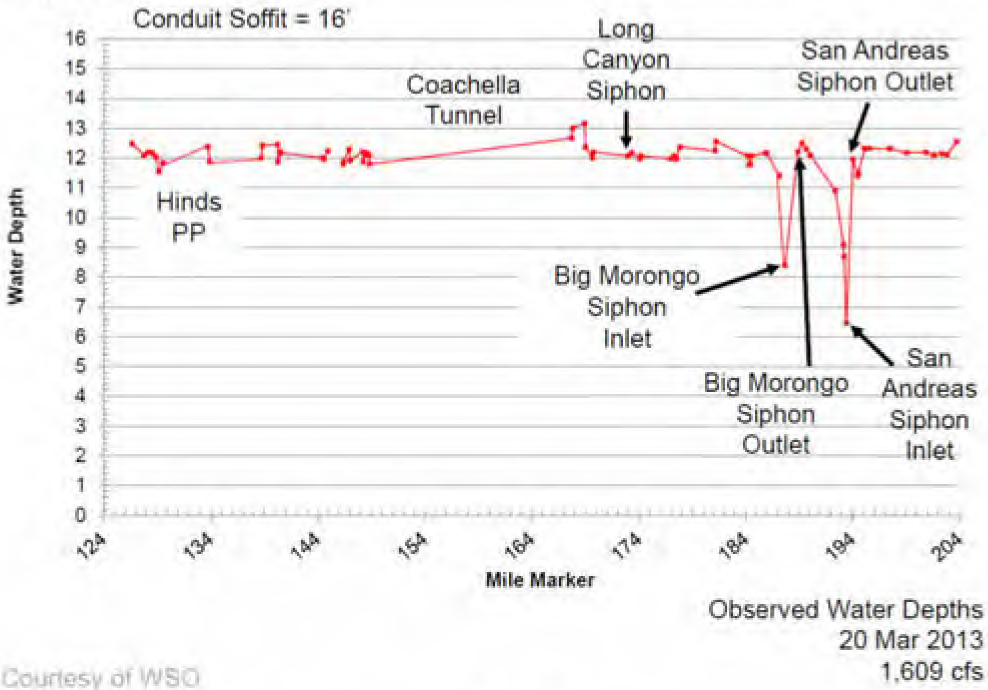

Figure 1
Observed Water Depths at Design Flow

The depth at the San Andreas Siphon and Big Morongo Siphon transition structures consistently stand out with observed water depth lower than the other siphons, dropping to less than 7 feet and less than 9 feet, respectively. These depths are fairly consistent with the depths of 7.8 feet and 8.9 feet observed in the design hydraulic profile discussed at the end of Section 0.

Mechanism

Some possible ideas that could have been incorporated include sizing the diameter of these siphons larger (reducing the headloss across the siphon) or including some type of weir structure.

It is surmised that the mechanism used for incorporating the additional head was to build the inlet transition structure 2.5 feet above the elevation at which the structure would have been constructed without the slope offset. Given that the pressurized pipeline within the siphon can change slope without impacting the hydraulics beyond minor losses, the slope of one of the stretches of pipeline could be raised to achieve a 2.5-foot elevation increase. The contract document suggests this -"The slope given in the hydraulic properties [0.00077] does not include the additional grade allowed to provide for adjustment if future earth movement should take place." (Contract 149)

An exaggerated demonstration of this mechanism is shown in Figure 1. The existing profile of the aqueduct, including the 2.5 foot allowance, is shown in black. A red line, lower at the upstream end of the siphon has been added to shown the 2.5-foot lower starting invert without the allowance. The blue line shows what the initial slope in the siphon would have been in the first pipeline segment without the allowance.

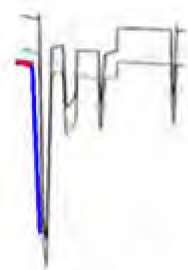

Figure 1
Surmised Design Mechanism

Further, exploring the different versions of the drawings prepared prior to construction suggests the addition of the grade as a slope change. Eight different record drawings are present in EDMS between August and December 1934 (the notice for bids was released 5 December 1934.) These partially correspond to four different construction methodologies and material choices prepared prior to the bid notice (jointed cast-in-place concrete, pre-cast concrete, above ground steel pipe, and buried steel pipe). Ultimately, jointed cast-in-place concrete was selected at the time of the bid notice. The upstream invert elevations of the transition structure in some of the drawings prepared in November 1934 have been raised by 2.5 feet from the August 1934 drawings, with differing slopes (however, each of the differing construction methodologies uses different slopes), with the height of the transition structures maintained between the different drawings. It should also be noted that the 2.5 foot allowance is observed on drawings dating back to 1933, so the allowance was likely planned for prior to 1934.

Assuming the head constraints on the design of the CRA would have been established first at the downstream end (either at the tunnels or of the elevation of Lake Mathews), this would suggest that if the allowance had not been included at each siphon, the CRA upstream of all three upstream siphons could have been designed 7.5 feet lower in elevation, with the lift at Hinds Pumping Plant reduced by 7.5 feet.

Conclusions

In review of record drawings and contract documents associated with the CRA, a tectonic allowance of 2.5 feet of HGL has been included in the design of Big Morongo Siphon, San Andreas Siphon, and the Casa Loma Siphon. Based on the above investigation into this allowance, it is believed that the mechanism for accomplishing the allowance is a slope offset in the invert elevation slope, accomplished by an increased slope in the pressurized pipeline segments within these siphons.

Based on available records, invert elevations have never been surveyed at Big Morongo Siphon, San Andreas Siphon, and the first barrel of the Casa Loma Siphon. Having invert elevation survey data will not prove the mechanism any further than currently shown on record drawings. However, if the internal height of the transition structures is in doubt, survey of the invert elevations of the transition structures could be of value.

In addition, internal inspection of the cast-in-place concrete pipeline and associated joints, as well as internal survey to determine any localized movement, may be desired for non-hydraulic reasons.

Differential survey between the inlet and outlet transition structures would likely be of little value beyond that already provided in 2014. Two additional levels of survey could be conducted—a survey of just the invert elevations of the transition structures, requiring minimal de-watering, and a survey and inspection of the entirety of the siphons, requiring full dewatering.

Estimates of effort for survey of the invert elevations in just the transition structures would be 24 staff hours plus minimal dewatering, and effort for the full siphon survey of the entire length of the two siphons would be 200 staff hours, plus staff for full dewatering.

References and List of Record Drawings

The following table lists record drawings and documents used in preparation of this analysis.

Table 3 Record Drawings and Documents Consulted

Record or ID Number	Record Drawing Type	Siphon	Revision Date
B-363-26	Plan and Profile	Big Morongo	22 Nov 1934
B-363-23	Plan and Profile	San Andreas	30 Nov 1935
B-363-12	Plan and Profile	Casa Loma Siphon	15 June 1934
B-11975	Plan and Profile	Big Morongo	30 Oct 1997
B-11979	Plan and Profile	San Andreas	1 Nov 1956
B-20749	Hydraulic Profile	Multiple, including Big Morongo and San Andreas	1 Aug 1965
B-20748	Hydraulic Profile	Multiple	1 Aug 1965
HR-149	Contract	Big Morongo and San Andreas	5 Feb 1937
FB 2740	Survey Field Book	Big Morongo and San Andreas	12 July 1938
1001 29 042	Survey Notes	Big Morongo and San Andreas	19 May 2014
2037 01 037	Survey Notes	Casa Loma Siphon Number 1	24 August 1998
2039 02 008	Survey Notes	San Jacinto Diversion Structure	5 May 2008
B-1660	Transitions & Sections	San Andreas	21 Nov 1934
B-1663	Transitions & Sections	Big Morongo	22 Nov 1934

Notes:
(1) Since the second barrel was never installed at Casa Loma Siphon, it does not have a

CRA Tectonic Uplift Allowance 8 March 2016

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Appendix 4

Summary of Damage to Metropolitan Infrastructure from Past Earthquakes

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Metropolitan experienced a significant amount of damage to its infrastructure during both the 1971 San Fernando and 1994 Northridge earthquakes. Both of these seismic events primarily impacted the Jensen Water Treatment Plant. Engineering prepared summary reports for both events. The information below represents a convenient summary of what may be found in "Report of Structural Damage to Joseph Jensen Filtration Plant, Earthquake of February 9, 1971" (Report No. 891C), "Historical Documentation of the Jensen Plant Earthquake Disaster of February 9, 1971" (Report No. 909), and "Damage and Repair Report for Joseph Jensen Filtration Plant, Northridge Earthquake of January 17, 1994 (October 1994).

1971 SAN FERNANDO EARTHQUAKE

The San Fernando earthquake struck the greater Los Angeles region in the early morning of February 9, 1971. The thrust earthquake, which had a moment magnitude between 6.5 and 6.7, caused severe damage in the northern San Fernando Valley, with extensive surface faulting to the south of the epicenter. The epicenter was approximately 6.8 miles from the Jensen Plant.

Metropolitan experienced widespread damage at the Jensen Plant. This included a severe break to a 72" Influent Conduit and damage to various structures including the Administration Building, Finished Water Reservoir, Access Tunnel, Mixing and Settling Basins, and Filters.

Following is a summary of the damage to these facilities.

INFLUENT CONDUIT

- Transverse cracks up to ½-in on concrete encasement
- Three joints in the ¼-inch thick steel cylinder separated
- Joint failed and opened up to ¾-inch at the soffit
- Fracture continued thru the top half of the joint
- Much spalling of the mortar lining about 8-inches on each side of the joint
- About 113-feet south of the 72-inch outlet, 75% of the joint failed
- Joint opened up about ¾-inch near the invert and the lining was damaged for about thirty inches each side of the joint
- Entire joint was pulled apart
- Mortar lining was damaged for about 24-inches on each side of the joint
- Considerable spalling and cracking of the lining was evident around the 72-inch outlet
- Lining suffered spalling and cracking approximately 15-feet downstream of the tunnel portal
- Several additional cracks, up to 1/16-inch wide, were observed in the lining
- Two 84-inch and 72-inch welded steel pipelines suffered only minor damage and consisted of cracking of the lining
- Minor cracking at the junction of the 72-inch pipelines and the 12-foot, 6-inch square reinforced concrete box conduit

- The 12-foot wide by 12-foot high reinforced concrete box extending northerly from the main control building had three transverse cracks in the walls and slabs located between Station 5+60 and 6+00;
- Cracks varied in width from 1/32-inch to 1/16 inch;
- 5 Transverse expansion joints in this portion of the influent conduit had separations varying from ½ -inch to 2-inches horizontally, and from ¼-inch to 1-inch vertically.

EFFLUENT CONDUIT

- Severe damage toward the southerly end;
- Differential displacement;
- Complete fracture or shearing.

MAIN CONTROL BUILDING

- Considerable horizontal and vertical displacement throughout; led to multiple non-structural damaged areas throughout building
- Building moved approximately 5-inches to the south and approximately 6-3/4-inches to the east
- There was settlement of 2-inches on the south side of the building causing a slight southeasterly tilt.

BALBOA INLET TUNNEL

- Concrete tunnel lining badly spalled and cracked at a distance approximately 100 feet near the Olive View Fault crossing;

CONNECTING CONDUITS

- Significant damage occurred at expansion joints, intersection of east-west and north-south galleries, and by punching of an embedded pipe into a wall
- Several portions of the structure between expansion joints moved as separated structures, on the three axes of movement, and also moved with twisting (torsional) action on each of the three planes
- In some cases, the joint filler and sealant was compressed and squeezed out of the joint
- Individual working of the structurally separated portions of the structure caused them to pound against each other, thereby resulting in spalling of concrete adjacent to the edges of the expansion joints
- Considerable cracking and some spalling occurred at the intersection of the east-west and north-south 25-foot wide influent conduit and pipe gallery, all were repairable
- Cracks in slabs and walls occurred at the intersection of pipe galleries Nos. 1 and 2 in the north-south influent conduit and pipe gallery, but all were repairable

- The southern end of the east-west pipe that was cast into the west wall of the north-south influent conduit pipe gallery pounded and caused the wall to shatter
- Large amount of movement took place in the overhead piping at the intersection of the east-west and north-south influent conduit pipe galleries
- Movement was in several directions, with pipe having been displaced.

MIXING AND SETTLING BASINS

- Significant damage occurred at expansion joints, and the intersection of the east-west and north-south galleries
- Several portions of the structure between expansion joints moved as separate structures on the three axes of movement
- Some cases, the joint filler and sealant was compressed and squeezed out of the joint;
- The individual working of the structurally separated portions of the structure caused them to pound against each other, thereby resulting in spalling of concrete adjacent to the edges of the expansion joint
- Cracking and some spalling occurred at the intersection of the east-west and north-south influent conduit and pipe gallery
- Cracks in slabs and walls occurred at the intersection of pipe galleries Nos. 1 and 2 in the north-south influent conduit and pipe gallery

FILTERS

- Some vertical and lateral displacement occurred between adjacent beds at some expansion joint locations
- Compressive loads forced expansion joint material out of some joints
- Minor spalling occurred adjacent to some expansion joints
- An apparent lateral thrust from the west caused the wash troughs to pull partly out of the insets
- Wash troughs acting as struts transferred the thrust to the gullet wall, which had not been completely poured, causing the wall to split at the east line of reinforcing bars
- Cracking and spalling in other filter beds occurred at the wash troughs but were minor in nature
- Minor spalling occurred where 16-inch spray header line passes through the wall filter beds
- The west end of the conduit was damaged
- Connection between the used washwater conduit and the 48-inch diameter conduit pulled apart
- Top walkway grid slab cracked diagonally across the northeast corner of filter bed
- Filter control building No. 2 separated from the walkway at the top of the filter beds expansion joint
- Separation varied from ½-inch to 1 ¼-inch at the expansion joint between Filter Control Building No. 2 and the valve and meter structure

- Valve and meter structure settled 1” lower than Filter Control Building No. 2
- Lining on north side of the return washwater line had a spalled area.

CHEMICAL BUILDING

- Severe lateral and vertical motion
- Column anchor bolts either stretched or pulled out of the footing concrete at all six columns
- Column in south wall buckled
- Column at northeast corner bowed out of line
- Diagonal bracing system in exterior walls failed
- Diagonals failed in tension or damaged in compression
- Upper concrete floors and roof were pierced by the diagonal bracing and columns
- Considerable cracking or spalling of slab concrete
- Building frame racked out of plumb, being tilted toward the east
- Metal door and window frames in north wall were racked out of square
- Several siding panels on the north wall broke loose from the framing
- Siding fasteners snapped off or pulled out
- All anchor bolts for the four chemical tanks failed by being sheared, bent or pulled out
- Tanks were not damaged by second floor slab; although marks on tank indicate that 6 to 8 inches of vertical movement took place
- Columns supporting exterior stairway were bent.

BRIDGE AND BOX CULVERT FOR RAILROAD SPUR TRACK

- Vertical crack at the juncture between the north abutment and the wing wall on the west side
- Wall and abutment became offset.

WASHWATER TANK

- Vertical movement of the tank
- Movement caused anchor bolts to either pull out or fail in tension
- Tank slammed down upon the ring wall, resulting in buckling in the upper courses of the tank skin
- Damage to stairway.

FINISHED WATER RESERVOIR

- North Wall:
    - Did not rupture but had 3 continuous horizontal cracks
    - Cracks varied in width from hairline to 1/32 inch and were spaced
    - There were many random vertical and diagonal hairline or large cracks.

- South Wall:
  - Easterly half of the south wall had several vertical and diagonal random cracks
  - Wall between column lines 'B' and 'C' was severely shattered
  - Some earth backfill entered the reservoir thru the wall and roof rupture
  - Random vertical and diagonal wall cracks occurred in the westerly half of the south wall
  - Fracturing and spalling occurred at other locations along the south wall on both the interior and exterior surfaces
  - Lateral offset at crack, particularly where it crossed the wall corbels.
- East Wall:
  - Portion of east wall, north of outlet received extensive damage
  - Bowed inward between the floor and roof slabs
  - Series of continuous horizontal cracks
  - Extensive lengths of spalls and cracks with some fractures occurred at the base of the wall
  - Large vertical crack occurred in the east wall
  - Overflow weir wall was also damaged and laterally offset at a vertical construction joint in the same area
  - East wall, south of the outlet structure, showed some offset and spalling at the floor line
  - Random and vertical cracks occurred at about mid-height
  - East wall of the finished water reservoir was severely fractured and spalled.
- West Wall:
  - Fractured and shattered above the floor slab line;
  - Horizontal displacement of the bottom of this wall occurred at the fracture;
  - Wall shattered for its full height between column 24 and 25.
- Roof
  - Failure plane occurred in the roof slab between column lines B and C
  - Extensive damage to the roof slab occurred adjacent to the drop panel connections;
  - Fracture at the drop panel line was apparent only in the north half of the reservoir
  - Continuous east-west failure occurred in line with the south edge of the roof slab drop panels
  - Roof slab south of this line had a vertical offset approximately 12 inches lower than the roof slab on the north side
  - From column line "0", east to column line "V", spalling was evident only at the west faces of the drop panels
  - Roof slab fractured between column lines "B" and "C"
  - Continuous east-west lines of failure occurred between column lines 3 and 4, 7 and 8, and 24 and 25. These breaks or spalls exposed the reinforcement for the full length of the reservoir roof slab.

- The width of spalling at the construction joint between column lines 24 and 25 varied between 4 feet and 6 feet. During the quake, this joint opened up, allowing for considerable quantities of gravel backfill to fall through from above.
- The roof slab was also severely spalled, shattered and offset vertically at the west edge of the drop panel line adjacent to the east wall
- Spalling also occurred at the west face of the drop panels at line "B" from column line 22, to a point midway between column lines 24 and 25.

RESERVOIR FLOOR

- While floor slab damage was general throughout the structure it was most apparent in the southeast quadrant
- Spalled strip running east-west between column 2 and 3, from a point midway between lines B and C to the east wall
- Spalled strip at the center of the structure, between lines 13 and 14. These spalled strips averaged about 2 feet wide and many of them had vertical offsets upward from the general floor level.
- There were additional spalled construction joints in the north-south direction; however, none of these were as long as the two east-west spalls previously described
- Spalling occurred at the drainage gutters for almost the entire length in both the north-south and east-west directions
- Continuous spalls occurred throughout and between various lines
- Floor cracking occurred midway between lines 14 and 15 in the east-west direction; the south exterior wall drop panels at M-1, N-1 and U-1 spalled in the east-west direction;
- Floor slab cracks located were located as follows:
  - North-south between lines Y and Z; from midway between lines 5 and 6 to a point midway between lines 17 and 18
  - North-south between lines between Z and AA, from a point midway between lines 2 and 3 to a point midway between lines 19 and 20; diagonally across the southeast corner of drop panel W-18
  - North-south between lines P and Q; from a point midway between lines 13 and 14; to column line 15
  - East-west between lines 14 and 15, from a point midway between lines D and E, to a point midway between lines E and F.

BAFFLE WALLS AND COLUMNS

- Damage to the baffle walls consisted of two principal types; cracking or fracturing of the vertical beams and dislodgement and fracturing of the corrugated asbestos cement panels, only one vertical concrete beam collapsed
- The other beams remained standing but were tilted out of plumb
- Many of the other vertical beams were fractured or cracked near the base or in the region slightly above the base
- There were a number of spalls in the cast-in-place concrete projections forming the panel slots on the sides of the circular roof columns
- A large number of the corrugated asbestos cement panels were damaged or completely destroyed. Some of them fell to the floor and were shattered, while others that remained in place were damaged less severely.
- Approximately 73 baffle walls vertical beams sustained cracks, fractures, spilling, etc.
- Damage to the reservoir roof columns varied widely, from hairline cracks to complete fractures
- The damage to any individual column appeared generally to be the same at the top as at the bottom
- The majority of columns were spalled, or otherwise damaged on the east and west sides
- There were two notable exceptions: The first row of columns south of the north wall and the first row of columns north of the south. In these two rows, major damage occurred on the north and south sides
- In all cases, damage to the circular columns appeared to be primarily due to flexure and not to vertical load
- A number of the columns, notably those in the first row east of the west wall, were visibly out of plumb
- The tops of these columns were displaced east. Damage to drop panels and column capitals were generally limited to minor spalls and some cracks, except for several bottom capitals located in the northeasterly quadrant of the reservoir that were fractured or shattered.

RESERVOIR OUTLET STRUCTURE

- Severe and extensive damage;
- Fractures throughout the entire structure.

RESERVOIR INLET STRUCTURE

- Moderate damage;
- Spalled concrete exposing reinforcement.

1994 NORTHRIDGE EARTHQUAKE

In 1994, the Northridge earthquake occurred on January 17, at 4:30 a.m. It had a duration of approximately 10–20 seconds. The blind thrust earthquake had a moment magnitude (M_w) of 6.7. The death toll was 57, with more than 8,700 injured. In addition, property damage was estimated to be between $13 and $50 billion, making it one of the costliest natural disasters in U.S. history. LADWP reported a total of 1,405 pipe repairs and that water pressure had dropped to zero in some areas. The epicenter was approximately 7.3 miles from the Jensen Plant.

Metropolitan had damage at the Jensen Plant and adjacent facilities. Following is a summary of the damage to these facilities:

MAJOR DAMAGE

- Jensen Plant Balboa Influent Conduit
  - 84-in influent pipeline severed approximately 3-in horizontally and 1-in vertically near venturi structure
- East Valley Feeder
  - Pipeline breaks occurred between Odessa and Rinaldi Streets (976+86.70) and Woodley Avenue and Rinaldi Street (957+66.50)
  - Sectionalizing valve damage caused damage to all electrical equipment
  - Street asphalt damage as result of pipe breaks/leaks
- West Valley Feeder No. 1
  - Crack at cut-off wall at Station 1219+10
  - Sectionalizing valve structure damaged, causing damage to all electrical equipment
- Main Electrical Center
- Service Connection CLWA-1T
  - Service connection structure settled and drifted laterally
  - Misalignment of valve assemblies
- Service Connection LA-25
  - Extensive damage at ten pipe joints in the 97-in diameter pipeline and 60-in diameter overflow pipeline; pipe joints spread 1/8” to 3/4”
  - Reinforced box conduit suffered a break and 2” separation; a 6-1/2” separation occurred at the joint where the double box conduit meets the discharge structure
  - Turnout structure moved 6 to 8 inches east
  - Double box conduit moved 3 inches to the east

- Service Connection LA-35T
  - Damage to valve structure and pipe bridge due to differential displacement
- Newhall Tunnel
  - Buckling of steel liner
  - Concrete construction joints opened and closed resulting in sand and water infiltration
  - Bulge on steel liner split at circumferential joint resulting in oil and water infiltration

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Appendix 5

Metropolitan Water Storage Capacity

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Over the past two decades, Metropolitan has developed a large regional storage portfolio that includes both dry year and emergency storage capacity. Storage generally takes two forms: surface reservoirs and groundwater basin storage. Heading into the most recent drought cycle, Metropolitan had developed over 5.5 million acre-feet of storage capacity and had successfully stored over 2.7 million acre-feet. This is a more than 13 times the storage capacity compared to the 1980s, with record quantities of water in reserve. This increase in storage capacity is shown in Figure 5-1.

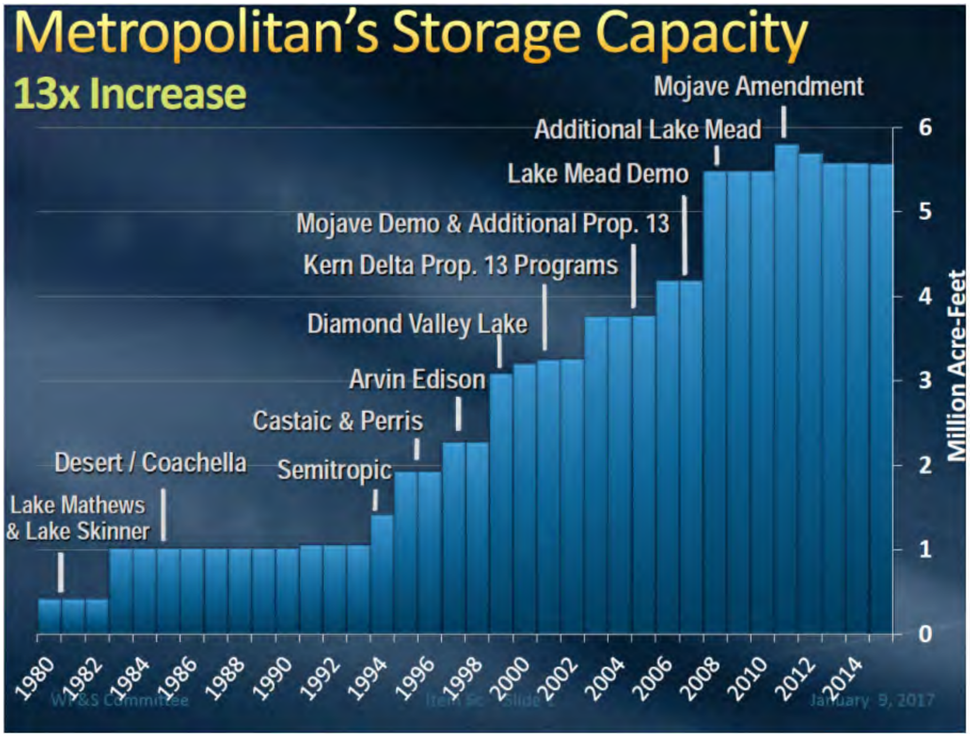

Figure 5-1. Summary of Metropolitan's Storage Capacity Over Time

Some examples of storage resources that have been developed since 1990 include:

- Surface Water Reservoirs:
  - Diamond Valley Lake (810,000 acre-feet)
  - SWP Article 56 Carryover Storage (up to 200,000 acre-feet)
  - Flexible Storage in Castaic Lake and Lake Perris (219,000 acre-feet)
  - Intentionally Created Surplus in Lake Mead (1.5 million acre-feet)
- Groundwater Storage:
  - Member Agency Conjunctive Use Programs (210,000 acre-feet)
  - Semitropic Storage Program (350,000 acre-feet)
  - Arvin-Edison Storage Program (350,000 acre-feet)
  - San Bernardino Municipal Water District Storage Program (50,000 acre-feet)
  - Kern Delta Water District Storage Program (250,000 acre-feet)
  - Mojave Storage Program (390,000 acre-feet)

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Appendix 6

Seismic Design Frequently Asked Questions

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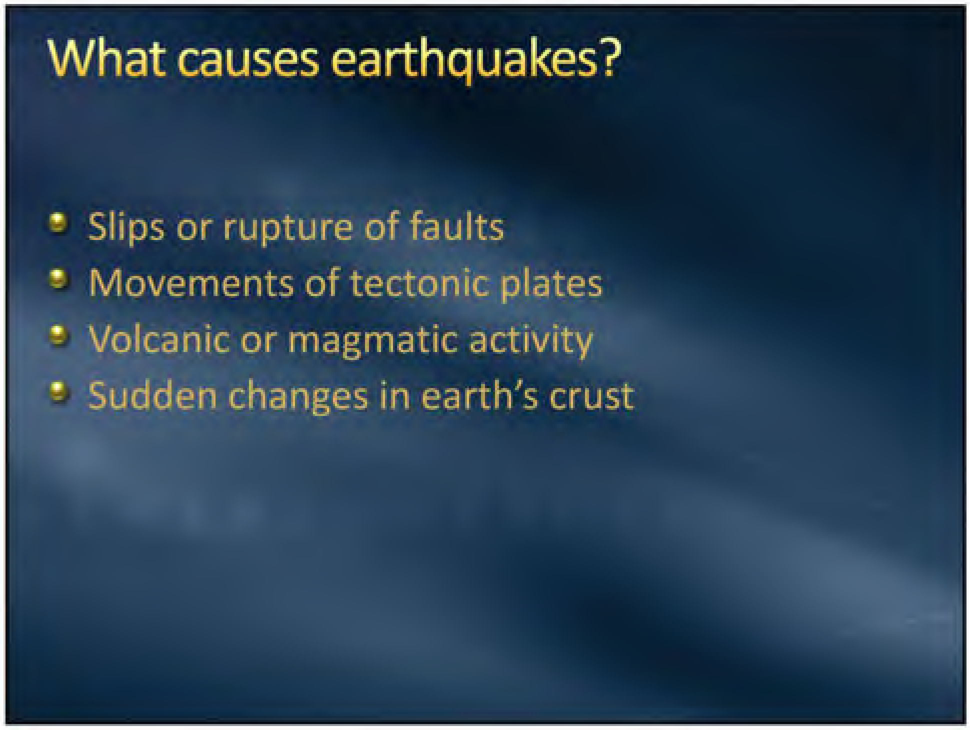
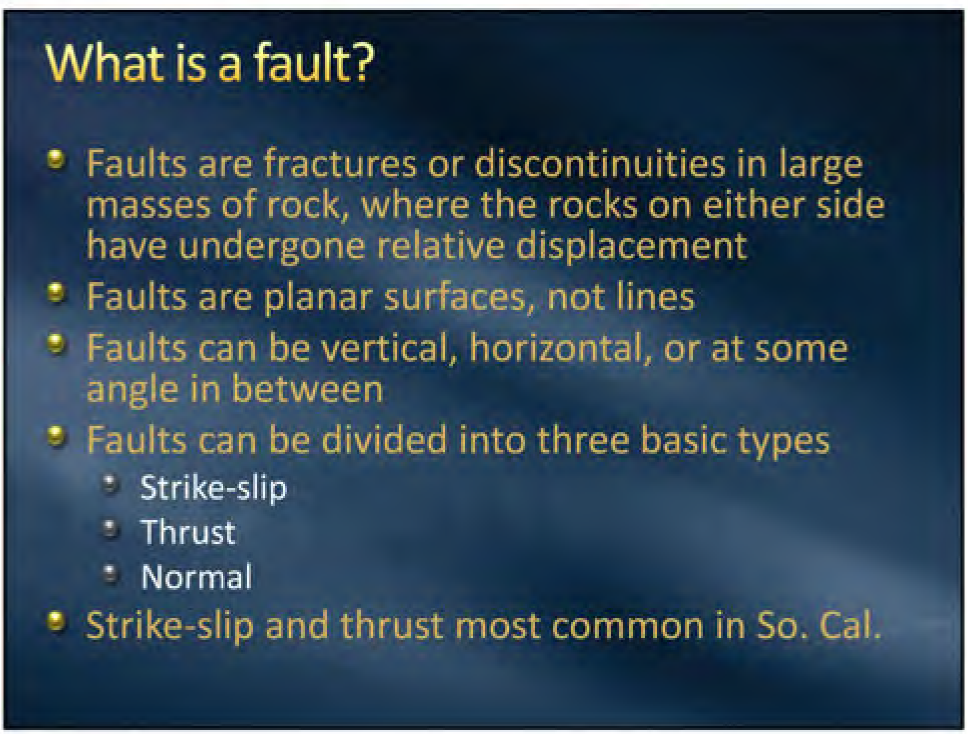
Seismic Design FAQs

September 2017

What are the effects of earthquakes?

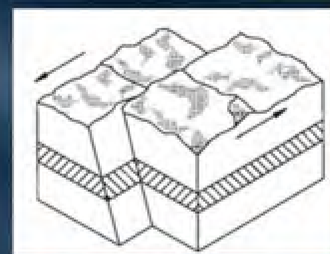
- Ground shaking
- Ground rupture
- Liquefaction
- Landslides and avalanches
- Tsunamis


What causes earthquakes?
Slips or rupture of faults
Movements of tectonic plates
Volcanic or magmatic activity
Sudden changes in earth's crust


What is a fault?
Faults are fractures or discontinuities in large masses of rock, where the rocks on either side have undergone relative displacement
Faults are planar surfaces, not lines
Faults can be vertical, horizontal, or at some angle in between
Faults can be divided into three basic types
Strike-slip
Thrust
Normal
Strike-slip and thrust most common in So. Cal.

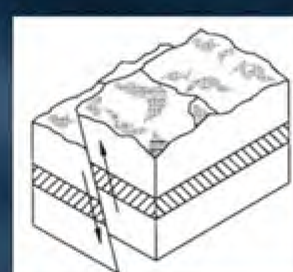
Strike-Slip Faults

- Faults are primarily vertical or near-vertical
- Movement occurs primarily laterally - one side slides by the other
- Primary examples are the San Andreas and San Jacinto Faults



Thrust Faults

- Faults occur at an angle to the surface
- Movement occurs primarily vertically - one side slides up over the other
- Primary examples are the Santa Susana and Bunker Hill Faults



Major Earthquake Faults in So. Cal.

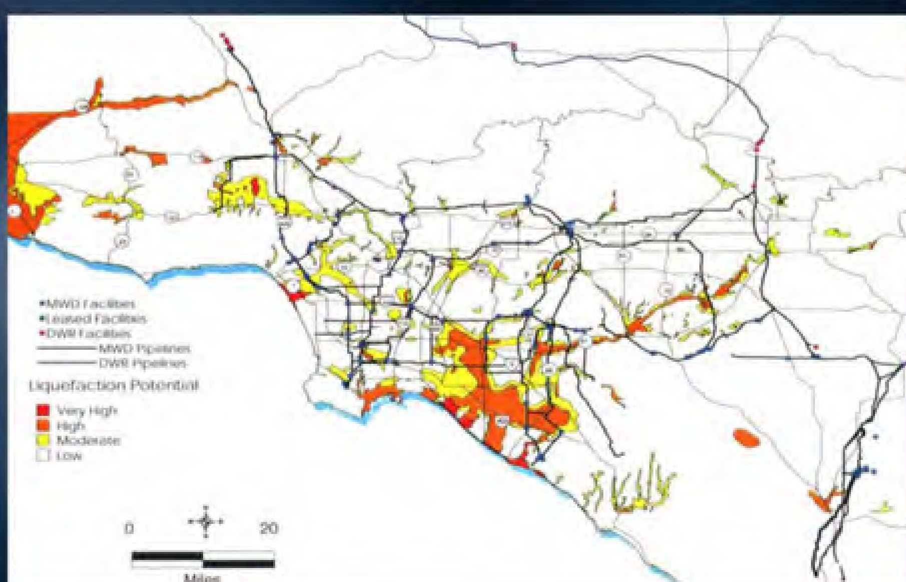
San Andreas Fault

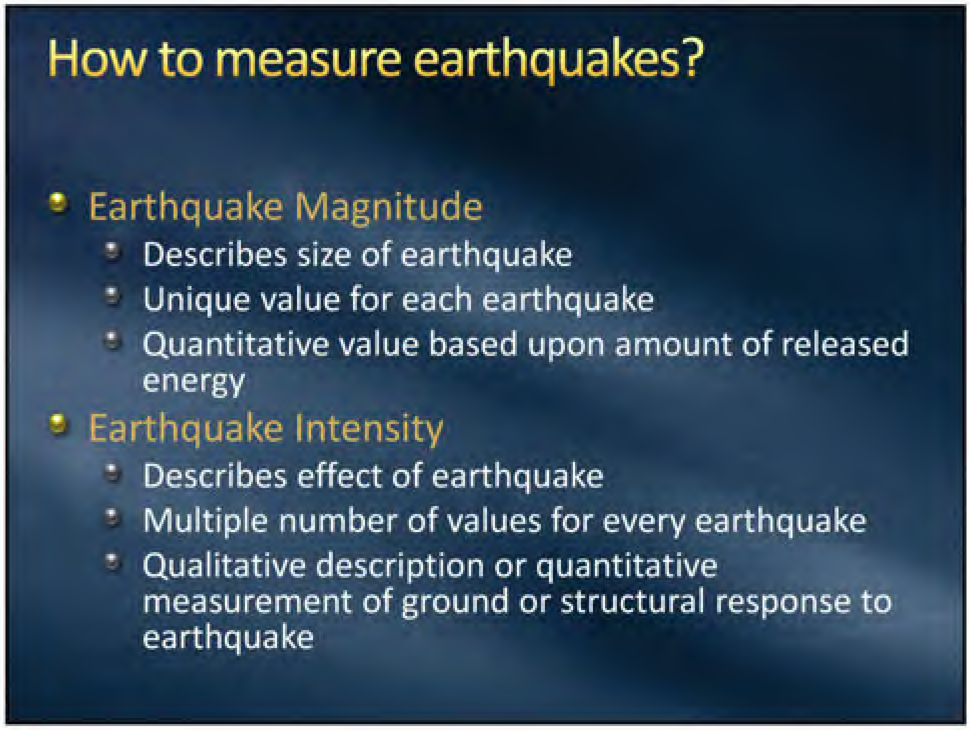
- Fault with the highest probability of generating a major earthquake in So. Cal.
- Potential impact on MWD operation
  - CRA
  - Hinds and Eagle Mountain Pumping Plants
  - Rialto and Inland Feeders
  - East Branch of State Water Project
  - DWR's Santa Ana Pipeline

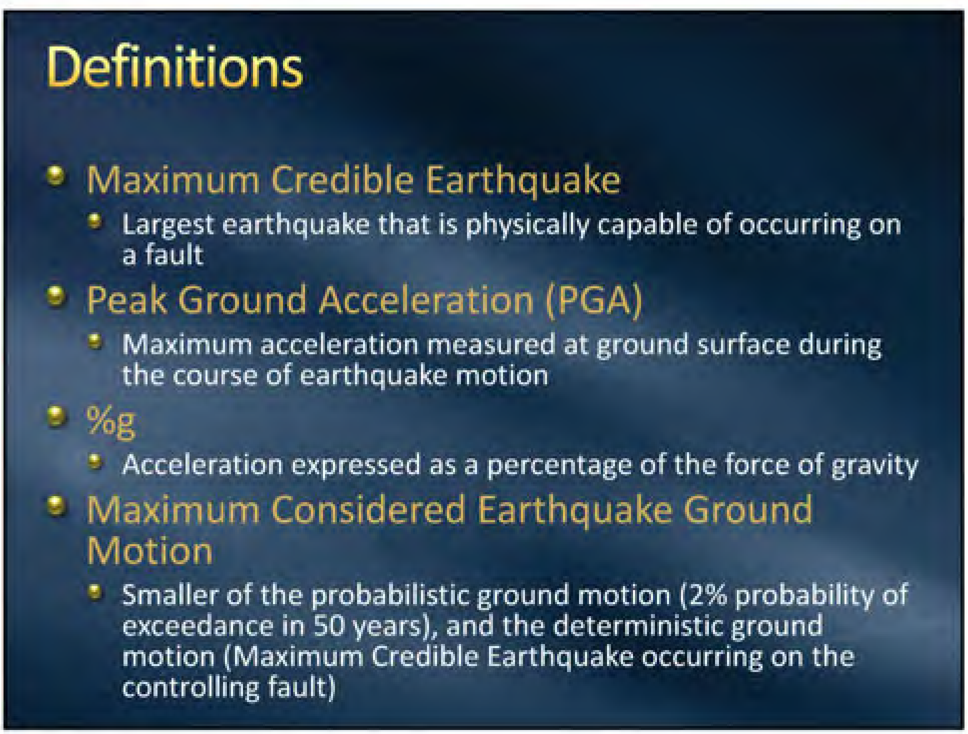
Liquefaction

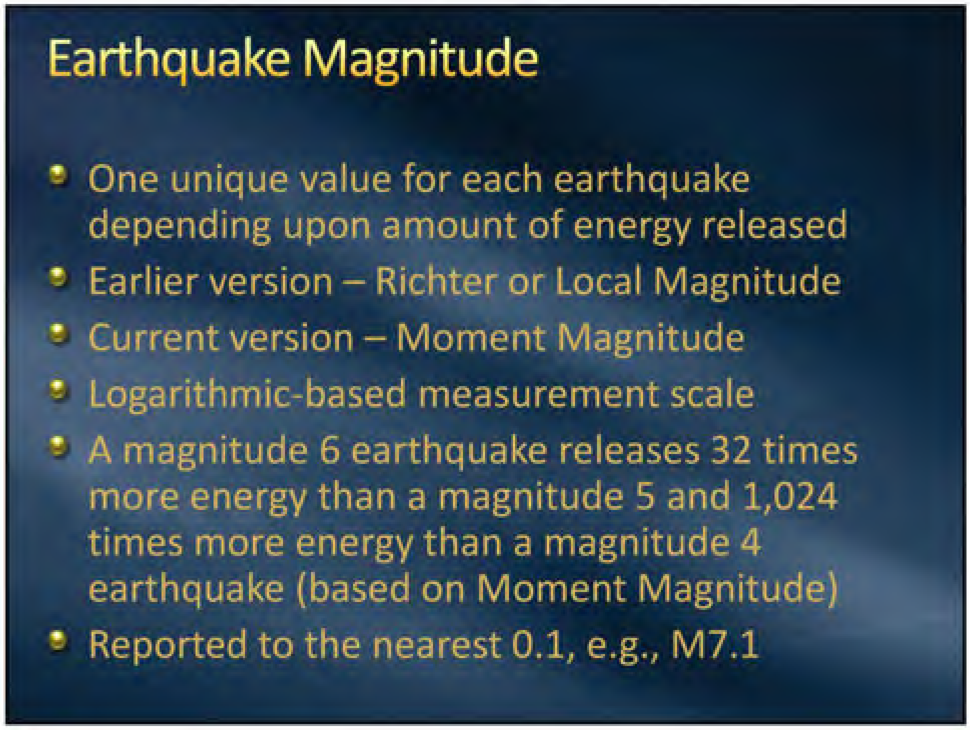
- What is liquefaction?
  - A process by which water-saturated soils temporarily lose strength and act like liquid
- Factors needed for liquefaction
  - Loose or low density sandy soils
  - Shallow ground water
  - Strong ground shaking

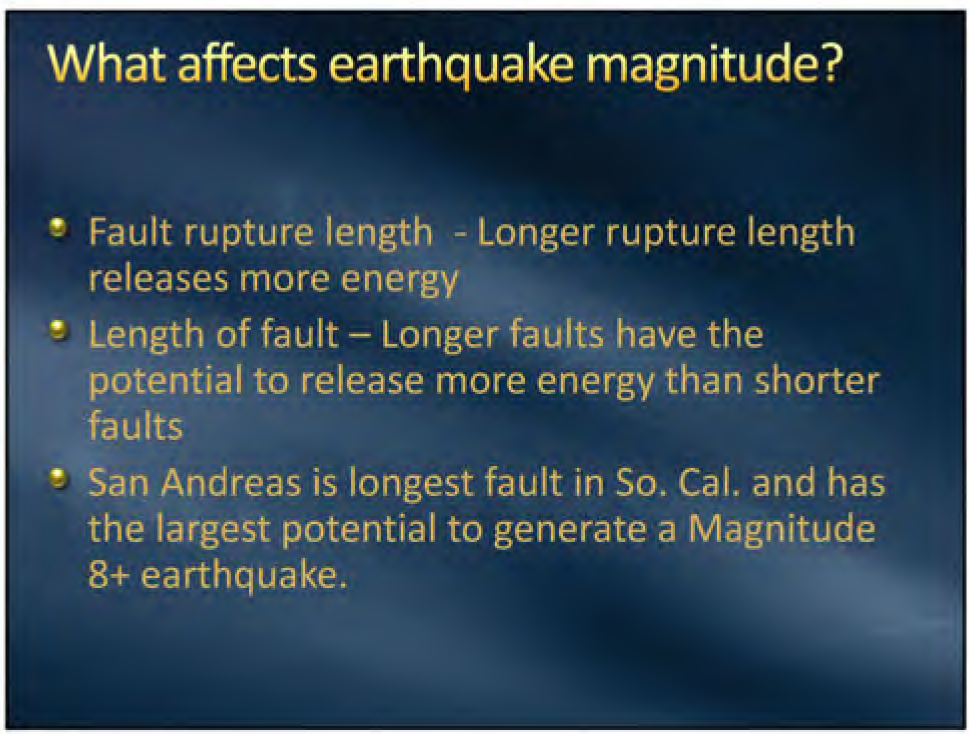
Liquefaction Susceptible Zones in So. Cal.

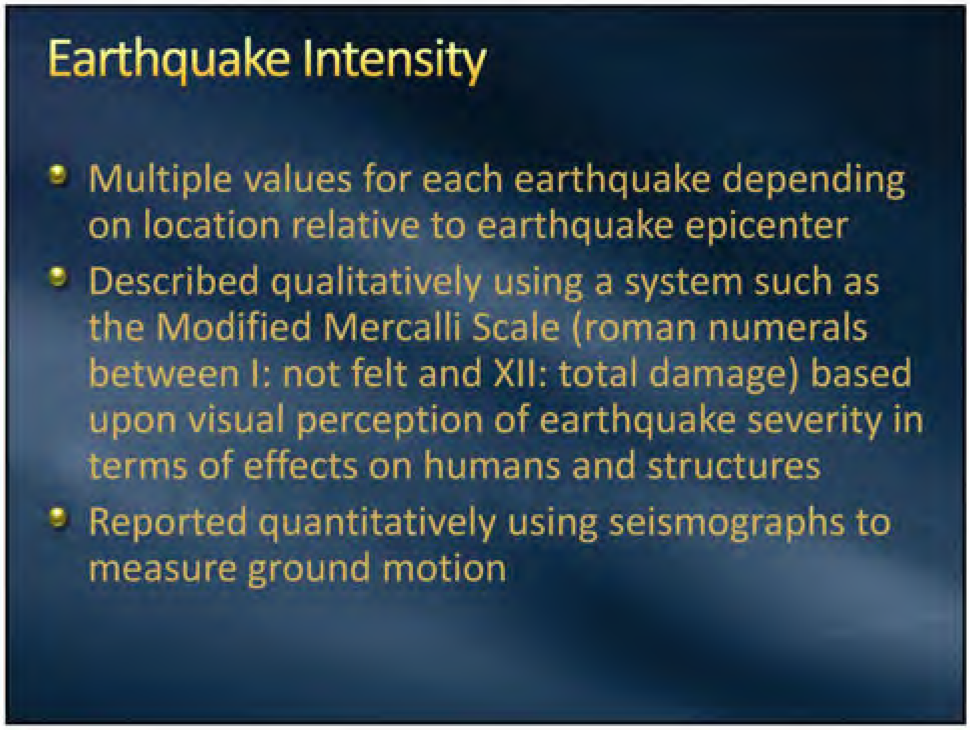


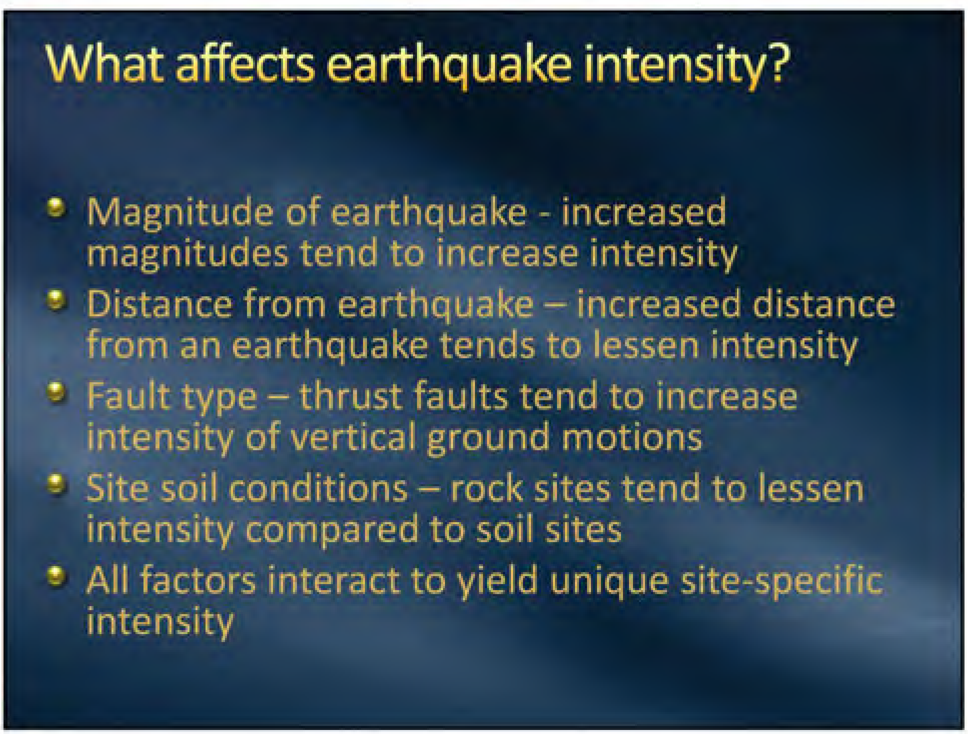

How to measure earthquakes?
Earthquake Magnitude
Describes size of earthquake
Unique value for each earthquake
Quantitative value based upon amount of released energy
Earthquake Intensity
Describes effect of earthquake
Multiple number of values for every earthquake
Qualitative description or quantitative measurement of ground or structural response to earthquake

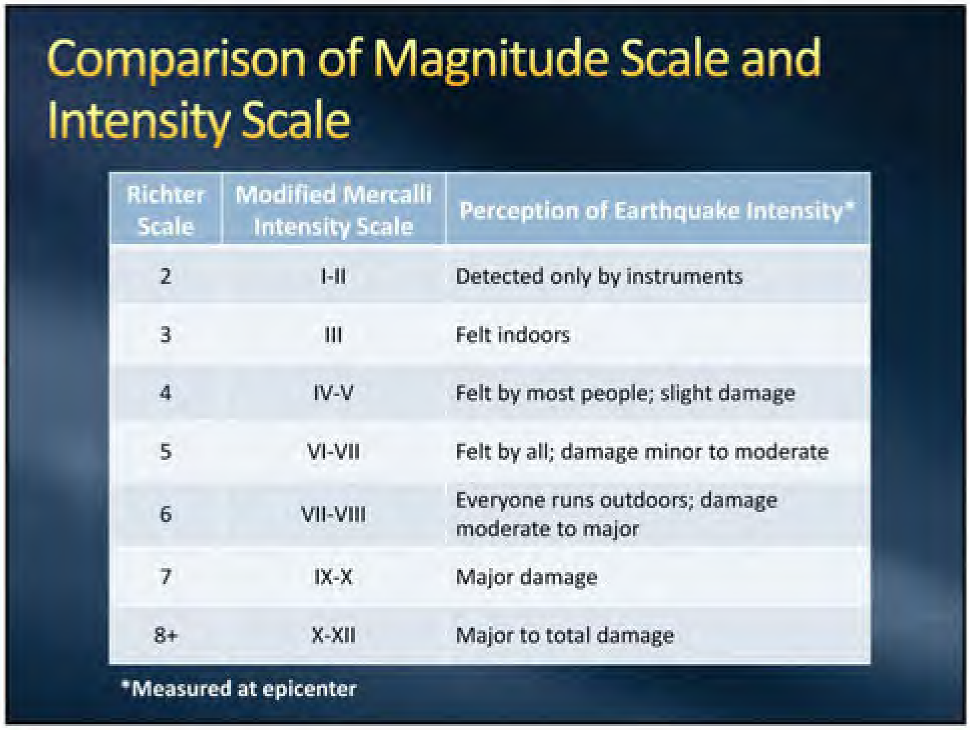

Definitions
Maximum Credible Earthquake
Largest earthquake that is physically capable of occurring on a fault
Peak Ground Acceleration (PGA)
Maximum acceleration measured at ground surface during the course of earthquake motion
%g
Acceleration expressed as a percentage of the force of gravity
Maximum Considered Earthquake Ground Motion
Smaller of the probabilistic ground motion (2% probability of exceedance in 50 years), and the deterministic ground motion (Maximum Credible Earthquake occurring on the controlling fault)


Earthquake Magnitude
One unique value for each earthquake depending upon amount of energy released
Earlier version – Richter or Local Magnitude
Current version – Moment Magnitude
Logarithmic-based measurement scale
A magnitude 6 earthquake releases 32 times more energy than a magnitude 5 and 1,024 times more energy than a magnitude 4 earthquake (based on Moment Magnitude)
Reported to the nearest 0.1, e.g., M7.1


What affects earthquake magnitude?
Fault rupture length - Longer rupture length releases more energy
Length of fault – Longer faults have the potential to release more energy than shorter faults
San Andreas is longest fault in So. Cal. and has the largest potential to generate a Magnitude 8+ earthquake.

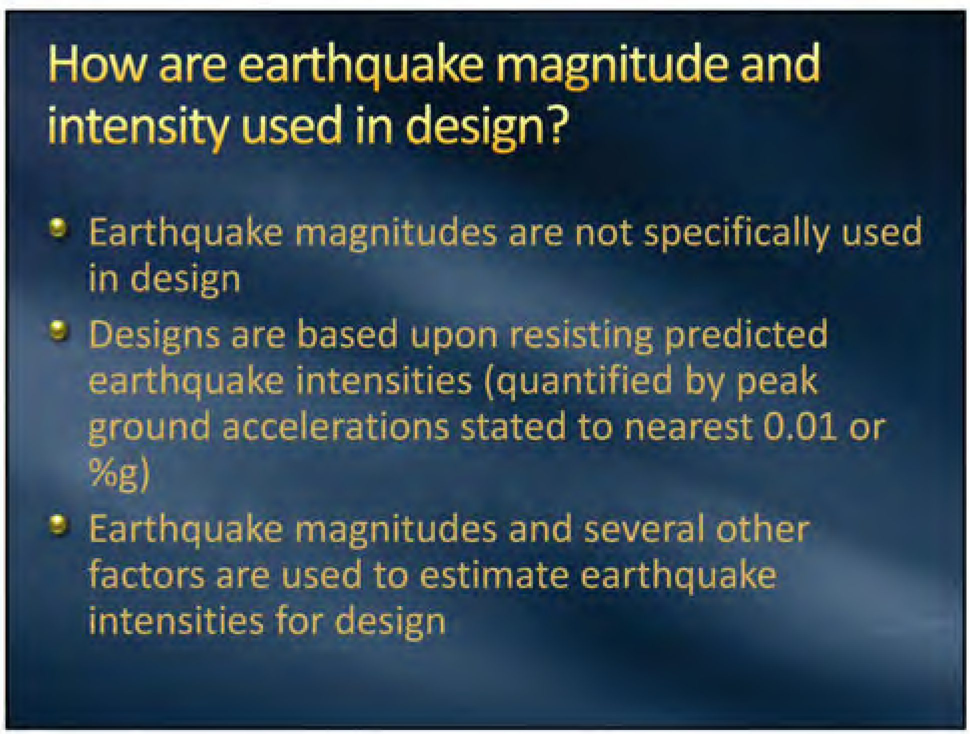

Earthquake Intensity
Multiple values for each earthquake depending on location relative to earthquake epicenter
Described qualitatively using a system such as the Modified Mercalli Scale (roman numerals between I: not felt and XII: total damage) based upon visual perception of earthquake severity in terms of effects on humans and structures
Reported quantitatively using seismographs to measure ground motion

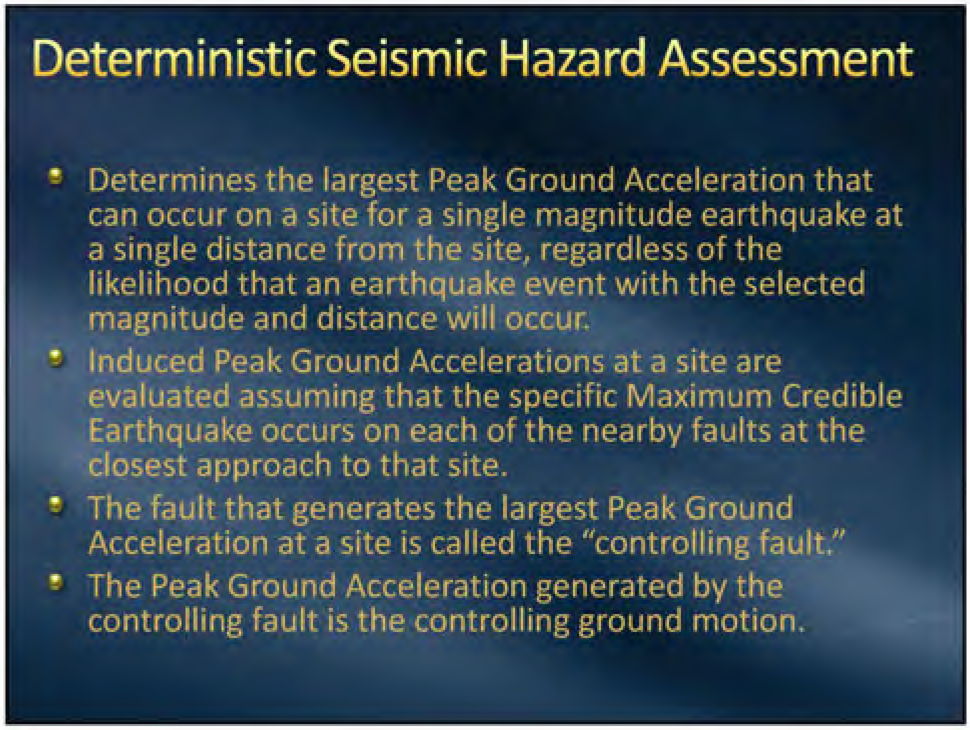

What affects earthquake intensity?
Magnitude of earthquake - increased magnitudes tend to increase intensity
Distance from earthquake – increased distance from an earthquake tends to lessen intensity
Fault type – thrust faults tend to increase intensity of vertical ground motions
Site soil conditions – rock sites tend to lessen intensity compared to soil sites
All factors interact to yield unique site-specific intensity

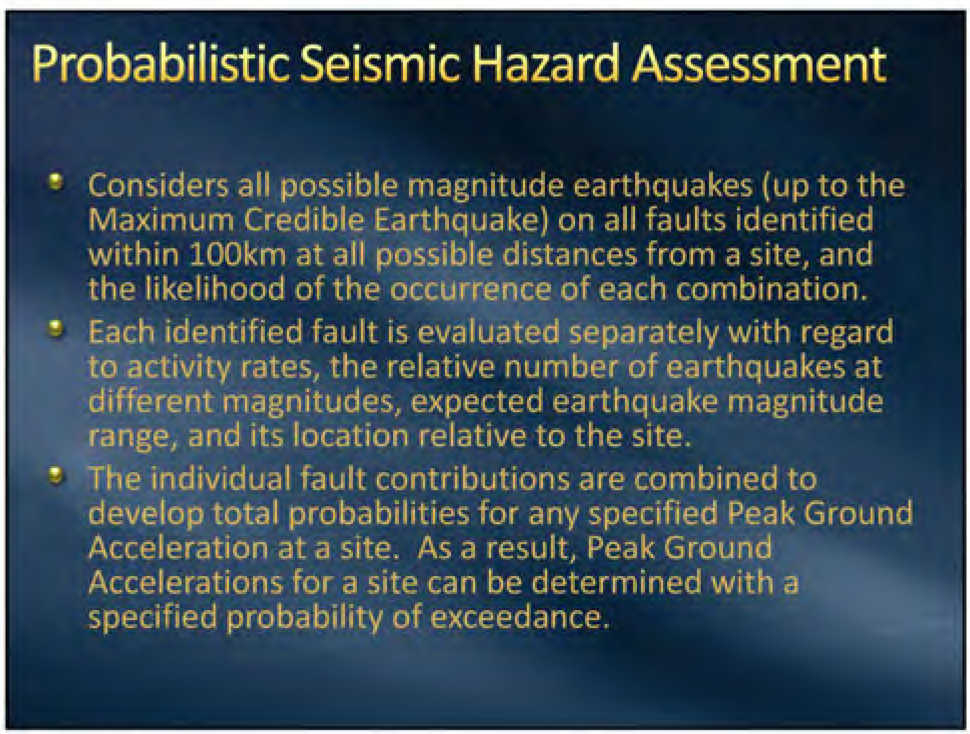

Comparison of Magnitude Scale and Intensity Scale

Richter Scale	Modified Mercalli Intensity Scale	Perception of Earthquake Intensity*
2	I-II	Detected only by instruments
3	III	Felt indoors
4	IV-V	Felt by most people; slight damage
5	VI-VII	Felt by all; damage minor to moderate
6	VII-VIII	Everyone runs outdoors; damage moderate to major
7	IX-X	Major damage
8+	X-XII	Major to total damage

*Measured at epicenter


How are earthquake magnitude and intensity used in design?
Earthquake magnitudes are not specifically used in design
Designs are based upon resisting predicted earthquake intensities (quantified by peak ground accelerations stated to nearest 0.01 or %g)
Earthquake magnitudes and several other factors are used to estimate earthquake intensities for design


Deterministic Seismic Hazard Assessment
Determines the largest Peak Ground Acceleration that can occur on a site for a single magnitude earthquake at a single distance from the site, regardless of the likelihood that an earthquake event with the selected magnitude and distance will occur.
Induced Peak Ground Accelerations at a site are evaluated assuming that the specific Maximum Credible Earthquake occurs on each of the nearby faults at the closest approach to that site.
The fault that generates the largest Peak Ground Acceleration at a site is called the "controlling fault."
The Peak Ground Acceleration generated by the controlling fault is the controlling ground motion.


Probabilistic Seismic Hazard Assessment
Considers all possible magnitude earthquakes (up to the Maximum Credible Earthquake) on all faults identified within 100km at all possible distances from a site, and the likelihood of the occurrence of each combination.
Each identified fault is evaluated separately with regard to activity rates, the relative number of earthquakes at different magnitudes, expected earthquake magnitude range, and its location relative to the site.
The individual fault contributions are combined to develop total probabilities for any specified Peak Ground Acceleration at a site. As a result, Peak Ground Accelerations for a site can be determined with a specified probability of exceedance.

Current Building Code Seismic Design Requirements

- Maximum Considered Earthquake (MCE) Ground Motion
  - Probabilistic: Ground motion with 2% probability of exceedance in 50 years
  - Deterministic: Ground motion generated by Maximum Credible Earthquake occurring on the controlling fault(s)
  - Smaller ground motion determined by these two methods governs design
  - Deterministic approach usually governs in So. Cal.
- A Regular Facility is designed for 2/3 of MCE Ground Motion to achieve Life Safety performance
- An Essential Facility is design for a higher performance
  - Building codes establish the minimum seismic design criteria, and building owners can choose to design for a higher performance
- Building codes do not apply to facilities under Cal. Division of Safety of Dams (DSOD) jurisdiction

Examples of Regular and Essential Facilities

Facilities	Description	Examples
Regular	Normal occupancy	•Commercial buildings •Residential buildings •Manufacturing facilities
Essential	High occupancy/Special occupancy	•Schools •Hospitals •Jails, detention facilities •Public utility facilities •Hazardous material storage facilities • Fire and police stations • Emergency shelters • Aviation facilities

Based on IBC 2009, ASCE 7-05

Examples of Design Peak Ground Acceleration in Recent Codes

Codes	Year in Effect in Cal.	Design Peak Ground Acceleration (PGA)[+]		
		Weymouth	USHQ	Skinner
UBC 1994	1995	0.4g	0.4g	0.4g
1994 Northridge Earthquake - Resulted in codification of the near-source effect*				
UBC 1997	1998	0.52g	0.4g	0.4g
Seismic hazard map updated to reflect the adoption of Maximum Considered Earthquake Ground Motion as the basis of structural design				
IBC 2009	2010	0.71g	0.59g	0.4g

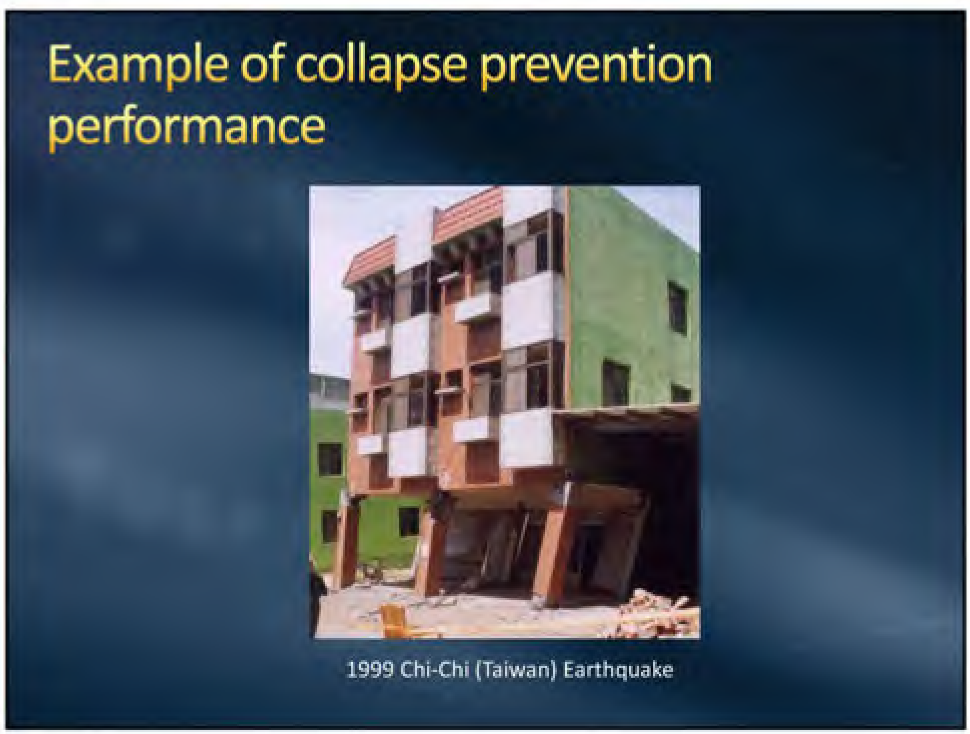
[+]The listed PGA values are based on generic seismic hazard maps included in the codes. A site-specific analysis may result in different values.
*Other factors such as frequency contents and shaking duration will result in adverse effect on structures that cannot be captured by PGA along. The effect is more pronounced when the site is close to earthquake epicenter, and accounted for by amplifying PGA.

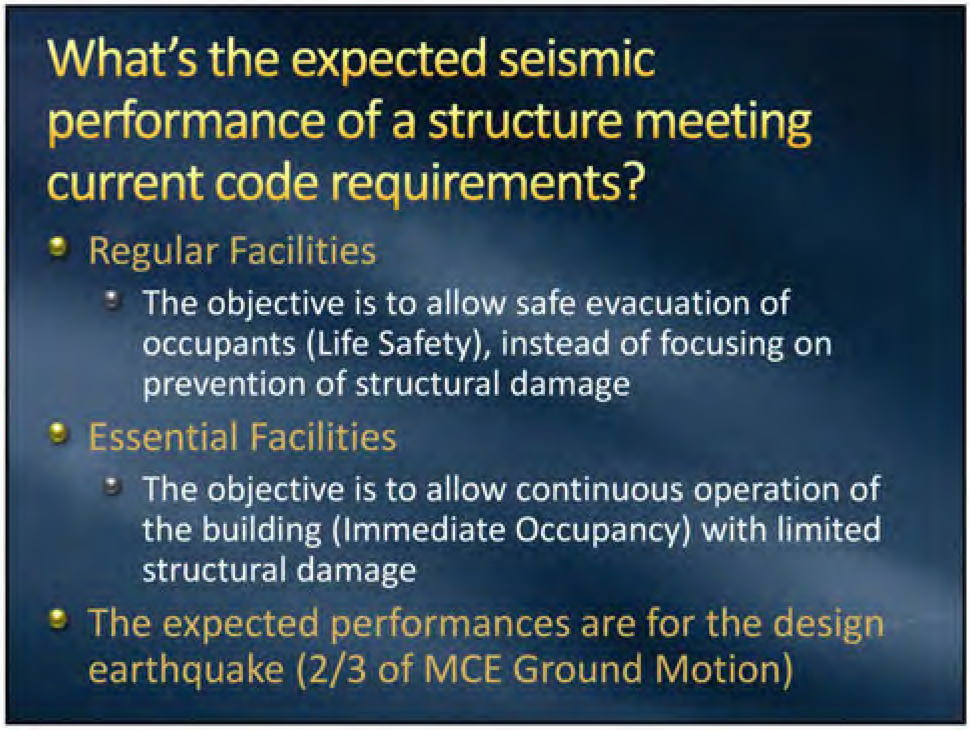
How to define seismic performance of structures?

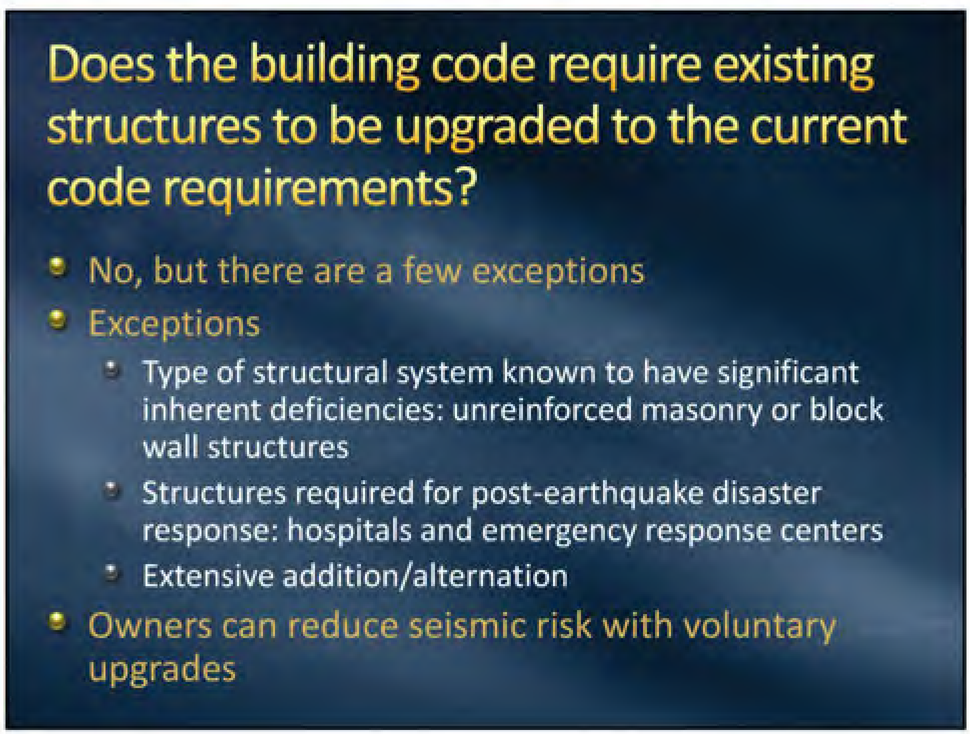
Structural Performance Level*	Expected Performance	Post-Earthquake Assessment
Immediate Occupancy	• Limited structural damage • Safe to occupy immediately after earthquake with minor repair	Green
Life Safety	• Significant structural damage; no imminent risk of collapse • Occupants would safely evacuate from the building • Not safe to occupy w/o major repair. Repair may be economically impractical.	Yellow or Red
Collapse Prevention	• Extensive structural damage and on verge of partial or total collapse • Building is likely damaged beyond repair both technically and economically	Red

*As defined in ASCE 41-06 Seismic Rehabilitation of Existing Buildings


Example of life safety performance
1999 Chi-Chi (Taiwan) Earthquake


Example of collapse prevention performance
1999 Chi-Chi (Taiwan) Earthquake


What's the expected seismic performance of a structure meeting current code requirements?
Regular Facilities
The objective is to allow safe evacuation of occupants (Life Safety), instead of focusing on prevention of structural damage
Essential Facilities
The objective is to allow continuous operation of the building (Immediate Occupancy) with limited structural damage
The expected performances are for the design earthquake (2/3 of MCE Ground Motion)


Does the building code require existing structures to be upgraded to the current code requirements?
No, but there are a few exceptions
Exceptions
Type of structural system known to have significant inherent deficiencies: unreinforced masonry or block wall structures
Structures required for post-earthquake disaster response: hospitals and emergency response centers
Extensive addition/alternation
Owners can reduce seismic risk with voluntary upgrades

What's the acceptable seismic performance level for an existing structure, as it may not meet the current code requirements?

- Depending on post-earthquake functions of the building, the owner may choose the desired performance level
  - Immediate Occupancy
  - Life Safety
  - Collapse Prevention
- Non-building structures (reservoirs, tanks...) are designed based on consensus standards and guidelines (e.g. ASCE, ASME, AWWA...)
  - Operational
  - Prevention of uncontrolled release of contents

What seismic performance are specified in MWD's seismic design criteria?

Building Type Structures				
Importance Designation	**Essential Facilities**		**Regular Facilities**	
	New	**Existing**	**New**	**Existing**
Building Code and Industry Standards	CBC ASCE 7	CBC ASCE 41	CBC ASCE 7	CBC ASCE 41
Design Intent Per Code/ Standard Language	Provide a larger margin against collapse in MCE and remain operational in Design Earthquake (2/3 MCE)	Enhanced performance against life safety in Design Earthquake	Collapse prevention in MCE and prevent life threatening damage in Design Earthquake	To achieve life safety in Design Earthquake
Metropolitan Seismic Design Objective	To remain operational following a major seismic event	Intended to maintain occupancy immediately following a major seismic event	May experience significant damage, but would prevent life threatening injury or casualty following a major seismic event	May experience significant damage, but would prevent life threatening injury or casualty following a major seismic event

What seismic performance are specified in MWD's seismic design criteria? (Cont.)

Water Containing Structures				
Importance Designation	**Essential Facilities (Related to Water Delivery)**		**Regular Facilities (Not Related to Water Delivery)**	
	New	**Existing**	**New**	**Existing**
Building Code and Industry Standards	CBC ASCE 7 ACI350 AWWA D100 API 650	CBC ASCE 41 ACI350 AWWA D100 API 650	CBC ASCE 7 ACI350 AWWA D100 API 650	CBC ASCE 41 ACI350 AWWA D100 API 650
Design Intent Per Code/ Standard Language	Provide a larger margin against failure in MCE and require a higher level of liquid tightness to maintain serviceability in Design Earthquake (2/3 MCE)	Not differentiated.	Prevent catastrophic failure in MCE and prevent uncontrolled release of liquid in Design Earthquake	Not differentiated.
Metropolitan Seismic Design Objective	To remain operational following a major seismic event	To remain operational or can be restored quickly following a major seismic event	May experience significant leak and require dewatering to repair, but would prevent uncontrolled release of liquid following a major seismic event	May experience significant leak and require dewatering to repair, but would prevent uncontrolled release of liquid following a major seismic event

How do the design and performance for a new facility and retrofit of an existing facility compare?

Appendix 7

Summary of Previous Metropolitan Seismically Induced Damage Studies

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The impact of earthquakes on Southern California and on Metropolitan's system has been the subject of several previous internal and external assessments:

Seismic Risk Assessment of Local Water Production Facilities in the Service Area of Metropolitan Water District of Southern California, **January 14, 1991, Dames & Moore.** This is a comprehensive report on the effects of a major earthquake on the Southern San Andreas Fault. The report has various models for estimating damage and concludes that there could be hundreds of local water pipelines damaged, loss of power, etc. Metropolitan feeders that are vulnerable to damage were identified, and the report estimates that Metropolitan service will be lost for 6 months or less. The report also predicts significant damage to ground water wells.

***Probable Maximum Loss Analysis for Metropolitan Water District of Southern California*. September 1998, EQE International.** This report was prepared to assess the potential monetary loss associated with several earthquake scenarios. This report highlighted the potential for widespread damage resulting from an earthquake. The study did not address the impact on deliveries or system recovery.

Assessment of Frequency of Recovery Plan and Extreme Events within the Metropolitan Water District Service Area, **December 2001, Geomatrix Consultants.** This report was prepared to aid in the evaluation of hazards under the System Reliability Plan (see next report). This report evaluated the probability of earthquakes of two levels of severity within Metropolitan's service area. The first was a moderate (strong) earthquake similar to the Northridge earthquake (M6.7) and the second was an extreme event, on the order of M7.5. The report provided information on the probability of these earthquakes both within each of Metropolitan's operating regions and within the service area as a whole. The scope of the report did not include evaluating the impact on service or time for recovery.

Distribution System Reliability Assessment, (Report No. 1227), **December 2006, Metropolitan Facility Planning staff.** This report evaluated the reliability of the distribution system. In addition, a separate section of the report dealt with the vulnerability of Metropolitan's facilities to various initiating events. The report addressed the probability of failures in the system due to various random causes including earthquakes. It utilized information from the Geomatrix study to estimate the probability of seismically induced failures. Estimates for the recovery time from the various events were provided.

Facility Reliability Assessments, **2006, Metropolitan Facility Planning staff.** Reliability assessments were conducted by Metropolitan of the five treatment plants and the Colorado River Aqueduct. These assessments evaluated the susceptibility of individual facilities to a series of hazards such as fire, flooding, and earthquakes. Earthquakes were identified as one of the highest risk hazards because of the potential to cause numerous simultaneous failures. The reliability assessments identified structures that had not been updated to the latest seismic criteria. As part of the Seismic Upgrade Program, these structures have been evaluated. Where necessary, capital projects were initiated to upgrade the facilities to the most recent building codes. Completed Facility Reliability Assessments are listed below:

- *Diemer Water Treatment Plant Reliability Assessment, (Report No. 1225),* 2006
- *Skinner Water Treatment Plant Reliability Assessment, (Report No. 1246),* 2006
- *Weymouth Water Treatment Plant Reliability Assessment, (Report No. 1255),* 2006

- *Mills Water Treatment Plant Reliability Assessment, Report No. 1269,* 2006
- *Jensen Water Treatment Plant Reliability Assessment, Report No. 1280,* 2006
- *Colorado River Aqueduct Reliability Assessment, Report No. 1297,* 2006

***System Reliability Study,* 2007, Metropolitan Facility Planning staff.** This study evaluated the reliability of the entire system. This study examined the impact of single failures within the system on the ability to deliver water to member agencies and identified existing backup options. The failures considered included individual facilities as a unit (e.g., a treatment plant or a reservoir). For pipelines, the study considered a failure in each isolatable segment of the line. The impact on deliveries to each service connection was identified and over 250 different events were studied. The study considered capabilities within Metropolitan's system, as well as the member agencies', to mitigate the failures. This study did not consider multiple failures that might be associated with an earthquake due to the almost unlimited number of combinations of failures that would have to be considered.

Golden Guardian 2008. In November 2008, under the auspices of the USGS, Caltech and Earthquake Research Associates, a major disaster drill was conducted in Southern California. The drill was based on a magnitude 7.8 earthquake on the San Andreas Fault (Golden Guardian Exercise). The preliminary studies conducted as part of the exercise indicated that major damage is expected. The impact on water systems was one of the areas of focus for the drill and the related studies. The studies concluded that in areas impacted heavily, water service could be lost for six months.

***Potential Effects of Southern California Seismic Events on Metropolitan Water Deliveries (Report No. 1335)*, January 2009, Metropolitan Facility Planning staff.** This report provided a perspective on the magnitude of damage that could result from moderate and extreme earthquakes, the corresponding potential impacts on Metropolitan water deliveries, and estimated time frames for restoring service. The report also offered recommendations for reducing the potential impacts of certain significant seismic events.

***Mills Water Supply Reliability Study (Report No. 1337),* Metropolitan Facility Planning staff.** The Mills study was prepared in response to findings of the Integrated Area Study, which identified risks to the raw water supply to the Mills plant. The study evaluated alternatives to improve the reliability and redundancy of the raw water supply to Mills. A capital project has been initiated to implement one of the options.

***Potential Impact of a Seismic Event on the CRA Tunnels (Report No.* 1478), August 2014, Metropolitan Facility Planning staff.** This is the first report of a comprehensive study of the seismic vulnerability of the CRA. Five companion reports (Metropolitan Report Numbers 1470, 1484, 1485, 1490 1558) are described below. This study evaluated the vulnerability of CRA tunnels to damage from a major seismic event, provided a perspective of the level, extent and type of seismic damage that could be imposed on CRA tunnels, and estimated the time frame to restore service. The results of the study showed that most of the CRA tunnels are expected to perform well following a large seismic event. Of all the CRA tunnels, only the area near the west portal of the San Jacinto tunnel would be subject to liquefaction, but this area would be easily accessible. The area above the west portal of the San Jacinto tunnel could also be subject to seismically induced landslides, but a project was completed in 1998 to mitigate the potential damage from a landslide at the portal. For the remainder of the tunnels, the potential to experience heavy damage from landslide or rockfalls is negligible. Despite traversing a highly seismic area, there are only three instances of the CRA tunnels crossing a known active fault: Whitewater Tunnel No. 2, Thousand Palms Tunnel No. 2, and Wide Canyon Tunnel No. 2. Of these three tunnels, Whitewater Tunnel No. 2 would likely experience the most significant displacement from a fault rupture.

For ground shaking, while a number of the tunnels could experience high levels of shaking based on estimated Peak Ground Acceleration (PGA), most of these tunnels are deep and constructed in hard rock, which is beneficial for their performance during an earthquake. However, approximately 4.2 miles of tunnel were identified as having a high potential of experiencing heavy damage from the Maximum Considered Earthquake (MCE). These are areas that have shallow cover (e.g. near portals) and experience high PGA values. It should be noted that the entire 4.2 miles would not be expected to be damaged from a single earthquake, but rather there would be isolated areas of damage with those identified tunnel sections. A CIP has been submitted to further investigate the vulnerability of these tunnel sections and to identify options to mitigate the risk.

The Whitewater Tunnel No. 2 was identified as having the greatest cumulative seismic risk. The tunnel is crossed by the Garnett Hills segment of the San Andreas Fault which, from the San Gorgonio Pass Seismic Event Vulnerability Study (Report No. 1484; 2014), could experience up to a 12 foot horizontal and 3 foot vertical offset from a rupture of the San Andreas Fault approximating the MCE. The tunnel could also experience very high levels of shaking from the MCE, and was constructed in compacted sands and gravels, which could negatively impact the performance against the shaking.

For the purpose of estimating repair times, a worst-case damage scenario was developed for the Whitewater Tunnel No. 2, and a tunnel repair workshop was conducted to get a realistic understanding of repair methods and repair times (reference Report No. 1485).

***Colorado River Aqueduct – San Gorgonio Pass Seismic Event Vulnerability Study (Report No. 1484),* July 2014, GeoPentech.** This study evaluated the potential for horizontal and vertical deformation following a large seismic event within the San Gorgonio Pass area. To assist in the study, a team of geoscientists experienced in assessing the potential for fault displacements along the southern San Andreas Fault System in the area of the San Gorgonio Pass was assembled under GeoPentech, Inc. The study incorporated the most recent information available regarding the seismicity of the area including: geology, geodesy, seismicity, paleoseismology, and tectonics.

The information gathered during the course of the study was used to develop a 3-dimensional deformation model of the San Gorgonio Pass area using Coulomb 3.3 (San Gorgonio Pass Model). The model was developed to estimate the surface fault displacement and deformation that would occur along and near the CRA within the San Gorgonio Pass as a result of future seismic events. The results of the San Gorgonio Pass Model were compared to current geologic and geomorphic data, which showed a reasonable reflection of the natural conditions of the area, validating the results of the model.

The MCE for the southern San Andreas Fault would be a rupture originating near the Salton Sea around Bombay Beach and extending through the San Gorgonio Pass up to between Wrightwood and Three

Points. Based on available geologic data, the most likely event on the San Andreas Fault to rupture in on the Garnett Hills Fault, which is a strand of the San Andreas Fault system located in the San Gorgonio Pass. Results from the San Gorgonio Pass Model indicate that an earthquake approximating the MCE for the Southern San Andreas Fault System could result in a horizontal offset of approximately 12 feet and a vertical deformation of approximately 3 feet at the Garnett Hills Fault crossing of the CRA. The vertical deformation would extend over the CRA for approximately 60 miles.

The seismic event would result in uplift along the longitudinal profile of the CRA with three separate peaks, with the last peak occurring at or near the Whitewater Tunnel No. 2 and resulting in a cumulative upward deformation of approximately 3 feet. This upward deformation of the CRA would reduce the flow carrying capacity of the aqueduct. An accompanying probabilistic rupture hazard analysis of the San Gorgonio Pass (Report No. 1470) showed that the above deformation occurring at the CRA crossing has a return period of approximately 750 years.

The Colorado River Aqueduct San Gorgonio Pass Seismic Event Vulnerability Study – Hydraulic Analysis, (Report No. 1558), **September 2014, Metropolitan Facility Planning and Hydraulics staff.** This study documents a detailed hydraulics analysis that evaluated the impact of a seismically induced vertical uplift of the CRA alignment over a length of approximately 60 miles, based on the uplift profile from the San Gorgonio Pass Seismic Event Vulnerability Study (Report No. 1484). The analysis showed that despite the uplift, Metropolitan would be able to continue flowing approximately 1300 cubic feet per second, approximately 80 percent of design flow, through the aqueduct after initial rapid repairs are completed. The analysis assumed free surface flow with a 3-foot minimum freeboard, the same as the current aqueduct design. Minor pressurization of the system could allow for some additional flow if required. The analysis also assumed that repairs to the CRA following the earthquake maintained the design cross sections and friction of the non-damaged CRA sections, and that no repairs were done to reestablish the grade.

Probabilistic Rupture Hazard Analysis of CRA at San Gorgonio Pass (Report No. 1470), **October 2014, Metropolitan staff.** This report is a supplemental report to Report No. 1484, "Colorado River Aqueduct – San Gorgonio Pass Seismic Event Vulnerability Study." The report documents the results of a probabilistic rupture hazard analysis of the CRA where it crosses the Garnett Hills segment of the Southern San Andreas Fault in the San Gorgonio Pass. The analysis showed that the projected 3-foot vertical and 12-foot horizontal surface deformation at the CRA crossing in the San Gorgonio Pass has a return period of approximately 750 years.

Colorado River Aqueduct Seismic Vulnerability Investigations – Summary Report (Report No. 1490)**, December 2014, Metropolitan Facility Planning staff.** This report briefly summarizes the results of the CRA seismic vulnerability studies (Reports 1478, 1484, 1485 and 1558).

Seismic Risk Assessment – Conveyance and Distribution System Tunnels (Report No. 1533), **March 2016, GeoPentech and Metropolitan Facility Planning staff.** This study evaluated the seismic risk of the 41 tunnels within Metropolitan's Conveyance and Distribution System to heavy damage during a future maximum considered earthquake (MCE) event that would adversely impact water deliveries to member agencies while the tunnel is out of service for repairs. The study was completed through a two part process. Part 1 screened each of the 41 tunnels and identified tunnels that were vulnerable to one or more seismic hazard, and could result in a loss of service to the member agencies (i.e., no backup capability) if flow through the tunnel is disrupted. Tunnels that met both criteria in Part 1 were deemed a potential seismic risk to Metropolitan's water delivery reliability and were pushed through to Part 2 of the process. Part 2 further evaluated each of the potential high-risk tunnels identified in Part 1 and numerically ranked each tunnels degree of seismic risk in order to identify which tunnel(s) may pose the greatest risk to Metropolitan's water delivery capability.

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Appendix 8

Administrative Code Section 4503 "Suspension of Deliveries" and 9/21/06 IAS Clarification

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§ 4503. Suspension of Deliveries.

(a) Whenever repairs or maintenance of the District's system, in the opinion of the Chief Executive Officer of the District, shall require suspension of delivery of water at any point or points, such delivery may be suspended without liability on the part of the District; provided, that except in cases of emergency, as determined by the Chief Executive Officer, notice of such suspension of service shall be given to the affected member public agency in advance of such suspension. Metropolitan will make a concerted effort to notify and work with member public agencies regarding all scheduled interruptions. The District will schedule non-emergency interruptions for the low demand months of the year, typically October through April, in coordination with the member public agencies.

(b) Each member agency shall have sufficient resources such as local reservoir storage, groundwater production capacity, system interconnections or alternate supply source to sustain a seven-day interruption in Metropolitan deliveries based on annual average demands. If a member public agency has been provided with a sixty (60) day notice of when an interruption in service is to occur, the member public agency shall be responsible for and reimburse direct costs, excluding labor costs, incurred by Metropolitan in the event that a scheduled non-emergency interruption of up to seven days is postponed or cancelled at the request of the member public agency as a result of insufficient local resources, and the District agrees to such cancellation or postponement. Direct costs shall be determined by Metropolitan's Chief Executive Officer, in consultation with the affected member agency. These direct costs shall be applied to the member public agency's water invoice following cancellation or postponement of the shutdown.

(c) Except in cases of emergency, the District, working with the member agencies, will produce a shutdown schedule each September for the annual shutdown season from October through April. The District will also develop a three-year shutdown schedule, which will give notice of the proposed shutdowns greater than seven days at least one-year in advance.

(d) Replenishment Service certifications will be adjusted for the reduction of credits that are accrued due to shutdowns that are greater than seven days. No adjustments will be made for shutdowns seven days or less unless the member agency provides a service to the District by serving another member agency in-lieu of District deliveries during a shutdown even if the shutdown is seven days or less.

Section 322.4 based on Res. 7260 – May 12, 1970, amending Res. 3896 – August 18, 1950; amended by M.I. 33642 – March 10, 1981. Section 322.4 repealed and Section 4503 adopted by M.I. 36464 – January 13, 1987, effective April 1, 1987; amended by M.I. 42278 - February 11, 1997; paragraph amended by M. I. 44812 - March 12, 2002; paragraph amended by M. I. 45943 – October 12, 2004; paragraphs assigned (a), (b), (c), & (d) designations and amended by M. I. 45988 – November 9, 2004.

2007 Integrated Area Study (IAS) Clarification

1. Original intent
    a. Communicated that MWD's system is interruptible
    b. Protected MWD from liability claims for required shutdowns
    c. Illustrated commitment to minimizing impacts
        i. Advanced notice & coordination
        ii. Non-emergency outages only during low flow months
    d. Required member agencies to make provisions for outages
        i. 7-day supply of average annual demands
        ii. No enforcement – no penalty

2. Updated text & interpretation
    a. Recognized changing conditions
        i. Increased member agency dependence upon MWD
        ii. Many agencies in non-compliance
        iii. Increased difficulty in storing treated water
    b. Revised requirement for member agency outage provisions
        i. Capability to sustain 7-day interruption (not limited to supply)
        ii. Penalty added for cancellation or postponement of outage

3. IAS clarification
    a. MWD planned outages are required to maintain long-term reliability
    b. Unplanned MWD outages may also occur
    c. Intent of 4503 was to encourage agency provisions for planned and unplanned outages
    d. Compliance not enforced (beyond interference with planned outages)
    e. Member agencies responsible for decisions regarding provisions for unplanned outages
    f. Regional flexibility improvements achieved through demand-driven LRP & IAS projects

REPORT

SEISMIC RESILIENCE REPORT

2020 UPDATE

The Metropolitan Water District of Southern California

700 N. Alameda Street, Los Angeles, California 90012

Report No. 1551-1

February 2020

Seismic Resilience Report 2020 Update

Prepared By:

The Metropolitan Water District of Southern California
700 North Alameda Street
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Report Number 1551-1
February 2020

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Additional copies: The Seismic Resilience Report is located on the Seismic Resilience SharePoint site. To obtain a copy of this document, please contact the Engineering Services Group.

Disclaimer

Extensive efforts have been made to ensure that the material contained in this document is accurate as of the date of publication. There are many factors, however, related to the content and applicability of this document which are beyond the control of MWD. In addition, the contents of this publication will be periodically updated, so the reader should inquire about any such changes in addition to reading this document. Finally, the reader is encouraged to seek appropriate technical and/or legal advice when specific facts or circumstances arise that raise questions concerning the applicability or interpretation of the policies and procedures discussed herein.

PUBLICATION HISTORY:

Initial Release (First Biennial Report No. 1551)	*February 2018*
2020 Update (Report No. 1551-1)	*February 2020*

Cover Photo: Test setup for large diameter seismic-resilient ductile-iron pipe to be used on Metropolitan's Casa Loma Siphon

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EXECUTIVE SUMMARY

In February 2018, the Metropolitan Water District of Southern California (Metropolitan) published *Report No. 1551, Seismic Resilience First Biennial Report*, which defined Metropolitan's Seismic Resilience Strategy and identified a number of near-term goals to improve Metropolitan's seismic resilience. The *2020 Seismic Resilience Report Update* is a supplement to the *Seismic Resilience First Biennial Report* (2018 Report). The purpose of the update is to document revisions to Metropolitan's Seismic Resilience Strategy, document seismic-resilience-related studies completed since publication of the 2018 Report, list the achievements related to the seismic performance objectives and near-term goals identified in the 2018 Report, and communicate new performance objectives and goals that will further increase the seismic resilience of Metropolitan's system.

Since the publication of the 2018 Report, Metropolitan has initiated multiple studies that will improve planning for earthquake response. Completed studies include an evaluation of Metropolitan's emergency storage requirements and an evaluation of the susceptibility of the conveyance and distribution pipelines to liquefaction. Staff is also nearing completion of an assessment of the potential damage to the conveyance and distribution pipelines from different earthquake events.

In the last two years, Metropolitan has also completed construction for seismic upgrades to 17 structures. Additionally, Metropolitan substantially completed the initial round of seismic evaluations for above-ground structures constructed pre-1990, which in general pose an elevated seismic risk. Evaluation of above-ground structures built post-1990 has been initiated as well as evaluation of hydraulic structures (e.g., reservoir outlet towers) to assess their seismic risk when compared to current design practices.

Finally, Metropolitan conducted over 100 emergency response exercises, workshops, and seminars since February 2018, including two large functional exercises. These exercises help to ensure that Metropolitan staff is prepared for when an eventual earthquake occurs. Metropolitan also started a new five-year exercise plan in 2019 that will allow all of its member agencies to participate in at least one of Metropolitan's annual emergency exercises during the next five years.

Overall, Metropolitan has achieved many of the near-term goals that were proposed in the 2018 Report and is continuing the efforts to complete the few items that are still outstanding. The strategy outlined in the 2018 Report to develop the seismic resilience of the system is an ongoing process that will continue to evolve and adapt as new information becomes available.

Staff recommends changing the frequency of written update reports from its current two-year cycle to a frequency of a written report every five years, with the next written report to the Board in 2025. Staff will continue to provide annual oral updates on Metropolitan's Seismic Resiliency Strategy to the Board.

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SECTION 1 PURPOSE

The Metropolitan Water District of Southern California (Metropolitan) owns and operates a complex conveyance, storage, treatment, and distribution system that serves a 5,200-square-mile service area within an active seismic region. Over its approximate 90-year history, Metropolitan has been proactive in mitigating seismic risk posed to the system, as well as improving its ability to maintain or quickly restore water deliveries following a major earthquake.

In February 2018, Metropolitan published *Report No. 1551, Seismic Resilience First Biennial Report* (2018 Report), which summarized Metropolitan's historical approach to mitigating seismic risk and defined the organization's current Seismic Resilience Strategy and the core components of that strategy. The report also identified performance objectives and near-term goals of the Seismic Resiliency Strategy. The 2018 Report is available on Metropolitan's website using the link below:

http://mwdh2o.com/PDF_About_Your_Water/SRS%20Report%201551_Final_030518A_Submit_Reduced.pdf

The *2020 Seismic Resilience Report Update* is a supplement to the 2018 *Seismic Resilience First Biennial Report*. The purpose of the update is to document recent revisions to Metropolitan's Seismic Resilience Strategy regarding emergency storage requirements, document seismic-resilience-related studies completed since publication of the 2018 Report, and list the achievements related to Metropolitan's Seismic Resilience of Structures Program, emergency response planning, and the seismic performance objectives and near-term goals identified in the 2018 Report. The report also identifies new performance objectives and goals that will further increase the seismic resilience of Metropolitan's system.

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SECTION 2 BACKGROUND

Seismic Risk

Southern California is crossed by numerous faults of varying levels of activity that are capable of generating large earthquakes and causing widespread damage. The 2018 Report listed six earthquakes that occurred within or near Metropolitan's service area in southern California since 1900 - four strong earthquake events (M6.0 – 6.9) and two major earthquake events (M7.0 to M7.9).

In 2019, two significant earthquakes events occurred in the region. On July 4, 2019, a M6.4 earthquake occurred near Ridgecrest, approximately 122 miles north/northeast of Los Angeles. Then on July 5th, a M7.1 earthquake occurred in the same vicinity. While the earthquakes caused major damage to Ridgecrest and the surrounding communities, the earthquakes only caused mild shaking in the Los Angeles region due to the distance from the epicenter. However, these earthquakes are a reminder that earthquake risk is always present and that the region must take steps to prepare and respond.

A map showing significant (M6.3 and greater) earthquakes that have occurred in the southern California region since 1900 is provided in Appendix A.

Seismic Resilience Strategy

Metropolitan's Seismic Resilience Strategy is comprised of four components that encompass the various functions that promote the organization's seismic resilience objectives.

> **Planning** – Developing and maintaining a diversified water portfolio, system flexibility, and emergency storage supplies
>
> **Engineering** – Evaluation and mitigation of seismic risks of infrastructure and the water system as a whole
>
> **Operations** – Maintain effective emergency planning and response capabilities
>
> **Reporting** – Increase accountability and transparency of seismic resilience programs

Metropolitan's Seismic Resilience Strategy was described in detail in the 2018 Report, and the overall structure of the strategy is unchanged. A detailed breakdown of Metropolitan's Seismic Resilience Strategy is provided in Figure 2-1. The figure provides an overview of the comprehensive actions taken to mitigate impacts from large earthquakes, to quickly respond following an earthquake event, and to provide transparency regarding seismic risk and preparedness.

As shown in Figure 2-1, in addition to the activities conducted under the Planning, Engineering, Operations, and Reporting components of the Seismic Resilience Strategy, Metropolitan has continued its involvement with the Seismic Resilient Water Supply Task Force. The Seismic Resilient Water Supply Task Force is a collaboration between Metropolitan, the Department of Water Resources (DWR), and the Los Angeles Department of Water and Power (LADWP) to improve the seismic resilience of the imported water supply aqueducts.

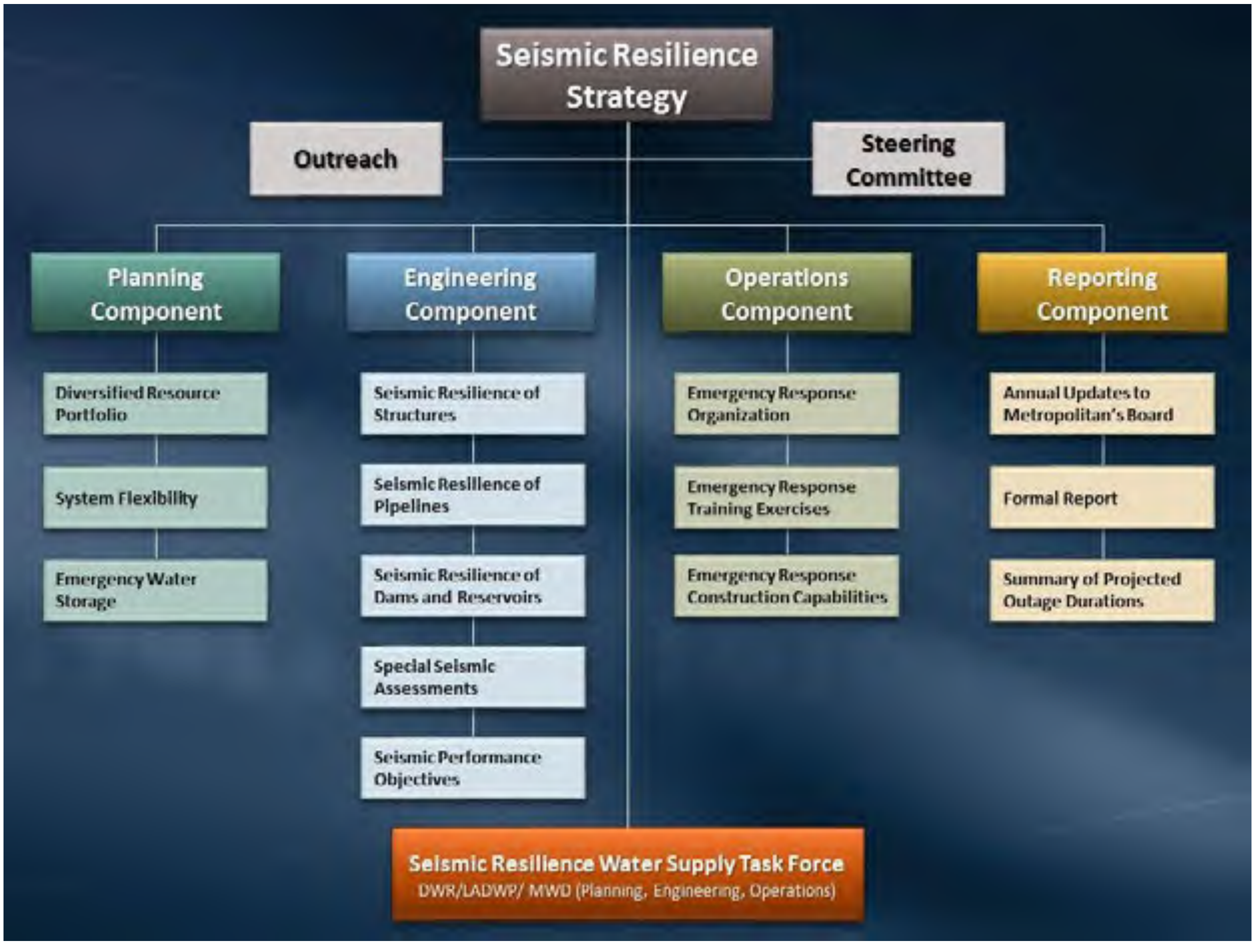

Figure 2-1: Detailed Breakdown of Metropolitan's Seismic Resilience Strategy

SECTION 3 SEISMIC RESILIENCE STRATEGY UPDATES/REVISIONS

Planning Component

Emergency Storage

Beginning in February 2018, Metropolitan and its member agencies convened a workgroup to evaluate regional storage, including the size and management of Metropolitan's emergency storage program. The goal of the emergency storage program evaluation was to update the emergency criteria and develop a revised methodology to determine emergency storage needs. The methodology and recommendation of the workgroup were described in a draft white paper, "2018 Evaluation of Regional Storage Portfolio: Draft Evaluation of Metropolitan's Emergency Storage Objective," and presented to Metropolitan's Board in May 2019[1].

The update of the emergency criteria was based on 1) newly revised potential outage durations for the region's imported water supplies – the Colorado River Aqueduct (CRA), the Los Angeles Aqueduct, and the State Water Project east and west branches – following a seismic event, and 2) a revisit of retail water demand and locally available supplies within the service area. The revised outages were developed as part of the Seismic Resilience Water Supply Task Force. The workgroup took into account the capabilities of member agencies when identifying reduction of retail water demand and local production during an emergency outage of imported supplies. This is a critical change in that the previous storage calculation assumed 100 percent local production during the outage period.

Diamond Valley Lake

The new emergency storage criteria considered various combinations of local demand reduction and supply production to develop an envelope of scenarios designed to prevent a shortage during an outage. Based on the range of potential scenarios, the workgroup recommended 750,000 acre-feet for the emergency storage program target, an increase from the previous planning target of 630,000 acre-feet.

The emergency storage is assumed to be distributed among the available capacities of existing Department of Water Resources and Metropolitan surface reservoirs located on the coastal side of the San Andreas Fault. Since member agency demands for supplemental water will be met through deliveries of supplies from storage, evaluation of spatial distribution of storage and most effective operation of the

[1] The Metropolitan Water District of Southern California, Water Planning and Stewardship Committee, Board Item 9-3, "Update of Metropolitan's Emergency Storage Objective," May 2019. http://www.mwdh2o.com/WhoWeAre/Board/Board-Meeting/Board%20Archives/2019/05-May/Letters/064883968.pdf

distribution system will be accomplished as part of Metropolitan's continued efforts and coordination within Metropolitan's storage portfolio evaluation or other regional planning processes.

System Flexibility

In July 2019, Metropolitan's Board of Directors authorized an amendment to the Administrative Code to enable delivery of member agency water supplies in Metropolitan's system in an emergency subject to the General Manager's approval[2]. The amendment is an effort to enhance water delivery reliability after a serious emergency in which 1) Metropolitan is unable to make deliveries to a member agency due to physical damage to Metropolitan's system resulting from a natural disaster or other emergency and 2) there are no alternate means for Metropolitan or the member agency to provide service to an area without the use of a portion of Metropolitan's system. The Administrative Code change clarifies the conditions of these emergency deliveries in a proactive way, instead of a reactive way in response to damaged infrastructure following a natural disaster or serious emergency.

Engineering Component

Seismic Resilience of Structures

Metropolitan has developed an ongoing program for evaluating and upgrading its above-ground facilities with the goal of protecting life safety and critical infrastructure to minimize water delivery interruptions following a seismic event. The initial round of evaluations focused on structures that were deemed likely to be more susceptible to damage from earthquakes – buildings constructed prior to 1990. Structures built after 1990 were constructed in accordance with the 1988 or later versions of the Uniform Building Code, which provides reasonable assurance of withstanding a design-level earthquake without catastrophic failure. The program procedure for the seismic resilience of Metropolitan's above-ground structures was described in the *Seismic Resilience First Biennial Report* and the program status as of January 2018 was provided. Since publication of that report, an additional 17 seismic upgrades have been completed. Figure 3-1 provides the overall status for the pre-1990 structures as of November 2019. Of the 311 pre-1990 structures identified, 63 percent were found to be acceptable and 37 percent (116 structures) potentially deficient following the rapid evaluation process. Of the 116 structures, 85 have either been seismically upgraded or are in design or construction. The remaining are largely structures that are not related to water delivery.

The program for seismically upgrading the above-ground structures is meant to be a continuous program, with the intent of reevaluating structures periodically. Structures found to be acceptable during the initial evaluation round may undergo a reevaluation, if warranted by new information such as a significant increase in seismic design force or displacement due to code revisions or newly discovered ground conditions, damage of structural components, severe material deterioration, and/or changes of occupancy.

[2] The Metropolitan Water District of Southern California, Engineering and Operations Committee, Board Item 8-4 "Authorize Amendments to the Administrative Code Regarding Deliveries of Member Agency Supplies in Metropolitan's System in an Emergency; the General Manager has determined that the Proposed Action is Exempt or Otherwise Not Subject to CEQA", July 2019. http://www.mwdh2o.com/WhoWeAre/Board/Board-Meeting/Board%20Archives/2019/07-July/Letters/07092019%20BOD%208-4%20B-L.pdf

As shown in Figure 3-1, evaluation of the pre-1990 structures related to water delivery has been substantially complete and the deficient structures are being addressed. Following the 1994 Northridge earthquake, and subsequent earthquakes in Taiwan, Japan, and New Zealand, substantial research in seismic design and code revisions has taken place. Post-1990 structures may or may not meet the current seismic performance standards, which has prompted Metropolitan to expand the seismic evaluation to post-1990 structures, a process which was initiated in early 2019 to further improve its seismic resilience. Twenty-six structures have been identified as part of the post-1990 structure list. Rapid evaluations have been completed on six structures, and none have been identified as seismically deficient.

As Metropolitan begins its evaluation of the post-1990 above-grade structures, staff is also initiating a process to identify and systematically evaluate below-ground structures such as vaults and manholes. Similar to the evaluation of above-ground structures, the prioritization of these facilities will consider potential impacts to water delivery and potential for loss of life.

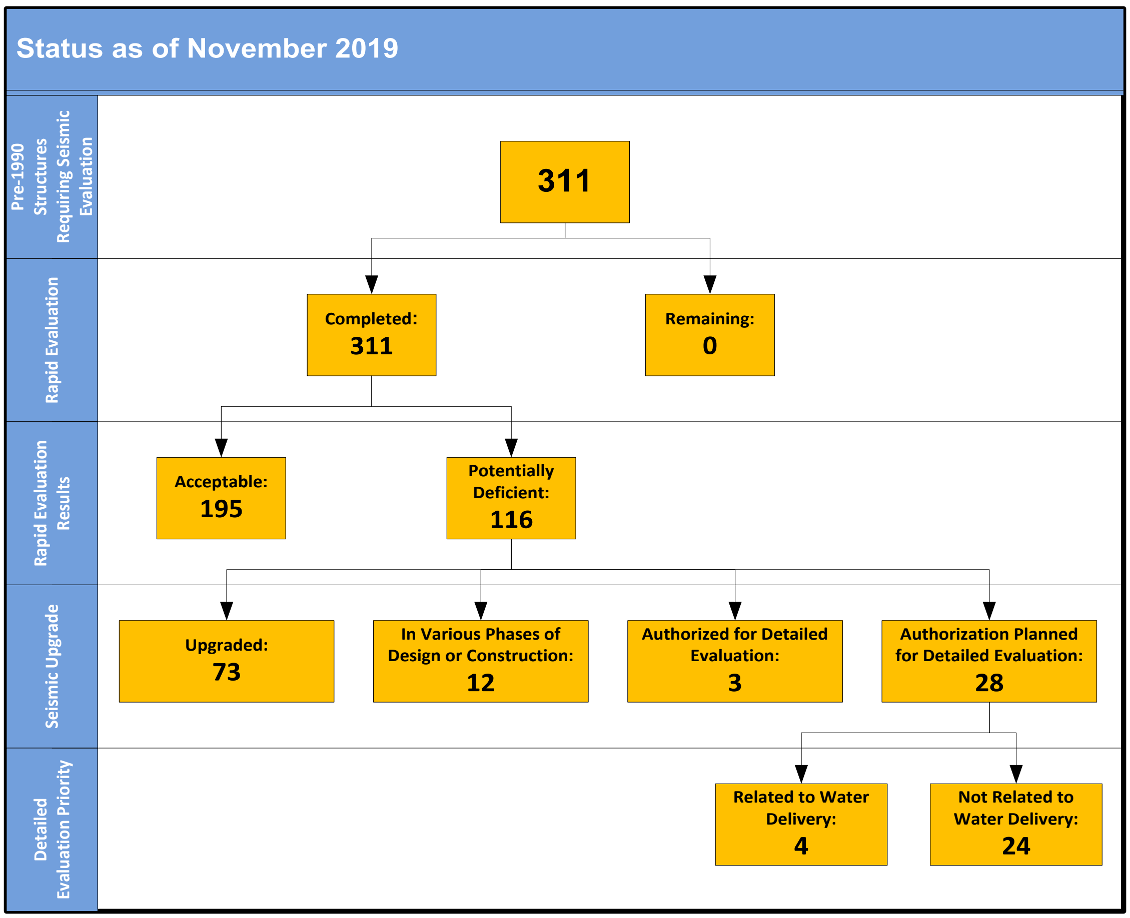

Figure 3-1: Status of Seismic Assessment and Upgrades of Pre-1990 Structures

Seismic Resilience of Pipelines

Metropolitan's pipelines have been constructed in conformance with standards of practice at the time of design. Historically, there have been very few prescriptive code requirements for seismic design of pipelines. Only recently have there been developments in mitigation options for large diameter pipelines, including improved techniques to analyze the response of structures and pipelines within the ground from shaking, increased post-earthquake data collection of ground motions and damage observations, and demonstrated performance of earthquake-resistant pipeline products.

In keeping with the goals of the Seismic Resilience Strategy, Metropolitan is developing seismic design criteria for new pipelines based on current state of practice, geotechnical and seismicity criteria, operating conditions, and asset management strategies. The planned design approach for new pipelines will be to establish performance criteria, identify seismicity and ground conditions along the alignment, and design the pipeline to resist damage from ground shaking and deformation. Specialized pipe joints and sections can be designed to accommodate ground deformation from fault displacement or liquefaction. For existing pipelines, seismic resilience will be incorporated as a component of pipeline rehabilitation projects. Metropolitan will evaluate each upgrade individually to balance risk, performance, and cost. See the Seismic Performance Objectives in this section for more information on the pipeline seismic design.

Metropolitan is in the early years of a 20-year program to rehabilitate its prestressed concrete cylinder pipelines (PCCP), which, at 163 miles, makes up approximately 20 percent of Metropolitan's conveyance and distribution system. The initial phase of the program will focus on the Second Lower Feeder, which will be upgraded with an interior steel liner. The new steel lining and the welded joints are designed to improve the seismic performance of the pipeline. For Reach 9 of the Second Lower Feeder, Metropolitan is investigating alternatives for realigning the portion of the pipeline that crosses the Newport-Inglewood Fault. One alternative being evaluated is to use specialized large-diameter earthquake-resistant steel pipe to accommodate fault displacement while maintaining structural integrity of the pipe for water conveyance.

Following this strategy, Metropolitan is completing the final design for rehabilitation of the Casa Loma Siphon Barrel No. 1 on the CRA in 2020. The Casa Loma Siphon Barrel No. 1 crosses the San Jacinto Fault Zone and is subject to long-term subsidence-induced deformation from groundwater pumping. The project will replace 800 feet of the existing 148-inch diameter concrete pipeline with two parallel barrels of 104-inch diameter earthquake resistant ductile iron pipe (ERDIP). The ERDIP joints are designed to accommodate ground displacements without failure, which will allow for uninterrupted service following a major earthquake.

Earthquake-Resistant Pipe

Seismic Resilience of Dams and Reservoirs

Metropolitan's ongoing strategy for managing the safety of its 24 dams includes five major components: (1) Detailed Inspections; (2) Monitoring & Reporting; (3) Facility Assessments; (4) Emergency Action Plans, including Inundation Maps; and (5) Capital Projects for dam improvements and upgrades.

Consistent with the goals of the Seismic Resilience Strategy, Metropolitan performs cyclical assessments of its facilities that include: 1) developing dam seismic performance criteria based on current state of practice, geotechnical and seismicity criteria, and operating conditions, 2) selecting design or safety evaluation earthquakes, 3) characterizing ground motions, 4) analyzing seismic performance of the dams and foundations, and 5) evaluating structural adequacy of dam appurtenant structures for earthquake loading.

Finally, Metropolitan has an ongoing Dam Safety Initiatives Program that has initiated several plans to improve Metropolitan's dam seismic safety and earthquake readiness. These initiatives are being coordinated with the California Division of Safety of Dams (DSOD) and Office of Emergency Services and include the following:

- Ongoing preparation of Emergency Action Plans, including inundation maps
- Performing training exercises at the dam site to test processes during a seismic event
- Providing training and guidance on overall dam safety
- Reviewing operation and maintenance methods for reservoir drawdown and operations after a seismic event
- Updating guidelines and procedures on protection against seismic risk
- Establishing a strong communications system on seismic information
- Performing structural strengthening of dams, including rehabilitation and improvement of spillways and inlet/outlet towers such as Lake Skinner Outlet Tower
- Improving dam safety instrumentation, monitoring, and reporting capabilities

Special Seismic Assessments

Metropolitan conducts studies to further the organization’s understanding of the vulnerability of the system to seismic hazards. The studies support emergency response training and planning for future earthquake events by estimating the magnitude of damage that may occur from various seismic events. Recently completed and ongoing studies are described below.

Completed Study:

> ***Report 1625 - Liquefaction Susceptibility Mapping for the Metropolitan Water District of Southern California’s Feeder System*** **(Carollo Engineers, Inc., 2019)**. The liquefaction susceptibility mapping study provides a relative scale of liquefaction susceptibility of deposits along Metropolitan’s conveyance and distribution system, given sufficient earthquake ground motions. Existing liquefaction maps available from the California Geological Survey provide a conservative overview of potentially liquefiable areas without any delineation for relative susceptibility. Areas are marked as either liquefiable or not liquefiable. The study utilized available geologic mapping data as well as publicly available groundwater data to map the relative liquefaction susceptibility of Metropolitan’s conveyance and distribution pipelines for historical high and modern (1999 to 2019) groundwater depths providing five levels of relative scaling of susceptibility from very high to very low. The results of the study will be used to identify specific locations that may be targeted for future site-specific detailed liquefaction analyses, help prioritize pipeline replacement projects, and assess alternative pipeline alignments.

Studies currently underway:

> ***Earthquake Damage Assessment of Metropolitan Water District Conveyance and Distribution Feeder System* (ABS Consulting, Inc.).** The study utilizes proprietary modeling software to estimate the potential number of pipeline breaks that may occur from various extreme earthquakes such as a Magnitude 7.8 earthquake on the South San Andreas Fault. The damage assessment model takes into account pipeline material and joint type, distance from earthquake source, and regional geologic conditions when developing the damage estimate. The results of the study will provide input into Metropolitan's earthquake emergency response planning and training activities, and help prioritize future pipeline seismic resilience enhancements. Anticipated completion is March 2020.

Seminars and Workshops

Metropolitan has recognized the importance of providing awareness of the seismic hazards and risks to Metropolitan, its member agencies, and sub-agencies and encouraging a transfer of knowledge of assessment and mitigation strategies to reduce seismic risk. Metropolitan ensures that risk awareness and knowledge transfer are promoted through active participation at various workshops.

In October 2019, Metropolitan co-hosted with LADWP the 11th Water System Seismic Conference. The conference is a bi-annual event that brings together utility, consulting, and academic professionals from the United States, Japan, and Taiwan to share knowledge in research, design practices, and construction technologies to prepare for and respond to seismic events. Conference topics included emerging design techniques, innovative construction practices, seismic damage assessments, seismic mitigation measures, and emergency response and recovery. In addition to co-hosting the conference, Metropolitan staff delivered four presentations on the organization's seismic resilience efforts. The papers and authors are listed in Appendix B.

Metropolitan Chief Engineer Providing Opening Remarks at 11th Water System Seismic Conference

In December 2019, Metropolitan co-sponsored the Earthquake Resilience Workshop for Water and Wastewater Utilities in Southern California. The workshop was a partnership with the United States Environmental Protection Agency and local utility and emergency management organizations to provide guidance and information to drinking water and waste water utilities to enhance their ability to enhance their resilience approach.

Staff also presented Metropolitan's seismic strategy and goals at the Member Agency Managers Meeting in August 2019. Staff described the various activities that Metropolitan conducts to understand the seismic risk and improve the overall resilience of the system. They also used the opportunity to promote the defense-in-depth approach to seismic resilience for the member agencies. This approach is a layered strategy of system hardening, emergency water supply diversification, and increased system flexibility, including potential interties between member agencies.

Seismic Performance Objectives

Structures

Metropolitan's facilities are categorized as either an essential facility or regular facility, depending on performance requirements of the structure in accordance with code requirements. The structures are then designed or rehabilitated to meet the design criteria specified in the applicable seismic codes.

Essential facilities are those that are required for Metropolitan's core business-water delivery. All structures that are directly or indirectly related to water conveyance, storage, treatment and distribution are considered essential. Additionally, structures that contribute to Metropolitan's business continuity are also considered essential. The performance objective for an essential facility is to allow for continuous operation of the structure with limited damage after a maximum considered seismic event. These essential facilities are designed or improved to allow for immediate occupancy or continuous operation after a major seismic event. As an owner/operator of essential lifeline facilities, Metropolitan's water-related facilities will remain functional for disaster relief and fire suppression following a seismic event.

For regular facilities, the objective is to allow safe evacuation of occupants with possible structural and non-structural damage. The performance objective is to ensure life safety and prevent collapse of the structure. A facility designed as a regular facility may require significant repair following a major seismic event.

Pipelines

Metropolitan's conveyance and distribution pipelines are considered essential pipelines that are required for post-earthquake response and recovery. The pipelines are intended to remain functional and operational during and following a maximum considered earthquake. No uncontrolled release of a substantial amount of water is permitted under this design scenario.

Metropolitan continuously improves its techniques to analyze the response of pipelines to a seismic event to improve its assessment and prediction of earthquake damage to these facilities. Post-earthquake data of ground motion and damage information are used to improve earthquake resilience design methodologies. The data collected is used in advanced seismic pipeline analysis that relies on finite element techniques for soil-structure 3d modeling. Innovation in the development of earthquake-resistant pipeline products contributes to better seismic performance.

For new pipeline seismic design, the performance objective is to ensure the pipeline, pipe joints, and pipe-to-structure connections are capable of resisting the seismic shaking resulting from earthquake wave propagation without permanent damage. As the pipeline crosses known earthquake faults, the system will be designed to accommodate the maximum anticipated ground movement from fault displacement using specialized joints or pipe sections. Automatic shutoff valves may be added on either side of the fault to increase system flexibility.

For existing pipeline seismic design, a comprehensive risk assessment of the system using the latest seismicity and pipeline fragility data will be performed. The vulnerabilities of each pipeline segment will be used to determine the priority and schedule of seismic rehabilitation. Seismic resilient design to resist shaking and accommodate fault displacement will be incorporated as components of the rehabilitation program. Each upgrade will be evaluated individually to balance risk, consequence, performance, and cost to define an economical long-term approach.

Operations Component

Emergency Response Training Exercises

In addition to training emergency response staff on National Incident Management System procedures, Metropolitan regularly conducts emergency response training exercises which have often been based upon a postulated seismic event.

Recent examples include:

- “ShakeOut“ Full-Scale Emergency Operations Center (EOC)/Incident Command Post (ICP) Exercise, October 17, 2019
- “Joint Infrastructure Security Exercise”- Tabletop Exercise with various Federal, State, and Local emergency management partner agencies- April 10, 2019
- “Operation Nomad”- Functional EOC/ICP and member agencies, November 14, 2018

In 2019, Metropolitan started a new five-year emergency exercise plan that will allow all of its member agencies to participate in at least one of Metropolitan’s annual emergency exercises. The first of these exercises was a tabletop exercise for the Orange County member agencies on August 29, 2019, which focused on a hypothetical incident at the Diemer Water Treatment Plant.

Metropolitan has conducted over 100 exercises since February 2018. This included two large functional emergency exercises for the EOC and multiple tabletop exercises, workshops, and seminars for the 12 Incident Command Posts located at the water treatment plants, conveyance and distribution facilities, and other strategic locations in Metropolitan’s service area.

The Metropolitan EOC also conducts monthly communication tests, which include Metropolitan’s emergency two-way radio system, on-line WebEOC system, Met-Alert mass notification system, and satellite phones. These monthly tests reach out to the member agencies, Treatment Plant Control Centers, ICPs, Metropolitan management, and the Department of Water Resources. These regular exercises help prepare Metropolitan and its member agencies to respond to future emergencies.

Emergency Response Capability

Metropolitan continues to maintain the necessary staffing, materials, and equipment to respond to two simultaneous pipeline breaks. The Machine Shop and Coating Shop at La Verne are available to fabricate pipe sizes up to 12 feet in diameter, and Metropolitan’s construction forces have the necessary equipment and expertise to make the repairs in-house. In addition, Metropolitan has upgraded its satellite phones to ensure communication ability following a seismic event and is in the process of installing high frequency radios at all Incident Command Posts (formerly Incident Command Centers) and the Emergency Operations Center.

Reporting Component

Formal Report

The interval for development of a formal report will be changed to every five years from the original two-year interval. Increasing the time interval between report updates will allow for a full Capital Investment Plan cycle to complete and for projects to move through concept, design, and construction.

Seismic Resilience Water Supply Task Force

The Seismic Resilience Water Supply Task Force (Task Force) is a collaborative effort involving Metropolitan, DWR, and LADWP to improve the seismic resilience of the imported water supplies to southern California. Following a major earthquake that disrupts the imported water supplies, the agencies would coordinate resources to repair the imported water supply aqueducts to ensure that deliveries are restored as quickly and to as many people as possible.

In March 2018, Metropolitan, DWR, and LADWP convened an aqueduct workshop to discuss lessons learned from recent large earthquakes in New Zealand, Japan, and Mexico; share each agency's approach to conducting seismic assessments; and discuss potential interties that may assist with recovery of water supply to the region. The group also had initial discussions on development of an emergency response plan specific to the Task Force.

Seismic Resilience Water Supply Task Force Aqueduct Workshop – March 2018

The Task Force also conducted two tabletop emergency exercises in 2018 and 2019. These exercises were used to give substance to some of the ideas in the Joint Agency Emergency Response Plan (ERP).

Metropolitan, DWR, and LADWP are developing a Water Mutual Assistance Agreement (WMUA), which will formalize the Task Force and define the reporting and accounting requirements for mutual assistance following a major seismic event that impacts imported water supplies. A draft of the Joint Agency ERP has also been completed. The Joint Agency ERP will be finalized along with the WMUA. The plan defines the scenarios that would trigger the deployment of the Multi-Agency Coordination Group, which enhances the collaboration in operation, reporting, and plan maintenance.

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SECTION 4 SEISMIC RESILIENCE NEAR-TERM GOALS

Status of 2018 Listed Goals

The 2018 Seismic Resilience First Biennial Report identified near-term goals to further Metropolitan's seismic resilience objectives. The near-term goals are listed below along with an update of the work done to date.

System Level Goals

Goal	Conduct Rialto Pipeline Alternative Supply Needs Study
Status: Metropolitan completed an initial study to identify the near-term and long-term emergency supply needs for member agency demand from the Rialto Pipeline. The Rialto Pipeline is exclusively supplied from the California Aqueduct East Branch and is susceptible to extended disruption from an earthquake on the San Andreas Fault. The study also identified options to meet emergency supply needs. Metropolitan is currently working with member agencies to expand on the emergency supply options.	

Goal	Complete a Re-evaluation of Metropolitan's Emergency Storage Needs
Status: Metropolitan, in coordination with member agencies, completed a re-evaluation of Metropolitan's emergency storage needs and presented the recommendations to increase storage from 630,000 acre-feet to 750,000 acre-feet to Metropolitan's Board in May 2019. A description of the emergency storage re-evaluation is provided in Section 3.	

Goal	Complete a Comprehensive Evaluation of Metropolitan's Storage Programs
Status: Metropolitan, in coordination with member agencies, will complete the 2020 Integrated Water Resources Plan (IRP). Metropolitan will use newly developed demand and supply forecasts to analyze its entire supply portfolio, including all storage programs, in assessing regional reliability.	

Facility Level Goals

Goal	Complete Construction of Approved Seismic Upgrade Projects
Status: Construction has been completed for the listed projects. • Carbon Creek Pressure Control Structure • Ten Control Structures along the Allen-McColloch Pipeline • Diemer Administration Building • CRA Pump Plants Switch Houses (Five Buildings) • Weymouth West Wash Water Tank	

Goal	Conduct Studies, and Complete Design of Approved Upgrade Projects

Status:

- Assessment of potential seismic-induced damage to Metropolitan's water conveyance and distribution pipelines

  Studies to estimate damage from shaking and at fault crossings from large earthquakes and liquefaction susceptibility of pipelines are in progress with an estimated completion date of March 2020. See Special Seismic Assessments under Section 3.

- Seismic upgrade for Diemer West Filter Building

  Completed design and construction of seismic upgrades is ongoing with an estimated completion date of December 2020.

- Complete evaluation of options, design, and construction contract to strengthen CRA Whitewater Tunnel No. 2

  Preliminary design is underway.

- Investigate options to improve emergency raw water bypass capabilities at treatment plants

  Study is ongoing.

- Vulnerability Study of CRA electric transmission and distribution systems

  Completed CRA Electric Transmission System Towers Reliability Study, which considered seismic vulnerability in addition to other hazards.

- Seismic Upgrade of Water Quality Lab in La Verne

  Project is currently in design.

- Seismic Upgrade of Weymouth Administration Building

  Project is currently in design.

- Seismic Study of Lake Skinner Outlet Tower

  Completed voluntary seismic assessment of the tower which considered current dam safety criteria

Emergency Response Goals

Goal 1:	**Prepare and Conduct Emergency Exercises**
Status: • Conduct a joint agency workshop to prepare a draft Joint Agency Response Plan • Conduct high-level training for DWR, LADWP, and Metropolitan staff on the Joint Agency Emergency Response Plan • Run a functional exercise on the Joint Agency Emergency Response Plan *Metropolitan conducted joint agency tabletop exercises to develop the Joint Agency Emergency Response Plan in 2018 and 2019. The functional exercise will be conducted following finalization of the Joint Agency Emergency Response Plan.*	
Goal 2:	**Execute MOU to Allow for Coordinated Emergency Response**
Status: • Prepare draft Memorandum of Understanding (MOU) and submit for review • Secure LADWP, Metropolitan, and DWR approval for the MOU *The Joint Agency Mutual Assistance Agreement is in the final stages of review and is expected to be signed off by all three parties in the near future.*	

Seismic Task Force Goals

2018 Goals:	Collaborative LADWP, Metropolitan, and DWR Goals

Status:

- Discuss the applicability of lessons learned from seismic events in Japan, Chile, New Zealand, and Mexico

  The organizations continue to incorporate lessons-learned from seismic events, including the July 4, 2019, M 6.4 and July 5, 2019, M 7.1 events in Ridgecrest, California

- Compare each agency's approach to conducting seismic assessments

  In development of the Joint Agency Emergency Response Plan, the organizations provided detailed presentations of their seismic assessments and the underlying assumptions to their anticipated damage and outage durations.

- Meet with Southern California Edison (SCE) and Southern California Gas Co. to discuss the potential vulnerabilities of aqueduct power systems

  Metropolitan held discussions with staff from SCE and shared information on the respective systems and seismic vulnerabilities.

- Conduct workshops to explore potential aqueduct interties

  DWR and LADWP continue to investigate the potential for constructing an intertie between the State Water Project East Branch and the Los Angeles Aqueduct.

2019 Goals:	Collaborative LADWP, Metropolitan, and DWR Goals

Status:

- Establish a leadership structure for a coordinated response to major events

  The leadership structure for a coordinated response is described in the Joint Agency Emergency Response Plan

- Finalize a three-agency database of available emergency response resources

  Updating list of emergency response resources for 2020

2019 Goals:	**Collaborative LADWP, Metropolitan, and DWR Goals (cont'd)**

Status:

- Conduct a three-agency tabletop exercise

  Metropolitan hosted a tabletop exercise in October 2019.

- Develop a ShakeOut Scenario Response and Restoration Plan

  The ShakeOut Scenario is identified as one of the triggers that would initiate the Joint Agency Emergency Response Plan.

- Conduct a second three-agency functional exercise that includes energy utilities

  Conducted a functional emergency exercise at the Robert B. Diemer Water Treatment Plant with local Sheriff and Fire Departments, SCE, City of Yorba Linda Emergency Services, Yorba Linda Water District, Orange County Emergency Management, and the Water Emergency Response of Orange County.

Other Near-Term Goals

1. Develop a Standard Approach for Evaluating Non-Structural Elements:

   Metropolitan is in the process of studying industry standards applicable to Metropolitan and collecting approaches taken by other agencies.

2. Establish Additional Performance Objectives for new pipelines, retrofit of pipelines, and new and existing tunnels:

   Metropolitan is now designing new pipelines and tunnels and retrofitting existing pipelines and tunnels in accordance with current standards and incorporating additional seismic mitigation measures wherever practicable.

3. Investigate the Potential for Developing a Model to Prioritize Pipeline Rehabilitation:

   This is being addressed through the Asset Management efforts, with input from recent seismic studies on risk from potential damage from shaking, fault rupture, and liquefaction.

4. Enhance Member Agency Planning Efforts Regarding New Facilities and Emergency Response Programs:

   The Member Agency Managers Workshop was used to present the Seismic Resilience Strategy and objectives and Seismic Task Force findings.

5. Seek Approval for Detailed Seismic Studies

   This is an ongoing effort. As Metropolitan completes the rapid evaluations of the Post-1990 structures, detailed studies will be recommended for those structures found to be potentially deficient.

6. Support the Delta Conveyance Project (part of the former proposed California WaterFix Project)

Metropolitan will continue to support the Delta Conveyance Project to increase the seismic resiliency of the Bay-Delta portion of the State Water Project.

2020 Update Near-Term Goals

The following section lists new near-term goals that will further Metropolitan's objective of seismic resilience. These goals are anticipated to be completed before the next update in 2025.

System Level Goals

Goal	Conduct Special Seismic Studies
• Update 2006 System Reliability Study, which analyzed the impacts of various single outage scenarios on Metropolitan's ability to meet member agency demand	

Goal	Conduct Planning Studies
• Complete the 2020 IRP and comprehensive distribution system study under collaborative regional process. Update the emergency storage objective based on new IRP goals and forecasts.	

Facility Level Goals

Goal	Complete Construction of Approved Projects
• Weymouth West Wash Water Tank Seismic Upgrade • Union Station Headquarters Building Seismic Upgrade • Diemer West Filter Seismic Upgrade • CRA Casa Loma Siphon Barrel No. 1 Replacement	

Goal	Complete Design of Approved Seismic Upgrade Projects
• Weymouth Administration Building Seismic Upgrade and Building Improvements • La Verne Water Quality Lab and Field Engineering Building Seismic Upgrades and Building Improvements • CRA Whitewater Tunnel No. 2 Seismic Upgrades • Lake Mathews Disaster Recovery Facility Seismic Upgrades • Upper Feeder San Gabriel Tower Seismic Upgrade • Weymouth Inlet Channel Structural Upgrades	

Goal	Seismic Upgrade of Below Ground Structures
• Initiate evaluation of below-ground structures. Identify and list all structures. Develop a prioritization system for evaluation.	

Task Force Goals

Goal	Emergency Response Plan and Exercises
• Conduct annual exercises to ensure familiarity with Joint Agency Emergency Response Plan • Semi-annual verification of emergency contact list for DWR, Metropolitan, and LADWP	

Other Near-Term Goals

- Promote to member agencies the Defense-in-Depth approach to seismic resilience as recommended in *Report 1335 – Potential Effects of Southern California Seismic Events on Metropolitan Deliveries* (January 2009).
- Continue to gain and share knowledge about seismic resilience through participation in workshops and conferences.
- Complete rapid evaluations for post-1990 above-grade structures.

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Appendix A – M6.3 or Greater Earthquakes in Southern California Region - 1900 to Present

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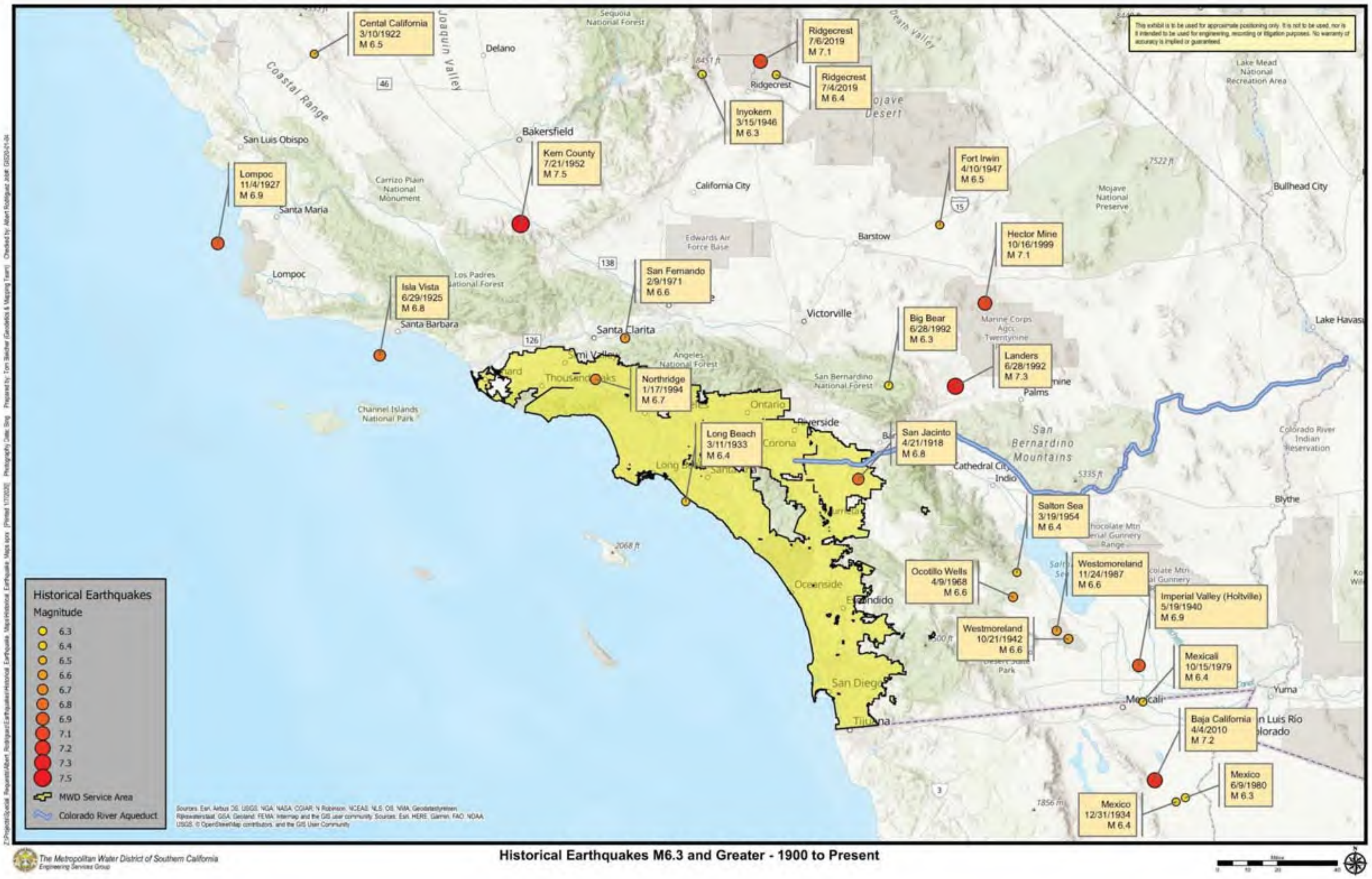

Historical Earthquakes M6.3 and Greater - 1900 to Present

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Appendix B – List of Metropolitan Staff Seismic Conference Papers

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Metropolitan Staff Papers Presented at the 11th JWWA/WRF/CTWWA Water Seismic Conference

Brainard, Andrew (2019), "Evaluation of Welded Joints in Steel Pipelines by Finite Element Modeling", P*roceedings of the 11th JWWA/WRF/CTWWA Water Seismic Conference*, October 9-11 2019, pp. 42-53.

Beikae, Mohsen (2019), "Monte Carlo Simulation of Probabilistic Rupture Hazard Analysis for Lifelines Crossing Active Faults", *Proceedings of the 11th JWWA/WRF/CTWWA Water Seismic Conference*, October 9-11 2019, pp. 107-119.

Chai, Winston (2019), "Seismic Rehabilitation of Upper Feeder Pipeline Santa Ana River Crossing – An Example of Metropolitan's Seismic Upgrade Program", *Proceedings of the 11th JWWA/WRF/CTWWA Water Seismic Conference*, October 9-11 2019, pp. 1-12.

Peng, Tao (2019), "Mitigation of Fault Displacement and Ground Subsidence for Large Diameter Pipeline", *Proceedings of the 11th JWWA/WRF/CTWWA Water Seismic Conference*, October 9-11 2019, pp. 217-228.

Appendix 10

METROPOLITAN'S ENERGY INTENSITY INFORMATION, INCLUDING CONVEYANCE AND DISTRIBUTION GENERATION

Appendix 10
METROPOLITAN'S ENERGY INTENSITY INFORMATION

Introduction

The Metropolitan Water District of Southern California is a wholesale water agency that distributes water to its 26 member agencies. These agencies receive treated and untreated water through Metropolitan's 830 miles of interconnected pipelines. There are over 400 service connections to the 26 member agencies located throughout Metropolitan's 5,200 square mile service area.

Metropolitan has always recognized the relationship between water and energy. In addition to being one of the original contractors for power from Hoover Dam in 1937, Metropolitan also paid for half of the cost of the Parker Dam power plant. The energy Metropolitan receives from these facilities provides greenhouse gas (GHG)-free electricity for pumping along the Colorado River Aqueduct. Metropolitan's conveyance and distribution system is also designed to minimize pumping. Imported supplies flow by gravity through Metropolitan's treatment plants and distribution system to the member agencies.

Water-Related Energy Use in California

The Water-Energy Nexus (W-E Nexus) recognizes that water supplies and energy supplies are interrelated. Water supplies require energy for heating and cooling, but also for transporting, treating and disposing. Likewise, energy supplies require water for cooling, fuel extraction and processing and hydropower production.

State agencies, water districts, and other stakeholders began to study the important link between energy and water in the 2000s. Since then, it has been widely reported that California's "Water Sector" uses 19 percent of the state's electricity and 32 percent of the state's natural gas not used for power generation.

The original source for these facts is the California Energy Commission's 2005 "California's Water – Energy Relationship" report (CEC-700-2005-011-SF, Nov. 2005[1]). In the report, the CEC analyzed energy use data for 2001 and disaggregated the 19 percent into urban water supply, wastewater treatment, customer end uses, and agriculture. Based on the CEC's analysis, approximately 3 percent of California's electrical use in 2001 was associated with urban water agency conveyance, treatment, and distribution. Customer end-uses such as the heating and cooling of water represented 11.1 percent. Another 0.8 percent was attributed to wastewater treatment and 4.2 percent was associated with agricultural uses. Table A.10-1 presents the water related energy use in California adapted from the 2005 CEC report.

The 3.8 percent of electricity associated with urban water supply and wastewater treatment represent the "embedded energy" in water.

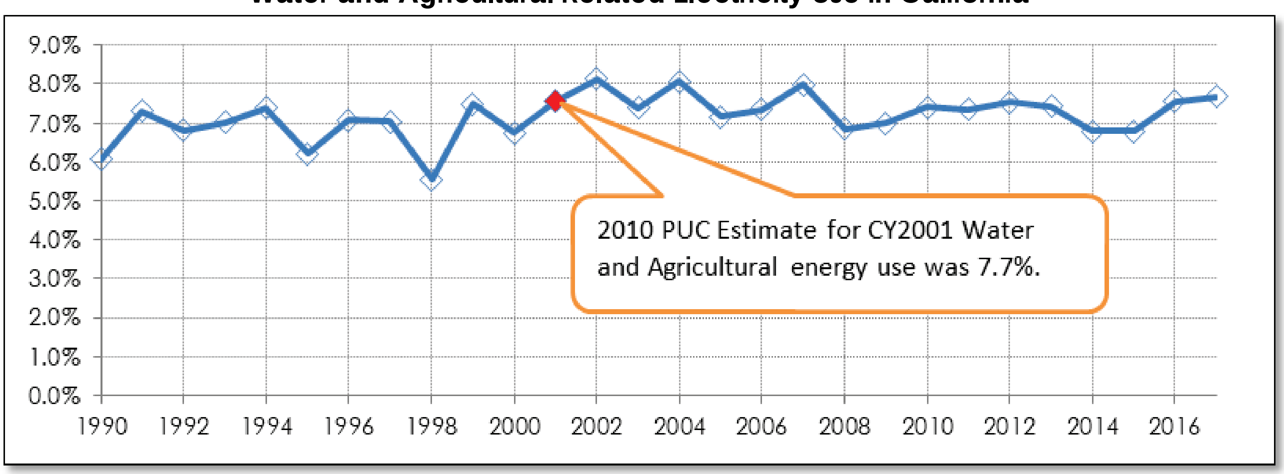
[1] https://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011.PDF

Table A.10-1
Water Related Energy Use in California[2]

	Electricity (Gigawatt-hour)	Natural Gas (Million Therms)
Urban Water Supply	**7,554**	**19**
Wastewater Treatment	2,012	27
Urban End Users	27,887	4,220
Agricultural Total	10,560	18
Total Water Sector Use	**48,013**	**4,284**
Total California Use	**250,494**	**13,571**
Urban Water Supply	**3.0%**	**0.1%**
Wastewater Treatment	0.8%	0.2%
Urban End Users	11.1%	31.1%
Agricultural Total	4.2%	0.1%
Total Water Sector Use	**19.2%**	**31.6%**

In 2010, the California Public Utilities Commission (PUC) reevaluated water-related energy use and estimated that 7.7 percent of the State's electricity was used for urban water supply, wastewater treatment, and agricultural-related pumping and treatment.[3] This is close to the CEC report estimate for those three sectors. While water-related electricity use varies from year to year, it has fluctuated between 6 percent and 8 percent over the past 30 years, as shown in Figure A.10-1.

Figure A.10-1
Water and Agricultural Related Electricity Use in California[4]



[2] "California's Water – Energy Relationship" report (CEC-700-2005-011-SF, 2005)
[3] Embedded Energy in Water Studies Study 1: Statewide and Regional Water-Energy Relationship (Public Utilities Commission, 2010, page 58)
[4] CEC: California Energy Consumption Data Base: http://ecdms.energy.ca.gov/

In response to California's GHG emission goals, Metropolitan and many other water utilities are taking steps to reduce water-related energy use and emissions. This includes increasing energy recovery in conveyance and distribution systems, developing renewable energy projects, performing energy studies, auditing facility energy usage, and other related actions. Additionally, the conservation programs administered by Metropolitan and the member agencies save embedded energy along with the energy associated with customer end uses. Section 3.8 contains a description of Metropolitan's energy sustainability initiatives and proposed Climate Action Plan.

Metropolitan's Energy Intensity

Under CWC 10631.2(a), urban water management plans "Shall include any of the following information that the urban water supplier can readily obtain:"

1. An estimate of the amount of energy used to extract or divert water supplies.
2. An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.
3. An estimate of the amount of energy used to treat water supplies.
4. An estimate of the amount of energy used to distribute water supplies through its distribution systems.
5. An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.
6. An estimate of the amount of energy used to place water into or withdraw from storage.
7. Any other energy-related information the urban water supplier deems appropriate.

This section provides Metropolitan's energy intensity information according to these guidelines. Due to the mixing of water supplies before and after treatment, Metropolitan's complex distribution system, and the large number of service connections, Metropolitan provides system-wide energy intensity values. As operational conditions change from month to month and year to year, Metropolitan's energy use and energy intensity also vary.

Metropolitan's operational control includes the Colorado River Aqueduct (CRA) but does not include the State Water Project (SWP). However, excluding upstream embedded energy from the SWP would not represent an accurate estimate of the energy embedded in Metropolitan's water supplies. To avoid potential misinterpretation of the data provided, this Appendix reports Metropolitan's energy intensity information with upstream SWP embedded energy.

Metropolitan's energy intensity for the water it provides to its member agencies is broken down into the following functions and described below:

- Source
- Conveyance
- Treatment
- Distribution
- Storage

Source

The water Metropolitan receives comes from two sources: (1) the California Department of Water Resources' (DWR) State Water Project, and (2) the Colorado River. The energy required to extract or divert water from these sources is reported in conveyance.

Conveyance

The energy requirements from the two conveyance systems supplying Metropolitan's water have been combined, along with the volume of water delivered, into a single weighted energy intensity value. This method provides an energy intensity estimate which can then be used by other water agencies and stakeholders. As the blend of water from the SWP and the Colorado River changes each year, the total energy consumption for conveyance also varies.

Metropolitan's energy intensity for conveyance also accounts for consequential and non-consequential hydropower. Consequential hydropower is hydropower produced as the sole result of a water demand or use. Non-consequential hydropower is hydropower produced as the result of some combination of water demand deliveries and releases for other purposes such as flood control. The non-consequential hydropower from Hoover Dam and the SWP's Hyatt-Thermalito Complex are discussed in the following sections.

Colorado River

Metropolitan conveys water from the Colorado River through its Colorado River Aqueduct (CRA). The water is pumped through five pumping plants to reach Metropolitan's service area. The nominal energy intensity of water conveyed through the CRA is 2,000 kWh/AF.

There are no recovery generating plants along the CRA. However, the water that Metropolitan pumps from the Colorado River has been released from Lake Mead through the Hoover Dam generators. Metropolitan receives 27.1 percent of the energy produced at Hoover. This energy is used to power the CRA pumps. The production rate (kWh/AF) at Hoover depends on several factors, including the elevation of Lake Mead. The USBR updates this value monthly. Metropolitan incorporates its share of the energy produced at Hoover in the calculation of the CRA conveyance energy requirement.

State Water Project

Metropolitan is a contractor for water from DWR's SWP. The SWP uses a combination of natural and man-made systems to move water from Lake Oroville on the Feather River in northern California, through the Sacramento/San Joaquin River Delta (Delta), and into the California Aqueduct for delivery to Southern California and other regions. DWR conveys water through the California Aqueduct using a series of pumps and hydroelectric generators. Metropolitan receives water from DWR through the West Branch of the California Aqueduct at Castaic Lake and from the East Branch of the California Aqueduct at several locations in San Bernardino and Riverside Counties.

The California Aqueduct's net energy intensity for the water received from the West Branch is 2,580 kWh/AF and for the East Branch it is 3,236 kWh/AF. These values are the nominal pumping requirements of the SWP pumps (Banks, Dos Amigos, Buena Vista, Teerink, Chrisman, Edmonston, Oso, and Pearblossom) less the nominal generation values from the West and East Branch recovery generating plants (Warne, Castaic, Alamo, Mojave, and Devil Canyon). These values exclude pumping and generating at the San Luis Gianelli Plant.

The SWP also produces power at its Hyatt-Thermalito complex (HTC) near Lake Oroville and the Feather River in northern California. DWR releases water from Lake Oroville which flows through the HTC hydro generators and produces power for the SWP. State Water Project Contractors, including Metropolitan, pay for the HTC based on their share of the SWP's Variable Operation, Maintenance, Power and Replacement (OMP&R) Component of the Transportation Charge. To determine the benefit Metropolitan receives from the HTC generation in calculating the Energy Intensity of SWP conveyance, this same OMP&R share (percentage) is used with the total generation from the HTC. From 2004 through 2018, Metropolitan's share of the HTC costs has ranged from 60.2 percent to 74.3 percent. A multi-year average percentage has been used to reduce the year-to-year volatility of this factor and calculate the non-consequential energy included in Metropolitan's conveyance energy intensity. Table A.10-2 presents the 2018 conveyance energy intensity with upstream SWP embedded energy.

The SWP contract has specific provisions on how and when to account for various water deliveries and the associated costs. This will result in differences between the SWP billing values and the amount of water delivered to Metropolitan from the SWP.

Table A.10-2
2018 Conveyance Energy Intensity with Upstream SWP Embedded Energy

	With SWP Embedded Energy
Net Energy Use (kWh)*	3,050,621,000
Water Conveyed (AF)	1,588,958
Energy Intensity (kWh/AF)	1,919.9

* Accounts for non-consequential hydropower generation of 94,161,800 kWh from Hoover Dam on the Colorado River and 861,900,000 kWh from the Hyatt-Thermalito Complex on the State Water Project.

Treatment

Metropolitan operates five treatment plants to provide potable water to its Member Agencies. The estimated amount of energy used to treat water supplies has been calculated by dividing the annual amount of energy consumed at the plant sites by the amount of water treated. In order to meet water quality regulations, Metropolitan has retrofitted its treatment plants to use ozone, rather than chlorine, as the primary disinfectant during treatment (chlorine and ammonia are added after filtration for a disinfection residual in the distribution system). Metropolitan generates ozone on-site at each treatment plant. The ozone generation process has increased the energy required for treating Metropolitan's supplies. Table A.10-3 presents the treatment energy intensity for 2018.

Table A.10-3
2018 Treatment Energy Intensity

	2018
Energy Use (kWh)	53,608,000
Water Treated (AF)	769,398
Energy Intensity (kWh/AF)	69.7

Metropolitan has also installed solar energy at three of its treatment plants with a combined capacity of five megawatts. The electricity generated by these facilities meets between 15 percent and 20 percent of the energy demands of those plants. Solar energy is added to the grid power used at each plant to estimate a total energy intensity value. In 2018, Metropolitan generated 10,409,000 kWh of solar energy from these facilities, reducing the electricity purchased from the grid and its associated GHG emissions.

Distribution

Due to the high elevations at which Metropolitan receives water from the SWP and CRA conveyance facilities, minimal pumping (and electricity use) is needed to distribute treated and untreated water to its Member Agencies. Gravity, not electricity, drives water supply deliveries through most of Metropolitan's distribution system.

In addition, Metropolitan has 16 recovery hydroelectric generating plants located throughout its distribution system. The generators produce electricity from the water flowing through the pipelines. These plants generate more power than is consumed from distribution pumping. Without the hydroelectric generators, embedded energy in the water would be reduced at facilities called pressure control structures and the potential for energy production would be lost. The energy used in the pumping plants and produced by the generators has been netted, with the result divided by water deliveries to calculate the distribution energy intensity.

Weather variation has a significant impact on distribution system energy intensity. In dry years with low SWP deliveries, Metropolitan generates less distribution system hydropower and may need to increase pumping to deliver CRA supplies throughout the region. Table A.10-4 presents the distribution system net energy intensity for 2018.

Table A.10-4
2018 Distribution System Net Energy Intensity

	2018
Pumping (kWh)	4,753,000
Hydropower Generation (kWh)	-239,699,000
Net Distribution Energy Use (kWh)	-234,946,000
Water Delivered (AF)	1,540,022
Energy Intensity (kWh/AF)	-152.6

Storage

Metropolitan maintains significant storage facilities and programs both inside and outside its service area. However, Metropolitan does not use any energy for storage programs under its "span of control." Water is delivered by gravity flow. External water storage and recovery are managed by other parties and are often transacted through exchange arrangements. Water delivered to Metropolitan from these storage programs is accounted for in conveyance energy intensity.

Metropolitan's Annual Energy and Energy Intensity

Energy and energy intensity information is provided for each of the non-zero processes listed above: Conveyance; Treatment; and Distribution. As noted previously, these values vary from year to year due to operational changes and differences in water supply availability. An estimated overall energy intensity is provided for untreated and treated water deliveries for 2018 and for a six-year average in the tables below. Both estimates account for non-consequential hydropower. Table A.10-5 presents the treated and untreated water energy intensity for year 2018. Table A.10-6 presents the average treated and untreated water energy intensity for 2013 through 2018. Figure A.10-2 shows Metropolitan's energy use for 2013 through 2018 and highlights the impacts of hydrological conditions on Metropolitan's energy use.

Table A.10-5
2018 Treated and Untreated Water Energy Intensity

	With SWP (kWh/AF)
Conveyance*	1,919.9
Treatment	69.7
Distribution	-152.6
Total Treated	1,837.0
Total Untreated	1,767.3

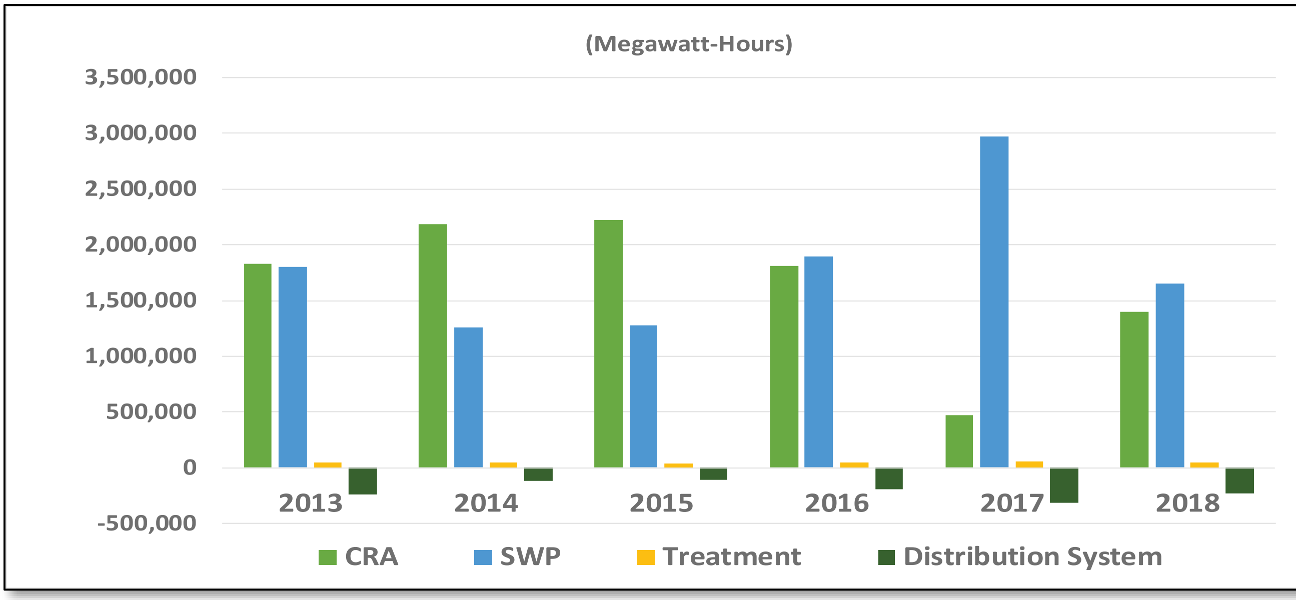
*Accounts for hydropower generation from Hoover and Hyatt/Thermalito

Table A.10-6
Average Treated and Untreated Water Energy Intensity (2013 – 2018)

	With SWP (kWh/AF)
Conveyance*	1,928.0
Treatment	57.0
Distribution	-121.9
Total Treated	1,863.0
Total Untreated	1,806.0

*Accounts for hydropower generation from Hoover and Hyatt/Thermalito

Figure A.10-2
Variations in Metropolitan Energy Use (2013-2018)



Greenhouse Gas Emissions

Metropolitan voluntarily reports its GHG emissions from all sources to The Climate Registry (TCR). TCR implements a GHG registry for California entities and develops protocols for GHG reporting. The data provided in TCR's registry is publicly accessible and transparent. Metropolitan's annual GHG data and those for many other water agencies are available through TCR's CRIS website[5]. To guarantee data quality, TCR requires published GHG information to be audited by a certified verification expert. Metropolitan has been auditing and reporting its annual GHG emissions to TCR since 2005.

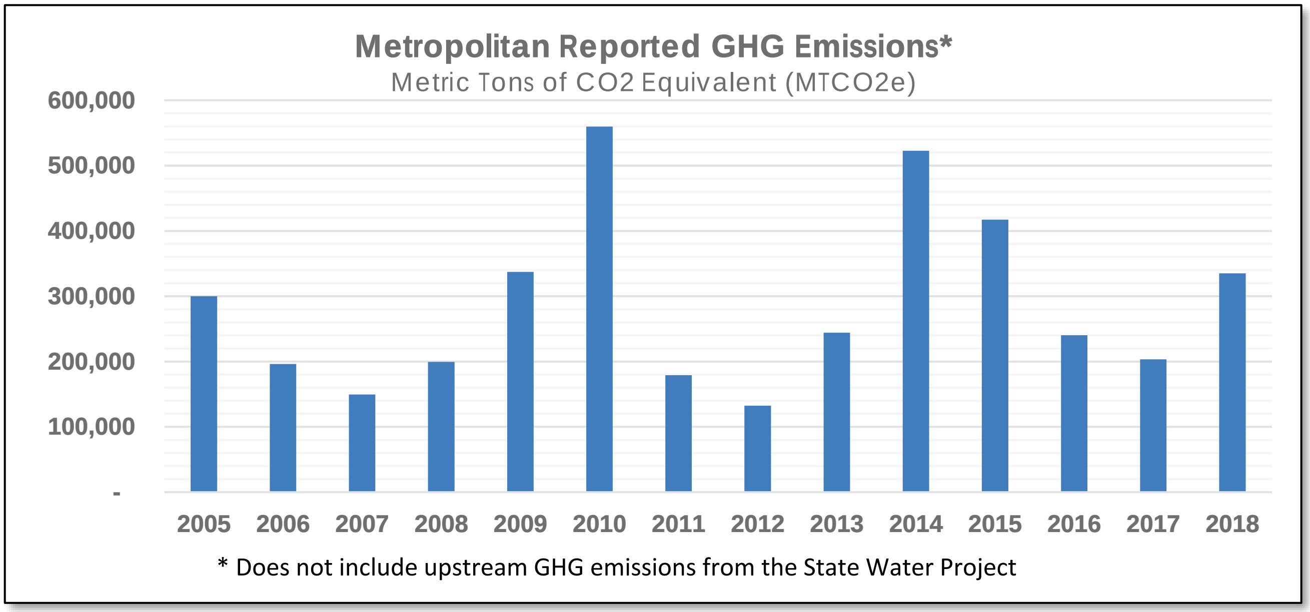
As with energy intensity, Metropolitan's GHG emissions vary due to hydrology. Over 95 percent of Metropolitan's GHG emissions are derived from electricity use, primarily from the CRA. In dry years, Metropolitan purchases additional grid electricity to accommodate higher CRA deliveries and uses more energy for distribution system pumping. The combination of higher electricity use coupled with higher GHG emission factors for purchased electricity cause Metropolitan's GHG emissions to spike in dry years. The opposite is true in wet years. Lower CRA deliveries are met with zero-carbon electricity from Hoover and Parker dams. In recent years, Metropolitan's GHG emissions have swung from 522,600 tons of CO2e emitted during the record low SWP allocation year in 2014 to 203,400 tons of CO2e emitted during the record wet year in 2017. Metropolitan's 10-year average of 317,100 tons of CO2e includes two dry-year/wet-year cycles.

[5] The Climate Registry CRIS GHG Database: https://www.theclimateregistry.org/tools-resources/reporting-toolkit/cris-resources/

Unlike Metropolitan's embedded energy described above, Metropolitan's reported GHG emissions do not include upstream SWP emissions. Metropolitan is participating in TCR's new Water-Energy Nexus GHG Registry and will be able to provide additional GHG metrics in the future.

The California Air Resources Board (CARB) tracks state-wide GHG emissions from all sources on an annual basis[6]. Compared to CARB's GHG inventory, Metropolitan's CO2e emissions represented 0.12 percent of the state's total emissions in 2014 and 0.05 percent in 2017. Additional information on Metropolitan's GHG emissions and Climate Action Plan are contained Section 3.8. Figure A.10-3 presents Metropolitan GHG emissions for 2005 through 2018.

Figure A.10-3
Metropolitan GHG emissions



DWR Required Water-Energy Nexus Table: Process Approach

Table A.10-7 contains Metropolitan's required Water-Energy Table for CY2018 using the Water Supply Process Approach in Table O-1A.

The table shows Metropolitan's energy intensity with upstream SWP embedded energy and non-consequential generation included.

Note that Metropolitan uses an alternative approach for calculating total or system-wide kWh/AF. Metropolitan's approach adds the energy intensity of the individual components to derive a system-wide total, where the required table divides the total net energy use by total deliveries. As a result, the system-wide kWh/AF total described in Table A.10-6 varies slightly from DWR's required Table A.10-7. Metropolitan also incorporates non-consequential hydropower production in its energy intensity calculations.

[6] https://ww2.arb.ca.gov/ghg-inventory-data; California's GHG emissions were 444.7 million tons of CO2e in 2014 and 424.1 million tons of CO2e in 2017, the latest year available.

Table A.10-7 (Table O-1A for Year 2018): Water Supply Process Approach Including Upstream State Water Project Energy Use

Urban Water Supplier: Metropolitan Water District of Southern California

Water Delivery Product (If delivering more than one type of product use Table O-1C)

Wholesale Potable Deliveries

Table O-1A: Recommended Energy Intensity - Water Supply Process Approach

Enter Start Date for Reporting Period: 1/1/18

End Date: 12/31/18

☑ Is upstream embedded in the values reported?

		Urban Water Supplier Operational Control							
		Water Management Process						Non-Consequential Hydropower (if applicable) See Narrative Below	
	Water Volume Units Used	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	acre feet	0	0	1,588,958	769,398	1,540,022	1,540,022	0	1,540,022
Energy Consumed (kWh)	N/A	0	0	3,050,621,091	52,687,943	-234,945,839	2,869,283,155		2,869,283,155
Energy Intensity (kWh/vol.)	N/A	0.0	0.0	1919.9	68.7	-152.6	1863.1	0.0	1863.1
				MWD method: process additive			1837.8		

Quantity of Self-Generated Renewable Energy

10,409,000 kWh

Data Quality (Estimate, Metered Data, Combination of Estimates and Metered Data)

Combination of Estimates and Metered Data

Data Quality Narrative:

Assumes Colorado river energy intensity at 2,000 kWh/AF; SWP East Branch at 3,236, and SWP West Branch at 2,580.
Energy use for the treatment and distribution processes are metered. Non-consequential hydropower is calculated from metered data.
Detailed descriptions of the methodology are contained in the appendix.

Narrative:

This table incorporates upstream State Water Project conveyance deliveries, energy use, consequential and non-consequential energy generation from Hoover Dam and the SWP Hyatt-Thermalito Complex.
Including upstream SWP imbedded energy represents the applicable energy intensity of Metropolitan's water supplies as delivered to its Member Agencies.

Metropolitan uses an alternative method for calculating overall energy intensity by adding the processes to derive a total utility value as described above.
Using Metropolitan's additive methodology, the total utility energy intensity for treated water would be 1,837 kWh/AF instead of 1,863 kWh/AF in the table above.

Total non-consequential hydropower included in 2018 conveyance: 956,021,000 kWh
- Hoover Dam non-consequential hydropower: 94,162,000 kWh
- Hyatt-Thermalito non-consequential hydropower: 861,859,000 kWh

Metropolitan delivers both treated and untreated water to its member agencies.

Glossary

Water-Energy Nexus: The recognition of the link between water supplies and energy supplies

Energy Intensity: A measure of the energy required to deliver, or process water expressed in kilowatt hours per acre-foot (kWh/AF)

Embedded Energy: The amount of energy required to deliver water supplies from a source to a delivery point. Also expressed in kilowatt hours per acre-foot (kWh/AF).

Greenhouse Gas Intensity: a measure of the overall greenhouse gasses required to deliver or process water, expressed in GHG/AF.

Hydropower: Renewable energy produced by water powering a turbine to produce electricity.

Water Sector: The water sector in the W-E Nexus is broadly defined to include customer end-uses of water such as heating or cooling; pumping and treating urban and agricultural water supplies; and wastewater disposal.

Consequential Hydropower: Hydropower produced as the sole result of a water demand or use. An example would be a hydropower recovery plant on an aqueduct that generates power as demands dictate flows in the aqueduct.

Non-consequential Hydropower: Hydropower produced as the result of some combination of water demand and other requirements such as flood releases or environmental flows.

The Climate Registry: A California non-profit organization tasked with managing a voluntary GHG registry for the State as well as implementing a voluntary GHG registry specifically for water-related GHG emissions.

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Appendix 11

QUANTIFYING REGIONAL SELF-RELIANCE AND REDUCED RELIANCE ON WATER SUPPLIES FROM THE DELTA WATERSHED

Appendix 11
METROPOLITAN'S
REDUCED DELTA RELIANCE REPORTING

A.11.1 Background

Under the Sacramento-San Joaquin Delta Reform Act of 2009, state and local public agencies proposing a covered action in the Delta,[1] prior to initiating the implementation of that action, must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the Delta Stewardship Council.[2] Anyone may appeal a certification of consistency, and if the Delta Stewardship Council grants the appeal, the covered action may not be implemented until the agency proposing the covered action submits a revised certification of consistency, and either no appeal is filed, or the Delta Stewardship Council denies the subsequent appeal.[3]

An urban water supplier that anticipates participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta should provide information in their 2015 and 2020 Urban Water Management Plans (UWMPs) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1).[4]

WR P1 details what is needed for a covered action to demonstrate consistency with reduced reliance on the Delta and improved regional self-reliance. WR P1 subsection (a) states that:

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

> *(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c);*
>
> *(2) That failure has significantly caused the need for the export, transfer, or use; and*
>
> *(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.*

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

> *(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;*

---

[1] Water Code, § 85057.5; Cal. Code Regs. tit. 23, § 5001.
[2] Water Code, § 85225; Delta Plan, App. D.
[3] Water Code, §§ 85225.10-85225.25; Delta Plan, App. D.
[4] Cal. Code Regs., tit. 23, § 5003.

(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code Section 1011(a).

The analysis and documentation provided below include all of the elements described in WR P1(c)(1) that need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action.

A.11.2 Summary of Expected Outcomes for Reduced Reliance on the Delta

As stated in WR P1(c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta.

The expected outcomes for Metropolitan's Delta reliance and regional self-reliance were developed using the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 (Guidebook Appendix C) issued in March 2021.

The data used in this analysis represent the total regional efforts of Metropolitan and its member agencies and their customers (many of them, retail agencies) and were developed in conjunction with Metropolitan's member agencies as part of the UWMP coordination process as described in Section 5 of Metropolitan's UWMP. In accordance with UMWP requirements, Metropolitan's member agencies and their customers (many of them, retail agencies) also report demands and supplies for their service areas in their respective UWMPs. The data reported by those agencies are not additive to the regional totals shown in Metropolitan's UWMP; rather, their reporting represents subtotals of the regional total and should be considered as such for the purposes of determining reduced reliance on the Delta.

While the demands that Metropolitan's member agencies and their customers report in their UWMPs are a good reflection of the demands in their respective service areas, they do not adequately represent each water supplier's contributions to reduced reliance on the Delta. In order to calculate and report their reliance on water supplies from the Delta watershed, water suppliers that receive water from the Delta through other regional or wholesale water suppliers would need to determine the amount of Delta water that they receive from the regional or wholesale supplier. Two specific pieces of information are needed to accomplish this: first is the quantity of demands on the regional or wholesale water supplier that accurately reflect a supplier's contributions to reduced reliance on the Delta, and second is the quantity of a supplier's demands on the regional or wholesale water supplier that are met by supplies from the Delta watershed.

For water suppliers that make investments in regional projects or programs it may be infeasible to quantify their demands on the regional or wholesale water supplier in a way that accurately reflects their individual contributions to reduced reliance on the Delta. Due to the extensive, long-standing and successful implementation of regional demand management and local resource incentive programs in Metropolitan's service area, this infeasibility holds true for Metropolitan's members as well their customers. For Metropolitan's service area, reduced reliance on supplies from the Delta watershed can only be accurately accounted at the regional level, as is demonstrated in this analysis.

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for Metropolitan's Delta reliance and regional self-reliance. The results show that as a region, Metropolitan and its members as well as their customers are measurably reducing reliance on the Delta and improving regional self-reliance, both as an amount of water used and as a percentage of water used.

Expected Outcomes for Regional Self-Reliance

- Near-term (2025) – Normal water year regional self-reliance is expected to increase by 813 TAF from the 2010 baseline; this represents an increase of almost 25 percent of 2025 normal water year retail demands (Table A.11-2).
- Long-term (2045) – Normal water year regional self-reliance is expected to increase by more than 1.28 MAF from the 2010 baseline, this represents an increase of more than 25 percent of 2045 normal water year retail demands (Table A.11-2).

Expected Outcomes for Reduced Reliance on Supplies from the Delta Watershed

- Near-term (2025) – Normal water year reliance on supplies from the Delta watershed decreased by 301 TAF from the 2010 baseline, this represents a decrease of 3 percent of 2025 normal water year retail demands (Table A.11-3).
- Long-term (2045) – Normal water year reliance on supplies from the Delta watershed decreased by 314 TAF from the 2010 baseline, this represents a decrease of just over 5 percent of 2045 normal water year retail demands (Table A.11-3).

A11.3 Demonstration of Reduced Reliance on the Delta

The methodology used to determine Metropolitan's reduced Delta reliance and improved regional self-reliance is consistent with the approach detailed in DWR's UWMP Guidebook Appendix C, including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources. Some of the key assumptions underlying Metropolitan's demonstration of reduced reliance include:

- All data were obtained from the current 2020 UWMP or previously adopted UWMPs and represent average or normal water year conditions.
- All analyses were conducted at the service area level, and all data reflect the total contributions of Metropolitan and its members as well as their customers.
- No projects or programs that are described in the UWMPs as "Projects Under Development" were included in the accounting of supplies.

Baseline and Expected Outcomes

In order to calculate the expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C. Data for the 2010 baseline were taken from Metropolitan's 2005 UWMP as the UWMPs generally do not provide normal water year data for the year that they are adopted (i.e., 2005 UWMP forecasts begin in 2010, 2010 UWMP forecasts begin in 2015, and so on).

Consistent with the 2010 baseline data approach, the expected outcomes for reduced Delta reliance and improved regional self-reliance for 2015 and 2020 were taken from Metropolitan's 2010 and 2015 UWMPs respectively. Expected outcomes for 2025-2045 are from the current 2020 UWMP. Documentation of the specific data sources and assumptions are included in the discussions below.

Service Area Demands without Water Use Efficiency

In alignment with the Guidebook Appendix C, this analysis uses normal water year demands, rather than normal water year supplies to calculate expected outcomes in terms of the percentage of water used. Using normal water year demands serves as a proxy for the amount of supplies that would be used in a normal water year, which helps alleviate issues associated with how supply capability is presented to fulfill requirements of the Act versus how supplies might be accounted for to demonstrate consistency with WR P1.

Because WR P1 considers water use efficiency savings a source of water supply, water suppliers such as Metropolitan that explicitly calculate and report water use efficiency savings in their UWMP will need to make an adjustment to properly reflect normal water year demands in the calculation of reduced reliance. As explained in the Guidebook Appendix C, water use efficiency savings must be added back to the normal year demands to represent demands without water use efficiency savings accounted for; otherwise the effect of water use efficiency savings on regional self-reliance would be overestimated. Table A.11-1 shows the results of this adjustment for Metropolitan. Supporting narratives and documentation for all of the data shown in Table A.11-1 are provided below.

Table A.11-1
Demands without Water Use Efficiency Accounted For

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Demands with Water Use Efficiency Accounted For	4,628,000	4,563,000	4,163,000	3,763,000	3,821,000	3,893,000	3,936,000	3,985,000
Reported Water Use Efficiency	865,000	936,000	1,056,000	1,162,000	1,211,000	1,263,000	1,325,000	1,389,000
Service Area Demands without Water Use Efficiency Accounted For	**5,493,000**	**5,499,000**	**5,219,000**	**4,925,000**	**5,032,000**	**5,156,000**	**5,261,000**	**5,374,000**

Service Area Demands without Water Use Efficiency

The service area demands shown in Table A.11-1 represent the total retail water demands for Metropolitan's service area and include municipal and industrial demands, agricultural demands, seawater barrier demands, and storage replenishment demands. These demand types and the modeling methodologies used to calculate them are described in Section 2.2 and Appendix 1 of Metropolitan's UWMP.

Water Use Efficiency

The water use efficiency numbers shown in Table A.11-1 represent the total water use efficiency savings (conservation) for Metropolitan's region, including savings from active, code-based, price-effect and pre-1990 sources. These sources of water use efficiency and the methodologies used to calculate them are described in Section 2.2, Section 3.4, Section 3.7 and Appendix 1 of Metropolitan's UWMP.

The demand and water use efficiency data shown in Table A.11-1 were collected from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table 2-6: Metropolitan Regional Water Demand Average Year
- 2015 values – Metropolitan's 2010 UWMP, Table 2-8: Metropolitan Regional Water Demands Average Year
- 2020 values – Metropolitan's 2015 UWMP, Table 2-3: Metropolitan Regional Water Demands Average Year
- 2025-2045 values – Metropolitan's 2020 UWMP, Table 2-3: Metropolitan Regional Water Demands Normal Water Year

Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table A.11-2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in Table A.11-2 represent efforts to improve regional self-reliance for Metropolitan's entire service area and include the total contributions of Metropolitan and its members as well as their customers. Supporting narratives and documentation for the all of the data shown in Table A.11-2 are provided below.

The results shown in Table A.11-2 demonstrate that Metropolitan's service area is measurably improving its regional self-reliance. In the near-term (2025), the expected outcome for normal water year regional self-reliance increases by 747 TAF from the 2010 baseline; this represents an increase of about 23 percent of 2025 normal water year retail demands. In the long-term (2045), normal water year regional self-reliance is expected to increase by more than 1.2 MAF from the 2010 baseline; this represents an increase of 25 percent of 2045 normal water year retail demands.

Table A.11-2
Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Use Efficiency	865,000	936,000	1,056,000	1,162,000	1,211,000	1,263,000	1,325,000	1,389,000
Water Recycling	316,000	348,000	436,000	550,000	613,000	687,000	698,000	706,000
Stormwater Capture and Use	100,000	103,000	110,000	80,000	82,000	82,000	82,000	82,000
Advanced Water Technologies	111,000	101,000	194,000	194,000	208,000	209,000	209,000	210,000
Conjunctive Use Projects	1,416,000	1,429,000	1,303,000	1,255,000	1,273,000	1,296,000	1,311,000	1,326,000
Local and Regional Water Supply and Storage Projects	252,000	224,000	261,000	257,000	257,000	258,000	258,000	258,000
Other Programs and Projects that Contribute to Regional Self-Reliance	875,000	1,250,000	1,200,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Water Supplies Contributing to Regional Self-Reliance	**3,935,000**	**4,391,000**	**4,560,000**	**4,748,000**	**4,894,000**	**5,045,000**	**5,133,000**	**5,221,000**

Service Area Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	5,032,000	5,156,000	5,261,000	5,374,000

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Supplies Contributing to Regional Self-Reliance	3,935,000	4,391,000	4,560,000	4,748,000	4,894,000	5,045,000	5,133,000	5,221,000
Change in Supplies Contributing to Regional Self-Reliance	**NA**	**456,000**	**625,000**	**813,000**	**959,000**	**1,110,000**	**1,198,000**	**1,286,000**

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Percent of Supplies Contributing to Regional Self-Reliance	71.6%	79.9%	87.4%	96.4%	97.3%	97.8%	97.6%	97.2%
Change in Percent of Supplies Contributing to Regional Self-Reliance	**NA**	**8.2%**	**15.7%**	**24.8%**	**25.6%**	**26.2%**	**25.9%**	**25.5%**

Water Use Efficiency

The water use efficiency information shown in Table A.11-2 is taken directly from Table A.11-1 above.

Water Recycling

The water recycling values shown in Table A.11-2 reflect the total recycled water production in Metropolitan's service area as described in Section 3.5 and Appendix 2 of Metropolitan's UWMP.

Stormwater Capture and Use

The stormwater capture and use data shown in Table A.11-2 include supplies from local surface water production as described in Section 1.4 and Appendix 2 of Metropolitan's UWMP.

These values do not include production from regional storage reservoirs; storage in these reservoirs is comprised of previously stored water from sources already reflected in Tables A.11-2 and A.11-3. These regional storage resources are generally used to provide additional regional self-reliance in dry years, which is not reflected in this normal water year analysis. The regional storage reservoirs and their yields are described in Section 3.6, Appendix 2 and Appendix 3 of Metropolitan's UWMP.

The stormwater capture and use values shown in Table A.11-2 also do not include stormwater capture that is used to recharge local groundwater basins. Stormwater capture for groundwater recharge supports production of groundwater in the region, and for the purposes of this analysis that production is already captured in Table A.11-2 under conjunctive use projects.

Advanced Water Technologies

The advanced water technologies data shown in Table A.11-2 include total groundwater recovery and seawater desalination production in Metropolitan's service area as described in Section 3.5 and Appendix 2 of Metropolitan's UWMP.

Conjunctive Use Projects

The values for conjunctive use projects shown in Table A.11-2 represent total groundwater production in the region as described in Section 1.4 and Appendix 2 of Metropolitan's UWMP.

The conjunctive use projects numbers shown in Table A.11-2 do not include production from regional groundwater conjunctive use programs. As described in the stormwater capture and use discussion above, these regional storage programs rely on previously stored water from sources already reflected in Tables A.11-2 and A.11-3 and are generally used to provide additional regional self-reliance in dry-years. The regional groundwater conjunctive use programs and their yields are described in Section 3.6 and Appendix 3.

Local and Regional Water Supply and Storage Programs

The data for local and regional water supply and storage programs shown in Table A.11-2 include supplies from the Los Angeles Aqueduct. This supply is described in Section 1.4 and Appendix 2 of Metropolitan's UWMP.

The local and regional supply numbers shown in Table A.11-2, except for "Other Programs and Projects that Contribute to Regional Self-Reliance" which is discussed below, were obtained from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table 2-6: Metropolitan Regional Water Demand Average Year

- 2015 values – Metropolitan’s 2010 UWMP, Table 2-8: Metropolitan Regional Water Demands Average Year
- 2020 values – Metropolitan’s 2015 UWMP, Table 2-3: Metropolitan Regional Water Demands Average Year
- 2025-2045 values – Metropolitan’s 2020 UWMP, Table 2-3: Metropolitan Regional Water Demands Normal Water Year

Other Programs and Projects that Contribute to Regional Self-Reliance

Other programs and projects that contribute to regional self-reliance shown in Table A.11-2 include current programs from the Colorado River Aqueduct. Colorado River supplies include Metropolitan’s basic Colorado River apportionment, as well as supplies that result from existing and committed programs, including those from the IID-MWD Conservation Program, the implementation of the Quantification Settlement Agreement (QSA), related agreements, and the exchange agreement with SDCWA. Colorado River Aqueduct supplies and programs are described in Section 3.1 and Appendix 3 of Metropolitan’s UWMP.

The values shown in Table A.11-2 for other programs and projects that contribute to regional self-reliance come from the following sources:

- Baseline (2010) values – Metropolitan’s 2005 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Year 2010 (Average Year)
- 2015 values – Metropolitan’s 2010 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Year 2015 (Average Year)
- 2020 values – Metropolitan's 2015 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Year 2020 (Average Year)
- 2025-2045 values – Metropolitan’s 2020 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Years 2025, 2030, 2035, 2040, 2045 (Normal Water Year)

Reliance on Water Supplies from the Delta Watershed

In order for a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) requires that water suppliers report the expected outcomes for measurable reductions in supplies from the Delta watershed either as an amount or as a percentage. This analysis provides both calculations. Based on the methodology described in Guidebook Appendix C, and consistent with the approach of this analysis in not including projects under development, this accounting does not include any supplies from potential future covered actions. Table A.11-3 shows the expected outcomes for reliance on supplies from the Delta watershed for Metropolitan’s service area. Supporting narratives and documentation for the all of the data shown in Table A.11-3 are provided below.

The results shown in Table A.11-3 demonstrate that Metropolitan’s service area is measurably reducing its Delta reliance. In the near-term (2025), the expected outcome for normal water year reliance on supplies from the Delta watershed decreased by 301 TAF from the 2010 baseline; this represents a decrease of 3 percent of 2025 normal water year retail demands. In the long-term (2045), normal water year reliance on supplies from the Delta watershed decreased by 314 TAF from the 2010 baseline; this represents a decrease of just over 5 percent of 2045 normal water year retail demands.

Table A.11-3
Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
CVP/SWP Contract Supplies	1,472,000	1,029,000	984,000	1,133,000	1,130,000	1,128,000	1,126,000	1,126,000
Delta/Delta Tributary Diversions	-	-	-	-	-	-	-	-
Transfers and Exchanges of Supplies from the Delta Watershed	20,000	44,000	91,000	58,000	52,000	52,000	52,000	52,000
Other Water Supplies from the Delta Watershed	-	-	-	-	-	-	-	-
Total Water Supplies from the Delta Watershed	**1,492,000**	**1,073,000**	**1,075,000**	**1,191,000**	**1,182,000**	**1,180,000**	**1,178,000**	**1,178,000**

Service Area Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	5,032,000	5,156,000	5,261,000	5,374,000

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,182,000	1,180,000	1,178,000	1,178,000
Change in Supplies from the Delta Watershed	**NA**	**(419,000)**	**(417,000)**	**(301,000)**	**(310,000)**	**(312,000)**	**(314,000)**	**(314,000)**

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Percent of Supplies from the Delta Watershed	27.2%	19.5%	20.6%	24.2%	23.5%	22.9%	22.4%	21.9%
Change in Percent of Supplies from the Delta Watershed	**NA**	**-7.6%**	**-6.6%**	**-3.0%**	**-3.7%**	**-4.3%**	**-4.8%**	**-5.2%**

CVP/SWP Contract Supplies

The CVP/SWP contract supplies shown in Table A.11-3 include Metropolitan's SWP Table A and Article 21 supplies. These supplies are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

The values shown in Table A.11-3 do not include Desert Water Agency/Coachella Valley Water District SWP contract supplies. These supplies are exchanged with Desert Water Agency and Coachella Valley Water District for an equal amount of Colorado River water, which is reflected in the Colorado River Aqueduct supplies shown in Table A.11-2. In addition, Desert Water Agency and Coachella Valley Water District should include their SWP contract supplies in their own accountings of reduced reliance. Additional information on these exchange agreements can be found in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

These values also do not include supplies from San Luis Carryover storage or Central Valley storage programs because storage in these programs comprises previously stored water from sources already reflected in Table A.11-3. These storage programs are generally used to provide additional regional self-reliance in dry years, which is not reflected in this normal water year analysis. The Central Valley storage projects and their yields are described in Section 3.3, and Appendix 3. San Luis Carryover storage is described in Section 3.2 and Appendix 3.

Transfers and Exchanges of Supplies from the Delta Watershed

The transfers and exchanges of supplies from the Delta watershed shown in Table A.11-3 include supplies from the San Bernardino Valley MWD Program, Yuba River Accord Purchase Program, the San Gabriel Valley MWD Program, Irvine Ranch Water District Storage and Exchange Program, and other generic SWP and Central Valley transfers and exchanges. These programs are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

Supplies from the Delta Watershed shown in Table A.11-3 are from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table A.3-7: California Aqueduct Program Capabilities Year 2010 (Average Year)

- 2015 values – Metropolitan's 2010 UWMP, Table A.3-7: California Aqueduct Program Capabilities Year 2015 (Average Year)
- 2020 values – Metropolitan's 2015 UWMP, Table A.3-7: California Aqueduct Program Capabilities Year 2020 (Average Year)
- 2025-2045 values – Metropolitan's 2020 UWMP, Table A.3-7: California Aqueduct Program Capabilities Years 2025, 2030, 2035, 2040, 2045 (Normal Water Year)

A.11.4 UWMP Implementation

In addition to the analysis and documentation described above, WR P1 subsection (c)(1)(B) requires that all programs and projects included in the UWMP that are locally cost-effective and technically feasible, which reduce reliance on the Delta, are identified, evaluated, and implemented consistent with the implementation schedule. WR P1 (c)(1)(B) states that:

> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta*[.]

In accordance with Water Code Section 10631(f), water suppliers must already include in their UWMP a detailed description of expected future projects and programs that they may implement to increase the amount of water supply available to them in normal and single-dry water years and for a period of drought lasting five consecutive years. The UWMP description must also identify specific projects, include a description of the increase in water supply that is expected to be available from each project, and include an estimate regarding the implementation timeline for each project or program.

Section 3 of Metropolitan's UWMP summarizes the implementation plan and continued progress in developing a diversified water portfolio to meet the region's water needs.

Water Use Efficiency

The water use efficiency numbers used in this analysis include the total water use efficiency savings (conservation) for the service area, including savings from active, code-based, price-effect and pre-1990 savings. The specific water use efficiency programs and their implementation are described in Section 3.4 of Metropolitan's UWMP.

Water Recycling

The water recycling values used in this analysis reflect the total recycled water production in Metropolitan's service area. Water recycling programs and implementation are discussed in Section 3.5 of Metropolitan's UWMP. In addition, individual project-level details are provided in Appendix 5.

Stormwater Capture and Use

The stormwater capture and use data used in this analysis include supplies from local surface water production. Local surface water production and its implementation are discussed in Appendix 2 of Metropolitan's UWMP.

Advanced Water Technologies

The advanced water technologies data used in this analysis include total groundwater recovery and seawater desalination production in Metropolitan's service. Groundwater recovery and seawater desalination programs and implementation are described in Section 3.5 of Metropolitan's UWMP. In addition, individual project-level details are provided in Appendix 5.

Conjunctive Use Projects

The values for conjunctive use projects used in this analysis represent total groundwater production in the region. Groundwater production and its implementation are discussed in Appendix 2 of Metropolitan's UWMP.

Local and Regional Water Supply and Storage Programs

The data for local and regional water supply and storage programs shown this analysis include supplies from the Los Angeles Aqueduct. This program and its implementation are described in Appendix 2 of Metropolitan's UWMP.

Other Programs and Projects that Contribute to Regional Self-Reliance

Other programs and projects that contribute to regional self-reliance used in this analysis include current programs from the Colorado River Aqueduct. Colorado River supplies include Metropolitan's basic Colorado River apportionment, as well as supplies that result from existing and committed programs, including those from the IID-MWD Conservation Program, the implementation of the Quantification Settlement Agreement (QSA), related agreements, and the exchange agreement with SDCWA. Colorado River Aqueduct programs and their implementation are described in Section 3.1 and Appendix 3 of Metropolitan's UWMP.

CVP/SWP Contract Supplies

The CVP/SWP contract supplies shown in this analysis include Metropolitan's SWP Table A and Article 21 supplies. These supplies and their implementation are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

Transfers and Exchanges of Supplies from the Delta Watershed

The transfers and exchanges of supplies from the Delta watershed shown in this analysis include supplies from the San Bernardino Valley MWD Program, Yuba River Accord Purchase Program, the San Gabriel Valley MWD Program, Irvine Ranch Water District Storage and Exchange Program, and other generic SWP and Central Valley transfers and exchanges. These programs and their implementation are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

A.11.5 2015 UWMP Appendix 11

The information contained in this Appendix 11 is also intended to be a new Appendix 11 attached to Metropolitan's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). Metropolitan provided notice of the availability of the draft 2020 UWMP (including this Appendix 11 which will also be a new Appendix 11 to its 2015 UWMP) and WSCP and the public hearing to consider adoption of both plans and Appendix 11 to the 2015 UWMP in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP were posted prominently on Metropolitan's website, mwdh2o.com, starting February 1, 2021, more than 60 days in advance of the public hearing on April 12, 2021. The notice of availability of the documents was sent to Metropolitan's member agencies, as well as cities and counties in Metropolitan's service area. In addition, a public notice advertising the public hearing in English and Spanish was published in 12 Southern California newspapers. The notification in English language newspapers was published on February 1 and 8, 2021. The notification was published on January 28-30, 2021 and February 1, 4-6, and 8, 2021 in Spanish language newspapers, satisfying the requirement for non-English language notification. Copies of: (1) the notification letter sent to the member agencies, cities and counties in Metropolitan's service area, and (2) the notice published in the newspapers are included in the 2020 UWMP Section 5. Thus, this Appendix 11 to Metropolitan's 2020 UWMP, which was adopted with Metropolitan's 2020 UWMP, will also be recognized and treated as Appendix 11 to Metropolitan's 2015 UWMP.

Metropolitan held the public hearing for the draft 2020 UWMP, draft Appendix 11 to the 2015 UWMP, and draft WSCP on April 12, 2021, at the Board's Water Planning and Stewardship Committee meeting, held online due to COVID-19 concerns. On May 11, 2021, Metropolitan's Board determined that the 2020 UWMP and the WSCP are consistent with the MWD Act and accurately represent the water resources plan for Metropolitan's service area. In addition, Metropolitan's Board determined that Appendix 11 to both the 2015 UWMP and the 2020 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003), which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolutions 9279, 9280, and 9281, the Board adopted the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP and authorized their submittal to the State of California. Copies of Resolutions 9279, 9280, and 9281 are included in the 2020 UWMP Section 5, and Resolution 9281 for the WSCP is attached to the WSCP as Attachment C.

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Appendix 12

DWR 2020 UWMP SUBMITTAL TABLES

Appendix 12
DWR 2020 UWMP SUBMITTAL TABLES

In fulfillment of California Water Code Sections, 10621(d) and 10644(a) and (b), Metropolitan's Final 2020 Urban Water Management Plan, Water Shortage Contingency Plan, and Appendix 11 Addendum to the 2015 Urban Water Management Plan were electronically submitted to the State of California through DWR's WUE Data Portal (https://wuedata.water.ca.gov/) in June 2021. This appendix contains the mandatory DWR 2020 UWMP Submittal Tables that were uploaded to the WUE data website.

Submittal Table 2-2: Plan Identification			
Select Only One	Type of Plan		Name of RUWMP or Regional Alliance *if applicable* (select from drop down list)
☑	Individual UWMP		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	Regional Urban Water Management Plan (RUWMP)		
NOTES:			

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☑	Supplier is a wholesaler
☐	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☑	UWMP Tables are in calendar years
☐	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
** Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

Submittal Table 2-4 Wholesale: Water Supplier Information Exchange (select one)	
☑	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with Water Code Section 10631. Completion of the table below is optional. If not completed, include a list of the water suppliers that were informed.
Section 5 pp. 5-8 to 5-9	**Provide page number for location of the list.**
☐	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631. **Complete the table below.**
Water Supplier Name	
Add additional rows as needed	
NOTES: NOTES: See 2020 UWMP Sections 2 and 5 for discussion of Metropolitan's planning coordination, outreach, and notification (list provided in Section 5 Table 5-3 pp. 5-8 and 5-9).	

Submittal Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	19,035,000	**20,089,000**	**20,634,000**	**21,145,000**	**21,610,000**	**22,026,000**
NOTES: See 2020 UWMP Appendix 1 Tabel A.1-2.						

Submittal Table 4-1 Wholesale: Demands for Potable and Non-Potable[1] Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only use types that will be recognized by the WUE data online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Sales to other agencies		Drinking Water	789,218
Sales to other agencies		Raw Water	605,043
Losses			48,520
		TOTAL	1,442,781
[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*			
[2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES: Sales to other agencies include Metropolitan deliveries to member and non-member agencies and deliveries from conjunctive use programs. Some of these deliveries are not revenue producing nor sales. Losses include evaporation losses from storage reservoirs and distribution system (2019 estimate). Water losses are both drinking and raw water.			

Submittal Table 4-2 Wholesale: Use for Potable and Raw Water [1] - Projected

Use Type	Additional Description (as needed)	Projected Water Use [2] Report To the Extent that Records are Available				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool.		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Other		1,149,000	1,110,000	1,084,000	1,100,000	1,125,000
Exchanges to other agencies		278,000	278,000	278,000	278,000	278,000
	TOTAL	1,427,000	1,388,000	1,362,000	1,378,000	1,403,000

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4*

[2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: See 2020 UWMP detailed discussion in Section 2, Metropolitan's Regional Water Demands Table 2-3 for Normal Water Year, and Supply Capability and Projected Demands Table 2-6 for Normal Water Year (average of 1922 to 2017 historic hydrologies).

Submittal Table 4-3 Wholesale: Total Water Use (Potable and Non-Potable)

	2020	2025	2030	2035	2040	2045 (opt)
Potable and Raw Water From Tables 4-1W and 4-2W	1,442,781	1,427,000	1,388,000	1,362,000	1,378,000	1,403,000
Recycled Water Demand* From Table 6-4W	0	0	0	0	0	0
TOTAL WATER DEMAND	1,442,781	1,427,000	1,388,000	1,362,000	1,378,000	1,403,000

**Recycled water demand fields will be blank until Table 6-4 is complete.*

NOTES:

OPTIONAL Table 4-4 Wholesale: Last Five Years of Water Loss Audit Reporting

Reporting Period Start Date (mm/yyyy)	Volume of Water Loss [1,2]
01/2015	10,628
01/2016	8,545
01/2017	7,928
01/2018	4,991
01/2019	6,907

[1] *Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.*

[2] ***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: See 2020 UWMP discussions in Section 2.6 and Appendix 7, and estimate of distribution system water losses in Tables A.7-1, A.7-2, A.7-3, A.7-4, and A.7-5.

Submittal Table 6-1 Wholesale: Groundwater Volume Pumped						
☑	Supplier does not pump groundwater. The supplier will not complete the table below.					
☐	All or part of the groundwater described below is desalinated.					
Groundwater Type	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
	TOTAL	0	0	0	0	0
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2020											
☑	Wholesale Supplier neither distributes nor provides supplemental treatment to recycled water. The Supplier will not complete the table below.										
							2020 volumes [1]				
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number (optional) [2]	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area? *Drop down list*	Treatment Level *Drop down list*	Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Add additional rows as needed											
						Total	0	0	0	0	0
[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3. [2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility											
NOTES:											

Submittal Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
☑	Recycled water is not directly treated or distributed by the Supplier. The Supplier will not complete the table below.						
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment *Drop down list*	2020*	2025*	2030*	2035*	2040*	2045* *(opt)*
Add additional rows as needed							
	Total	0	0	0	0	0	0
*** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.							
NOTES:							

Submittal Table 6-5 Wholesale: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☑	Recycled water was not used or distributed by the supplier in 2015, nor projected for use or distribution in 2020. The wholesale supplier will not complete the table below.	
Name of Receiving Supplier or Direct Use by Wholesaler	2015 Projection for 2020*	2020 Actual Use*
Add additional rows as needed		
Total	0	0
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*		
NOTES: The 2015 UWMP Table 2-3 included projection for recycled water use in 2020 of 436 TAF under average hydrology. In 2020, the actual recycled water use (regional total within Metropolitan service area) is estimated at 441 TAF (excluding Santa Ana River baseflow), as discussed in this 2020 UWMP Section 3.5 on Table 3-14 p. 3-78 and Appendix 2 p. A.2-8. Regional total represents the projected production of projects by Metropolitan member agencies. Metropolitan's Regional Recycled Water Program is still a pilot project, with recent Board approval to proceed with environmental planning.		

Submittal Table 6-7 Wholesale: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☑	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
2020 UWMP Section 3 and Appendix 3	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description *(if needed)*	Planned Implementation Year	Planned for Use in Year Type *Drop Down list*	Expected Increase in Water Supply to Supplier*
	Drop Down Menu	*If Yes, Supplier Name*				
Add additional rows as needed						
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: See 2020 UWMP Section 3 description of resources and program development for CRA, SWP, Central Valley/SWP storage and transfers programs, conservation, LRP (groundwater recovery, recycling, desalination), and groundwater. Also, see Appendix 3 detailed discussion of all supply programs and justification for supply projections.						

Submittal Table 6-8 Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Purchased or Imported Water		1,069,648	Other Non-Potable Water	
Supply from Storage		367,069	Other Non-Potable Water	
Transfers		6,064	Other Non-Potable Water	
	Total	1,442,781		0
*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.				
NOTES: Actual volume of water reported in this table are raw water. The "Other Non-Potable Water" from the Water Quality column drop down list is the closest description to raw water.				

Submittal Table 6-9 Wholesale: Water Supplies — Projected											
Water Supply	Additional Detail on Water Supply	Projected Water Supply* Report To the Extent Practicable									
		2025		2030		2035		2040		2045 (opt)	
Drop-down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Other		3,912,000		3,906,000		3,903,000		3,901,000		3,898,000	
	Total	3,912,000	0	3,906,000	0	3,903,000	0	3,901,000	0	3,898,000	0
*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.											
NOTES: See 2020 UWMP detailed discussion in Section 2 and Supply Capability and Projected Demands Table 2-6 for Normal Water Year (average of 1922-2017 hydrologies). Projected water supply includes capability of current and proposed programs.											

Submittal Table 7-1 Wholesale: Basis of Water Year Data (Reliability Assessment)			
Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000	Available Supplies if Year Type Repeats	
		☑ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location: 2020 UWMP Section 2 Tables 2-4, 2-5, 2-6, and Appendix 3.	
		☐ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	% of Average Supply
Average Year	1922-2017		100%
Single-Dry Year	1977		
Consecutive Dry Years 1st Year	1988		
Consecutive Dry Years 2nd Year	1989		
Consecutive Dry Years 3rd Year	1990		
Consecutive Dry Years 4th Year	1991		
Consecutive Dry Years 5th Year	1992		

Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table. Suppliers may create an additional worksheet for the additional tables.

***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: See 2020 UWMP Section 2.3 discussion of sources of supply and water reliability assessment under normal water year, single dry year, and five consecutive drought years (summarized in Tables 2-4, 2-5, and 2-6). See Section 3 and Appendix 3 for a detailed discussion of all supply programs and justifications for supply projections. See Section 2 p. 2-7 for description, assumption, and basis of the three year types.

Submittal Table 7-2 Wholesale: Normal Year Supply and Demand Comparison

	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	3,912,000	3,906,000	3,903,000	3,901,000	3,898,000
Demand totals *(autofill fm Table 4-3)*	1,427,000	1,388,000	1,362,000	1,378,000	1,403,000
Difference	2,485,000	2,518,000	2,541,000	2,523,000	2,495,000

NOTES: See 2020 UWMP detailed discussion in Section 2, and Supply Capabilities and reliability assessment in Table 2-6 for Normal Water Year condition (average of 1922-2017 historic hydrology).

Submittal Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison

	2025	2030	2035	2040	2045 (Opt)
Supply totals*	2,772,000	2,761,000	2,760,000	2,760,000	2,757,000
Demand totals*	1,544,000	1,500,000	1,473,000	1,496,000	1,525,000
Difference	1,228,000	1,261,000	1,287,000	1,264,000	1,232,000

***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: See 2020 UWMP detailed discussion in Section 2, and Supply Capabilities and reliability assessment in Table 2-4 for Single Dry Year condition (repeat of 1977 hydrology).

Submittal Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	2,178,800	2,219,000	2,241,000	2,263,000	2,239,000
	Demand totals	1,592,000	1,570,000	1,537,000	1,539,000	1,564,000
	Difference	586,800	649,000	704,000	724,000	675,000
Second year	Supply totals	2,178,800	2,219,000	2,241,000	2,263,000	2,239,000
	Demand totals	1,592,000	1,570,000	1,537,000	1,539,000	1,564,000
	Difference	586,800	649,000	704,000	724,000	675,000
Third year	Supply totals	2,178,800	2,219,000	2,241,000	2,263,000	2,239,000
	Demand totals	1,592,000	1,570,000	1,537,000	1,539,000	1,564,000
	Difference	586,800	649,000	704,000	724,000	675,000
Fourth year	Supply totals	2,178,800	2,219,000	2,241,000	2,263,000	2,239,000
	Demand totals	1,592,000	1,570,000	1,537,000	1,539,000	1,564,000
	Difference	586,800	649,000	704,000	724,000	675,000
Fifth year	Supply totals	2,178,800	2,219,000	2,241,000	2,263,000	2,239,000
	Demand totals	1,592,000	1,570,000	1,537,000	1,539,000	1,564,000
	Difference	586,800	649,000	704,000	724,000	675,000
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG) m** ust remain consistent throughout the UWMP as reported in Table 2-3.*						

NOTES: See 2020 UWMP detailed discussion in Section 2, and Supply Capabilities and reliability assessment in Table 2-5 for Five Consecutive Drought Year condition (repeat of 1988-1992 hydrology). Similar to the multiple dry-year reporting in past UWMPs, Metropolitan's reliability assessment for the five consecutive year drought is developed by simulating the five-year driest sequence leading to each of the fifth year reporting. This allows impacts of multiple consecutive years of droughts to be captured within the sequential accounting of Metropolitan's various supply program storage balance. The five consecutive years of supply and demand are then averaged and presented every five years rather than a year by-year display. Over the years, Metropolitan has developed numerous programs to increase its water supply capabilities, dry year supplies, and regional storage. These programs may be exercised in conjunction with effective demand management measures during drought years. Under this reliability planning, if a five consecutive year drought sequence was to repeat, Metropolitan could exercise similar supply augmentation and demand management options for each of the five drought years at the appropriate level to meet demands. This methodology best captures Metropolitan's complex demand and supply planning with appropriate flexibility.

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Total Water Use	1,596,000
Total Supplies	1,164,000
Surplus/Shortfall w/o WSCP Action	(432,000)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	432,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	1,669,000
Total Supplies	1,903,000
Surplus/Shortfall w/o WSCP Action	234,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	234,000
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	1,688,000
Total Supplies	1,300,000
Surplus/Shortfall w/o WSCP Action	(388,000)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	388,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	1,491,000
Total Supplies	1,468,000
Surplus/Shortfall w/o WSCP Action	(23,000)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	23,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	1,592,000
Total Supplies	1,369,000
Surplus/Shortfall w/o WSCP Action	(223,000)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	223,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

Note: See 2020 UWMP discussion in Section 2.4 Drought Risk Assessment and the supply augmentation actions that may be exercised to meet demands through 2025.

Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions** *(Narrative description)*
1	Up to 10%	Shortage response actions will be customized to meet the circumstances for the particular shortage. Response actions may include a combination of supply augmentation from flexible supplies and dry year storage, demand response actions, and operational measures.
2	Up to 20%	Shortage response actions will be customized to meet the circumstances for the particular shortage. Response actions may include a combination of supply augmentation from flexible supplies and dry year storage, demand response actions, and operational measures.
3	Up to 30%	Shortage response actions will be customized to meet the circumstances for the particular shortage. Response actions may include a combination of supply augmentation from flexible supplies and dry year storage, demand response actions, and operational measures.
4	Up to 40%	Shortage response actions will be customized to meet the circumstances for the particular shortage. Response actions may include a combination of supply augmentation from flexible supplies and dry year storage, demand response actions, and operational measures.
5	Up to 50%	Shortage response actions will be customized to meet the circumstances for the particular shortage. Response actions may include a combination of supply augmentation from flexible supplies and dry year storage, demand response actions, and operational measures.
6	>50%	Shortage response actions will be customized to meet the circumstances for the particular shortage. Response actions may include a combination of supply augmentation from flexible supplies and dry year storage, demand response actions, operational measures, and emergency storage if needed.
NOTES: Actions taken will be based on resource and operational conditions throughout the year. To determine specific actions that would be taken at each level, Metropolitan will evaluate circumstances including cost, timing, distribution needs and capabilities, and other variables that include SWP allocation, Colorado River conditions, take capacities, and storage balances. See Table A.4-5 Shortage Stages and Response Actions from Appendix 4: Water Shortage Contingency Plan.		

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
1 to 6	Expand Public Information Campaign	Range between 160,000 to 320,000 acre-feet	Assumed range of between 5% and 10% effectiveness in demand reduction realized at the wholesale level, using a hypothetical single dry year assessment of wholesale demand within the 2020 Urban Water Management Plan (2025 single-dry year). Based on assumptions of service area retail M&I demand of 4.379 MAF and up to 20 percent of retail demands could be reduced if a successful media campaign reached and influenced the entire service area population (source: American Water Works Association. 2019. Manual of Water Supply Practices – M60, Second Edition: Drought Preparedness and Response. p. 35)	
1 to 6	Other	Up to 900,000 acre-feet	Water Supply Allocation Plan (WSAP) allocates Metropolitan's wholesale water supplies among its member agencies. The WSAP is designed to reduce demands by up to approximately 50 percent of the WSAP's calculated base demand. Up to 900,000 AF of savings is based on a hypothetical WSAP base demand of 1.8 MAF. Actual reductions and base demands are based on a formula that includes various factors such as actual local supply production, population growth, and conservation.	
NOTES: Total estimated savings potential from differerent Demand Reducation Actions are nonadditive. Savings potential from voluntary actions overlaps with savings from supply allocations.				

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier *Drop down list* *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
1 to 6	Transfers	Up to 64,000 acre-feet	Based on a hypothetical 2025 single dry year assessment within the 2020 Urban Water Management Plan. See Table 2-1 in the 2020 UWMP.
1 to 6	Other Actions (describe)	Up to 1,714,000 acre-feet	Dry year storage. Based on a hypothetical 2025 single dry year assessment within the 2020 Urban Water Management Plan.
6	Stored Emergency Supply	Up to 750,000 acre-feet	Based on Metropolitan's Emergency Storage Objective, set at 750,000 AF. Emergency storage represents water Metropolitan reservees for the region for use in the event of supply interruptions from earthquakes or similar emergencies.
NOTES:			

Submittal Table 10-1 Wholesale: Notification to Cities and Counties (select one)		
☑	Supplier has notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
2020 UWMP Section 5 Table 5-3	Provide the page or location of this list in the UWMP.	
☐	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
NOTES: See 2020 UWMP Section 5 discussion on Metropolitan's notification to cities and counties (list provided in Table 5-3). Metropolitan sent a total of 195 notification letters to cities, counties, and member agencies within its service area.		

WATER TOMORROW

Planning for the Future

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

APPENDIX E

Inland Empire Utilities Agency (IEUA) 2020 UWMP

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

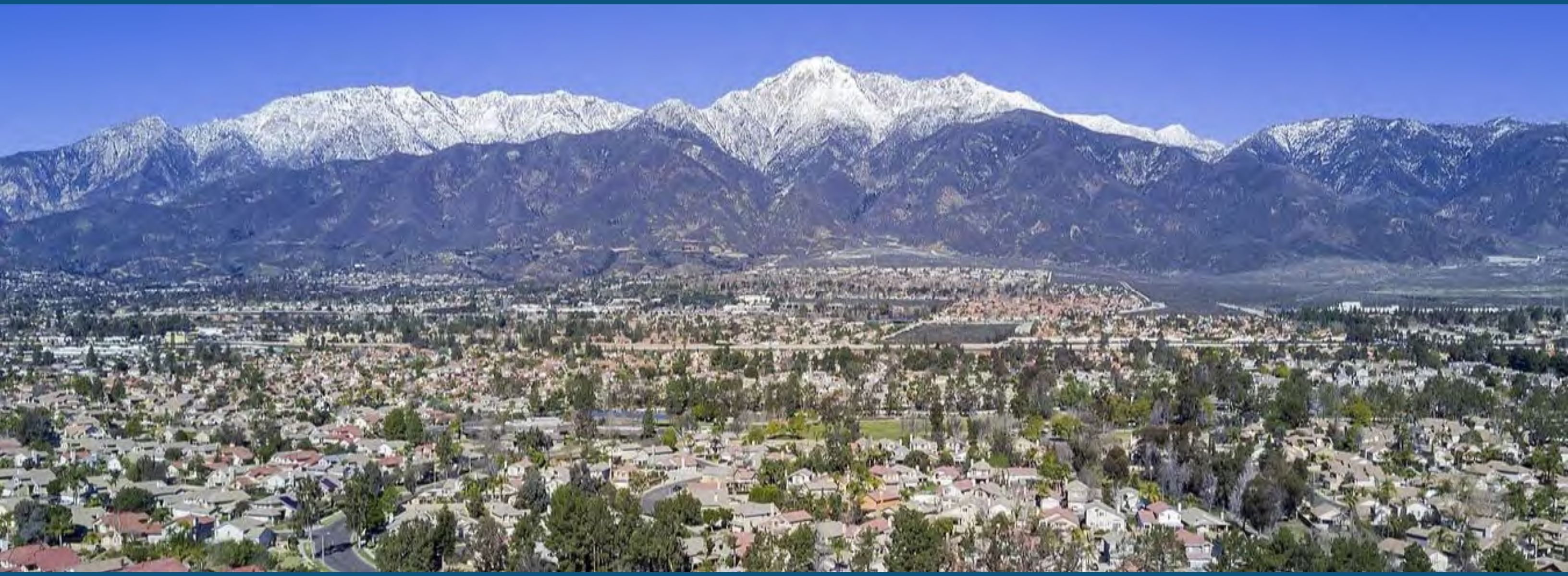
June 2021

K/J 2044518*00

Revision 1, December 2021

2020 Urban Water Management Plan

FINAL



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2020 Urban Water Management Plan FINAL

29 June 2021

6/29/2021

Prepared for

Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708

KJ Project No. 2044518.00

Revision 1, December 2021: Updated Table 9-3

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Acronyms

The following abbreviations and acronyms are used in this report.

°F	degree Fahrenheit
µg/L	micrograms per liter
%	percent
1,1-DCE	1,1-dichloroethene
1,2,3-TCP	1,2,3-Trichloropropane
AB	Assembly Bill
Act	Urban Water Management Planning Act
AF	acre-feet
AFY	acre-feet per year
Agency	Inland Empire Utilities Agency
AWE	Alliance for Water Efficiency
AWPF	Advanced Water Purification Facility
BMP	best management practice
CBFIP	Chino Basin Facilities Improvement Program
CBWCD	Chino Basin Water Conservation District
CBWM	Chino Basin Watermaster
CCAP	Climate Change Action Plan
CCR	California Code of Regulations
CCWRF	Carbon Canyon Water Recycling Facility
CDA	Chino Basin Desalter Authority
cfs	cubic feet per second
Chino Basin	Chino Groundwater Basin
CII	Commercial, Industrial, and Institutional
CIM	California Institution for Men
CIMIS	California Irrigation Management Information System
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVWD	Cucamonga Valley Water District
CWC	California Water Code
DAC	Disadvantaged Community
DCP	Drought Contingency Plan
DDW	State Water Resources Control Board Division of Drinking Water
Delta	Sacramento-San Joaquin Delta

DMM	Demand Management Measure
DRA	Drought Risk Assessment
DWR	Department of Water Resources
EDU	equivalent service unit
EPA	U.S. Environmental Protection Agency
EMP	Energy Management Plan
ETo	evapotranspiration
Freon 39	dichloromethane
FWC	Fontana Water Company
FY	Fiscal Year
GMZ	Groundwater Management Zone
GPCD	gallons per capita per day
HAL	Health Advisory Level
HET	high efficiency toilet
IEBL	Inland Empire Brine Line
IEUA	Inland Empire Utilities Agency
IRP	Integrated Water Resources Plan
IRP Model	2020 IRP Regional Water Supply Infrastructure Model
IX	ion exchange
JPA	Joint Powers Authority
kWh	kilowatt-hour
LEAP	Landscape Evaluation and Audit Program
LRP	Local Resources Program
LUBDM	Land Use-Based Demand Model
M&I	municipal and industrial
MAF	million acre-feet
MCL	maximum contaminant level
Metropolitan	Metropolitan Water District of Southern California
MG	million gallons
mg/L	milligrams per liter
MGD	million gallons per day
MHI	Median Household Income
MOU	Memorandum of Understanding
MVWD	Monte Vista Water District
MWD	Metropolitan Water District of Southern California
MWELO	Model Water Efficiency Landscape Ordinance

NDMA	N-Nitroso dimethylamine
NDEA	N-Nitrosodiethylamine
ng/L	nanograms per liter
NL	Notification Level
No.	number
NPDES	National Pollutant Discharge Elimination System
NRWS	non-reclaimable wastewater system
NTC	National Theater for Children
OBMP	Optimum Basin Management Program
OBMPU	Optimum Basin Management Program Update
OCSD	Orange County Sanitation District
OSY	Operating Safe Yield
OWOW	“One Water One Watershed”
PCE	tetrachloroethene
pCi/L	picocuries per liter
PFAS	poly- and per-fluorinated compounds
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PHG	Public Health Goal
Plan	Urban Water Management Plan
ppm	parts per million
ppt	parts per trillion
PRV	Pressure Regulating Valve
RO	reverse osmosis
RP	Recycling Plant
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
RUWMP	Regional Urban Water Management Plan
RWIP	Recycled Water Implementation Plan
RWQCB	Regional Water Quality Control Board
RWPS	Recycled Water Program Strategy
SARWQCB	Santa Ana Regional Water Quality Control Board
SAWCo	San Antonio Water Company
SAWPA	Santa Ana Watershed Project Authority
SB	Senate Bill
SBCFCD	San Bernardino County Flood Control District
SBX7-7	Senate Bill 7 of Special Extended Session 7 aka Water Conservation Act of 2009

SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCWS	SoCal Water Smart
SGMA	Sustainable Groundwater Management Act
SWP	State Water Project
TAF	thousand acre-feet
TAZ	Transportation Analysis Zone
TCE	trichloroethylene
TDS	Total Dissolved Solids
TYCIP	Ten-Year Capital Improvement Plan
TYF	Ten-Year Forecast
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act of 1983
VOC	volatile organic compound
Watermaster	Chino Basin Watermaster
WFA	Water Facilities Authority
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WUE	Water Use Efficiency
WUEBP	Water Use Efficiency Business Plan
WVWD	West Valley Water District

Section 1: Introduction/Lay Person Description

1.1 Overview

This document presents the 2020 Urban Water Management Plan (UWMP, Plan) for the Inland Empire Utilities Agency (IEUA or Agency) wholesale water service area. This section describes the general purpose of the Plan, discusses Plan implementation, and provides general information about IEUA and service area characteristics.

The State of California mandates that all urban water suppliers within the state prepare an UWMP. Detailed information on what must be included in these plans, as well as whom must complete them can be found in California Water Code (CWC) sections 10610 through 10657. According to the Urban Water Management Planning Act (UWMP Act) of 1983, an urban water supplier is defined as a supplier, either public or private, that provides water for municipal purposes either directly or indirectly to more than 3,000 customers or supplies more than 3,000 acre-feet (AF) annually. Urban water suppliers are required to prepare, adopt, and file an UWMP with the California Department of Water Resources (DWR) every 5 years. The 2020 UWMP updates are due to DWR by July 1, 2021.

1.2 Purpose

An UWMP is a planning tool that generally guides the actions of urban water suppliers. It provides managers and the public with a broad perspective on a number of water supply issues. It is not a substitute for project-specific planning documents, nor was it intended to be when mandated by the State Legislature. For example, the Legislature mandated that a plan include a section which "…describes the opportunities for exchanges or water transfers on a short-term or long-term basis." [Wat. Code, § 10631, subd. (d)]. The identification of such opportunities and the inclusion of those opportunities in a plan's general water service reliability analysis neither commits an urban water supplier to pursue a particular water exchange/transfer opportunity, nor precludes it from exploring exchange/transfer opportunities never identified in its plan. Before an urban water supplier is able to implement any potential future sources of water supply identified in a plan, detailed project plans are prepared and approved, financial and operational plans are developed, and all required environmental analysis is completed.

"A plan is intended to function as a planning tool to guide broad-perspective decision making by the management of water suppliers." [Sonoma County Water Coalition v. Sonoma County Water Agency (2010) 189 Cal. App. 4th 33, 39.] It should not be viewed as an exact blueprint for supply and demand management. Water management in California is not a matter of certainty and planning projections may change in response to a number of factors. "[L]ong-term water planning involves expectations and not certainties. Our Supreme Court has recognized the uncertainties inherent in long-term land use and water planning and observed that the generalized information required . . . in the early stages of the planning process are replaced by firm assurances of water supplies at later stages." (Id., at 41.) From this perspective, it is appropriate to look at the UWMP as a general planning framework, not a specific action plan. It is an effort to generally answer a series of planning questions such as:

- What are the potential sources of supply and what amounts are estimated to be available from them?
- What is the projected demand, given a reasonable set of assumptions about growth and implementation of water management practices?
- How do the projected supply and demands compare and relate to each other?

Using these "framework" questions and resulting answers, the implementing agency will pursue feasible and cost-effective options and opportunities to develop long-term supplies and sustainably meet demands.

Water suppliers can explore enhancing basic supplies from traditional sources such as local groundwater and imported water, as well as other options. These include groundwater extraction, water exchanges and transfers, water conservation, recycling, brackish water desalination, and water banking/conjunctive use. Additional specific planning efforts may be undertaken in regard to each option, involving detailed evaluations of how each option would fit into the overall supply/demand framework, potential environmental impacts, and how each option would affect customers.

The UWMP Act requires preparation of a plan that, among other things:

- Accomplishes water supply planning over a 20-year period in 5-year increments. (IEUA is going beyond the requirements of the Act by developing a plan which spans 25 years.)
- Identifies and quantifies existing and projected water supply opportunities, including recycled water, for existing and future demands, in normal, single-dry, and multiple-dry years.
- Implements conservation and efficient use of urban water supplies.

Additionally, Senate Bill (SB) 7 of Special Extended Session 7 (SBX7-7) was signed into law in November 2009, which calls for progress towards a 20 percent (%) reduction in per capita water use statewide by 2020. SBX7-7, otherwise referred to as the Water Conservation Act of 2009, requires each urban retail water supplier to develop and report a water use target in its 2010 UWMP, and to develop and report an interim 2015 water use target, baseline daily per capita use, and 2020 compliance daily per capita use, along with the basis for determining those estimates. Beginning in 2016, retail water suppliers were required to comply with the water conservation requirements in SBX7-7 in order to be eligible for State water grants or loans. Water suppliers have the ability to revisit the SBX7-7 baseline and water use targets determined in the 2010 UWMPs and update them in the 2020 UWMP.

In addition to the relatively new requirements of SBX7-7, a number of other changes to the Water Code have been enacted since 2010 which apply to the preparation of the 2020 Plan. These changes include:

- UWMP Submittal Date: 2020 UWMP updates must be adopted and submitted to DWR by July 1, 2021.
- Reporting on Compliance with SBX7-7 Targets: The 2020 UWMP will be required to document compliance with the 20% reduction described in the 20 by 2020 Water Conservation Plan, and a comparison of actual water use against the target.
- 5-year Drought Risk Assessment: In past UWMPs, suppliers were to conduct a drought risk assessment assuming a period of drought lasting 3 consecutive years. This requirement has changed, and suppliers must now assess a drought lasting 5 years.
- Sustainable Groundwater Management Act (AB 1739, SB1168, and SB1319): Requires UWMPs to show consistency with Groundwater Sustainability Plan (GSP) supply protections, if applicable.
- Seismic Risk Assessment (SB 664): If applicable, requires an urban water supplier to include within its plan a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.
- Water Shortage Contingency Plan (WSCP) Updates: State requirements call for an update to the existing WSCP and that it be formally adopted as a stand-alone plan. The WSCP must be updated in parallel with the UWMP.
- Making Water Conservation a California Way of Life [Assembly Bill (AB) 1668 and SB 606]: Regulations targeting indoor water demand and affecting the need for additional water use efficiency in the State.
- Annual Water Supply and Demand Assessments: Assessments will be required, starting June 2022, and the process to do the assessment must be described in the 2020 UWMP.
- Items optional in the past, but now required, include: calculating the energy intensity of water, incorporation of land use changes in demand forecasting, and estimating water savings from codes and standards.

A checklist to ensure compliance of this Plan with the UWMP Act requirements is provided in Appendix A.

1.3 IEUA UWMP Preparation

In accordance with the CWC, urban water suppliers with 3,000 or more service connections, or supplying 3,000 or more acre-feet of water per year (AFY), are required to prepare a UWMP every 5 years. The 2020 UWMP must be approved and submitted to DWR by July 1, 2021.

This 2020 UWMP is an update of IEUA's portion of the IEUA and Water Facilities Authority (WFA) 2015 UWMP. In 2015, IEUA prepared a Regional UWMP (RUWMP) in collaboration with WFA, a wholesale supplier of imported water (State Water Project water) purchased from Metropolitan Water District of Southern California (MWD or Metropolitan) via IEUA. WFA provides services to five retail agencies that are encompassed within IEUA's service area, including the Cities of Chino, Chino Hills, Ontario, Upland, and Monte Vista Water District (MVWD). This 2020 Wholesale UWMP was not prepared as an RUWMP and was developed by IEUA individually in coordination with its retail agencies.

While this 2020 UWMP provides water demand, water supply, and supply reliability assessment for the entire IEUA region, all requirements of the CWC for each of IEUA's retail agencies will be met through each retail agency's individual 2020 UWMP. Additionally, as reported in the 2015 UWMP, IEUA formed a regional alliance consisting of seven of its retail agencies (all retail agencies excluding SAWCo and WVWD) to comply with SB x7-7 goals. The regional alliance will also allow IEUA and its retail agencies to continue to cooperatively participate in developing Water Use Efficiency (WUE) programs and meeting water conservation goals. Table 1-1 identifies this as an individual UWMP prepared by IEUA. Table 1-2 indicates that IEUA is a wholesale supplier.

A water supplier may report on a fiscal year or calendar year basis but must clearly state in its UWMP the type of year that is used for reporting. The type of year should remain consistent throughout the Plan. All data in this Plan is reported in fiscal years and volumes are reported in AF, as shown in Table 1-2.

Table 1-1: DWR Plan Identification (DWR Table 2-2)

Select Only One	Type of Plan	Name of RUWMP or Regional Alliance if applicable
X	Individual UWMP	
	Water Supplier is also a member of a RUWMP	
	Water Supplier is also a member of a Regional Alliance	
	RUWMP	

Notes:

Table 1-2: DWR Supplier Identification (DWR Table 2-3)

	DWR Supplier (select one)
X	Supplier is a wholesaler
	Supplier is a retailer
	Fiscal or Calendar Year (select one)
	UWMP Tables are in calendar years
X	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
	07/01
	Units of measure used in UWMP
	AF

1.3.1 Relationship to Other Planning by IEUA

IEUA has developed plans to expand and provide an adequate water supply for its retail agencies. The plans include:

- 2020 Water Use Efficiency Business Plan (WUEBP) – The WUEBP is updated every 5 years with input from IEUA's regional WUE partners to increase regional sustainability through using water more efficiently, eliminating water waste, and drought-proofing the region through increased use of recycled water, groundwater, stormwater, and other local water supplies. The 2020 WUEBP is currently in development and will provide updated analyses and recommended methods to improve efficiency and achieve regional sustainability.

- 2020 Regional Drought Contingency Plan (DCP) – The DCP was developed to define regional shortage conditions, identify vulnerabilities, build resiliency through mitigation and response actions, and facilitate consistent communication within the service area while ensuring equity and fairness. The DCP was also developed to support the needs of the WSCP, a requirement of this 2020 UWMP.

- 2015 Integrated Water Resources Plan (IRP) and 2020 Modeling – The IRP and modeling was conducted to support regional and local water supply planning by assessing water supply vulnerabilities and evaluate collaborative infrastructure and management strategies to increase water supply resiliency in the region.

- 2018 Climate Change Action Plan (CCAP) – The CCAP was developed to identify local impacts of climate change and lay the groundwork for projects and management practices that will allow IEUA to continue providing reliable services to the region while remaining a steward to the environment.

- 2015 Recycled Water Program Strategy (RWPS) Report – The purpose of the RWPS Report was to update recycled water Direct Use demand projections and changes to IEUA's groundwater recharge program, as well as investigate operational changes to the recycled water conveyance system as a result of increasing reuse of the recycled water supply availability.

- 2015 Energy Management Plan (EMP) – The EMP analyzed historical energy usage, established a current energy and Greenhouse Gas emissions baseline, forecasted future demand, examined procurement strategies, and explored measures to ease IEUA's energy load while cultivating a reliable and sustainable energy infrastructure across its facilities.

1.3.2 Relationship to Water Shortage Contingency Plan

Several elements of the 2020 UWMP, especially Section 7, Reliability Planning, and Section 8, Demand Management Measures, are coordinated with the WSCP which is a separate document. The WSCP is a detailed plan of how IEUA intends to act in the case of water shortage conditions. The WSCP identifies specific response actions that align with six standard water shortage levels. The information in the WSCP was prepared using the information developed in the 2020 DCP. The 2020 WSCP is included in Appendix B.

1.4 Structure and Organization of the Plan

The content presented in this UWMP corresponds to the outline of the Act, specifically Article 2, Contents of Plans, which correspond to the CWC Sections 10631, 10632, and 10633. The organization of the report differs slightly from the DWR UWMP Guidebook's organization in order to reflect the unique characteristics of IEUA's systems, as well as to be as consistent as possible with IEUA's IRP and Water Use Efficiency Business Plan. This UWMP is organized as follows:

- Section 1 – Introduction
- Section 2 – Water Demands
- Section 3 – SBX7-7 Baseline and Targets
- Section 4 – Water Resources
- Section 5 – Recycled Water and Reuse
- Section 6 – Water Quality
- Section 7 – Reliability Planning
- Section 8 – Demand Management Measures
- Section 9 – Energy Intensity Reporting
- Section 10 – Seismic Risk Assessment

The UWMP Checklist has been completed, which identifies the location of the UWMP Act requirements in this UWMP and is included in Appendix A.

1.5 System Description

IEUA was formed as a municipal water district by popular vote of its residents in June 1950 to become a member agency of MWD for the purpose of importing water to its retail agencies. IEUA has significantly expanded its water and wastewater utility services since 1950 to also include wastewater treatment, recycled water production and distribution, co-composting of green waste and municipal biosolids, desalination of brackish water, and disposal of non-reclaimable industrial wastewater and brine. IEUA is governed by a five-member Board of Directors. Each Director is publicly elected for a 4-year term and represents one of the five divisions:

- Division 1 – Upland, Montclair, portion of Ontario, and portion of Rancho Cucamonga.
- Division 2 – Ontario, portion of Chino, and portion of Fontana.

- Division 3 – Chino and Chino Hills.
- Division 4 – Fontana, portion of Rialto, and portion of Bloomington.
- Division 5 – Rancho Cucamonga and portion of Fontana.

2021 IEUA Board members are:

- Marco Tule – Director, Division 1.
- Paul Hofer – Director, Division 2.
- Steven Elie – Secretary/Treasurer, Division 3.
- Jasmin Hall – President, Division 4.
- Michael Camacho – Vice President, Division 5.

IEUA owns and operates four regional water recycling plants in its service area: Regional Water Recycling Plant Number (No.) 1, Regional Water Recycling Plant No. 4, Regional Water Recycling Plant No. 5, and the Carbon Canyon Water Recycling Facility (RP-1, RP-4, RP-5, and the CCWRF). IEUA's regional recycled water plants produce disinfected, tertiary treated recycled water in compliance with California's Title 22 regulations. Wastewater is collected with regional wastewater interceptors and two non-reclaimable wastewater pipeline systems. Biosolids produced at the water recycling plants are handled by three facilities: RP-1 Solids Handling Facility, Regional Water Recycling Plant No. 2 (RP-2) Solids Handling Facility, and the Inland Empire Regional Composting Facility. IEUA owns and operates sewer lines and recycled water pipelines. The recycled water systems include pump stations, reservoirs, and pressure regulating stations to serve numerous pressure zones. IEUA also operates groundwater recharge facilities in cooperation with the Chino Basin Watermaster (CBWM or Watermaster), San Bernardino County Flood Control District (SBCFCD), and the Chino Basin Water Conservation District. The Chino I Desalter is managed by IEUA under an agreement with the Chino Basin Desalter Authority (CDA). IEUA does not own or operate drinking water facilities.

1.5.1 Service Area

IEUA provides a number of services for the southwestern section of San Bernardino County in the Santa Ana River Watershed. The IEUA service area almost entirely overlies the Chino Groundwater Basin (Chino Basin). The 242-square mile service area encompasses the Chino Basin which consists of a relatively flat alluvial valley from east to west and slopes from north to south at a 1 to 2% grade. Valley elevation ranges from about 2,000 feet above sea level in the foothills below the San Gabriel Mountains to about 500 feet near Prado Dam. Figure 1 shows the IEUA service area and its retail agencies.

IEUA's service area population has grown quickly in the past decade and is expected to increase in the future. The region's growth underlies the need for careful water resources planning and management to ensure adequate water supplies and address water quality challenges.

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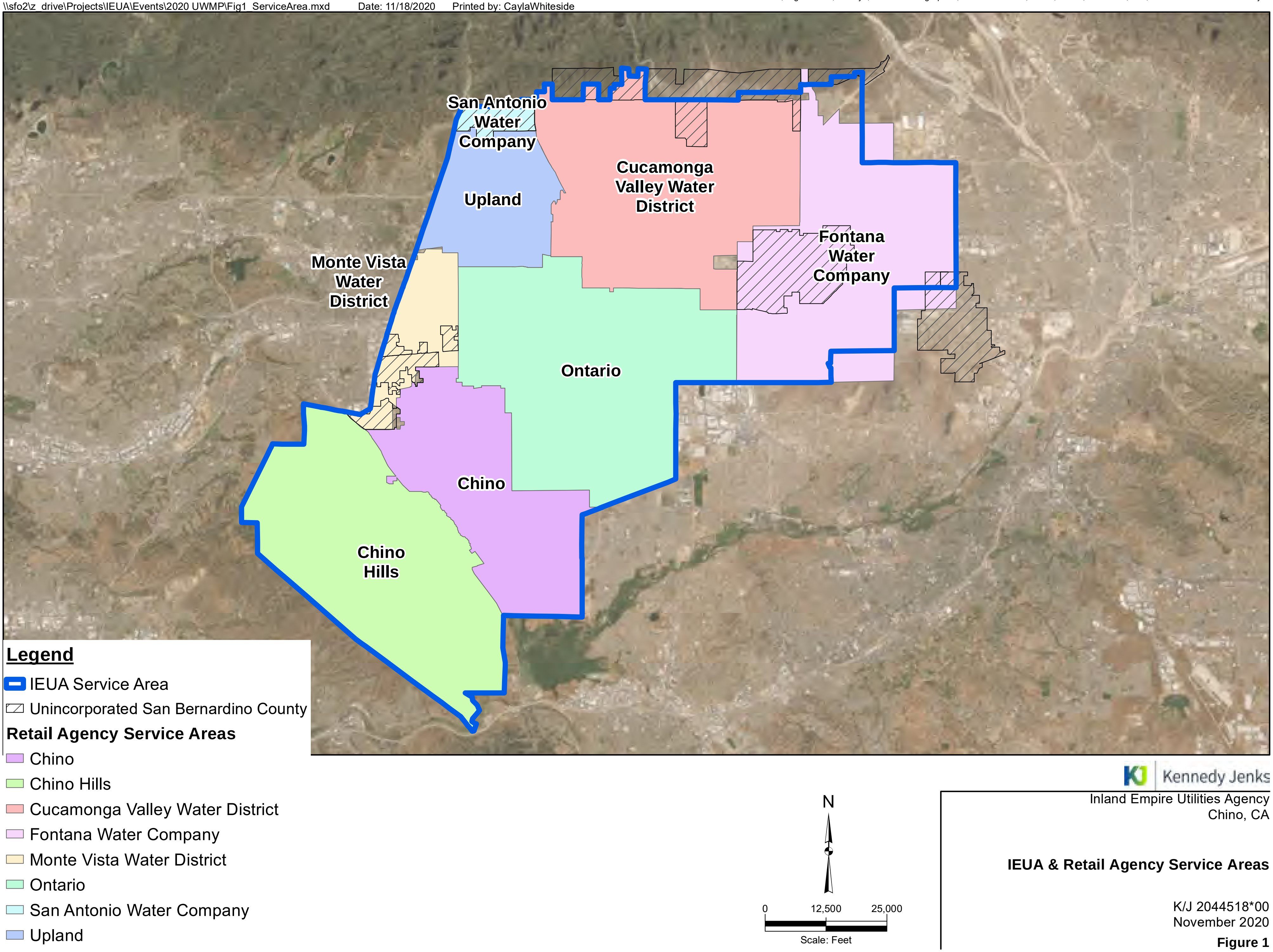
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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Chino, CA

IEUA & Retail Agency Service Areas

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November 2020

Figure 1

1.5.2 Retail Agencies

The IEUA service area consists of the cities of Chino, Chino Hills, Montclair, Upland, Ontario, Rancho Cucamonga, and Fontana, and unincorporated areas within San Bernardino County. There are nine retail water agencies within IEUA's service area which are described in Table 1-3. Two of IEUA's retail water agencies, (Fontana Water Company (FWC) and Cucamonga Valley Water District (CVWD)) purchase untreated water directly from IEUA and provide their own treatment. Five of IEUA's retail water agencies purchase treated water from WFA. WFA purchases untreated imported water from IEUA, treats and delivers the water to the cities of Chino, Chino Hills, Ontario, Upland, and MVWD. IEUA also provides wastewater services to seven agencies including the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Upland, and CVWD in the city of Rancho Cucamonga.

Table 1-3: IEUA Retail Agencies

Agency Name	Description
City of Chino	The City of Chino serves water to a population of approximately 74,000 in the City and some unincorporated areas in San Bernardino County.
City of Chino Hills	The City of Chino Hills provides water to a population of approximately 77,600 in the City within its 46 square mile service area that also includes small portions of Chino and Pomona.
Cucamonga Valley Water District	CVWD is a special district that provides water to approximately 200,460 residents within a 47-square mile area comprised mainly of the City of Rancho Cucamonga. CVWD also provides water to small portions of the cities of Upland, Ontario, Fontana, and unincorporated areas of San Bernardino County.
Fontana Water Company	Fontana Water Company is a retail investor-owned utility company that provides water to approximately 215,500 residents mainly in the City of Fontana, and also serves portions of the cities of Rancho Cucamonga and Rialto, outside the IEUA service area.
Monte Vista Water District	MVWD is a county water district that provides retail water services to a population of approximately 54,200 in the City of Montclair, portions of the City of Chino, and unincorporated areas of San Bernardino County between Chino, Ontario, and Pomona. MVWD is also a wholesale water supplier to the City of Chino Hills, providing up to 21 MGD of water.
City of Ontario	The City of Ontario supplies water to a population of approximately 168,780 in the city and some unincorporated areas of San Bernardino County. The City of Ontario also serves a small portion of the City of Rancho Cucamonga.
San Antonio Water Company	SAWCo is a mutual water company organized as a private non-profit corporation, with more than 70% of shares owned by municipalities. SAWCo wholesales surface water from San Antonio Creek and potable groundwater to Upland, Ontario, and irrigation customers.
City of Upland	The City of Upland encompasses 15 square miles and serves water to approximately 75,790 people.
West Valley Water District	WVWD is a retail water agency serving over 80,000 residents, some of which fall into an overlapping service area with IEUA. Through an assistance agreement, WVWD has the potential to receive imported water for up to 1,500 AFY through San Bernardino Valley Municipal Water District and MWD during supply outages, emergencies, or loss of local water supply through December 2035.

1.6 Population

The Southern California Association of Governments (SCAG) conducts a forecast process every 4 years to project growth in employment, population, and households at the regional, county, jurisdictional, and sub-jurisdictional levels for use in its Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and other planning documents. The forecasting process includes a review of US Census Bureau and California Department of Finance projections, development of key input assumptions, and meetings with all 197 local jurisdictions one-on-one to review the draft growth forecast. The growth forecast for population, household, and employment are developed for the years 2020, 2030, 2035, and 2045. The preliminary range of growth figures are produced first at the county level and then refined to smaller areas, called city and transportation analysis zones (TAZs), which are then released to local jurisdictions for comments and input. Once the growth forecasts for these TAZs are finalized, they are adopted by the Regional Council.

The 2020 SCAG RTP/SCS data and associated TAZs for San Bernardino County were obtained and used to calculate the current and projected population within IEUA's service area. A geospatial analysis was used to identify the TAZs within the IEUA service area and the population associated with each of these zones was summed to find the total population within IEUA's service areas for the years provided by SCAG. It should be noted that the FWC is only partially within the service area and only the population within IEUA's service boundary is considered in this UWMP. For 2025 and 2040, the population value was interpolated between the years provided before and after.

From these calculations, IEUA's service area currently serves a population of approximately 906,046 in 2020 and has an expected growth rate of approximately 0.90% per year. With this growth rate, IEUA's service area is expected to reach a population of 1,119,568 in 2045. Table 1-4 shows the projected population for every 5 years from 2020 through 2045. Table 1-4 is equivalent to DWR Table 3-1; all tables within the Plan that are DWR Standardized Tables have the DWR Table number in parentheses in the title. All completed DWR Standardized Tables are included in Appendix C.

Table 1-4: IEUA Population – Current and Projected (DWR Table 3-1)

	2020	2025	2030	2035	2040	2045
Population Served	906,046	945,849	987,401	1,031,771	1,074,773	1,119,568

Note: Population projections calculated using the 2020 Southern California Association of Governments population forecast.

1.7 Demographics and Socioeconomics

Approximately 25% of the IEUA service area population is considered a designated disadvantaged community (DAC) based on the American Community Survey Median Household Income (MHI) data. Census tracts are determined to be disadvantaged when the average household income is 80% or less than statewide median household income. The city of Montclair is a DAC, as is a large portion of the FWC's service area. There are also additional census tract areas that are designated as disadvantaged communities based on the MHI throughout the service area, primarily between HWY 10 and Mission Boulevard in the cities of Ontario and Montclair and between HWY 10 and HWY 66 in Rancho Cucamonga and Upland. The disadvantaged communities in the region are shown on Figure 2.

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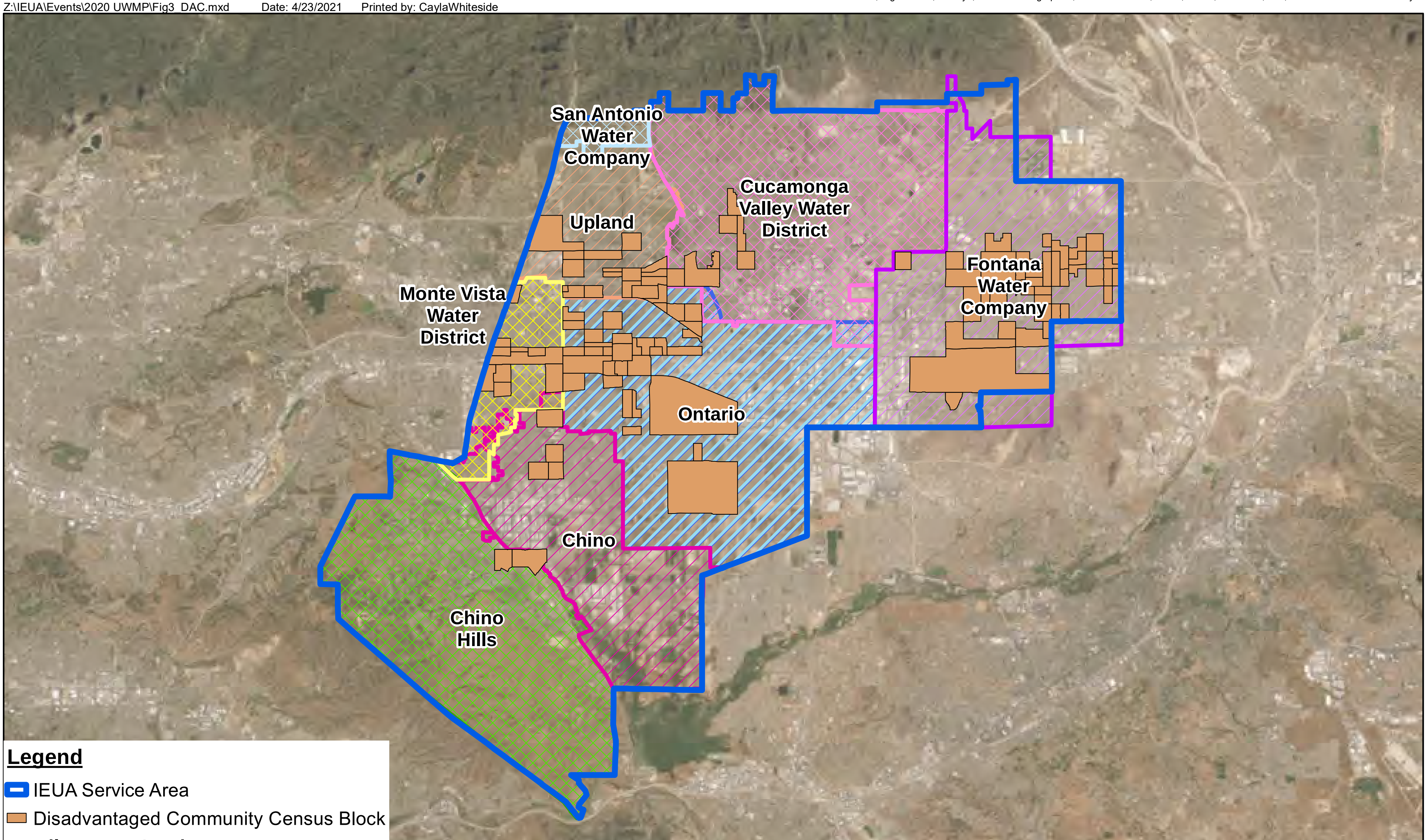
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- IEUA Service Area
- Disadvantaged Community Census Block

Retail Agency Service Areas

- Chino
- Chino Hills
- Ontario
- Cucamonga Valley Water District
- Fontana Water Company
- Monte Vista Water District
- San Antonio Water Company
- Upland

Source: Department of Water Resources' Disadvantaged Communities Mapping Tool using U.S. Census (American Community Survey) 2018 data.

N

0 12,500 25,000

Scale: Feet

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Chino, CA

Disadvantaged Community Areas

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April 2021

Figure 2

1.8 COVID-19 Impacts

As with most water service agencies in the state of California, the COVID-19 pandemic beginning in fiscal year 19/20 period impacted IEUA and its service area's operations. Transitions were made to remote or virtual activities where possible, and some capital improvement projects experienced delays until proper safety attire, such as masks, could be secured to ensure work could be continued safely. Some in-person public outreach and education events were cancelled. In addition, IEUA deferred its equivalent service unit (EDU) rate for 12 months and held water connection fees constant to compensate for the economic downturn and job loss in its service area. On May 6, 2020, the IEUA Board voted to defer the increase in sewer EDU rates established in Resolution No. 2019-11-2; the sewer EDU rate increase will be deferred 12 months, until July 1, 2021. IEUA held water connection fees constant from fiscal year 19/20 to fiscal year 20/21 as outlined in Resolution No. 2020-7-11. IEUA remains considerate of the continuation of the ongoing impacts of the pandemic and how it may impact future activities and operations.

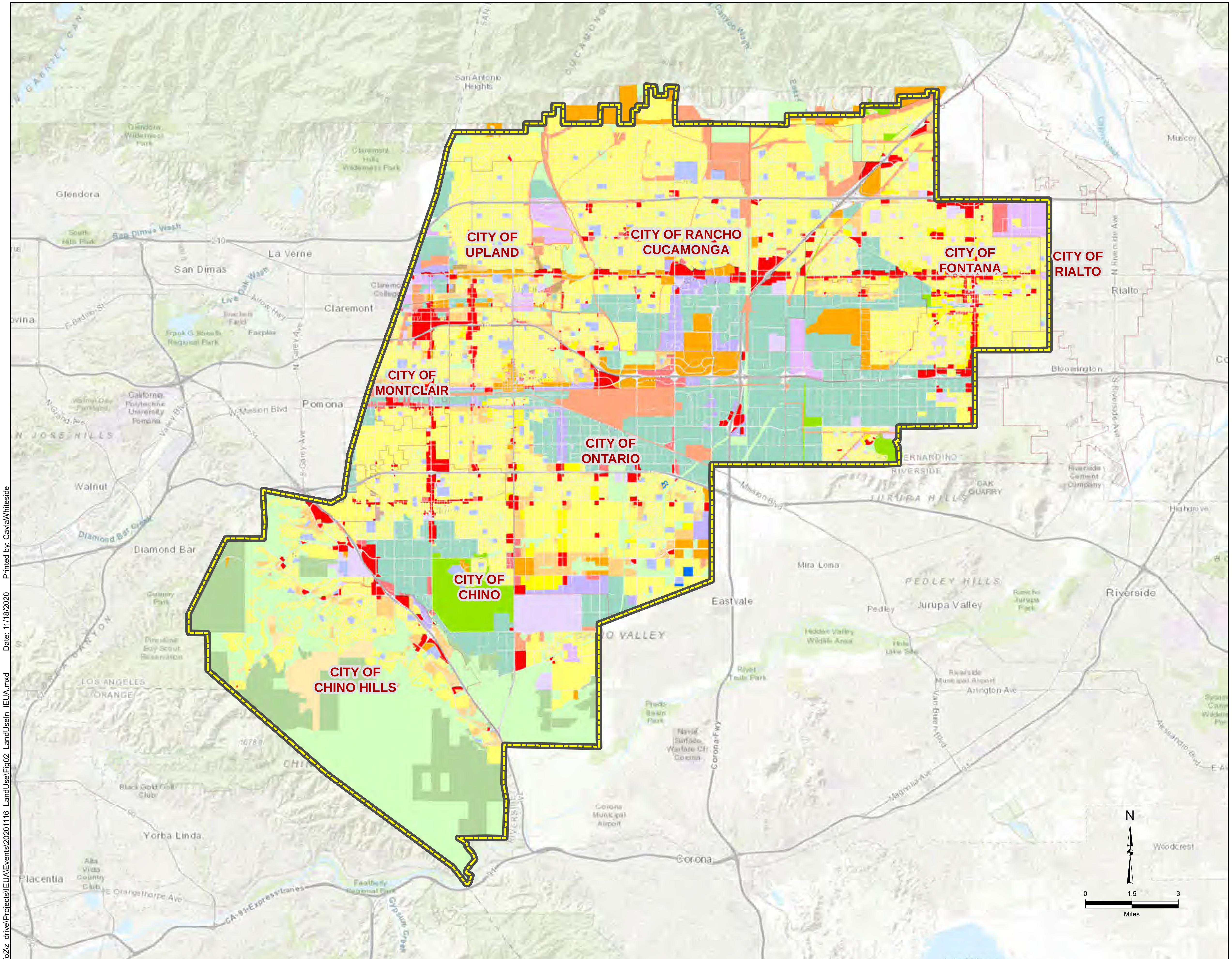
1.9 Land Use in the Service Area

When IEUA was formed in 1950, its service area was primarily field crops, citrus, and vineyards with a total urban area land use of less than 8%. Since 1950, urban areas have expanded significantly and replaced most agricultural land in the northern and central portions of the Chino Basin. The conversion of agricultural land to urban development is anticipated to continue within the Chino Basin.

SCAG's 2020 RTP/SCS includes land use information. The SCAG worked with the region's 197 local jurisdictions to refine their land use dataset that was drafted in 2016. The most recent update was finalized on April 29, 2020. The land use dataset includes general plan land use, specific plan land use, zoning code, and existing land use. Figure 3 shows the land use code present in the IEUA service area. The majority of the service area is comprised of single family residential, industrial, and commercial areas. There are also large areas of open space in the service area, such as the Chino Hills State Park.

The 2015 Land Use Based Demand Model evaluated the existing and planned land uses within the service area out to 2040. The future land uses were calculated based on the general plans for each city in the service area using city spheres of influence as boundaries to prevent overlap. Residential land use is expected to have the largest growth, approximately 31% by 2040. Medium, high, and very high-density residential land uses are projected to increase more than low and very low-density residential land use. Industrial land use is projected to grow at 20%, while vacant land will decrease 98%and agriculture use will decrease by 96%.

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



Legend

IEUA Service Area

Land Use

- Agriculture
- Commercial and Services
- Education
- Facilities
- General Office
- Industrial
- Mixed Commercial and Industrial
- Mixed Residential
- Mixed Residential and Commercial
- Mobile Homes and Trailer Parks
- Multi-Family Residential
- Open Space and Recreation
- Rural Residential
- Single Family Residential
- Specific Plan
- Transportation, Communications, and Utilities
- Undefined
- Undevelopable or Protected Land
- Water

Source:

Southern California Association of Government's 2020 Land Use GIS Dataset. Updated April 29, 2020.

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Land Use in IEUA Service Area

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November 2020

Figure 3

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1.10 Climate

IEUA is located within the South Coast Air Basin (SCAB) that encompasses all of Orange County and the urban areas of Los Angeles, San Bernardino, and Riverside counties. The SCAB climate is characterized as "Mediterranean" with a semi-arid environment with mild winters, warm summers, and moderate rainfall. The average annual rainfall in the IEUA water service area is approximately 15 inches, most of which occurs during the winter months.

Temperatures range in average from 41 to 67 degrees Fahrenheit (°F) during the winter and from 60 to 90°F degrees during the summer. Table 1-5 presents the region's annual average climate data. The temperature, rainfall, and standard monthly average evapotranspiration (ETo) is provided by the California Irrigation Management Information System (CIMIS) Station Number 78 in Pomona.

Table 1-5: IEUA Service Area Annual Climate

Month	Standard Monthly Average Evapotranspiration (ETo) (inches)	Average Total Rainfall (inches)	Average Temperature (degrees Fahrenheit)	
			Max	Min
January	1.97	3.22	67.46	42.29
February	2.36	3.34	68.03	42.91
March	3.67	2.16	70.13	45.21
April	4.68	1.10	73.20	47.24
May	5.22	0.40	76.10	51.71
June	5.90	0.18	81.95	56.38
July	6.61	0.09	87.56	60.34
August	6.49	0.16	89.31	60.36
September	4.96	0.45	87.17	58.41
October	1.74	0.84	80.07	52.75
November	2.35	1.06	73.32	45.86
December	1.78	2.41	66.74	40.98

Source: California Irrigation Management System (CIMIS) data provided from Station No. 78 in Pomona, Los Angeles County, March 14, 1989 to October 31, 2020 http://wwwcimis.water.ca.gov/cimis/welcome.jsp.

1.11 Potential Effects of Climate Change

1.11.1 Overview

The topic of growing interest and research for water planners and managers is climate change and the potential impacts it could have on California's future water supplies. DWR's California Water Plan considers how climate change may affect water availability, water use, water quality, and the ecosystem. The California Water Plan Update 2018 builds upon previous updates and provides recommended actions, funding scenarios, and an investment strategy to meet the challenges and goals laid out in the prior 2013 Plan.

Chapter 3 of the California Water Plan, "Actions for Sustainability", and Volume 1, Chapter 5 of the California Water Plan, "Managing an Uncertain Future," evaluated three different scenarios of future water demand based on alternative but plausible assumptions on population growth, land use changes, water conservation and future climate change (DWR 2019). Future updates will test different response packages, or combinations of resource management strategies, for each future scenario. These response packages help decision-makers, water managers, and planners develop integrated water management plans that provide for resource sustainability and investments in actions with more sustainable outcomes. The 2018 Update provides recommended actions in order to support each of the identified goals of the plan. The goals are 1) Improve Integrated Watershed Management, 2) Strengthen Resiliency and Operational Flexibility of Existing and Future Infrastructure, 3) Restore Critical Ecosystem Functions, 4) Empower California's Under-Represented or Vulnerable Communities, 5) Improve Inter-Agency Alignment and Address Persistent Regulatory Challenges, and 6) Support Real-Time Decision-Making, Adaptive Management, and Long-Term Planning (DWR 2019).

California faces the prospect of additional water management challenges due to a variety of issues including population growth, regulatory restrictions, and climate change. Climate change is of particular interest because of the range of possibilities and their potential impacts on essential operations. The most likely scenarios involve increased temperatures, which will reduce the Sierra Nevada snowpack and shift more runoff to winter months, and accelerated sea level rise. The other much-discussed climate change scenario is an increase in precipitation variability, with more extreme drought and flood events posing additional challenges to water managers (DWR 2014). Even without population changes, water demand could increase. Precipitation and temperature influence water demand for outdoor landscapes and irrigated agriculture. Lower spring rainfall increases the need to apply irrigation water. Further, warmer temperatures increase crop evapotranspiration, which increases water demand. Water-related resources that are considered important and potentially sensitive to future climate change include water demands, water supplies, water quality, sea level rise, flooding, and ecosystem and habitat.

1.11.2 IEUA Climate Change Vulnerabilities

Climate analysis conducted for the 2015 IRP suggests that temperatures within the IEUA service area will rise over the coming decades and that precipitation will continue to be highly variable, with no consensus on a trend towards wetter or drier conditions. It is therefore important to identify water management options that will ensure future demand can be met under a variety of different hydrologic circumstances. Despite uncertainty over the specific effect of climate change on IEUA's water supply, the various projections showed an overall tendency of future decreases in supply sources. The largest potential impact on supply is the vulnerability of imported water from the State Water Project (SWP), indicating a need to improve regional sustainability and decrease dependency on the SWP supply. The 2015 IRP analysis identified recycled water supplies as a critical asset in bolstering a flexible management portfolio since these supplies are generated locally and not impacted by climate. In conjunction with maximizing recycled water supplies, the 2015 IRP also found that the implementation of additional water use efficiency programs would bolster the resiliency of IEUA's water portfolio against climate impacts.

The 2020 Regional DCP also assessed climate change vulnerabilities within the regional's water supply sources. The DCP found that while precipitation variability is expected to align with historical trends, the wet years will likely be wetter and the dry years drier, exacerbating an already highly variable water supply reliability factor (DCP 2020). It is anticipated that the groundwater supply will be adversely impacted by increased temperatures and drought.

Groundwater elevation and water quality are both dependent upon rainfall and supplemental sources of recharge. Droughts similar to the 2011 to 2017 drought could significantly decrease natural groundwater recharge and an increased intensity of storm events could lead to an inability to capture and recharge stormwater (DCP 2020). Stormwater is a high-quality water source that can improve the quality of groundwater supplies once it has infiltrated and blended with the aquifer; a reduction in stormwater recharge could result in a degradation of groundwater quality. In addition, reduced rainfall and increased groundwater withdrawal may lead to more salinity buildup and increased concentrations of salt, nitrate, and other constituents, requiring the need for additional water supply for blending or investment in advanced treatment technologies (DCP 2020). Applications for recycled water in the basin become constrained if the salinity in the basin rises beyond the Regional Water Quality Control Board's (RWQCB's) specified limits.

The largest potential climate change impact on supply is the effect of shifting snowmelt and resulting runoff patterns on the SWP. The SWP's infrastructure was designed to capture snowmelt from the Sierra Nevada snowpack, and when snow melts during the spring and summer months, a combination of reservoirs and conveyance facilities provide a steady water supply throughout the year. The reservoirs were sized based on historical precipitation patterns, so with more precipitation falling as rain instead of snow in the winter months, more water will be required to be released from reservoirs and will not be available during the higher summer demand periods (DCP 2020). The reliability of imported SWP is expected to decrease as the changes in precipitation caused by climate change continue. This decrease in reliability indicates a need to improve regional sustainability and decrease dependency on the SWP supply. The 2015 IRP analysis identified recycled water supplies and WUE as a critical asset in bolstering a flexible management portfolio since these supplies are generated locally and not impacted by climate. In addition, MWD is considering investments in Delta conveyance to minimize potential SWP reductions and has developed a conceptual 150 million gallons per day (MGD) Regional Recycled Water program to further reduce climate change impacts on the SWP.

Local surface water is also an important resource for retail agencies within the IEUA service area. These supplies are dependent on precipitation and temperature, which are influenced by climate change. Extreme precipitation events can result in short periods with high volumes of runoff that will be difficult to capture, while extended droughts or dry years will result in long periods without these supplies. Higher temperatures will also cause more evaporation and transpiration, reducing the volume of water bodies such as lakes, as well as the amount of soil moisture. Reduced soil moisture means that soil may absorb and hold more water when rain occurs, which would reduce the amount of water flowing into creeks and streams.

The climate change effects and their potential to impact supply and demand are considered throughout this document.

1.12 Implementation of the Plan

This subsection provides a cooperative framework within which the Plan will be implemented including agency coordination, public outreach, and resources maximization.

1.12.1 Preparation of the Plan

IEUA's water supply planning relates to the policies, rules, and regulations of its regional and local water providers. IEUA's service area is dependent on imported water from MWD, its regional wholesaler. As such, this 2020 UWMP was developed from a wholesale perspective. While the Wholesale UWMP provides water demand, water supply, and supply reliability assessment for the service area, all requirements of the CWC for each of IEUA's retail agencies will be met through each retail agency's individual 2020 UWMP. This Plan was prepared at a wholesale level, in coordination with retail water agencies within IEUA's service area for consistency. Table 1-6 summaries the varying levels of contribution. Furthermore, IEUA regularly coordinates with retail and regional water agencies for the planning of this UWMP and other documents to support the long-term water planning and management for the region. A detailed description of regional water agency coordination is included in Section 1.13.

Table 1-6: Coordination with Appropriate Agencies

Agency Name	Participated in Plan Development	Commented on Draft	Attended Public Meetings	Sent Notice of Plan in Preparation[a]	Received Copy of Draft Plan[b]	Sent Notice of Intent to Adopt[a]	Received Copy of Adopted Plan[b]
City of Chino	Yes	No	No	Yes	Yes	Yes	Yes
City of Chino Hills	Yes	No	No	Yes	Yes	Yes	Yes
Cucamonga Valley Water District	Yes	No	No	Yes	Yes	Yes	Yes
Fontana Water Company	Yes	No	No	Yes	Yes	Yes	Yes
Monte Vista Water District	Yes	No	No	Yes	Yes	Yes	Yes
City of Ontario	Yes	No	No	Yes	Yes	Yes	Yes
San Antonio Water Company	No	No	No	Yes	Yes	Yes	Yes
City of Upland	Yes	No	No	Yes	Yes	Yes	Yes
West Valley Water District	No	No	No	Yes	Yes	Yes	Yes
Chino Basin Desalter Authority	No	No	No	Yes	Yes	Yes	Yes

Agency Name	Participated in Plan Development	Commented on Draft	Attended Public Meetings	Sent Notice of Plan in Preparation[(a)]	Received Copy of Draft Plan[(b)]	Sent Notice of Intent to Adopt[(a)]	Received Copy of Adopted Plan[(b)]
Chino Basin Water Master	No	Yes	No	Yes	Yes	Yes	Yes
Chino Basin Water Conservation District	No	No	No	Yes	Yes	Yes	Yes
Formation Commission for San Bernardino County	No	No	No	Yes	Yes	Yes	Yes
Metropolitan Water District	Yes	No	No	Yes	Yes	Yes	Yes
City of Montclair	No	No	No	Yes	Yes	Yes	Yes
San Bernardino County Flood Control District	No	No	No	Yes	Yes	Yes	Yes
San Bernardino County Planning Department	No	No	No	Yes	Yes	Yes	Yes
Santa Ana Watershed Project Authority	No	No	No	Yes	Yes	Yes	Yes
Santa Ana Regional Water Quality Control Board	No	No	No	Yes	Yes	Yes	Yes
Water Facilities Authority	Yes	No	No	Yes	Yes	Yes	Yes

Notes:

(a) IEUA sent notice of plan in preparation in November of 2020 and notice of intent to adopt in April 2021 to all retail agencies, except for WVWD; IEUA sent notice of preparation and notice of intent to adopt with WVWD in May 2021. Both notices are included in Appendix E.
(b) IEUA posted the draft 2020 UWMP to its website on 11 May 2021 and the adopted final 2020 UWMP to its website by July 1, 2021.

1.12.2 Plan Adoption and Amendment Process

IEUA began preparation of this Plan in October 2020. The final version of the Plan was adopted by IEUA Board on June 16, 2021 and submitted to DWR within 30 days of Board approval. The Board Resolution stating the adoption of the 2020 UWMP (Resolution No. 2021-6-10) is included in Appendix D.

Notification of IEUA's intent to amend the UWMP was posted on IEUA's website and provided to the relevant agencies at least 60 days prior to the public hearing. Table 1-7 lists the relevant water suppliers and agencies that IEUA sent a Letter of Notification on November 24 and 30, 2020 that it was in the process of preparing an updated UWMP. A copy of the Letter of Notification is included in Appendix E. A public hearing was held and the final amended UWMP was adopted by the IEUA Board on June 16, 2021 and submitted to DWR within 30 days of Board approval. The amended final UWMP was also submitted to the California State Library, City and County.

This plan includes all information necessary to meet the requirements of the Water Conservation Act of 2009 (Wat. Code, §§ 10608.12-10608.64) and the Urban Water Management Planning Act (Wat. Code, §§ 10610-10656).

Table 1-7: DWR Wholesale: Water Supplier Information Exchange (DWR Table 2-4)

Select One	Supplier
X	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with Water Code Section 10631. Completion of the table below is optional. If not completed, include a list of the water suppliers that were informed.
	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631.

Water Supplier or Agency Name
Chino Basin Water Master
Chino Basin Desalter Authority
City of Chino
City of Chino Hills
Cucamonga Valley Water District
Fontana Water Company
Local Agency Formation Commission for San Bernardino County
City of Montclair
Monte Vista Water District
Metropolitan Water District
City of Ontario
City of Rancho Cucamonga
Santa Ana Regional Water Quality Control Board
San Antonio Water Company
Santa Ana Watershed Project Authority
San Bernardino County Planning Department
Three Valleys Municipal Water District
City of Upland
Water Facilities Authority
West Valley Water District

1.12.3 Public Outreach

IEUA encouraged community and public interest involvement in the plan update through a public hearing and inspection of the draft document on June 16, 2021. Public hearing notifications were published in local newspapers. A copy of the published Notice of Public Hearing is included in Appendix E. The hearing provided an opportunity for all residents and employees in the service area to learn and ask questions about their water supply in addition to IEUA's plans for providing a reliable, safe, high-quality water supply. Copies of the draft plan were made available for public inspection at the IEUA headquarters and website.

Table 1-8 presents a timeline for external coordination and outreach during the development of the Plan. A copy of the public outreach materials is provided in Appendix E.

Table 1-8: External Coordination and Outreach

Date	Milestone	External Coordination and Outreach
November 24 and 30, 2020	Notification of Preparation	Encouraged public involvement
April 5, 2021	Notice of Intent to Adopt	Notified the public of the intent to adopt the UWMP and WSCP
May 11, 2021	Draft UWMP and WSCP	Draft UWMP and WSCP released to solicit input
June 16, 2021	Public Hearing	Review contents of Draft UWMP and WSCP and take comments
June 16, 2021	Board Adoption	UWMP and WSCP considered for approval by the Board
By July 1, 2021	Made UWMP and WSCP Available to the Public	Posted on IEUA's website for public access (no later than 30 days after filing with DWR)
By July 13, 2021	Submittal to Library and City/County	Submit the UWMP and WSCP to the California State Library and city or county within service area (no later than 30 days after adoption)

1.12.4 Resource Maximization

Several documents have been developed to enable IEUA and the region to maximize the use of available water resources, including IEUA's 2015 UWMP, the plans described in Section 1.3.1, DWR's 2019 State Water Project Delivery Capability Report (DWR 2019), IEUA's draft 2020 Water Use Efficiency Business Plan, IEUA's Water Shortage Contingency Plan, and communication with IEUA staff. A complete reference list is provided in Section 11 of this Plan.

1.13 Regional Water Agency Coordination

There are many agencies involved in water management within the service area. IEUA is working in cooperation with each of these agencies to achieve water supply reliability, water quality, and watershed management goals for the Santa Ana River Watershed and the Inland Empire. This section provides a description of these agencies.

1.13.1 Metropolitan Water District of Southern California

IEUA is a member agency of MWD, which is a public agency that provides supplemental imported water from the northern California SWP and the Colorado River Aqueduct (CRA) to 26 member agencies located in the Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties. Nearly 90%of the population within these counties, approximately 19 million people, resides within MWD's 5,200-square mile service area.

As a water wholesaler, MWD has no retail customers. It distributes treated and untreated imported water from the CRA and SWP to its member agencies. MWD provides an average of 50% of the municipal, industrial, and agricultural water used within its service area. The remaining 50% comes from local groundwater, local surface water, recycling, and from the City of Los Angeles' Owen's Valley Aqueduct in the eastern Sierra Nevada. MWD prepares its own UWMP. MWD currently provides financial support for local water projects and water conservation projects implemented by its member agencies that increase the reliability of water supplies to the region.

MWD sponsors the Local Resources Program (LRP), established in June 1998, to encourage member agencies to develop and use recycled water and recover groundwater to reduce dependence on imported water supplies. IEUA currently receives financial contributions from MWD from the following programs:

- Conservation Credits Program – MWD pays the lesser of one-half the program cost or the equivalent of $195 per AF of water saved through conservation. A variation of this policy provides funding for programs that document water savings.

MWD also provides financial and technical assistance to its member agencies for implementing the water conservation measures, such as Best Management Practices (BMP), that were initiated by the California Urban Water Conservation Council (CUWCC) Best Management Practices Memorandum of Understanding. CUWCC is now known as the California Water Efficiency Partnership. IEUA currently receives financial contribution from MWD for the following conservation programs:

- Residential and Commercial SoCal Water Smart Program - MWD sponsors a region-wide program that offers single family residents' rebates for high efficiency toilets (HET) and washers, weather-based irrigation controllers, rotating nozzles, and synthetic turf. MWD also provides rebates for plumbing fixture upgrades, landscaping devices, turf replacement, and some industry specific technologies for commercial, industrial, and institutional (CII) customers.

- Residential Landscape Retrofit Program - MWD sponsors outdoor irrigation evaluations and retrofits of high efficiency landscape devices for residential water customers with lot sizes of ¼ acre or larger.

- Residential Pressure Regulation Program – MWD funding supports installation of pressure regulating valves (PRVs) at meters, homes, or at the point-of-connection for irrigation systems to automatically reduce high incoming water pressure from water mains and provide a lower, more functional pressure distribution. PRVs ensure that end-use plumbing fixtures operate at the intended flow rate and reduce the incidence of excessively leaky pipes and fixtures.

- Residential Education, Survey, and Controller Upgrade Program – Focused on the higher water use demographic within the small residential landscape sector, this program promotes an improved understanding of landscape irrigation control technologies while ensuring more efficient scheduling and operation of automated irrigation systems through required training class attendance, landscape evaluations, and smart controller technology upgrades.

- FreeSprinklerNozzles.com Program - This program, which ended in 2019, enabled residential and commercial customers within IEUA's service area to obtain a voucher for free high efficiency irrigation spray nozzles through a web-based portal.

1.13.2 Santa Ana Watershed Project Authority

The Santa Ana River Watershed faces enormous challenges as it strives to adapt to changing conditions, many of which are at an unprecedented scale in its modern history. The Santa Ana Watershed Project Authority (SAWPA) acts as the Regional Water Management Group and its mission is to facilitate communication, identify emerging opportunities, develop regional plans, secure funding, implement programs, build projects, and operate and maintain facilities.

IEUA is a member of SAWPA, which was formed in 1972. SAWPA is a Joint Powers Authority (JPA) that coordinates regional planning within the Santa Ana River Watershed to address water quality and supply improvements. SAWPA is comprised of the five major water supply and wastewater management agencies within the Santa Ana Watershed including: IEUA, Eastern Municipal Water District, Orange County Water District, San Bernardino Valley Municipal Water District, and Western Municipal Water District.

Since the early 1970s, SAWPA has played a key role in developing and updating the Regional Basin Plan for the California Regional Water Quality Control Board. SAWPA conducts water-related investigations and planning studies, and builds facilities needed for regional water supply and water quality remediation.

The "One Water One Watershed" (OWOW) is the Santa Ana River Watershed's integrated regional water management plan. This plan reflects a collaborative planning process that addresses all aspects of water resources throughout the region and watershed. OWOW integrates different disciplines such as: water supply, water quality, recycled water, stormwater management, water use efficiency, land use, energy use, climate change, and habitat. It includes planning of future water demands and supplies over a 20-year time horizon within the watershed as a hydrologic and interconnected system. The plan represents collaboration across jurisdictions, and political boundaries involving multiple agencies, stakeholders, individuals, and groups; and attempts to address the issues and differing perspectives of all the entities involved through mutually beneficial solutions. The plan's comprehensive view of the watershed and water issues is one in which all types of water (imported, local surface and groundwater, stormwater, and wastewater effluent) are viewed as components of a single water system, inextricably linked to land use and land cover.

1.13.3 Chino Basin Watermaster

IEUA is a member of the CBWM Board of Directors. CBWM was established in 1978 by a judgment entered by the Superior Court of California. The judgment requires that the CBWM develop a management plan for the Chino Groundwater Basin that meets water quality and quantity objectives for the region.

In 1998, CBWM developed an integrated set of water management goals and actions for the Chino Basin known as the Optimum Basin Management Program (OBMP) that describes nine program elements to meet the water quality and local production objectives in the Chino Groundwater Basin. The OBMP encourages the increased use of local supplies to help “drought proof” the Chino Basin.

In July 2000, CBWM adopted the “Peace Agreement” that ended over 15 years of litigation within the Chino Basin. The Peace Agreement outlined the schedule and actions for implementing the OBMP. In December 2007, CBWM adopted the “Peace II Agreement” that redefined the future programs and actions required to implement the OBMP, based on the 9 years of experience and accomplishments in implementing the OBMP. Between 2009 and 2010, CBWM updated the Groundwater Recharge Master Plan in response to changes in demand, recharge capacity, safe yield, and other factors.

CBWM recently concluded the 2020 OBMP Update through a year-and-a-half long process that gathered input from all stakeholders. The management plan contained in the 2020 OBMP outlines a series of activities proposed by the stakeholders to achieve the goals of the 2020 OBMP which are: 1) Enhance Basin Water Supplies, 2) Protect and Enhance Water Quality, 3) Enhance Management of the Basin, and 4) Equitably Finance the OBMP. Implementation of the management plan will require an updated Implementation Plan, and amendments to the Peace Agreement. This is especially true of the storage management component of the OBMP, which needs to be updated and adopted by the Court before June 30, 2021.

As the environmental review of the 2020 OBMP Update has not yet been completed, CBWM developed a Local Storage Limitation Solution addendum, which allows the continued temporary utilization of managed storage under the 2000 OBMP. The efforts to fully complete the 2020 OBMP Update environmental review and Implementation Plan should advance in a timely manner to ensure the adequate protection of the regional groundwater supply. The Chino Ground Basin is a very important resource that the region relies on for supporting its vibrant economy and growing population. The 2020 OBMP and future Implementation Plan, including the revised Storage Management Plan is essential to reliably maintain this significant groundwater resource.

1.13.4 Chino Basin Water Conservation District

The Chino Basin Water Conservation District (CBWCD) was established in 1949 to protect and replenish the Chino Groundwater Basin with rainfall and stormwater runoff from the San Gabriel Mountains. CBWCD uses an extensive system of percolation ponds and spreading grounds to augment the natural capacity of the region to capture runoff for recharge. CBWCD also promotes water conservation through public education programs. IEUA works closely with the CBWCD. IEUA, CBWM, the San Bernardino County Flood Control District, and CBWCD jointly sponsor the Chino Basin Recycled Water Groundwater Recharge Program that is an integral part of basin water management.

1.13.5 Santa Ana Regional Water Quality Control Board

The Santa Ana Regional Water Quality Control Board (SARWQCB) is responsible for the development and enforcement of water quality objectives to meet the requirements of the Federal Clean Water Act, California Porter-Cologne Act, and the National Pollutant Discharge Elimination System (NPDES).

In 1975, the SARWQCB completed the Water Quality Control Plan for the upper portion of the Santa Ana Watershed. The plan outlined specific water quality management actions to address water quality and salt build up, in the form of total dissolved solids (TDS) within the Chino Groundwater Basin. These included the construction of a large well field and desalters in the lower part of the Chino Basin to extract and treat poor quality water, and construction of a pipeline to export brine from the upper Basin to the Orange County Sanitation District (OCSD) Plant 1. The Water Quality Control Plan was updated in 1995, 2008, 2011, 2016, and 2019.

The Inland Empire Brine Line (IEBL), previously known as the Santa Ana River Interceptor, was built and has been in operation since 1975. The 2020 OBMP Update by CBWM has been developed to meet the requirements of the 1975 Plan.

1.13.6 Chino Basin Desalter Authority

The CDA is a JPA consisting of the cities of Chino, Chino Hills, Norco and Ontario, the Jurupa Community Services District, the Santa Ana River Water Company, Western Municipal Water District, and IEUA. The CDA treats brackish groundwater from the lower Chino Basin with the Chino I and II Desalter facilities along with distribution of drinking water to retail agencies. IEUA operates and maintains the Chino I Desalter while Jurupa Community Services District operates and maintains the Chino II Desalter. These desalter facilities consist of groundwater wells and associated raw water pipelines, treatment facilities, pumps, and water distribution pipelines. Treatment processes include ion exchange (IX) and reverse osmosis (RO). Three of the nine retail agencies currently purchase desalted water as part of their water supply.

1.13.7 San Bernardino County Flood Control District

The SBCFCD is partnering with IEUA, CBWM, and CBWCD in implementation of the Chino Basin Groundwater Recharge Master Plan. The implementation is known as Chino Basin Facilities Improvement Program (CBFIP). The CBFIP includes modifications to several SBCFCD basins and flood control channels including the installation of five rubber dams and three drop inlet diversion structures to divert imported, storm and recycled water to 16 groundwater recharge sites.

1.14 Fundamental Findings of the Urban Water Management Plan

It is the stated goal of the IEUA to deliver a reliable and high-quality water supply to its service area, even during dry periods. The analysis in this Plan documents that IEUA and its service area will have sufficient supply to meet water use demands out to 2045 during all considered dry period scenarios. The region has also successfully achieved its goal of reducing water use by 20% by 2020 as part of SBX7-7. The Plan documents IEUA's commitment to conservation and support of water use efficiency programs for its retail agencies to continue water demand reduction. IEUA has identified recycled water use as an important source of supply currently and in the future and continues to explore other potential supply opportunities which are described throughout the document. Finally, the Plan considers potential impacts to each of its supply sources due to climate change, regulations, and water quality changes and addresses potential future actions needed to increase the resiliency of the region.

Section 2: Water Demands

This section describes historical, current, and projected water usage and demands within IEUA's service area. Regional water demands represent the total demand of all agencies within IEUA's service area over the planning horizon. These demands are broken down by retail agency in the following subsections.

Since the 1990s, approximately 90% of the region's water demands have come from urban municipal and industrial (M&I) users with the remaining 10% coming from agricultural users. Overall urban water demand since 1995 has increased by approximately 20%, despite a regional growth of 30% (approximately 200,000 more residents). This is indicative of new water use behaviors, such as efficient irrigation and the use of more efficient indoor fixtures, which prolong the availability of current regional water supplies into the future. Water use efficiency measures implemented by IEUA and its retail agencies are discussed in detail in Section 8.

The 2015 UWMP projected 2020 total urban demand to be approximately 210,500 AFY. However, actual demands have decreased over the past 5 years from 200,000 AF in FY 14/15 to 192,202 AF in FY 19/20. Over the past 5 years, the average water usage has been even lower, approximately 187,500 AFY (ranging from 168,800 AF in FY 15/16 to 203,400 AF in FY 17/18). This decrease is in part due to slow population growth (approximately 0.9% growth per year), changes in plumbing codes, implementation of water use efficiency programs, and the increased education and of consumers about California drought conditions and their subsequent conservation measures.

While IEUA anticipates a slight increase in water usage in the future due to the growing population in the region and the projected temperature increases, long-term demands are not expected to exceed the peak 10-year demand of 227,586 AF reached during the FY 13/14 drought. The 2015 Integrated Water Resources Plan demand modeling found that new developments in the region are more efficient due to changes in the plumbing code, higher density developments with less landscaping, and compliance with landscape ordinance requirements set forth in AB 1881. A continued focus on water use efficiency and per capita reductions, as required in SBX7-7, AB 1668, and SB 606, is anticipated to continue reducing overall water demands.

The impact of state-wide mandates has also affected demand in the region. The Water Conservation Act of 2009 (SBX7-7) provides the regulatory framework to support the statewide reduction in urban per capita water use described in the 20x2020 Water Conservation Plan (DWR 2010). As detailed in Section 3, the IEUA region has reduced its gallons per capita per day water usage by more than 20% compared to the baseline value calculated in 2010.

These findings suggest that future developments will require less water than in the past, reducing the previous projected regional need for additional water supplies. This shift has significant implications for future wastewater and recycled water planning. Regional treatment plants may not need to be expanded for hydraulic capacity as quickly as previously thought; however, treatment plants will have to be expanded to treat increased wastewater strength due to greater solids concentration, and future available recycled water supplies may be lower than previously expected.

Several factors can affect demands and associated projections, including:

- Land use revisions
- New regulations
- Consumer choice
- Economic conditions
- Transportation needs
- Environmental factors
- Conservation programs
- Building and plumbing codes.

These factors affect the amount of water needed, as well as the timing of when it is needed. During an economic recession, there is a major downturn in development and a subsequent slowing of the projected demand for water. The projections in this Plan do not attempt to forecast recessions or droughts. Likewise, no speculation is made about future building and plumbing codes or other regulatory changes.

2.1.1 Demand Projection Methodology

IEUA has been working with its consultant and its contracting agencies on wastewater and recycled water land use-based demand forecasts. The goal of this effort is to develop potential demand projections that disaggregates regional data to the agency level. The project is collecting and compiling data, developing flow factors, unit demands, and agency demands in 5-year increments, and preparing a spreadsheet model and technical memorandum. The effort is estimated to be completed by the submission of IEUA's 2020 UWMP. Draft projections were provided for inclusion in this 2020 UWMP.

In addition, projections on local water supply and demand and retail agency demands on IEUA were gathered from each of IEUA's retail agencies. These projections were prepared by retail agencies for use in their respective 2020 UWMPs. Retail agencies within the service area used various methodologies based on the best available data, land use changes, climate change, and conservation efforts to create their retail demand projections. These agencies also worked with others, such as developers and municipal departments, to refine their projections. Retail agency projections were also informed by the comprehensive IEUA IRP developed in 2014-2016 and the 2020 IRP Regional Water Supply Infrastructure Model (IRP Model). These planning documents were developed in collaboration with IEUA's retail agencies for the purpose of assessing water supply vulnerabilities and evaluating infrastructure and management strategies that will improve near-term and long-term water resources management for the region. The IRP evaluated new growth, development, and water demand patterns within the service area and assessed water needs and supply source vulnerabilities under climate change. The IRP provided aggregated water demand projections based on an econometric demand forecasting model. The IRP Model incorporated existing regional and local supplies, key local and regional infrastructure, interconnections between agencies, and current and projected annual potable water demands to simulate requirements for imported water or other sources to blend with and utilize wells with impaired groundwater quality. The IRP Model evaluated multiple scenarios to identify areas with unmet water demands and areas with water surpluses.

IEUA coordinated with its retail agencies to collect retail supply and demand data that was gathered into regional totals. Additional details on the demand projection methodology completed by each retail agency can be found in their respective 2020 UWMPs. Coordination with land use agencies to develop water projections for both IEUA and its retail agencies are detailed in the following section.

2.1.2 Coordination with Land Use Agency to Develop Water Projections

It is important to have city land use planners identify anticipated timing of development as they are the most knowledgeable of development activities, growth patterns, and trends within their city. The 2015 IRP and 2015 Land Use-Based Demand Model (LUBDM) included significant considerations of land use and coordination with regional agencies to develop accurate water projections that were again referenced for the development of the 2020 UWMP water projections. Land use data used for the 2015 LUBDM were sourced from the General Plans of the cities in the region, the Metropolitan Water District's 2010 water demand model, and regional growth plans, such as SCAG's 2012-2035 RTP/SCS. The 2015 LUBDM and IRP were created to provide consistently developed agency demand projections through 2040. In addition to the sources mentioned, this model developed land use designations for the service area using existing land use geospatial information system databases, Google Earth, windshield surveys, and meetings with community development departments. The 2015 IRP project team met with planning or community development departments for each City within IEUA's service area: the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Rancho Cucamonga, and Rialto. These meetings focused on confirmation of general plan land use for vacant land that is developable and confirmation of boundaries and existing land uses. The extensive effort to improve the classification accuracy of over 70% of the existing land use resulted in a detailed database of existing land use.

Additional details on land use agency coordination conducted by retail agencies for the 2020 planning effort can be found in each individual retail agencies' 2020 UWMP.

2.1.3 Current and Projected Land Use

As discussed in Section 1.7, when IEUA was formed, land use within the service area was primarily field crops, citrus, and vineyards. Since then, urban areas have expanded significantly and replaced many agricultural uses in the northern and central portions of the Chino Basin. The conversion of agricultural land to urban developments is anticipated to continue for land use within the Chino Basin based on the region's general plans. Residential land use is expected to grow significantly over the next two decades, while vacant and agricultural land is expected to decrease by over 85%. Industrial land use is projected to increase as well, although not as much as residential land use.

2.2 Non-Potable Versus Potable Water Use

Water use in IEUA's service area includes both potable and non-potable water. While IEUA does have a non-reclaimable water system, which includes industrial wastewater that cannot be feasibly reclaimed and exported for disposal, the only non-potable water reported in this UWMP is recycled water. Within Section 3, gross water use indicates water use that does not include recycled water. IEUA water demands have been split into imported water and recycled water for clarity. It is important to distinguish between potable and non-potable demands because recycled water supplies have limited permitted uses. Where possible, retail agencies' demands have been split into potable and non-potable demand. Additional details on recycled water uses and projections are included in Section 5.

It should be noted that water use may shift from potable to non-potable water use or vice versa. As IEUA works to maximize and optimize recycled water use and decrease reliance on imported water, some potable water demands may shift over time to become non-potable water demands. In addition, there is some overlap between recycled water demands and potable water supplies. Recycled water that is used for groundwater recharge will eventually be used as potable local groundwater supply.

2.3 Past, Current, and Projected Water Use by Sector

Retail suppliers must identify water use for at least each of the 10 water use sectors identified in Water Code Section 10631(d), which include:

- Single-family residential
- Multi-family
- Commercial
- Industrial
- Institutional and governmental
- Landscape
- Sales to other agencies
- Saline water intrusion barriers, groundwater recharge, or conjunctive use
- Agricultural
- Distribution system water losses.

Wholesale suppliers are only required to report their direct uses but may choose to report an aggregation of all customer reported water uses by sector. Additional water use sectors may be necessary to account for the entirety of an agencies water uses. "Other" water use sectors may include exchanges, surface water augmentation, transfers, wetlands or wildlife habitat, or other, as appropriate.

IEUA has worked with its retail agencies to provide water use data for IEUA as a wholesaler and by retail agency for the purposes of transparency and comprehensive future planning. IEUA's retail agencies have also prepared 2020 UWMPs that include details on their individual water use by sector.

2.3.1 IEUA Water Use

As a wholesaler, IEUA supplies untreated imported water that is purchased from MWD and supplied to its retail agencies. In FY 2019-2020, 66,438 AF of untreated imported water was supplied to its retail agencies, as shown in Table 2-1.

Table 2-1: Demands for Potable and Non-Potable Water – Actual (DWR Table 4-1)

2020 Actual			
Use Type	**Additional Description**	**Level of Treatment When Delivered**	**Volume (acre-feet)**
Sales to other agencies	MWD Imported Water	Raw Water	66,438
		TOTAL	**66,438**

Note: Volume values from IEUA Annual Water Use Database.

2.3.2 Water Use by Retail Agency

The total water use of IEUA's eight retail agencies for FY 19-20 is shown in Table 2-2. Total water use includes recycled water for direct use but not recycled water for groundwater recharge. The total water use for FY 19-20 was 192,100 AF. The water use of the retail agencies is met by local surface water, stormwater, Chino Basin groundwater, non-Chino groundwater, and the Chino Basin Desalters, in addition to the imported water supplies by MWD through IEUA and the recycled water for direct use shown in Table 2-1.

Table 2-2: Water Demand by Retail Agency – Actual

Retail Agency	Volume in Acre-Feet (2020 Actual)
City of Chino	19,303
City of Chino Hills	14,493
Cucamonga Valley Water District	47,059
Fontana Water Company[a]	37,804
Monte Vista Water District	9,035
City of Ontario	39,666
San Antonio Water Company	6,219
City of Upland	18,520
TOTAL	**192,100**

Notes: Volume values from FY 19/20 Annual Water Use Report; includes recycled water for direct use; does not include recycled water for groundwater recharge. Interagency transfers within the region are not included.
(a) Includes demands within IEUA service area only.

2.4 Distribution System Water Losses

In addition to the traditional demand sources, there is another component that impacts water resources – "water losses." Water losses are typically defined as the difference between water production and water sales. These water losses can come from authorized, but unmetered sources, such as firefighting and main flushing, or unauthorized sources such as leakage, illegal connections, and inaccurate flow meters. Retail water agencies are required to calculate their current and projected water losses using the American Water Works Association Method (Title 23 California Code of Regulations Section 638.1 et seq).

Wholesale suppliers are not required to perform water loss audits or report any distribution system losses, although it is recommended that they estimate losses for reliability planning and projecting water needs.

IEUA does not own or operate any potable water infrastructure, and therefore, does not have any distribution losses to report.

2.5 Projected Water Use

Estimating future water demand is a function of several factors. Water usage is influenced by geographic location, topography, land use, demographics, and water system characteristics (i.e., system pressures, water quality, and metering of connections).

2.5.1 IEUA Projected Water Use

A key component of the 2020 UWMP is to provide insight into the future water demand outlook of the region in addition to IEUA's service area. Demand is met through a diverse portfolio of groundwater, purchased imported water from MWD, local surface water, desalinated water, and recycled water (all of which are described in Section 4). IEUA, as the regional wholesaler, is responsible for the purchase of imported water and the provision of recycled water.

Table 2-3 identifies IEUA's projected demand for imported water, which is the maximum volume its retail agencies are contracted to purchase within a given year. Resolution No. 2014-12-1 (also known as the Purchase Order Agreement) establishes the allocations for the purchase of imported water from IEUA by WFA, CVWD, and FWC for a volume less than or equal to 69,572 AFY. Under the IEUA-MWD contract, IEUA is able to purchase up to 93,283 AFY of imported water from MWD at the Tier 1 rate. If the projected imported water demand for a retail agency increases above the values in Resolution No. 2014-12-1, updates to the Resolution may be required. The quantity of imported water available may be less than the contract amount during drought years; water supply reliability is discussed in detail in Section 7. In FY19/20, IEUA's service area purchased 66,438 AF of imported water from MWD, which met 35% of the region's total water use. IEUA and its retail agencies aim to decrease their reliance on imported water by pursuing a variety of water use efficiency and conservation strategies, along with maximizing the recycled water use within the region. While efforts are being made to reduce IEUA's imported water demand to less than its contract amount with the retail agencies in the future, conservative planning assumptions are being made by retail agencies regarding imported water needs in case projects are delayed and/or savings are not realized. This conservative planning approach, and the relatively low imported water use compared to historical use in FY

19/20, accounts for the increase in potable and raw water use between 2020 and 2025 in Table 2-4.

Table 2-4 identifies IEUA's total water demands, which includes the imported water demand projections and the recycled water demand projections. Recycled water demand is projected to increase modestly over the planning horizon, to approximately 9% of total demands by 2045. For additional details on IEUA's recycled water program, refer to Section 5. IEUA currently meets 37% of total water demands within the region; this percentage is expected to decrease to 32% of total demands within the service area by 2045. The IEUA region plans to meet future demand through the diversification of local supply sources, water use efficiency measures, improved groundwater basin management, and the maximization of recycled water use.

Table 2-3: Use for Potable and Raw Water – Projected (DWR Table 4-2)

Use Type	Additional Description	Projected Water Use				
		2025	2030	2035	2040	2045
Sales to other agencies		77,416	79,630	81,974	84,021	84,065
TOTAL		**77,416**	**79,630**	**81,974**	**84,021**	**84,065**

Note: Values from retail agency projections for use of imported water from MWD through IEUA.

Table 2-4: Total Water Use (Potable and Non-Potable) (DWR Table 4-3)

	2020	2025	2030	2035	2040	2045
Potable and Raw Water	66,438	77,416	79,630	81,974	84,021	84,065
Recycled Water Demand	30,496	39,300	41,297	42,162	44,191	44,691
TOTAL WATER DEMAND	**96,934**	**116,716**	**120,927**	**124,136**	**128,212**	**128,756**

Note: 2020 Values from FY 19/20 Recycled Water Annual Report and Annual Water Use Database. Projected potable and raw water volumes is the sum of each retail agency's expected use of imported water from MWD through IEUA. Recycled water direct use projections from retail agencies and groundwater recharge projections from IEUA.

2.5.2 Projected Water Use by Retail Agency

Table 2-5 presents the water demands for the IEUA service area by retail agency for the years 2020 to 2045. These demands include imported water, surface water, groundwater, desalinated water, and recycled water.

Table 2-5: Water Demand by Retail Agency – Projected

Retail Agency	2025	2030	2035	2040	2045
City of Chino	20,843	22,310	23,087	23,963	25,108
City of Chino Hills	17,120	17,334	17,678	17,725	17,769
Cucamonga Valley Water District	53,369	58,092	59,650	60,949	60,949
Fontana Water Company	45,593	46,909	47,665	50,442	51,943
Monte Vista Water District	14,232	14,564	15,175	15,437	15,706
City of Ontario	52,550	58,513	63,406	73,668	73,668
City of Upland	25,328	25,328	25,328	25,328	25,328
TOTAL	**229,035**	**243,050**	**251,989**	**267,512**	**270,471**

Note: Provided by retail agencies in preparation of their respective 2020 UWMPs. SAWCo is not included in the table because transfers from SAWCo are reported within receiving member agency values. Wholesale demands from MVWD to Chino Hills are reflected under Chino Hills' retail demands.

2.5.3 Water Use Projections for Lower Income Households

SB 1087 requires that water use projections of an UWMP include the projected water use for single-family and multi-family residential housing for lower income households as identified in the housing element of any city, county, or city and county in the service area of the supplier. This requirement only applies to retail suppliers; therefore, IEUA is exempt from this requirement. Details on water use projections for lower income households completed by IEUA's retail agencies can be found in each individual retail agency's UWMP.

2.6 Effects of Climate Change on Water Usage

A major factor that affects water usage is weather. Historically, when the weather is hot and dry, water usage increases. The amount of increase varies according to the number of consecutive years of hot, dry weather and the conservation activities imposed. During cool, wet years, historical water usage has decreased, reflecting less water usage for exterior landscaping. Therefore, even without population changes, water demand could increase as a result of climatic conditions. Precipitation and temperature influence water demand for outdoor landscaping and irrigated agriculture. Lower spring rainfall increases the need to apply irrigation water. Further, warmer temperatures increase crop evapotranspiration, which increases water demand.

Climate projections suggest that temperatures within the IEUA service area will rise over the coming decades; there is also expected to be an increase in the frequency, magnitude, and duration of heat waves, causing longer, drier, and more frequent periods of drought. The 2015 IRP found that water demand in its service area may increase by 4.3% for a 3.6^{o} F temperature increase by 2040. In addition, dry years are expected to result in increased water demand; IEUA estimates that 1 dry year would increase demand by up to 5.6% by 2040 while a longer period of dry weather (3+ years) would increase demand by up to 8.9% by 2040.

2.7 Effects of Codes, Standards, and Ordinances

In recent years, water conservation has become an increasingly important factor in water supply planning and management in California. Over the past 10 years there have been a number of regulatory changes related to conservation including new standards for plumbing fixtures, a new statewide landscape ordinance, a state universal retrofit ordinance, new Green Building standards, demand reduction goals and more. In 2018, the California State Legislature enacted Assembly Bill 1668 and Senate Bill 606 to establish a new foundation for long-term improvements in water conservation and drought planning to adapt to climate change and the resulting longer and more intense droughts in California. The California plumbing code has also instituted requirements for new construction that mandate the installation of ultra-low-flow toilets and low-flow showerheads. It is assumed that these changes in water use behavior will continue as the state continues to pass legislation like AB 1668 and SB 606 that create a long-term water conservation framework. A summary of current codes, standards, and regulations impacting regional water demand is included in Table 2-6.

Residential, commercial, and industrial usage can be expected to further decrease as a result of the implementation of more aggressive water conservation practices. In southern California, the greatest opportunity for conservation is in developing greater efficiency and reduction in landscape irrigation. The irrigation demand can typically represent as much as 70% of the water demand for residential customers depending on lot size and amount of irrigated turf and plants. Conservation efforts will increasingly target this component of water demand. IEUA's WUEBP includes "passive" policy initiatives, such as landscape ordinances, and "active savings" that reduce water demand.

"Passive" water saving initiatives that IEUA has employed include residential and commercial high-efficiency toilets, high efficiency clothes washers, and turf replacement. Table 8-6 in Section 8 shows the estimated annual water savings to be achieved over the next 5 years. More details on IEUA's conservation efforts are provided in Section 8.

Table 2-6: Codes, Standards, and Regulations Impacting Water Demand

Regulatory Statute	Requirements	Agency or Regional Implementation	Approach
Assembly Bill 1668 and Senate Bill 606	Compliance with new water use targets, development of Water Shortage Contingency Plans, water loss audits	Implemented locally by water agency	Continuation of water use efficiency programs and policy initiatives. Development of WSCP and 5-year Drought Risk Assessment within the UWMP
20x2020 (SB X7-7)	Reduce per capita water use 20% over baseline by 2020	Implemented by the Regional Alliance	Implementing active water use efficiency programs and policy initiatives within the region
AB1881 – Model Water Efficiency Landscape Ordinance	ETo Allowances: Residential 0.55 Commercial 0.45	Implemented locally by city and/or county	Agencies need to educate customers and developers about ordinance requirements
Assembly Bill 715	Requires any toilet or urinal sold or installed in California cannot have a flush rating exceeding 1.28 and 0.125, respectively	Manufacturers, distributors, retailers, plumbers, and customers must all adhere to new standards	Supply chain removes non-conforming fixtures from marketplace and supplies only efficient and conforming fixtures
Senate Bill 407	Requires existing buildings comply with 1992 standards	Implemented locally by city and county	Difficult to enforce. Could be added to current criteria for change of ownership inspections and reporting

Regulatory Statute	Requirements	Agency or Regional Implementation	Approach
CalGreen	20% reduction of water use. Designated irrigation controllers shall be weather- or soil moisture-based	Implemented locally by city and county	Difficult to enforce. Could be added to current criteria for change of ownership inspections and reporting
Senate Bill 555	Requires water agencies to submit annual water loss reports	Implemented by Agencies	Agencies compile data and submit report to DWR
Assembly Bill 1	City or county cannot fine customers for failure to water	Local agencies to follow requirements of the bill	Agencies need to communicate requirements with cities and counties
Assembly Bill 349	HOAs cannot prohibit installation of artificial turf and allows for turf removal and installation of low water use plants	Local agencies to follow requirements of the bill	Agencies need to work with HOA's and community groups to educate about the bill

Section 3: SB X7-7 Baseline and Targets

3.1 Existing and Target Per Capita Water Use

The Water Conservation Act of 2009 (SBX7-7) is one of four policy bills enacted as part of the November 2009 Comprehensive Water Package (Special Session Policy Bills and Bond Summary). The Water Conservation Act of 2009 provides the regulatory framework to support the statewide reduction in urban per capita water use described in the 20x2020 Water Conservation Plan (DWR 2010). Consistent with SBX7-7, each water supplier must determine and report its existing baseline water consumption and establish water use targets in gallons per capita per day (GPCD) and compare actual water use against the target; reporting began with the 2010 UWMP. The primary calculations required by SBX7-7 are summarized in Table 3-1.

IEUA, as an urban wholesale water supplier, is not required to develop a baseline or set reduction targets to achieve a 20% reduction in GPCD by 2020. However, as the statute does require urban retail water suppliers to comply, IEUA prepared a regional approach establishing a baseline and setting targets based on regional demands in support of its retail agencies. All retail agencies within IEUA's service area have agreed to the formation of a regional alliance and will continue to cooperatively participate in developing WUE programs and meeting water conservation goals.

As a wholesale water supplier, IEUA is required to provide an assessment of its present and proposed WUE measures, programs, and policies that will help its retail water suppliers achieve their water reduction goals. IEUA and its retail agencies have developed core strategies to meet compliance requirements through a collaborative process that focuses on aligning activities with established regional water use efficiency principles and goals.

Table 3-1: SBX7-7 Calculation Requirements

	2010 UWMP	2015 UWMP	2020 UWMP
Base Daily Water Use calculation (average GPCD used in past years)	First calculated and reported in the 2010 plan	May be revised in 2015 Plan; must be revised if 2010 Census data not used in original calculation	NA
Interim Water Use Target (target GPCD in 2015)	First calculated and reported in 2010 Plan	May be revised in 2015 Plan; must be revised if 2010 Census data not used in original calculation	NA
Compliance Water Use Target (target GPCD in 2020)	First calculated and reported in 2010 Plan	May be revised in 2015 Plan; must be revised if 2010 Census data not used in original calculation	NA
Actual 2015 Water Use (in GPCD)	NA	In 2015, Plan must compare actual 2015 GPCD against 2015 target	NA

	2010 UWMP	2015 UWMP	2020 UWMP
Actual 2020 Water Use (in GPCD)	NA	NA	In 2020, Plan must compare actual 2020 GPCD against 2020 target

In the 2020 UWMP, a water supplier must demonstrate compliance with the target established in 2015. Compliance is done through the review of the SBX7-7 Verification Tables submitted with the 2020 Plan (included as Appendix F).

The Base Daily Water Use calculation is based on gross water use by an agency in each year and can be based on a 10-year average ending no earlier than 2004 and no later than 2010, or a 15-year average if 10% of 2008 demand was met by recycled water. Base Daily Water Use must account for all water sent to retail customers, excluding:

- Recycled water
- Water sent to another water agency
- Water that went into storage.

It is at an agency's discretion whether to exclude agricultural water use from the Base Daily Water Use Calculation. If agricultural water use is excluded from the Base Daily Water Use calculation, it must also be excluded from the calculation of actual water use in later urban water management plans. IEUA did not adjust for agriculture exclusions in the SBX7-7 calculations.

Finally, the selected Compliance Water Use Target must be compared against what DWR calls the "Maximum Allowable GPCD." The Maximum Allowable GPCD is based on 95% of a 5-year average base gross water use ending no earlier than 2007 and no later than 2010. The Maximum Allowable GPCD is used to determine whether a supplier's 2015 and 2020 per capita water use targets meet the minimum water use reduction requirements of SBX7-7. If an agency's Compliance Water Use Target is higher than the Maximum Allowable GPCD, the agency must instead use the Maximum Allowable GPCD as its target.

3.1.1 Historical Demand, Selected Baseline, and 20x2020 Targets

In the 2010 UWMP, the baseline and water use targets for the IEUA regional alliance were calculated using an aggregate of individual agency water use and population information to calculate one baseline GPCD for the whole IEUA region. To do this, IEUA along with its retail agencies analyzed historical retail demand data from 1995 to 2010 and selected a 10-year baseline period (1999 to 2008). The aggregate of individual agency water use and population information for the same period were used to calculate the regional alliance's baseline GPCD and water use targets for 2015 and 2020. The targets set in the 20x2020 Water Conservation Plan do not include recycled water use. Thus, recycled water use was subtracted from historical recycled water production to get retail demands for non-recycled supplies. The 2015 interim target and the 2020 target was a 10 and 20% reduction from the baseline GPCD, respectively.

The GPCD baselines and targets found using the regional aggregate approach are summarized in Table 3-2.

Table 3-2: 2010 Regional Alliance GPCD Baseline and Targets

Baseline Period	Baseline	2015 Target (10% Reduction)	2015 Actual	2020 Target (20% Reduction)
1999-2008	251	226	160	201

Note: From 2010 IEUA UWMP.

In 2015, an alternative approach to calculating the regional water use targets was carried out to compare findings. For this method, each water supplier in the regional alliance first calculated its individual target in its retail UWMP as if it were complying individually. Then, the individual targets were weighted by each supplier's population and averaged over all members in the alliance to determine the regional water use target. The GPCD baseline and target found for the 10-year baseline period using the population weighted average approach is summarized in Table 3-3. The 2020 Target in Table 3-3 is used to determine 2020 compliance.

In the 2015 UWMP, IEUA demonstrated compliance with its regional alliance 2015 interim target, indicating that the alliance was on track to meet the 2020 water use target.

Table 3-3: 2015 Regional Alliance GPCD Baseline and Targets (DWR Table 5-1R)

Baseline Period	Year Span	Average Baseline[(a)]	2020 Target[(a)] (20% Reduction)
10 year	1995 – 1999 to 2004 - 2008	245	193

Notes:
The 10-year baseline period was selected for the 2020 Compliance Water Use Target.
The 5-year period average baseline value in included in DWR Table 5-1 in Appendix C.
(a) All values reported as gallons per capita per day (GPCD).

3.1.2 2020 Compliance

In this 2020 UWMP, the regional alliance must demonstrate compliance with its 2020 water use target. IEUA chose to use the same approach that was completed in 2015. Each of IEUA's retail agencies first calculated its individual target in its retail UWMP, then the individual targets were weighted by each supplier's population over the total population in the IEUA region to determine the 2020 water use in GPCD.

The 2020 population for the total IEUA region, the sum of the populations of each of its retail agencies, is 905,816. This population includes IEUA's total service area, as well as areas outside the service area that are part of its retail agencies, as is the case for Fontana Water Company. This population is used for the calculation of the regional alliance's 2020 GPCD. The retail agencies used different sources for calculating their service area populations, including

SCAG, the DWR Population Tool, and the California Department of Finance. All retail agencies selected compliance method 1.

Table 3-4 summarizes the baseline, 2015 target, 2015 actual, and 2020 target GPCDs as calculated in the 2015 UWMP and includes the 2020 actual GPCD reported by each retail agency. The resulting weighted IEUA region GCPD for 2020 is included in the table.

The actual 2020 water use in the region is 171 GPCD, approximately 11% lower than the 2020 Target of 193 GPCD, indicating compliance and the success of the collective efforts of IEUA and its retail agencies to reduce water use in the region. These efforts include regional and local actions such as:

1. Water Use Efficiency Active Programs – offering customers a portfolio of programs including cost-effective indoor and outdoor water efficiency measures.
2. WUE Passive Policy Initiatives – including building codes and landscape ordinances.
3. Recycled Water Use – reducing demand for potable water by increasing recycled water supply.

IEUA and its retail agencies did not have any applicable optional adjustments for extraordinary events, economic adjustments, or weather normalization, as shown in DWR Table 5-2 in Appendix C, DWR's SBX7-7 compliance verification table.

Table 3-4: 2020 Regional Alliance GPCD Compliance by Retail Agency

Retail Agency	10-15-yr Baseline (GPCD)	2020 Target (GPCD)	2020 Service Area Population	2020 Actual (GPCD)
Chino	237	189	80,808	169
Chino Hills	217	173	82,409	157
CVWD	290	232	198,979	206
Fontana	216	176	229,041	154
MVWD	205	167	57,787	124
Ontario	245	196	178,409	161
Upland	275	220	78,383	210
IEUA Region	**245**	**193**	**905,816**	**171**

Note: Data provided by retail agencies. IEUA Regional values calculated using weighted average of population and demand.

Section 4: Water Resources

4.1 Overview

IEUA and its retail agencies have developed a diverse portfolio of water supply sources, including groundwater from the Chino Basin and other basins (Cucamonga, Rialto, Lytle Creek, Colton, and the Six Basins groundwater basins), local surface water from creeks originating in the San Gabriel Mountains, recycled water produced locally, and imported water from the SWP via MWD. This section describes the water resources available to IEUA and its service area for the 25-year period covered by the Plan. Both currently available and planned supplies are discussed. Table 4-1 includes the 2020 actual water supplies available for each of IEUA's retail agencies. Table 4-2 shows the projected water supply by category for each of the retail agencies out to 2045. IEUA's supply for its retail agencies, both actual and projected, are included in Section 4.3, which discusses imported water from MWD.

Table 4-1: Retail Agency Water Supplies – Actual (DWR Table 6-8R)

		2020		
Water Supply	**Additional Detail on Water Supply**	**Actual Volume**	**Water Quality**	**Total Right or Safe Yield *(optional)***
Purchased or Imported Water	MWD/IEUA	66,438	Other Non-Potable Water	
Groundwater (not desalinated)	Chino Basin	51,749	Drinking Water	
Groundwater (not desalinated)	Other Basins	26,436	Drinking Water	
Surface water (not desalinated)		16,652	Drinking Water	
Recycled Water	IEUA	16,278	Recycled Water	
Desalinated Water - Groundwater	Chino Desalter Authority	14,649	Drinking Water	
Total		**192,108**		

Note: Data from IEUA Annual Water Use Report Database. Includes recycled water for direct use; does not include recycled water for groundwater recharge. Excludes interagency transfers within the region.

Table 4-2: Retail Agency Water Supplies – Projected (DWR Table 6-9)

Water Supply	Additional Details on Water Supply	2025 Reasonably Available Volume	2030 Reasonably Available Volume	2035 Reasonably Available Volume	2040 Reasonably Available Volume	2045 Reasonably Available Volume
City of Chino						
Purchased or Imported	WFA	5,353	5,353	5,353	5,353	5,353
Groundwater	Chino Basin	5,990	7457	8,734	9,810	10,955
Groundwater - Desalinated	CDA	5,000	5000	5,000	5,000	5,000
Recycled	IEUA	4,500	4500	4,000	3,800	3,800
City of Chino Hills						
Purchased or Imported	IEUA	14,258	14,258	14,258	14,258	14,258
Purchased or Imported	MVWD	8,407	8,407	8,407	8,407	8,407
Groundwater	Chino Hills Wells	4,158	4,158	4,158	4,158	4,158
Groundwater - Desalinated	CDA	4,200	4,200	4,200	4,200	4,200
Recycled	IEUA	2,661	2,661	2,661	2,661	2,661
Cucamonga Valley Water District						
Purchased or Imported	IEUA	28,369	28,369	28,369	28,369	28,369
Groundwater	Other	10,250	14,773	16,331	17,630	17,630
Groundwater	Cucamonga Basin	10,000	10,000	10,000	10,000	10,000
Surface	Cucamonga Canyon	800	800	800	800	800
Surface	Deer Canyon	50	50	50	50	50
Surface	Day/East Canyon	2,100	2,100	2,100	2,100	2,100
Recycled	IEUA	1,800	2,000	2,000	2,000	2,000
Fontana Water Company						
Purchased or Imported	IEUA	15,000	15,000	15,000	15,000	15,000
Purchased or Imported	SBVMWD	3,200	3,200	3,200	3,200	3,200
Groundwater	Chino Basin	9,278	9,983	10,128	12,293	13,183
Groundwater	Rialto – Colton Basin	5,865	5,976	6,087	6,199	6,310
Groundwater	Lytle Basin	6,390	6,390	6,390	6,390	6,390
Groundwater	No Man's Land Basin	4,860	4,860	4,860	4,860	4,860
Surface	Lytle Creek	1,000	1,500	2,000	2,500	3,000

Water Supply	Additional Details on Water Supply	2025 Reasonably Available Volume	2030 Reasonably Available Volume	2035 Reasonably Available Volume	2040 Reasonably Available Volume	2045 Reasonably Available Volume
Monte Vista Water District						
Purchased or Imported	IEUA/WFA	5,000	5,000	5,000	5,000	5,000
Purchased or Imported	SAWCo	671	671	671	671	671
Groundwater	Chino Basin	7,461	7,793	8,404	8,666	8,935
Recycled	IEUA	1,100	1,100	1,100	1,100	1,100
City of Ontario						
Purchased or Imported	IEUA/WFA	20,249	22,915	24,943	31,476	31,476
Groundwater	Chino Basin	11,000	13,000	15,000	17,000	17,000
Groundwater - Desalinated	CDA	8,533	8,533	8,533	8,533	8,533
Surface	SAWCo	600	600	600	600	600
Recycled	IEUA	12,168	13,465	14,330	16,059	16,059
City of Upland						
Purchased or Imported	IEUA/WFA	5,541	5,541	5,541	5,541	5,541
Purchased or Imported	SAWCo	6,857	6,857	6,857	6,857	6,857
Groundwater	Chino Basin	5,743	5,743	5,743	5,743	5,743
Groundwater	Six Basins	4,122	4,122	4,122	4,122	4,122
Groundwater	Cucamonga Basin	683	683	683	683	683
Surface	SAWCo	1,679	1,679	1,679	1,679	1,679
Recycled	IEUA	703	703	703	703	703
Total		**245,599**	**259,400**	**267,995**	**283,471**	**286,386**

Note: Data provided to IEUA from retail agencies as part of their 2020 UWMP with adjustments made by IEUA to account for interagency transfers. SAWCo transfers/purchases are reported within receiving member agency values. Data shown above includes a transfer from MVWD to Chino Hills of 8,407 AFY.

4.2 Historical and Current Local Water Supplies

4.2.1 Local Surface Water

Several of the retail agencies within the northern part of IEUA's service area have long standing legal rights to divert and treat water supplies from local surface sources in the Santa Ana River watershed. These sources include San Antonio Canyon, Cucamonga Canyon, Day Creek, Deer Creek, Lytle Creek, and several smaller surface streams (DCP 2020). IEUA does not provide local surface water directly to its retail agencies, although it does participate in the capture and recharge of stormwater caused by surface water runoff. Stormwater is discussed in Section 4.2.3.

Production from surface supplies varies dramatically depending on climate conditions. However, when available, local surface water is an extremely valuable resource as it is essentially "free," with the only cost to retail agencies being the operation of necessary facilities to capture, treat and distribute this water (DCP 2020). This is due in part to the high quality of local surface water. Nevertheless, surface water is treated to state and federal drinking water quality standards before it can be served for public use.

4.2.2 Groundwater

4.2.2.1 Historical Groundwater Pumping

Retail agencies within IEUA's service area use local groundwater as a significant source of the water supply. Most of the groundwater comes from the Chino Basin, which is detailed in the following section. Historical groundwater pumping by retail agency for the last 5 years is presented in Table 4-3. The groundwater pumping volume HAS decreased every year since 2016.

Table 4-3: Groundwater Volume Pumped Over Past 5 Years by Retail Agencies

Groundwater Type	Location or Basin Name	2016	2017	2018	2019	2020
Alluvial Basin	Chino Basin Groundwater	76,302	71,272	63,255	60,417	51,749
Alluvial Basin	Other Groundwater Basins	26,607	28,490	28,819	24,294	26,436
	TOTAL	**102,909**	**99,762**	**92,074**	**84,711**	**78,185**

Note: Groundwater volume pumped by IEUA retail agencies. Years represent fiscal year ending. Data from Annual Water Use Reports and Annual Water Use Report Database.

4.2.2.2 Chino Basin Groundwater

The Chino Basin is one of the largest groundwater basins in southern California, containing approximately 5 million acre-feet (MAF) of water with an unused storage capacity of approximately 1 MAF for a total potential of 6 MAF. Groundwater from the Chino Basin accounts for approximately 45% to 60% of the total water used by IEUA's retail agencies in IEUA's service area over the last 10 years. The Chino groundwater basin is managed by the Chino Basin Watermaster established under the 1978 Judgment. IEUA does not provide groundwater directly to its retail agencies.

Approximately 5% of Chino Basin is located in Los Angeles County, 15% in Riverside County, and 80% in San Bernardino County. Chino Basin is bounded by Cucamonga Basin and the San Gabriel Mountains to the north, the Temescal Basin to the south, Chino Hills and Puente Hills to the southwest, San Jose Hills, Pomona, and Claremont basins on the northwest, and the Rialto/Colton Basins on the east. IEUA's service area overlies approximately 70% of Chino Basin.

San Bernardino County Superior Court created the CBWM in 1978 as a solution to lawsuits over historical water right allocations. CBWM is responsible for managing Chino Basin in accordance with the 2000 Peace Agreement, 2007 Peace II Agreement, and the OBMP. CBWM is governed by three stakeholder groups, called Pools. The three Pools consist of:

- Overlying Agricultural Pool: Representing dairymen, farmers, and the State of California

- Overlying Non-Agricultural Pool: Representing area industries
- Appropriative Pool: Representing local cities, public water districts, and private water companies.

Although groundwater is an important local supply, the water quality in the lower Chino Basin area has been impacted by historical agricultural uses and now has high levels of nitrates and TDS (OBMPU 2020). There are also some areas that exceed standards for perchlorate and volatile organic compounds (VOCs). These groundwater supplies require additional treatment, and/or blending with higher quality imported water before it can be used as a potable supply. CBWM works in partnership with municipalities, IEUA, and the SARWQCB to address these water quality problems and to manage the groundwater basin sustainably. Water quality of the Chino Basin groundwater is discussed in detail in Section 6.

Chino Basin is hydrologically subdivided into five groundwater zones or systems, referred to as management zones. Each management zone has a unique hydrology, and actions within one zone have little or no impact on adjacent zones. Management zones are used to characterize the groundwater level, storage, production, and water quality conditions. Throughout these management zones, there are 19 existing spreading basins that have the capability of recharging stormwater, recycled water, and/or imported water into the Chino Basin (OBMPU 2020). A description of each of the management zones is listed below.

- Management Zone 1: This zone is bounded on the southwest by Chino and Puente Hills, on the northwest by the San Jose fault that separates the Chino Basin from the Pomona and Claremont Heights Basins, on the north by an unnamed non-echelon fault system, and on the east by a line that stretches from the southernmost edge of the Red Hill fault to Prado Dam. Groundwater generally flows south with some localized flows to the west in response to groundwater production.
- Management Zone 2: This zone is bounded on the west by Management Zone 1, on the north by the Red Hill fault, on the northeast by a segment of the Rialto-Colton fault, and on the east by a segment of Barrier J. Groundwater generally flows in a southwesterly direction in the northern half of the zone and then due south in the southern half of the zone.
- Management Zone 3: This zone is bounded on the west by Management Zone 2, on the northeast by the Rialto Colton fault, and on the southeast by the Bloomington divide. Groundwater generally flows in a southwesterly direction.
- Management Zone 4: This zone is bounded on the west by Management Zone 3, on the north by the Jurupa Hills, on the southeast by the Pedley Hills, and on the south by Management Zone 5. Groundwater flows west.
- Management Zone 5: This zone is bounded on the north and west by Management Zones 3 and 4, on the east by the Riverside Narrows, and on the south by the La Sierra area and Temescal Basin.

4.2.2.2.1 Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA), passed in 2014 and amended in 2015, creates a framework for sustainable, local groundwater management in California. SGMA directed DWR to identify priority groundwater basins for the purpose of implementing SGMA. SGMA requirements to create sustainable groundwater management agencies and sustainable groundwater management plans no later than 2022 applies only to high and medium priority basins. SGMA exempts adjudicated groundwater basins – those that already operate under a court-ordered water management plan – from the requirements of designating a Groundwater Sustainability Agency and developing a Groundwater Sustainability Plan. The Chino Basin is an adjudicated basin and is included in SGMA's list of exempt basins. The Chino Basin priority is "very low" as established by the DWR in the 2019 Basin Prioritization Report.

4.2.2.2.2 Chino Basin Management and Safe Yield

The Chino Basin is managed according to the 1978 Judgement described in Section 1. In 1998, the Chino Basin Watermaster developed an integrated set of water management goals and actions for the basin known as the Optimum Basin Management Program (OBMP). The goals of the OBMP are to enhance basin water supplies, protect and enhance water quality, enhance basin management, and equitably finance the OBMP.

The court judgement allocates groundwater rights by establishing an annual pumping "safe yield" for each Pool described above. The Operating Safe Yield (OSY) is the annual amount of groundwater that can be pumped from the Chino Basin by the Pool parties free of replenishment obligations. For planning purposes, controlled overdraft for the Appropriative Pool was not included. Annual groundwater production in excess of the OSY is allowed by the adjudication, provided that the pumped water is replaced and recharged back into the groundwater basin.

In 2011, the OSY for the basin was reassessed and was estimated to be 135,000 AFY for the period FY 2010/2011 to FY 2019/20. The next effort to recalculate the Safe Yield was recently completed in 2020 for the period FY 2020/21 to FY 2029/30 at 131,000 AFY.

As discussed in Section 1, the land use in the region has changed from primarily agricultural to primarily urban in the past several decades. It was anticipated that municipal pumping would be less than the agricultural pumping. The Chino Basin Desalters were identified as the optimal multi-benefit project to replace the expected decrease in agricultural production while also pumping and treating contaminated and high-salinity groundwater.

4.2.2.3 Chino Basin Desalter Facilities

The Chino Basin Desalters provide a local source of potable water supply through treatment of unusable groundwater. They also provide hydraulic control of the lower Chino Groundwater Basin. These facilities are critical to the continued use of recycled water in the region as well as the improvement of groundwater quality and yield in the Chino Basin. IEUA operates one of the facilities (Chino I Desalter) under contract with the CDA. The City of Chino, City of Chino Hills, and City of Ontario purchase water from the CDA.

The CDA was formed to manage the production, treatment, and distribution of highly treated potable water to cities and water agencies throughout the Chino Basin. A Joint Exercise of

Powers Agency, the CDA was formed by the Jurupa Community Services District; Santa Ana River Water Company; Western Municipal Water District; the Cities of Chino, Chino Hills, Norco, and Ontario; and IEUA to treat brackish groundwater extracted from the lower portion of the Chino Basin. Brackish water is water that has more salt [about 1,000 parts per million (ppm) of TDS] than fresh water, but not as high as seawater (about 35,000 ppm of TDS).

The Chino I Desalter was constructed in 2000 through a Joint Participation Agreement among five agencies: SAWPA, Western Municipal Water District, Orange County Water District, MWD, and IEUA. The Chino II Desalter was constructed in 2007 and provides a supplemental supply to the Cities of Chino, Chino Hills, and Ontario located within IEUA's service area as well as to the Jurupa Community Services District, City of Norco and the Santa Ana River Water Company located outside of IEUA's service area. The treatment processes at the Chino I and Chino II Desalters include RO and IX for the removal of nitrate and TDS. The treatment processes at Chino I Desalter also includes air stripping for the removal of VOCs.

These facilities serve three purposes. First, they convert unusable groundwater into a reliable potable water supply for the region and are part of a long-term pollution cleanup strategy for the Chino Basin. Second, they provide hydraulic control over the lower Chino Basin, which prevents the migration of poor-quality water into the Santa Ana River as well as downstream impacts on groundwater basins in Orange County. Third, they maintain and enhance groundwater yield for the Chino Basin.

Currently, there are 31 Chino Desalter wells with the capacity to pump about 37,600 AFY of groundwater from the southern portion of the Chino Basin, but not all wells are in operation (OBMPU 2020). Over the last 5 years, the Chino I and Chino II Desalters have produced between 28,100 and 30,000 AFY, averaging 29,200 AFY of treated groundwater combined (OBMPU 2020). IEUA retail agencies who receive water from the Desalter facilities as part of their water supply portfolios include the cities of Chino, Chino Hills, and Ontario. The Phase III expansion of the program was completed in 2016 which provided an additional 10,000 AFY of capacity. This final expansion of the system allows the Desalters to meet the 40,000 AFY pumping per the OBMP Peace Agreements. Table 4-4 shows the amount of groundwater purchased by IEUA retail agencies from the CDA for water from the Chino I Desalter over the past 5 years. IEUA retail agencies only purchase a portion of the total groundwater produced; the Western Municipal Water District also purchases groundwater from the CDA.

Table 4-4: CDA I Volume (AFY) Purchased by IEUA Retail Agencies Over Past 5 Years (DWR Table 6-8ds)

Plant Name or Well ID	Plant Capacity (AFY)	Intake Type	Source Water Type	Influent TDS	Brine Discharge	2016	2017	2018	2019	2020
Chino Desalter Authority	40,000	Open water Intake	Ground water	1,000 ppm	Brine Line	11,883	12,292	13,242	15,010	14,649
					TOTAL	**11,883**	**12,292**	**13,242**	**15,010**	**14,649**

Note: Purchased by the cities of Chino, Chino Hills, and Ontario from Chino I Desalter. These three IEUA retail agencies only purchase a portion of the total water produced by the CDA. Data from the IEUA FY 19/20 Annual Water Use Report.

4.2.2.4 Other Groundwater

Local groundwater supplies from basins other than the Chino Basin are a significant supplemental source of water for the retail water agencies within IEUA's service area. These basins include the Cucamonga, Rialto, Lytle Creek, Colton, and the Six Basins groundwater basins. The Six Basins is comprised of the Ganesha, Live Oak, Pomona, Lower Claremont Heights, Upper Claremont Heights, and Canyon Basin.

IEUA's retail agencies that use groundwater from all or some of these basins include the City of Upland, CVWD, and FWC. IEUA does not provide groundwater directly to its retail agencies.

4.2.3 Stormwater

Stormwater is water that originates during rainfall and snow melt. IEUA does not provide stormwater directly to its retail agencies. The stormwater primarily comes from surface water runoff from rain and snow that falls in the San Gabriel Mountains and moves down through the Santa Ana watershed. In undeveloped areas, the soil absorbs much of the runoff and helps retain the water within the groundwater basin. However, developed areas with a significant amount of impermeable surfaces tent to accumulate runoff in large quantities in a relatively short amount of time. Stormwater runs off roofs, through streets, and into regional storm drains, which are largely diverted into the region's flood control channels.

There are six major flood control channels spread throughout the Chino Basin region. These channels collect and manage the stormwater generated within the watershed. Major flood control channels that convey stormwater within IEUA's service area include:

- San Sevaine Creek
- Day Creek
- Deer Creek
- Cucamonga Creek
- West Cucamonga Creek
- San Antonio Creek.

Located adjacent to the channels are detention basins that are operated regionally under a multiple-use agreement for both flood control and groundwater recharge operations. IEUA, the Chino Basin Watermaster, the Chino Basin Water Conservation District and others work closely with the San Bernardino Flood Control District to maximize the amount of stormwater that can be captured and recharged into the Chino Groundwater Basin. These channels also carry dry weather runoff from excessive outdoor irrigation. Stormwater percolates to groundwater and is not utilized directly as a supply type but is counted in the volume of annual groundwater supply.

Runoff that is not captured by detention basins ultimately flows to the Santa Ana River. While there are efforts by agencies further downstream to capture these flows, large amounts of water discharge into the ocean during storm events.

4.2.4 Recycled Water and Reuse

IEUA has produced and distributed high quality recycled water since 1972 when the Agency expanded its services to include regional wastewater treatment. IEUA serves recycled water for both indirect use (outdoor irrigation, industrial processing) and groundwater recharge.

IEUA owns and operates four regional recycled water plants that produce disinfected and filtered tertiary treated recycled water in compliance with California’s Title 22 regulations. The four water recycling plants are: Regional Water RP-1, RP-4, and RP-5, and the CCWRF. These four plants treated 55,233 AF of wastewater and produced approximately 30,495 AF of recycled water during FY 2019-20. The volume not used for recycled water (24,715 AF) was discharged to the discharge locations described in Table 5-1. IEUA also owns an additional regional recycled water plant, RP-2, which only performs solids handling and is scheduled for decommissioning due to its location. More details about IEUA’s recycled water system are included in Section 5.

4.2.5 Transfers, Exchanges, and Groundwater Banking Programs

Water transfers are a water management tool used to alleviate water shortages in IEUA’s service area and the Santa Ana River Basin. Water transfers allow an agency to move or sell water from one service area to another, even when the agencies are not connected by pipelines. Water transfers can be effective during periods of severe drought or emergencies and take multiple forms to increase local reliability among agencies. The Chino Basin is a valuable resource for water transfers because it acts as a storage facility that has a capacity of up to 6 MAF.

IEUA provides imported water from MWD to WFA, CVWD, and FWC directly. WFA provides water via interconnections to Upland, Ontario, MVWD, and the City of Chino. MVWD has an interconnection that provides an annual supplemental water supply to the City of Chino Hills. In FY 19-20, MVWD sold approximately 7,707 AFY to the City of Chino Hills. Interconnections also exist between CVWD and FWC. Upland has interconnections with SAWCo, CVWD, Ontario, and Chino. The CDA’s Chino I and Chino II Desalters have interconnections with all participating agencies with a common supply with booster pumps and storage reservoirs that provide flexibility and reliability during emergencies and drought conditions. The CDA provides water to Chino, Chino Hills, Ontario, and other external agencies.

The Chino Basin Recycled Water Groundwater Recharge Program was created as part of the Chino Basin OBMP and is jointly sponsored by IEUA, CBWM, CBWCD, and the SBCFCD. The purpose of the program is to enhance water supply reliability and improve drinking water quality throughout the basin. A network of pipelines direct stormwater run-off, imported water, and IEUA recycled water to 16 recharge sites throughout the IEUA service area. These recharge basins hold the water so it can percolate into the ground and replenish the groundwater supply. Currently, only 10 of the 16 groundwater recharge basins are permitted to receive recycled water.

4.3 Historical and Current Imported Supplies

4.3.1 Metropolitan Water District

IEUA was originally formed in 1950 to act as a municipal wholesale water district in order to provide regional municipalities with imported water purchased from MWD as a supplemental source of water. Due to water quality considerations in the Chino Basin, IEUA only purchases State Water Project water from MWD for its supplies. Table 4-5 and Table 4-6 show the current and projected amount of water supplies that IEUA will have available to supply its retail agencies.

Table 4-5: IEUA Water Supplies – Actual (DWR Table 6-8)

		2020		
Water Supply	**Additional Detail on Water Supply**	**Actual Volume**	**Water Quality**	**Total Right or Safe Yield *(optional)***
Purchased or Imported Water	MWD	66,438	Raw Water	
Recycled Water	Direct Use and Groundwater Recharge	30,495	Recycled Water	
	Total	**96,933**		

Note: Recycled water supply includes recycled water for both direct use and groundwater recharge. From IEUA Annual Water Use Database and FY 19/20 Recycled Water Annual Report.

Table 4-6: IEUA Water Supplies – Projected (DWR Table 6-9)

Water Supply	Additional Detail on Water Supply	2025 Reasonably Available Volume	2025 Total Right or Safe Yield *(optional)*	2030 Reasonably Available Volume	2030 Total Right or Safe Yield *(optional)*	2035 Reasonably Available Volume	2035 Total Right or Safe Yield *(optional)*	2040 Reasonably Available Volume	2040 Total Right or Safe Yield *(optional)*	2045 *(opt)* Reasonably Available Volume	2045 *(opt)* Total Right or Safe Yield *(optional)*
Purchased or Imported	MWD	93,283		93,283		93,283		93,283		93,283	
Recycled Water	Direct Use and Groundwater Recharge	60,073		63,207		64,142		66,836		66,836	
	Total	**152,356**		**156,490**		**157,425**		**160,119**		**160,119**	

Projected Water Supply Report to the Extent Practicable (spanning header over all year columns)

Note: Purchased or Imported Water from MWD is IEUA's maximum contract amount for MWD water from Resolution 2014-12-1. Recycled Water projections from draft wastewater plant flow projections.

4.3.2 Imported Water Rates

The IEUA Board of Directors established the most recent rates for the delivery of imported water supplies on July 15, 2020. Effective July 1, 2020 and January 1, 2021, IEUA's rates for imported water are listed in Table 4-7 for the 2020, 2021, and 2022 Calendar Years (IEUA, Resolution No. 2020-7-7, July 2020).

Table 4-7: MWD Imported Water Rates

Rate Type	2020	2021	2022
Tier 1 Full Service Untreated	$755 per AF	$777 per AF	$799 per AF
Tier 2 Full Service Untreated	$842 per AF	$819 per AF	$841 per AF
WSAP Penalty[(a)]	2 X Tier 1 (100% - 115%) 4 X Tier 2 (115% or greater) Imposed by MWD		
Capacity Charge	$8,800 per cfs	$10,700 per cfs	$12,200 per cfs

Notes:

(a) Metropolitan Water Supply Allocation Plan (WSAP) Penalty rates are applied for exceedances of reduced imported water allocations from MWD caused by the adoption of a WSAP. Any penalty rates are "passed through" to the appropriate agency that caused the imposition of a penalty rate by MWD.

cfs = cubic feet per second

4.4 Planned Water Supply Projects and Programs

IEUA's Ten-Year Forecast (TYF) includes wastewater, recycled water, groundwater, stormwater, and conservation projects to enhance local supplies and reliability for the service area. These projects provide supply reliability and consist of groundwater recharge basin improvements, improving treatment and distribution of wastewater and recycled water facilities, and increasing conservation. These plans are described generally in the following sections and a summary of these projects are included in Table 4-8.

Table 4-8: IEUA's Expected Future Water Supply Projects or Programs (DWR Table 6-7)

X	Some or all the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format in this section (Section 4.4).

Name of Future Projects or Programs	Joint Project with other suppliers?	Description	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Supplier
Recharge Basin Improvements	Yes, Chino Basin Watermaster	See Section 4.4.5	2021	All Year Types	11,852 AF

Name of Future Projects or Programs	Joint Project with other suppliers?	Description	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Supplier
Water Use Efficiency Business Plan	Yes, Retail Agencies, MWD, and others	See Section 4.4.1 and Section 8	2020/2025	All Year Types	9,008 AF
Recycled Water Interties	Yes, Western Riverside County Regional Wastewater Authority	See Section 4.4.3	To be determined	All Year Types	6,000 AFY
RP-5 Liquids Treatment Expansion	No	See Section 4.4.3	2020/2025	All Year Types	See Note
RP-1 Liquids Capacity Recovery and Solids Treatment Expansion	No	See Section 4.4.3	2030/2035	All Year Types	See Note

Note: The projects and schedule detailed in this table are subject to change. Expected Increase in Water Supply is not compatible with some of these projects as they give IEUA the capacity to meet flows and do not provide water on their own. Recharge Basin improvements increase the amount of stormwater and recycled water that can be recharged to the Chino Basin.

4.4.1 Water Management Tools

Resource optimization such as groundwater recharge minimizes IEUA's reliance on imported water. Optimization efforts are typically led by regional agencies in collaboration with local/retail agencies. The 2020 WUEBP is under development, and may focus on using water more efficiently, eliminating water waste, and drought-proofing the region. The plan identifies inefficient water use within the region and provides recommended programs and tools that can be implemented by IEUA's retail agencies to continue increasing water use efficiency.

4.4.2 Transfer or Exchange Opportunities

Since IEUA receives its SWP imported water through MWD, any transfer or exchange opportunities related to SWP allocation would be coordinated by MWD. IEUA does not have any current projects or plans related to the transfer or exchange of its imported water.

The Chino Basin area itself is a large area and consists of many other water agencies outside of IEUA's retail agencies. To increase water supplies and provide flexibility, IEUA is continuing conversations amongst water agencies within the Santa Ana River Watershed and its retail agencies to further explore the opportunity to secure long-term partnerships. Various inter-agency connections would also enhance flexibility and increase reliability in local areas, as well as regional supplies. This would allow IEUA and its retail agencies to have a more robust system for aid during outages, emergencies and to optimize the use of local water supplies.

4.4.3 Non-Potable Reuse Opportunities

By emphasizing local water supply development within the service area, the region has developed and will continue to develop cost-effective supplies that reduces the dependence on imported supplies. Non-potable reuse of current supplies, as well as expansion and robust improvement of facilities and standards will further help IEUA and the region answer challenges and increase supply benefits.

One of the larger supply projects is the expansion of the liquids treatment and the construction of a wastewater solids handling facility at RP-5. The solids handling will replace the solids handling currently at RP-2, since the plant is located in a flood zone and will be decommissioned. There are also potential recycled water connections to neighboring agencies being explored to increase non-potable reuse and improve recycled water supply reliability for the region. These potential connections include extending pipelines and adding pumping facilities to serve additional recycled water to the eastern portion of its service area and the construction of a pipeline that will function as a recycled water intertie between the Western Riverside County Regional Wastewater Authority and IEUA, as well as a potential recycled water intertie between the City of Rialto and IEUA.

A future Advanced Water Purification Facility (AWPF) is also included in the TYF to ensure compliance with regulatory requirements, as well as a long-term component of regional water supply enhancement. This project was included in the IEUA Master Plan, IRP, and TYF to anticipate compliance with future standards expected in the 2030s. The project may potentially include the evaluation and forecasting of the AWPF, injection wells, and conveyance and other auxiliary facilities. IEUA is regularly monitoring its compliance metrics to address TDS and other regulatory challenges.

A liquids capacity recovery and solids treatment expansion of the Regional Water RP-1 project is expected to begin construction in FY 2026/27.

TYF recycled water projects to increase both direct use and groundwater recharge are expected to provide approximately 30,000 AFY of direct use and 18,700 AFY of groundwater recharge supply by as early as 2025.

4.4.4 Desalination Opportunities

The UWMP Act requires a discussion of potential opportunities for use of desalinated water (Water Code Section 10631[i]). IEUA operates and maintains the Chino I Desalter that is managed by the CDA. The CDA Program is a significant source of groundwater production for the region. Since the completion of the Phase III expansion project in 2016, the total pumping capacity of the CDA program is approximately 40,000 AFY of potable water. Over the last 5 years, the Chino I and Chino II Desalters have produced between 28,100 and 30,000 AFY, averaging 29,200 AFY of treated groundwater combined. In 2020, the Chino I and II Desalter’s produced approximately 30,246 AFY of treated groundwater, of which approximately 14,649 AFY was delivered to IEUA retail agencies.

The future AWPF mentioned above is also an opportunity to increase available groundwater desalination supply. Advanced treatment would sufficiently reduce the salinity of brackish groundwater and remove other possible contaminants to create additional water supply for the region.

4.4.5 Groundwater Recharge

Groundwater recharge and production are an integral part of IEUA's water system due to the substantial storage in the Chino Basin. As part of IEUA's commitment to its retail agencies and region, there are various projects working towards efficient means of groundwater production and increasing recharge capacity for the area.

As part of the Recharge Master Plan Update completed in 2013, IEUA and the CBWM evaluated 27 yield enhancing capital projects for the Chino Basin. In 2017, CBWM and IEUA approved the implementation of recharge improvements as part of the Update for the following basins: Wineville Basin, Jurupa Basin, Victoria Basin, Lower Day Basin, and Montclair Basin. The recharge improvement project design began in 2017, construction started in 2018, and project completion is expected to occur in 2020/2021. The next Recharge Master Plan Update is scheduled to be kicked off in 2021 and completed by 2023, as a collaborative effort to continue evaluating recent efforts and explore further enhancements.

In conjunction with CBWM, IEUA and retail agencies also worked with the region on the 2020 Optimum Basin Management Program Update (OBMPU). This Update includes multiple potential improvements to recycled water, groundwater, stormwater, and other existing systems. Potential improvements are outlined for existing facilities and operations and new facilities to achieve additional stormwater recharge potential alongside other program elements in the Update. IEUA has also worked with its retail agencies and the larger region to explore concepts for possible future enhancements through its Integrated Water Resources Plan and modeling effort. To answer challenges associated with groundwater contamination and increasing regulations, concepts discussed include use of turnouts as extra supply for hard reaching areas, well-head treatment, and the benefit of centralized treatment plants. These plans are currently only in the conceptual phase and may be further modeled and explored in the coming years.

4.4.6 Stormwater Management

It is widely recognized that the patterns of urban development, including hard surfacing (roads, roofs) and storm water management systems (concrete channels) have resulted in a significant reduction in natural infiltration of storm water into the groundwater within southern California and throughout the nation. CBWM estimated that the Chino Basin was losing on average about 40,000 AF of stormwater annually that previously replenished the groundwater basin because of historical patterns of development. The 2020 OBMPU identifies maximizing stormwater recharge as a primary goal for the Basin and has identified improvements to existing facilities and operations to be made. The theoretical average annual stormwater discharge available for diversion is about 74,000 AFY and the annual average stormwater recharge volume is approximately 15,000 AFY (OBMPU). In 2018, IEUA and the CBWM identified potential new stormwater recharge projects. Due to the unit cost of the new projects, which was greater that the projected cost of imported water supplied by MWD, no project was recommended for implementation at that time. The evaluation of stormwater recharge projects will again be completed in the 2021 Recharge Master Plan Update.

4.5 Effects of Climate Change

As discussed in Section 1.10.2, IEUA's service area faces hydrologic changes and uncertainty caused by the effects of climate change that may impact its water supplies. In general, the IEUA region expects an overall decrease in supply sources, caused by increased temperatures, increased intensity of extreme weather events, and shifting snowmelt and runoff patterns.

IEUA's imported water supply may be impacted by shifting snowmelt and runoff patterns that affect the capture and storage of snowmelt for the SWP. The reliability of SWP water is expected to decrease as climate change-caused precipitation changes continue. This decrease in reliability indicates a need to improve regional sustainability and decreased dependency on the SWP. In order to increase its resiliency in the face of climate change impacts, IEUA and the region plans to further develop its recycled water and local water supplies.

Local supplies are not immune to the effects of climate change, however. Local surface water supplies are dependent on precipitation and temperature, which are influenced by climate change. Extreme precipitation events can result in short periods with high volumes of runoff that will be difficult to capture, while extended droughts or dry years will result in long periods without these supplies. Higher temperatures will also cause more evaporation and transpiration, reducing the volume of water bodies such as lakes, as well as the amount of soil moisture.

Local groundwater may be adversely impacted by increased temperatures as well. Groundwater elevation and water quality may decrease during periods of drought or by the inability to capture and recharge stormwater due to increased storm intensity. Reduced rainfall and increased groundwater withdrawal may lead to more salinity buildup and increased concentrations of nitrate and other constituents, requiring the need for additional water supply for blending or investment in advanced treatment technologies (DCP 2020). Reductions in groundwater recharge caused by lower levels or precipitation or stormwater infiltration could impact the quality of the groundwater and result in regulatory violations that preclude the use of the source. A description of the water quality concerns and their possible impacts on reliability within the IEUA region is included in Section 6.

The 2018 CCAP identified recycled water supplies as a critical asset in bolstering a flexible management portfolio since these supplies are generated locally and not impacted by climate. While not directly impacted by climate change effects, applications for recycled water in the basin may become constrained if the salinity in the basin rises beyond the RWQCB's specified limits. In addition, reduced wastewater flows during drought periods due to conservation mandates may impact the volume of recycled water available for use.

The impacts of climate change of the region's water supplies are not insignificant and must be addressed to ensure the availability of sufficient water supplies. IEUA will continue assessing and addressing climate change vulnerabilities moving forward through development of its CCAP, development of its WUEBP, and participation in MWD's Local Resource Program to develop local supplies.

4.6 Reduced Delta Reliance

The Delta Plan is a comprehensive, long-term resource management plan for the Sacramento-San Joaquin Delta (Delta) that was developed as part of the Delta Reform Act of 2009 (Water code section 85000 et seq) and includes both regulatory policies and recommendations, aimed at promoting a healthy Delta ecosystem. Delta Plan Policy WR P1 [California Code of Regulations (CCR), Title 23, § 5003] is one of 14 regulatory policies in the Delta Plan. WR P1 identifies UWMPs as the tool to demonstrate consistency with state policy to reduce reliance on the Delta for any Supplier that is participating in or carrying out a proposed covered action or receiving Delta water from a proposed covered action. Within the supplier's UWMP, information should be provided that can be used to demonstrate consistency with this policy. Section (c)(1) of WR P1 states that suppliers that have (A) completed an urban water management plan, (B) implemented the efficiency measures in that plan, and (C) shown a measurable reduction in Delta reliance and improvement in regional self-reliance in the plan, are contributing to reduced reliance on the Delta and are therefore consistent with WR P1 [CCR, Title 23, § 5003(c)(1)].

IEUA is an urban water supplier and a member agency of MWD. As a recipient of imported water delivered via MWD, IEUA may indirectly receive water through a proposed project (covered action) and/or receive water from the Delta. MWD has prepared a detailed analysis that demonstrates consistency with the Delta Plan Policy (MWD 2020 UWMP, Appendix 11). In addition, IEUA has completed its own analysis, which is included in Appendix G. The analysis show that IEUA expects to increase its supplies contributing to regional self-reliance as a percent of demand by approximately 17.5% by 2045. As a recipient of water from MWD, it is infeasible for IEUA to determine the volume of its imported water supplies that come directly from the Delta. Therefore, IEUA's calculation of reduced reliance on Delta water supplies comes from MWD's regional analysis. This analysis shows that MWD's expects to reduce the percent of water supplies expected to come from the Delta by 5.2% by 2045.

In addition, this document also identifies future local supply opportunities (Section 4.3) and WUE measures (Section 8) that will increase IEUA's regional self-reliance and reduce demand for imported water. IEUA is continuing to look into local, cost-effective, and technically feasible water supply sources, as described in these sections and its WUEBP. A measurable reduction in Delta reliance and improvement in regional self-reliance can be seen from the achievements of the past 5 years of WUE and the projections for recycled water use. Over the past 5 years, IEUA's water use efficiency program has saved approximately 30,974 AF of water over the lifetime of the measure (Section 8.8). Over the next 5 years, the WUE program expects to save an additional 9,008 AF of water. By 2045, the IEUA region expects 10% of its supply to come from recycled water. Non-potable reuse is expected to increase through 2045 to 30,424 AFY and groundwater recharge is expected to increase to 16,420 AFY by 2025 and remain fairly constant through 2045 (Section 5.4). IEUA and its retail agencies remain committed to enhancing local supply and implementing water use efficiency measures to reduce their demand on imported water, thereby reducing reliance on the Delta.

Section 5: Recycled Water and Reuse

5.1 Recycled Water Planning

Recycled water opportunities have continued to grow in southern California as public education and the need to expand local water supplies continues to be a priority. Recycled water also provides a degree of flexibility and added reliability during drought conditions when imported water supplies are restricted. Recycled water is wastewater that is treated through primary, secondary, and tertiary processes and is acceptable for most non-potable water purposes such as irrigation, and commercial and industrial process water following Title 22 requirements.

IEUA began providing recycled water to customers in 1972. Initially, recycled water was delivered to a few large water users such as the Whispering Lakes Golf Course and Westwind Park in the City of Ontario, and Prado Park and Golf Course in the City of Chino.

In the early 1990s, IEUA began the construction of the first phase of the CCWRF that included treatment facilities and distribution pipelines to serve customers in Chino and Chino Hills. In conjunction with the construction of the first phase of the CCWRF, IEUA began planning for a regional recycled water delivery system to provide recycled water throughout its service area. This planning effort culminated with the completion of the IEUA Regional Recycled Water Program Feasibility Study in January 2002.

In 2004, IEUA developed a regional recycled water program implementation plan to prioritize the phased construction of the adopted 2002 Recycled Water Program Feasibility Study. This major planning effort resulted in the completion of the 2005 Recycled Water Implementation Plan (RWIP).

In 2007, IEUA developed the Recycled Water Three-Year Business Plan. The Business Plan was intended to guide the expansion of IEUA's recycled water system. The Plan focused on the most cost effective and quickest ways to increase the amount of recycled water available and used within IEUA's service area. The Plan focused on the following 3 years, to be revised and updated on an annual basis. Metrics and an annual use goal were identified for each year. Revisions/updates to the Plan were made with an FY 2010-11 update memo, the Wastewater Facilities Master Plan in 2014, the RWPS in 2015, and the IEUA FY 2015-16 Budget and Ten-Year Capital Improvement Plan (TYCIP).

More recently, the IEUA FY 2020-21 TYF, the 2018 CCAP, and the 2020 Regional Drought Contingency Plan have been used to evaluate future recycled water system projects that would benefit IEUA and its retail agencies. All three reports identified the goal of maximizing recycled water production and usage as crucial for increasing IEUA's independence from imported water supply and its resiliency during drought scenarios. As discussed in Section 2.1.2, additional studies related to wastewater flows and recycled water production are currently underway.

5.2 Regional Facilities

Regional recycled water facilities are plants, pipelines, pump stations, and reservoirs that serve recycled water to a recharge site or to more than one contracting agency. Regional facilities are constructed, owned, and operated by IEUA. Local facilities deliver recycled water from the regional facilities to customers within a contracting agency's service area and are maintained by the contracting agency. These local facilities consist mainly of pipelines (local laterals) but can also include pump stations and reservoirs. Joint regional/local facilities can be financed by IEUA to ensure timely implementation of the recycled water program. Local agencies are responsible for the planning, design, construction, and operation of local laterals and other local recycled water facilities. IEUA works closely with each agency to coordinate their recycled water planning efforts.

The regional recycled water facilities consist of a looped pipeline system that connects all four Regional Water RPs. The treated effluent from the four regional wastewater recycling effluent pump stations is delivered to the recycled water retail agencies and customers through five pressure zones, several hundred miles of pipelines, three booster pump stations, three storage reservoirs, and pressure regulating stations. The IEUA recycled water system is shown on Figure 4.

5.2.1 Wastewater Collection and Treatment

IEUA manages the Regional Sewage Service within its 242-square mile service area to collect, treat, and dispose of wastewater delivered by contracting local agencies. IEUA's facilities serve seven contracting agencies: cities of Chino, Chino Hills, Fontana, Montclair, Ontario, and Upland, and the CVWD. A system of regional trunk and interceptor sewers convey sewage to regional recycled water plants that are owned and operated by IEUA. Local sewer systems are owned and operated by local agencies.

IEUA also operates a non-reclaimable wastewater system (NRWS) that includes pipelines and pump stations that export the high-salinity industrial wastewater generated within the service area for treatment and eventual discharge to the Pacific Ocean. These water sources are not suitable for non-potable reuse. The NRWS is comprised of two separate collection systems independent of the regional wastewater system. The North System which discharges to the Sanitation District of Los Angeles County treatment facility in the city of Carson, and the South System which discharges to the Santa Ana Watershed Project Authority and the Orange County Sanitation District facility in Fountain Valley. The treated brine is then discharged to the Pacific Ocean.

5.2.2 Wastewater Treatment Plants

The wastewater collected in the regional sewer system is treated at the four RPs that IEUA owns and operates. The recycled water produced at the RPs meets Title 22 standards for non-potable reuse and groundwater recharge. All the RPs have primary, secondary, and tertiary treatment and recycled water pumping facilities that are interconnected in a regional network that IEUA also owns and operates. Effluent that is not beneficially reused from the RPs is discharged to nearby creeks that feed into the Santa Ana River where a portion of the water is recharged into the Chino Basin.

The four regional facilities are the RP-1, RP-4, RP-5, and CCWRF. RP-1 and RP-4 serve mostly the northern parts of the service area and RP-5 and CCWRF serve mostly the southern parts of the service area.

RP-1 is located in the City of Ontario and was originally commissioned in 1948. The current wastewater treatment capacity of RP-1 is 44 MGD, although it currently treats approximately 21 MGD. There are three sets of effluent pump stations that pump from RP-1 to four different pressure zones. RP-1 also has a 60 MGD biosolids treatment capacity, to treat biosolids which come from both RP-1 and RP-4. The stabilized, dewatered solids are trucked from RP-1 to the Inland Empire Regional Composting Facility for further treatment to produce Grade A compost.

RP-4 is located in the City of Rancho Cucamonga and has been in operation since 1997. RP-4 has a capacity of 14 MGD, and currently treats approximately 10 MGD. Waste sludge from RP-4 is discharged back to the sewer and flows by gravity to RP-1. RP-4 serves three pressure zones.

RP-5 is located in the City of Chino and has been in operation since 2004. The plant has a 15 MGD capacity for raw sewage and 1.3 MGD capacity for solids processing from RP-2. Currently, RP-5 is treating approximately 8.4 MGD. Ultimately, RP-5 is planned to treat up to

Recycled Water Distribution System

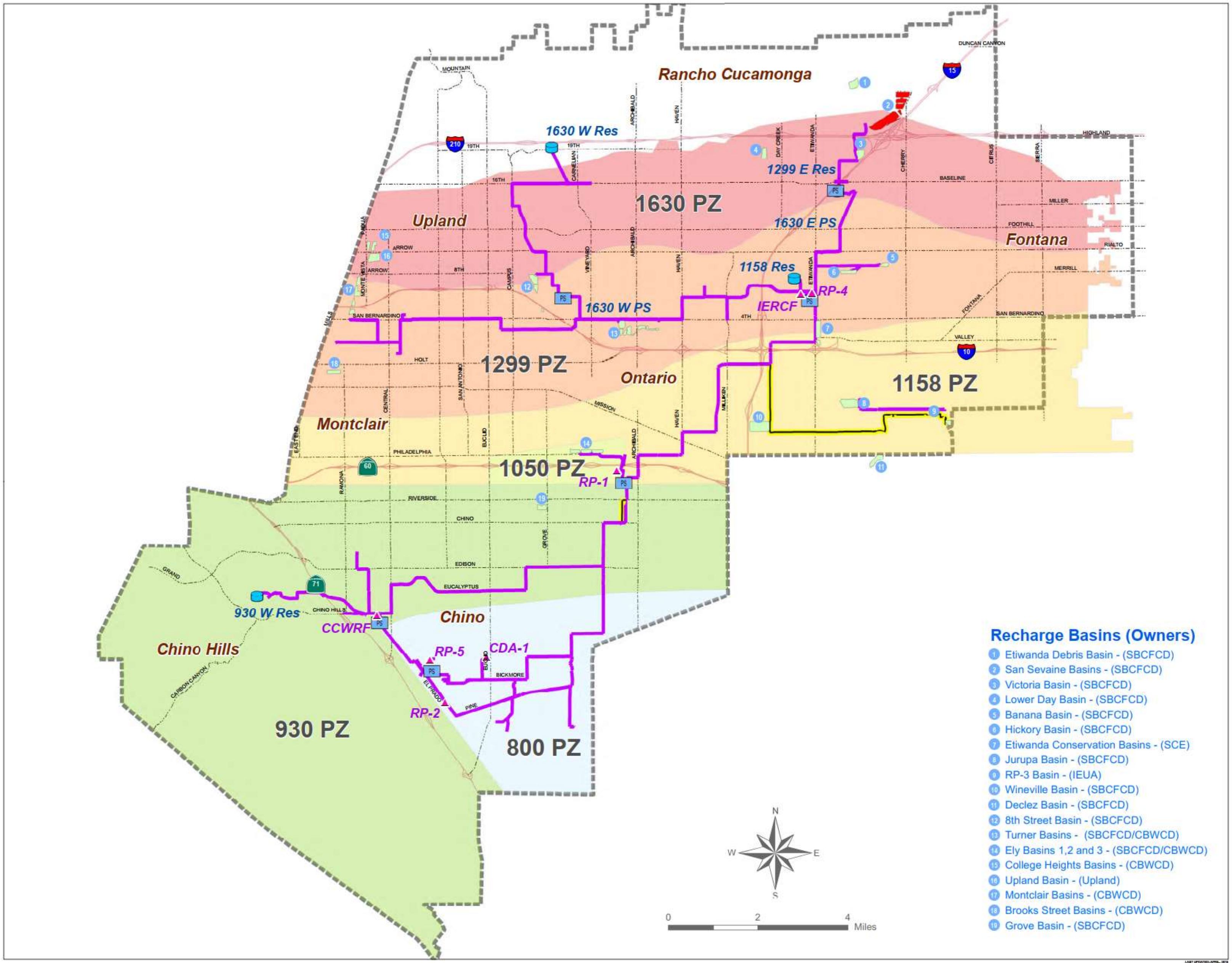
Legend Key

Pipeline Status
- Design
- Bid
- Construction
- Operating

Pump Station Status
- Design
- Bid
- Construction
- Operating

Reservoirs Status
- Design
- Bid
- Construction
- Operating

Recharge Improvement Status
- Design
- Bid
- Construction
- Operating



Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

60 MGD of wastewater and 68 MGD of solids combined from both RP-5 and the CCWRF. The disinfected effluent from RP-5 flows to a common channel where it can be discharged to a creek or pumped to a single pressure zone.

The CCWRF is located in the City of Chino and has been in operation since 1992. The plant was designed to treat up to 11.4 MGD and currently treats approximately 9.5 MGD. The removed biosolids are pumped to RP-2 for processing. RP-2 is an older plant that is owned by IEUA and is only used for solids handling. RP-2 is scheduled for decommissioning within the next 10 years. The CCWRF serves one pressure zone.

IEUA uses bypass and diversion facilities to optimize flow and capacity within the system through the San Bernardino Avenue Lift Station, Montclair Lift Station and Diversion Structure, RP-4 and CCWRF influent bypass (CCWRF influent bypass), RP-1 primary effluent diversion, and Etiwanda Trunk Line. Flows are routed between RPs to maximize recycled water deliveries while minimizing overall pumping and treatment costs. Aside from the San Bernardino Avenue Lift Station and the Montclair Lift Station, IEUA also operates the Prado Park Lift Station and RP-2 Lift Station in the sewer collection system to shift flows from one portion of the service area to another, and to pump from low points to high points.

5.3 Historical and Current Wastewater Flows

IEUA uses sewage bypass and diversion facilities to optimize the flows and capacity utilization. In general, flows are routed between plants to maximize recycled water deliveries and recharge while minimizing overall pumping and treatment costs. Currently, the regional interceptors can bypass flow from RP-4 to RP-1 and from CCWRF to RP-5. Primary effluent can also be bypassed from the RP-1 equalization basins to RP-5. The four sewer lift stations are also used to balance flows and keep water in the northern portion of the service area. Table 5-1 shows wastewater treated, recycled, and disposed of in IEUA's service area in FY 2019-20.

Over the past decade, the region has experienced increased indoor water use efficiency as a result of drought, public policy, more efficient building codes and devices, and effective conservation program campaigns. At regional facilities, this has resulted in a decrease in the volume of sewage flows of approximately 10% since 2013, as reported in the FY 2020-21 TYF. Despite this decrease, the population has increased, resulting in increased sewage strength. Even with decreasing wastewater flows, IEUA has been able to recycle more water through diversion with the Montclair and San Bernardino Avenue Lift Stations. These lift stations provide the RPs in the northern service area with more wastewater as the recycled system has been expanded and is near the groundwater recharge basins.

In FY 19-20, a total of 56,384 AF of wastewater was treated, of which 25,899 AF was discharged and 30,495 AF was recycled within the IEUA service area. The wastewater treatment and discharge volumes for FY 19-20 are included in Table 5-1.

The 2015 Wastewater Facilities Master Plan Update projections were revised in 2020 to account for reduced wastewater flows observed at the treatment plants. The revised projected wastewater flows are expected to reach approximately 56 MGD by 2040. Forecast flows are based on historical flow trends and future growth provided by contracting agencies. As discussed in Section 2.1.2, wastewater flow projections are currently being updated.

Table 5-1: Wastewater Treatment and Discharge Within Service Area in 2020 (DWR Table 6-3)

Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(Optional)*	Method of Disposal	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level	Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
RP-1	DP-001	Prado Lake	8 332818001	Lake outfall	Yes	Tertiary	26,932	25,889	30,495	0	N/A
	DP-002	Cucamonga Creek	8 332818001	River or creek outfall	Yes	Tertiary				0	N/A
RP-4	DP-002	Cucamonga Creek	8 332818001	River or creek outfall	Yes	Tertiary	10,718			0	N/A
RP-5	DP-003	Chino Creek	8 332818001	River or creek outfall	No	Tertiary	9,699			0	N/A
CCWRF	DP-004	Chino Creek	8 332818001	River or creek outfall	No	Tertiary	9,035			0	N/A
			Total				**56,834**	**25,889**	**30,495**	**0**	N/A

Note:
Data from FY 19/20 Recycled Water Annual Report and wastewater treatment plant flow data. Flow data is in acre-feet.

5.4 Current Recycled Water Uses

IEUA's recycled water distribution facilities consist of a pipeline network, booster pump stations, pressure regulating stations, and reservoirs as shown previously on Figure 4. These facilities allow distribution of recycled water into six pressure zones for non-potable reuse and groundwater recharge. A large transmission line connects RP-1 and RP-4 and serves the northern portion of IEUA's service area. The Edison and San Antonio Channel Pipelines were constructed to provide recycled water to areas of Ontario, Chino, and Montclair. Another transmission line ties RP-1 into RP-5 and CCWRF. Four storage reservoirs provide operational storage and have capacities varying from 3 million gallons (MG) to 5 MG. The three booster pump stations provide water from lower to higher pressure zones and three pressure reducing stations provide flow from higher pressure zones to lower pressure zones when the pressure drops below a certain point (Stantec, Recycled Water Program Strategy, April 2015). This system provides water for irrigating parks and golf courses. CCWRF's distribution system delivers water to the cities of Chino and Chino Hills.

Currently, there are over 1,300 recycled water metered connections to the recycled water distribution system. Delivered recycled water is beneficially reused for a variety of applications, including landscape and agricultural irrigation, school yards, commercial car washes and laundries, industrial process water, construction, dust control, and groundwater recharge.

A network of pipelines also directs stormwater run-off, imported water, and IEUA recycled water to 16 recharge sites throughout the IEUA service area. These recharge basins hold the water so it can percolate into the ground and replenish the groundwater supply. Currently,10 of the 16 groundwater recharge basins are permitted to received recycled water. Annually over the last 5 years, IEUA has recharged approximately 10,000 to 15,000 AF, the majority of which is recycled water.

In addition to the direct use demands and groundwater recharge program, IEUA maintains an annual base flow to the Santa Ana River at Prado Dam of up to 17,000 AF, which is currently met with recycled water. Groundwater recharge was the largest use in FY 2018/19, accounting for 41% of recycled water, followed by landscape irrigation (33%), and agricultural irrigation (21%).

In FY 2019-20, IEUA's recycled water usage was approximately 30,495 AF, of which approximately 16,278 AF was used for non-potable reuse (outdoor irrigation, industrial processes, and agriculture) by IEUA member agencies, approximately 773 AF was used directly by IEUA, and approximately 65 AF was used by San Bernardino County. An additional 13,381 AF was used for groundwater recharge. The total recycled water demand was 8% greater than FY 2018-19, with recycled water recharge up 16% and direct use up 2%. The remaining 25,889 AF wastewater not used for recharge or recycling was discharged to the Santa Ana River. Recycled water demands for the combined direct use and recharge purposes were approximately 57% of available supply, with a maximum demand of approximately 75% of available supply occurring during July through September.

Current and projected recycled water volumes through 2045 are shown in Table 5-2. Non-potable direct use is expected to increase to 27,571 AFY by 2045 and groundwater recharge is expected to increase to 16,420 AFY by 2025 and then remain constant through 2045.

Table 5-2: Current and Projected Retailers Provided Recycled Water Within Service Area (DWR Table 6-4)

Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment	2020	2025	2030	2035	2040	2045 *(opt)*
Direct Use	Tertiary	17,115	22,880	25,742	25,742	27,771	28,271
Groundwater Recharge	Tertiary	13,381	16,420	16,420	16,420	16,420	16,420
Total		**30,495**	**39,300**	**41,297**	**42,162**	**44,191**	**44,691**

Note: 2020 value from FY 19/20 Recycled Water Annual Report. Projected values from retail agencies. No projections were made for 2045, so the projected volume is held constant from 2040. Groundwater recharge projections from IEUA projections based on groundwater recharge annual report data. 2020 Direct Use Value includes 16,278 AF from IEUA's member agencies, 773 AF used by IEUA, and 65 AF used by San Bernardino County.

The projected 2015 recycled water use from IEUA's 2015 UWMP was compared to the 2020 actual recycled water use as shown in Table 5-3. Recycled water direct use for 2020 was projected higher in 2015 than the actual recycled water direct use in 2020. The recycled water groundwater recharge volume projected for 2020 in 2015 is approximately the same as the 2020 actual recycled groundwater recharge volume. The discrepancy between the 2015 projected recycled water direct use and the 2020 actual recycled water direct use is largely due to significant land use conversions from agricultural to commercial and residential in IEUA's service area.

Table 5-3: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual (DWR Table 6-5)

	2015 Projection for 2020	2020 Actual Use
Direct Use	30,757	17,115
Groundwater Recharge	13,977	13,381
Total	**44,734**	**30,495**

Note: From 2015 IEUA UWMP and FY 19/20 Recycled Water Annual Report.

5.5 Potential and Projected Recycled Water Uses

The regional recycled water program is committed to maximizing the beneficial use of recycled water. IEUA will continue to develop, expand, and provide flexibility to allow the region to use available recycled water supplies. Expansion of the recycled water program relies on the treatment capacity of the water reclamation facilities and wastewater flow projections. IEUA's overall goal is to achieve maximum reuse of available recycled water within its service area.

5.5.1 Non-Potable Reuse

Major projects to be completed in the next 10 years are outlined in the TYF. There are several projects planned for the recycled water facilities. RP-1 projects include mechanical upgrades, effluent conveyance and flare system improvements, and energy recovery. For RP-4, process improvements, outfall repairs, and a potential plant expansion are planned for the next decade. The CCWRF has projects planned for headworks rehabilitation, aeration blower replacement, and odor control system replacement. There are no major expansion projects planned for the

CCWRF in the next 30 years. The RP-2 is located within the redefined flood zone behind Prado Dam, and since the plant does not have physical flood protection, the solids handling done at RP-2 will be relocated to RP-5 by 2023 and RP-2 will be decommissioned. RP-5 will also undergo an expansion of its liquid treatment capacity and the construction of a wastewater solids handling facility within the next 10 years. A liquids capacity recovery and solids treatment expansion of the Regional Water RP-1 project is expected to begin construction in FY 2026/27.

Another major potential project is the recycled water interties to neighboring agencies within the Santa Ana River Watershed that will increase the availability of local, resilient recycled water supplies within the IEUA service area. The construction of a pipeline that will function as a recycled water interties between the Western Riverside County Regional Wastewater Authority and the City of Rialto with IEUA are also being considered. As detailed in Section 4.4.3, a future AWPF was considered in the TYF to increase recycled water use. TYF recycled water projects to increase both direct use and groundwater recharge are expected to provide approximately 30,000 AFY of direct use and 16,420 AFY of groundwater recharge supply by 2025.

5.5.2 Indirect Potable Reuse

In conjunction with CBWM, CBWCD, and SBCFCD, IEUA conducts the groundwater recharge program within Chino Basin to replenish and maintain the Chino Groundwater Basin. Recharged water includes captured stormwater, recycled water, and imported water. The groundwater recharge projects are a means to diversify the water supply for the region and maximize the beneficial reuse of recycled water and the yield of the Chino Basin. Recycled water recharge is a key component of the region’s water supply portfolio. The more recycled water that is recharged into the Chino Groundwater Basin, the more resilient the region becomes.

5.6 Recycled Water Rates

IEUA’s recycled water volumetric rate reflects the costs associated with the operations and maintenance of its water recycling and distribution facilities, operating costs for groundwater basins, associated administration expenses, and debt service costs related to the financing of infrastructure construction. Total recycled water sales in FY19-20 were approximately $15.8 million. Adopted recycled water rates for 2019-2020 are included in Table 5-4. This table also includes the rates from the 2015 UWMP and the adopted rate for FY 20-21. A rate study will be initiated in 2021 to evaluate and provide recommendations on the future recycled water rates; FY 22-23 rates and beyond will be updated as needed based on the study and related efforts.

Table 5-4: IEUA Recycled Water Program Rates

Rate Description	2015-16	2019-20	2020-21
Direct Delivery ($/AF)	$350	$490	$490
Groundwater Recharge ($/AF)	$410	$550	$550
Effective Date	10/01/15	7/01/19	7/01/20
Deliveries (AF)	32,619	30,495	-

Notes: Current rate Resolution No. 2020-7-9 is effective through June 30, 2022.
FY 2020-21 total deliveries volume not available until July 1, 2021.

5.7 Methods to Encourage Recycled Water Use

In May 2002, IEUA's Board adopted Ordinance No. 75 establishing incentives and the mandatory use of recycled water when available. Under the provisions of Ordinance No. 75, which is consistent with the CWC Sec 13550 and the SWRCB guidelines, potential recycled water customers who do not use recycled water when it is available are subject to a 50% surcharge on their potable water rate.

IEUA also provides technical assistance to prepare necessary engineering reports and coordinate SWRCB, Division of Drinking Water (DDW) approval of recycled water use at each customer's site. IEUA has also retained experts in industrial water use and quality to assist customers in assessing operational needs associated with using recycled water.

5.7.1 Funding

Implementation of the regional recycled water program has historically been coordinated with the availability of state and federal funds to minimize use of regional capital funds. IEUA has adopted a TYF that has a budget that breaks out the federal, state, and local funding for recycled water projects. Local funding will be through the Regional Capital Fund, state grants, loans through DWR and the SWRCB, and federal grant funding through the US Bureau of Reclamation's Title XVI program.

The proposed FY 2020 TYF cost is $920.6 million, which includes water, wastewater, and recycled water projects, including the RP-1 Capacity Recovery project. The TYF is funded by a combination of pay-as-you-go, low interest State Revolving Fund loans, IEUA revenues, grants, and contributions.

Section 6: Water Quality

The quality of any natural water is dynamic in nature. This is true of local groundwater basins with the quality of water changing over the course of a year. Depending on water depth, groundwater will pass through different layers of rock and sediment and leach different materials from those strata. During periods of drought, the mineral content of groundwater increases. Water quality is not a static feature of water, and these dynamic variables must be recognized.

Water quality regulations also change. This is the result of the discovery of new contaminants, changing understanding of the health effects of previously known, as well as new contaminants, development of new analytical technology, and the introduction of new treatment technology. All water purveyors are subject to drinking water standards set by the U.S. Environmental Protection Agency (EPA) and the SWRCB DDW.

Planning efforts of IEUA, the CBWM, and retail agencies emphasize the importance of water quality. The region generally enjoys good water quality, but isolated areas of poor quality require blending of certain water sources or treatment to meet drinking water standards. Significant increases in the use of groundwater, recycled water, and demineralized groundwater can reduce reliance on imported MWD water and increase focus on local water quality monitoring. It is projected that a significant portion of urban water demand will continue to be met using Chino Basin groundwater. Thus, the discussion of water quality focuses primarily on water quality in the Chino Basin.

This section provides a general description of the water quality of the local supplies, the Chino Basin supply, and a discussion of potential water quality impacts on the reliability of these supplies.

6.1 Local Supplies

Local water supplies include surface water from nearby mountain streams, recycled water from IEUA treatment plants, recovered groundwater from the Chino Basin Desalters, and groundwater extracted from the Chino Basin and other groundwater basins in the area.

6.1.1 Surface Water

Surface water from local sources that originate in the San Antonio Canyon, Cucamonga Canyon, Day Creek, Deer Creek, Lytle Creek, and other smaller surface streams is generally of high quality since these creeks are fed by snowmelt and other precipitation in the San Gabriel Mountains. Surface water sources are treated prior to introduction to the potable water supply to ensure bacteriological quality and compliance with state and federal water quality standards.

6.1.2 Recycled Water

Recycled water holds the greatest potential as a new source of supply in the Chino Basin and in the southern California region as a whole. By the year 2045, direct recycled water use is projected at 27,571 AFY and another 16,420 AFY of recycled water will be used for groundwater replenishment.

All IEUA water recycling treatment plants produce recycled water suitable for full body contact recreation and generally meet the more stringent aquatic habitat criteria. The continued use of recycled water is driven by compliance with regulatory limitations for IEUA's recycled water and groundwater recharge operations. In the event of non-compliance, assets would become stranded and IEUA would need to supplement its water supply portfolio with more expensive and/or less reliable sources. Numeric limitations for TDS are imposed upon recycled water and groundwater recharge. In addition, an ambient water quality TDS concentration, a statistical construct that represents an estimate of the volume-weighted TDS concentration of groundwater, is established to determine the assimilative capacity within the basin.

The ambient TDS concentration in the Chino Basin groundwater has been gradually increasing over the past several years, due to climate change, conservation, and drought periods, thus reducing the basin's assimilative capacity. In addition, emerging contaminants of concern, such as 1,2,3-Trichloropropane (1,2,3-TCP), perfluorooctanoic acid (PFOA), and microplastics could impact IEUA's ability to maximize recycled water use. The April 2020 Regulatory Challenges memorandum prepared by IEUA evaluates water quality regulatory challenges for the future of its water supply.

During the 2012 to 2016 drought, the 12-month running-average TDS concentration in recycled water approached the permit limit for TDS due to an increase in TDS concentration from water supplies used by retail agencies and indoor water conservation. The Regulatory Challenges memorandum estimated that, without taking additional action, TDS limit for recycled water use may be exceeded within the next 10 years. IEUA and the CBWM petitioned the RWQCB to consider updating the maximum-benefit Salt and Nutrient Management Plan to incorporate a revised compliance metric for recycled water TDS and nitrate to allow a longer-term averaging period, which would provide an average concentration that is less susceptible to exceedances during drought. This evaluation is currently ongoing. As of the last annual report, submitted in April 2019, the TDS and nitrate maximum concentration limits have never been exceeded; however, the IEUA-established "trigger limit", which is 20 milligrams per liter (mg/L) below the permit limit and triggers a water quality evaluation, was reached in 2015.

Poly- and per-fluorinated compounds (PFAS) are known to be present in recycled water and any new regulatory standards for PFAS could impact the ability to reuse recycled water without treatment. 1,2,3-TCP is a chlorinated hydrocarbon with high chemical stability that is very persistent in groundwater and the regional water recycling facilities IEUA operates were not designed to remove it. During 2019, recycled water used for groundwater recharge exceeded the 1,2,3-TCP maximum contaminant limit (MCL) and PFOA notification level (NL) and went into an accelerated monitoring schedule for 16 weeks. Corrective action reports were submitted to the DDW and RWQCB in February 2020 and source evaluation for both compounds is ongoing. Advanced treatment may be required to meet future regulations of these two contaminants.

Finally, there are other contaminants of emerging concern, such as microplastics, which are likely to emerge over the next 10 years which could also require advanced treatment to continue recharge of recycled water, further underscoring the need for advanced treatment in the region.

Based on these water quality trends, IEUA has concluded that the implementation of AWPFs may likely be required to address increasing salinity in the 2030s. Though there are a number of solutions that IEUA could implement to address groundwater quality challenges, none are as optimal as the implementation of advanced treatment. Advanced treatment would address TDS levels for both direct use and groundwater recharge while also addressing contaminants of emerging concern. In addition, advanced water purification has the potential to be integrated into future recycled water uses, such as direct potable reuse.

6.1.3 Treated Groundwater

Treated groundwater from the Chino Desalters 1 and 2 is very high quality since it is treated by RO, IX, and air stripping. Groundwater from the lower part of the Chino Basin is treated by the desalters, as it has high TDS and nitrate concentration. TDS and nitrate are reduced by the RO process and nitrate concentration is further reduced by the IX process. Two of the Chino Desalter 2 expansion wells are being used to capture groundwater contaminants from the South Archibald plume. Some of the groundwater wells for Desalter 1 have been impacted by a VOC plume located near the Chino Airport. VOCs are removed by an air stripping facility at Desalter 1. Other identified plumes (CIM plume and an Ontario Airport Plume) could impact desalter wells and increase treatment needs. The operation of the Chino Desalters 1 and 2 is a critical component of maximum benefit commitments under the Basin Plan and a long-term salinity management strategy that enables the region to use recycled water within the Chino Basin.

6.1.4 Other Groundwater Basins

Limited information is available on water quality from the groundwater basins surrounding Chino Basin. Most of the basins have elevated concentrations of nitrate. Use of these local groundwater supplies by retail water agencies for potable water supply suggests that any present water quality issues can be resolved by blending or well head treatment.

6.1.5 Imported Water

MWD supplies about half the water used in southern California from its two main sources of water: 1) water from the SWP delivered via the California Aqueduct and 2) water from the Colorado River delivered via the Colorado River Aqueduct. The TDS in the Colorado River water averages about 700 mg/L during normal water years. Water supplies from the SWP have significantly lower TDS levels, averaging 275 mg/L. IEUA’s service area is a SWP-exclusive area, only importing MWD water from the SWP in order to meet TDS objectives in the Chino Basin.

Other major water quality concerns include:

- Perchlorate in local groundwater supplies
- Hexavalent chromium in groundwater
- 1,2,3-TCP in groundwater
- Disinfection by-products.

6.2 Chino Basin Groundwater Quality

Chino Basin groundwater is a critical resource to the entire Santa Ana River Watershed. The Chino Basin Watermaster performed monitoring of over 600 wells in the period from 1999 to 2001 to establish a baseline of groundwater quality for the basin to assist with the implementation of the Optimum Basin Management Program. Groundwater quality data has been obtained periodically since 1990. Since 2000, the Chino Basin Watermaster has assessed groundwater quality in the basin using data compiled through its own monitoring activities and the efforts of other cooperating entities, and has reported on the water quality trends and findings related to regulated contaminates and contaminants of emerging concern in a biannual State of the Basin report. The water monitoring program has been periodically refined as needed to support the detection of water quality anomalies and contaminants of concern.

The most recent groundwater quality data comes from sampling done over the 5-year period from July 2013 to June 2018. This included 141 "active municipal supply wells" (wells that pumped groundwater anytime during 2017 or 2018), other municipal supply wells not determined to be active, and private agricultural, non-agricultural, and monitoring wells, whether recently active or not.

From these groundwater monitoring results, the three most common contaminants that exceed a primary MCL in the Chino Basin at active municipal wells are nitrate (71 wells), 1,2,3-TCP (33 wells), and perchlorate (27 wells). Of the recently active 141 municipal supply wells, 45 have at least one drinking water contaminant, 17 wells have two contaminants, 14 have three contaminants, five have four contaminants, and five have five contaminants. The wells with drinking water contaminants are located in the southern (south of the 60 freeway) and western (west of Euclid Avenue) areas of the basin. Of the 141 recently active municipal supply wells, only two wells shown an exceedance of a California NL for 1,4-dioxane. There may be additional exceedances for 1,4-dioxane and other contaminants, but since the monitoring of contaminants with an NL is not required by DDW or testing may be performed using analytical methods with the lowest detection limits that are greater than the NLs. Table 6-1 and Table 6-2 provide a summary of active municipal supply wells with exceedances of primary MCLs and NLs.

Perchlorate and hexavalent chromium are also the two contaminants characterized in the basin that are undergoing review and consideration by the DDW for a primary MCL revision.

Table 6-1: Summary of Drinking Water Contaminants with Primary MCLs

Analyte	Primary CA MCL	Number of Active Municipal Supply Wells with Exceedance of MCL	Number of Municipal Supply Wells with Exceedance of MCL	Number of Total Wells in the Chino Basin with Exceedance of MCL
Nitrate-Nitrogen	10 mg/L	71	80	553
1,2,3-Trichloropropane	0.005 μg/L	33	36	111
Perchlorate	6 μg/L	27	30	387

Analyte	Primary CA MCL	Number of Active Municipal Supply Wells with Exceedance of MCL	Number of Municipal Supply Wells with Exceedance of MCL	Number of Total Wells in the Chino Basin with Exceedance of MCL
Trichloroethylene (TCE)	5 µg/L	11	14	269
Gross Alpha	15 pCi/L	6	7	14
Chromium	50 µg/L	4	4	4
Arsenic	0.01 mg/L	3	5	74
1,2-Dibromo-3-chloropropane	0.2 µg/L	3	3	4
Tetrachloroethene (PCE)	5 µg/L	3	3	96
Trihalomethanes	10 µg/L	2	3	2
Nitrite-Nitrogen	1 mg/L	2	2	17
1,1-Dichloroethene (1,1-DCE)	5 µg/L	1	1	13
Dichloromethane (Freon 39)	5 µg/L	1	1	91
Uranium	20 pCi/L	1	1	1

Notes: Data collected for FY 2013/2014 to FY 2017/2018. "Active" Municipal supply wells are those that have been pumped at least once during the years 2017 and 2018.
µg/L = micrograms per liter; pCi/L = picocuries per liter

Table 6-2: Summary of Drinking Water Contaminants with Notification Levels

Analyte	CA Drinking Water NL	Number of Active Municipal Supply Wells with Exceedance of NL	Number of Municipal Supply Wells with Exceedance of NL	Number of Total Wells in the Chino Basin with Exceedance of NL
1,4-Dioxane	1 µg/L	2	2	133
Manganese	0.5 mg/L	0	0	118
N-Nitroso dimethylamine (NDMA)	0.01 µg/L	0	0	60
Vanadium	0.05 mg/L	0	0	55
Naphthalene	0.017 mg/L	0	0	48
1,2,4-Trimethylbenzene	0.33 mg/L	0	0	26
1,3,5-Trimethylbenzene	0.33 mg/L	0	0	19
Methyl Isobutyl Ketone	0.12 mg/L	0	0	11
n-Propyl benzene	0.26 mg/L	0	0	11
HMX (Octogen)	0.35 mg/L	0	0	11
Chlorate	0.8 mg/L	0	0	4

Analyte	CA Drinking Water NL	Number of Active Municipal Supply Wells with Exceedance of NL	Number of Municipal Supply Wells with Exceedance of NL	Number of Total Wells in the Chino Basin with Exceedance of NL
formaldehyde	0.1 mg/L	0	0	3
N-Nitrosodiethylamine (NDEA)	0.01 μg/L	0	0	3
Ethylene Glycol	14 mg/L	0	0	1
n-Butylbenzene	0.26 mg/L	0	0	1

Note: Data collected for FY 2013/2014 to FY 2017/2018. "Active" Municipal supply wells are those that have been pumped at least once during the years 2017 and 2018.

6.2.1 1,2,3-TCP

The occurrence of 1,2,3-TCP in nearly 25% of active municipal supply wells is noteworthy. The MCL for 1,2,3-TCP is 0.005 micrograms per liter (μg/L), which is 5 parts per trillion (ppt). This is the lowest numerical value for a MCL established to date in California. Unlike newly adopted MCLs, the MCL for 1,2,3-TCP became immediately effective upon its adoption in December 2017, requiring municipal water agencies to either cease using active wells with 1,2,3-TCP concentrations in excess of the new MCL immediately or implement treatment or blending to ensure their water supplies have concentrations below the MCL. Before 2018, municipal water supplies were not routinely tested for 1,2,3-TCP, or when testing occurred it was not always done using the lowest available detection limit. For this reason, the DDW also required municipal water agencies to perform quarterly compliance monitoring in 2018 using laboratory detection limits low enough to test for concentrations equivalent to the MCL of 0.005 μg/L. The wells producing 1,2,3-TCP concentrations equal to or greater than the MCL are primarily located in the western half of the Basin. At least three agencies within the IEUA service area have had to shut down supply wells or modify operations as a result of the new MCL.

6.2.2 Perchlorate

An MCL of 6 μg/L was established in 2007. The Public Health Goal (PHG) for perchlorate was reduced from 6 μg/L to 1 μg/L in 2015 after scientific literature indicated the possible health effects to infants from exposure to perchlorate in drinking water. The DDW thereby lowered its required detection limit for the purposes of reporting from 4 μg/L to 1 or less μg/L to gather state-wide data to determine whether a revision to the MCL is warranted.

Over the 5-year period of measurement, 49% of the wells in the Chino Basin had a 5-year maximum concentration that exceeds the MCL of 6 μg/L and 95% of the detectable concentrations of perchlorate in the basin were above the PHG of 1 μg/lL Perchlorate is prevalent throughout the basin. If the MCL were lowered from 6 μg/L, treatment facilities could be required across most of the Chino Basin.

6.2.3 Hexavalent Chromium

Hexavalent Chromium (Chromium VI) is produced from by-products of industrial applications and the manufacturing of stainless steel and other alloys as well as occurring naturally in some locations. The PHG for Chromium VI is 0.02 μg/L. In 2013, DDW adopted an MCL for Chromium

VI of 10 μg/L, which was then challenged in court. In 2017, a judgment was issued invalidating the Primary MCL for drinking water since there was no consideration of the economic feasibility of complying with it. The court ordered DDW to conduct an economic evaluation and establish and adopt a new MCL, which could be the same or different from the now invalidated MCL of 10 μg/L. 7% of all wells sampled in the basin have a concentration above 10 μg/L; 127 of the 141 municipal wells have detectable concentrations of Chromium VI, and nine of the 141 active municipal wells exceeded 10 μg/L. Hexavalent chromium is not a widespread compliance issue based on the 10 μg/L, but compliance could be problematic in the future if a new, lower MCL is established.

6.2.4 Poly- and Per-fluorinated Compounds

In 2009, the EPA published provisional Health Advisory Levels (HALs) for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) of 400 nanograms per liter (ng/L) and 200 ng/L, respectively. In 2016, the EPA significantly lowered the HAL for PFOA and PFOS to a combined 70 ng/L and in 2018, the DDW established NLs for PFOA and PFOS of 14 and 13 ng/L, respectively. The majority of wells in the Chino Basin have not been sampled for either of these contaminants. The 30 wells that have been sampled were tested in 2015 using laboratory detection limits of 20 and 40 ng/L, which is higher than the current NLs. Monitoring or recycled water recharge blending sources shows that many of the sources have detectable concentrations of PFOA and PFAS, some of which are above the NLs. The EPA and DDW have indicated that they are moving forward with adopting MCLs for PFOA and PFAS in the near future. The occurrence of these contaminants in Chino Basin groundwater as of March 2019 is not well characterized and there are recharge water sources with concentrations above the NLs. Widespread monitoring is necessary to understand the occurrence of PFOA and PFAS in the basin to plan for compliance with potential future drinking water regulations.

6.2.5 Total Dissolved Solids and Salts

During the development of the 2000 OBMP, IEUA and the Watermaster recognized that implementing a recycled water recharge and reuse program would require large scale treatment and mitigation of salt loading for TDS and nitrate. The Watermaster and IEUA petitioned the RWQCB to establish a maximum benefit-based salt and nutrient management plan that involved increasing the TDS and nitrate objectives for the Chino-North groundwater management zone (GMZ) to numerically higher value to enable recycled water reuse without mitigation or treatment. The plan included the implementation of a monitoring, analysis, and reporting program, the construction and future expansion of the Chino Basin Desalters to attain hydraulic control of the GMZ to protect the Santa Ana River, the construction of recharge facilities to increase storm and recycled water recharge, and a commitment to future treatment of recycled water or groundwater, as needed, to protect beneficial uses and comply with the maximum benefit TDS and nitrate objectives. The maximum benefit SNMP was incorporated into the Basin Plan in January 2004.

TDS has a California secondary MCL of 500 mg/L. Over the 5-year period from July 2013 to June 2018, 61% of wells measured had 5-year maximum values exceeding the MCL. The average and median values were 778 and 614 mg/L, respectively. The wells with the highest TDS concentrations are predominantly located south of Highway 60 in the area of historical and current agricultural land uses. It is expected that TDS concentrations in the basin will increase over time since it is operated as a closed basin.

Nitrate has a primary MCL of 10 mg/L. Over the 5-year period, 68% of the wells measured had 5-year maximum values exceeding the MCL. The average and median values were 26 and 17 mg/L, respectively. As with TDS, the wells with the highest nitrate concentrations are located in the historical and current agricultural land use areas.

6.2.6 Other Contaminants

There are other active municipal supply wells with exceedances of primary MCLs in the IEUA service area, as listed in Table 6-1, including trichloroethylene (TCE), gross alpha, chromium, arsenic, 1,2-dibromo-3-chlorpropane, tetrachloroethene (PCE), trihalomethanes, nitrite-nitrogen, 1,1-dichloroethene (1,1-DCE), dichloromethane (Freon 39), and uranium. The percentage of wells with 5-year maximum concentrations exceeding the primary MCLs for some of these contaminants are 14% for arsenic, 26% for TCE, 10% for PCE, and 6% for 1,2-DCA.

The number of active municipal wells with exceedances for any of these contaminants is less than 11, indicating they are not widespread compliance issues. However, these contaminants should be observed, and planning should be conducted to ensure the ability to adapt to any increases in the number of wells with exceedances or changes to MCLs for these contaminants that could cause future water supply issues.

6.3 Water Quality Impacts on Reliability

Maintaining the quality of the groundwater and other water supply increases the reliability by ensuring that deliveries are not interrupted due to water quality concerns. A direct result from the degradation of any water supply is increased treatment cost before consumption. The poorer the quality of the source water, the greater the treatment cost. Water may degrade in quality to the point that it is not economically feasible for treatment. In this scenario, the degraded source water is taken off-line. This in turn can decrease water supply reliability by potentially decreasing the total supply and increasing demands on alternative water supplies.

Groundwater quality impairment has impacted significant supplies across the basin. Including CDA, approximately one-third of existing groundwater supply capacity is currently offline due to impairment or requires clean water for blending purposes to meet water quality regulations. Water quality issues are constantly evolving, and IEUA will have to continue to take action to protect and treat water supplies when needed. Potential future impacts to water supply reliability could be caused by increasing TDS concentration in recycled water, revisions on DDW MCLs, and changes in contamination plume characteristics.

The use of recycled water could become more difficult in the future because the ambient TDS concentration in the Chino Basin groundwater is increasing, thereby reducing assimilative capacity. Increases in TDS concentration from water supplies used by retail agencies and from the SWP could further increase the TDS concentration of recycled water, especially if coupled with an increase in indoor water conservation.

The Watermaster monitors and delineates the extents of the contaminant plumes located in the basin, including the Chino Airport and South Archibald plumes, General Electric Test Cell and Flatiron plumes, the former Kaiser Steel Mill Facility plume, the California Institution for Men plume, the Stringfellow plume, and the Milliken Landfill plume. Currently, the Chino Airport and South Archibald plumes are undergoing remedial strategies using the Chino Basin Desalters for pumping and treating the contaminated groundwater. Any subsequent movement of contaminant plumes could affect additional groundwater wells and the water supply of the basin, and therefore, the water supply reliability of IEUA.

Changes in DDW MCL values can also affect groundwater supply in the Chino Basin. The adoption of an immediately effective MCL for 1,2,3-TCP as discussed above resulted in the cessation of use of wells with concentrations in excess of the new MCL. Some supply wells were shut down or had to modify their operations due to this new MCL. The EPA is currently developing MCLs for PFOA and PFOS. Given that recycled water used for groundwater recharge exceeded the PFOA notification level in 2019, a newly established MCL would impact the ability to use both recycled water and groundwater sources. Similarly, revisions in primary MCL values for perchlorate and hexavalent chromium could cause compliance issues in the future if new, lower MCLs are established. Prolonged reductions in groundwater pumping due to groundwater contamination could reduce the safe yield and potentially contribute to the loss of hydraulic control and the spread of contamination in the basin. It will become increasingly necessary to pump and treat groundwater to comply with drinking water standards and maintain Safe Yield and hydraulic control of the basin.

Section 7: Reliability Planning

7.1 Overview

The UWMP Act requires urban water suppliers to assess water supply reliability that compares total projected water use with the expected water supply over the next 20 years in 5-year increments. The UWMP Act also requires an assessment for a single-dry year and multiple-dry years. Water Code section 10635(b) is a new requirement for the 2020 UWMPs and requires suppliers to prepare a drought risk assessment, which enables suppliers to evaluate their risk under a severe drought period lasting for 5 consecutive years starting in 2021. This section presents the reliability and drought risk assessments for the IEUA service area.

7.2 Supply Challenges

As discussed throughout this document, especially in Sections 2, 4, 5, and 6, supply can be affected by a variety of factors, including water quality regulations and climate change impacts. Some sources are more vulnerable to seasonal or climatic shortage than others. The supply challenges for each of the region's water sources are discussed in this section. A summary of the factors that may result in inconsistency of supply for each source in IEUA's service area are included in Table 7-1.

Table 7-1: Factors Resulting in Inconsistency of Supply

Water Supply Source	Legal	Environmental	Water Quality	Climatic
Local Surface Water	None identified.	None identified.	None identified.	Shifting precipitation patterns; reduced snowpack; increased evaporation.
Stormwater	None identified.	Increases in impervious surfaces.	Storm water quality may require treatment prior to infiltration	Reduced infiltration rates and stormwater capture.
Chino Basin Groundwater	Development of new MCLs for contaminants present in the basin.	Safe yield operating constraints.	Contaminants exceeding MCLs.	Changes in rainfall frequency and intensity; impacts to recharge and runoff.
Other Groundwater	Development of new MCLs for contaminants present.	Safe yield operating constraints.	Contaminants exceeding MCLs.	Reduced natural infiltration.

Water Supply Source	Legal	Environmental	Water Quality	Climatic
Chino Basin Desalter	Groundwater replenishment obligation.	None identified.	Shifts in contaminant plume characteristics or location.	None identified.
Recycled Water	Changes in water quality requirements.	None identified.	Increasing TDS levels. See Legal.	Reduction in amount of wastewater and impacted by increase in imported water TDS during drought periods
Imported Water	Potential cutbacks.	None identified.	Disinfection byproduct precursors; arsenic; nutrient levels.	Shifts in precipitation patterns; reduced snowpack; and potential for increased TDS in drought periods

7.2.1 Local Surface Water

Local surface water is impacted by climate due to its dependence on precipitation and snow melt. Changes in precipitation patterns and earlier snow melt due to increased temperatures will affect local surface water both in quantitatively and temporally. Higher temperatures could also result in increased evaporation of soil moisture or exposed water bodies, reducing surface water supplies. Surface water supplies are also highly variable on a yearly basis.

Surface water is generally of high quality and is anticipated to be unaffected by water quality changes.

7.2.2 Stormwater

Increases in temperature and evaporation rates can dry out soil, resulting in increased water runoff as water is unable to penetrate dry soil. Climate change is expected to cause higher intensity rainfall storms on a more infrequent basis, which could also reduce the amount of stormwater runoff able to be captured. Annual snow melt patterns are also expected to change, which could affect water supply planning and stormwater capture.

Other challenges include reductions in natural infiltration into the ground due to channelization, new development, increased outdoor water efficiency, and open space conversion. Construction of additional stormwater recharge facilities may be limited in the highly urbanized service area. Water quality of stormwater may require treatment, especially in green infrastructure, integrated with stormwater recharge facilities.

7.2.3 Chino Basin Groundwater

Chino Basin groundwater supplies are dependent on rainfall and supplemental sources for recharge, as well as the ability of soil to absorb water during rainfall events. These dependencies make this groundwater supply vulnerable to climate change impacts, such as warmer temperatures and drought increasing the dryness of soil, resulting in less absorption and an increase of water runoff instead of percolation through the soil. Chino Basin groundwater supplies are not impacted by climate once the water is stored in the groundwater basin.

As discussed in Section 6, there are several common contaminants that exceed primary MCLs or NLs in the basin at active municipal wells, including nitrate, 1,2,3-TCP, perchlorate, hexavalent chromium, and 1,4-dioxane. Increases in the prevalence of these, and other contaminants, may result in the closure of supply wells which would impact water supply reliability. In addition, the use of recycled water could become more difficult in the future due to increasing TDS concentration in the groundwater. Finally, any changes in or development of new MCLs or other legislative concentration requirements would affect groundwater supply.

7.2.4 Other Groundwater

Climate effects on non-Chino Basin groundwater is expected to be similar to those identified for the Chino Basin, including a reduction in reduced natural infiltration, safe yield operating constraints, and water quality issues.

7.2.5 Chino Basin Desalter

Water supply from the Chino Basin Desalters is not affected by climate change, but may be affected by the outstanding obligation for groundwater replenishment to the Chino Basin through the duration of the Peace Agreement and the high energy needs and costs of the treatment of brackish water and brine disposal. In addition, any changes or movement of the contaminant plumes that are being treated by the Desalters could affect nearby groundwater wells or result in increased treatment costs.

7.2.6 Recycled Water

Recycled water holds the greatest potential as a source of reliable supply in the IEUA service area. Recycled water is the most climate resilient water supply available to the region as wastewater flows were shown not to be impacted by climate according to the 2015 IEUA IRP. However, since the service area's water supply can include 20 to 30% of SWP imported water, droughts have resulted in higher salinity levels in source water supply, which directly impacts the salinity in the treated recycled water. Additionally, increases in more efficient indoor water use may reduce the amount of wastewater available for recycled water in the future.

Recycled water is also vulnerable to increasingly strict regulatory and environmental issues related to the construction and operation of recycled water systems, especially the high amount of energy consumption required in recycled water treatment. Recycled water requires the highest level of treatment to meet Title 22 water quality requirements, which can be very energy intensive.

7.2.7 Imported Water

Changing climate patterns are expected to shift precipitation patterns and affect water supply. The areas of concern for California include a reduction in Sierra Nevada Mountain snowpack, increased intensity and frequency of extreme weather events, rising sea levels causing increased risk of Delta levee failure, seawater intrusion of coastal groundwater basins, and potential cutbacks on SWP to meet ecological and other needs. The major impact in California is that without additional surface and groundwater storage, the earlier and heavier runoff (rather than snowpack retaining water in storage in the mountains), will result in more water being lost to the oceans. A heavy emphasis on storage is needed in the State of California.

MWD is responsible for providing high quality potable water throughout its service area. Over 300,000 water quality tests are performed per year on MWD's water to test for regulated contaminants and additional contaminants of concern to ensure the safety of its waters.

The key water quality issues for SWP waters are disinfection byproduct precursors, in particular, total organic carbon and bromide. Disinfection byproducts result from total organic carbon and bromide in the source water reacting with disinfectants at the water treatment plant. MWD has resolved these treatment restrictions by using ozone disinfection at its treatment plants. All MWD's treatment plants currently have ozone treatment facilities.

Arsenic is also of concern in some groundwater storage/transfer programs that MWD participates in. Groundwater inflows into the California Aqueduct are managed to comply with water quality regulations and protect downstream water quality while meeting supply targets. Additionally, nutrient levels in SWP system are relatively high, leading to the potential for algal related taste and odor issues that can affect water management strategies. MWD is engaged in efforts to protect the quality of SWP water from potential increases in nutrient loading from wastewater treatment plants (MWD, 2020 UWMP, June 2021).

Imported SWP water is an important water supply source for the water agencies in the Chino Basin, and its TDS concentration is an important consideration in the salt and nutrient management plan in the Basin Plan. The TDS concentration in SWP water at Lake Silverwood, the point from which SWP water is distributed to the Chino Basin, has historically varied from 74 to 430 mg/L, with the lower TDS concentrations associated with above normal to wet hydrologic conditions and the higher TDS concentrations associated with below normal to dry hydrologic conditions.

7.3 Supply and Demand Comparisons

IEUA's service area relies on a variety of supply types, as detailed above. The available baseline water supply projections for the entire IEUA region by source type are included in Table 7-2 below. The imported water supply type is broken into imported water to be supplied by IEUA via MWD and imported water delivered to IEUA retail agencies from other wholesale agencies.

While this summary of baseline regional water supply sources is useful for IEUA's planning purposes, the reliability assessment was completed using only supplies/demands for imported water from MWD and IEUA recycled water, as these are the water supply sources that IEUA manages. Each retail agency is completing its own reliability assessment which are included in their respective 2020 UWMPs. IEUA's ability to satisfy demands during three scenarios: a normal water year, single-dry year, and multiple-dry years was completed and described in the following sections.

The available imported water supply is not expected to decrease or change for these years due to the redundancy and reliability provided by MWD's extensive storage and water management system. As discussed in MWD's 2020 UWMP, MWD does not anticipate a shortfall in water supply for any of the dry year scenarios. While the California Aqueduct supplies are anticipated to decrease during dry years, overall, MWD does not expect any shortfall due to their diligent efforts to increase resiliency to drought over the past several years by using off-stream storage and other means. While IEUA only receives water from the California Aqueduct, they still expect to receive up to their full contract amount for both single dry and multiple dry years. The recycled water supply is not expected to dramatically decrease during drought periods; however, there are some slight fluctuations due to changes in water use behaviors during drought periods.

Since imported water is expected to be available during all year types, the basis of water year data that was used for the reliability assessment is therefore based on recycled water conditions. The average year supply is the average recycled water supply (total wastewater plant effluent flows) for FY 15/16 through FY 19/20. The single dry year supply basis is the wastewater treatment plant flows during FY 15/16, a hydrologically dry year with relatively low wastewater plant flows. This year was one of the last years of California's historic 2011-2017 drought, when almost 80% of the state was in a state of severe drought from 2013 through 2017 (National Oceanic and Atmospheric Administration, n.d.). The basis water years were limited to the past 5 years to accurately account for the growth in recycled water supply and demand that has occurred. The multiple dry year supply basis is based on repeated FY 15/16 conditions. Table 7-3 shows the basis of water year data used to define each scenario. The single and multiple dry year percentage of average supply was used as a multiplier to calculate the reduced volume of supplies available in the single dry and multiple dry years scenario. Since recycled water is not strongly influenced by drought periods, the available supply during the dry year scenarios is just 26 AF less than the average year supplies, which rounds to 100% of average year supplies.

Table 7-2: Projected Regional Baseline Water Supply Sources

Supply Type	2020	2025	2030	2035	2040	2045
Imported Water – IEUA	66,438	92,928	94,928	96,928	98,928	98,928
Imported Water – Other	17,667	10,728	10,728	10,728	10,728	10,728
Chino Basin Groundwater	51,749	63,129	72,822	78,441	89,776	92,080
Other Groundwater	26,436	27,060	27,171	27,282	27,394	27,505
Surface Water	16,652	10,089	10,089	10,089	10,089	10,089
Recycled Water - Direct Use	16,278	23,932	25,929	26,794	28,823	29,323
Recycled Water - Groundwater Recharge	13,381	16,420	16,420	16,420	16,420	16,420
Chino Basin Desalter	14,649	17,733	17,733	17,733	17,733	17,733
Water Use Efficiency	3,292	9,788	11,984	17,257	22,570	27,802
TOTAL	**226,542**	**271,807**	**287,804**	**301,672**	**322,461**	**330,608**

Note: Roll up of retail agency projections except for 2020, which are actual values. SAWCo is not included in the table because transfers from SAWCo are reported within receiving member agency values. The values in this table match the retail agency water supplies shown in Table 4-2, with the additional inclusion of recycled water for groundwater recharge and water use efficiency as supply sources. For the "Imported water – IEUA" supply, water purchases in excess of Tier 1 allocation of Resolution 2014-12-01 will be assessed at the Tier 2 rate.

Table 7-3: IEUA Service Area: Basis of Water Year Data (Reliability Assessment) (DWR Table 7-1)

		Available Supplies if Year Type Repeats	
			Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP Location:
		X	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
Year Type	**Base Year** *If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000*	**Volume Available (acre-feet)**	**% of Average Supply**
Average Year	FY 15/16 - FY 19/20	147,503	100%
Single-Dry Year	FY 15/16	147,477	100%
Multiple-Dry Years 1st Year	FY 15/16	147,477	100%
Multiple-Dry Years 2nd Year	FY 15/16	147,477	100%
Multiple-Dry Years 3rd Year	FY 15/16	147,477	100%
Multiple-Dry Years 4th Year	FY 15/16	147,477	100%
Multiple-Dry Years 5th Year	FY 15/16	147,477	100%

Note: Average year is the average of FY 15/16 through FY 19/20 wastewater plant flows plus the MWD contract amount from Resolution 2014-12-1. Single and multiple dry years is FY 2015/16.

As described in the sections that follow, Table 7-4 through Table 7-6 present the supplies and demands under the various water year scenarios for the 25-year planning period in 5-year increments for combined potable (imported) and non-potable (recycled) water sources.

7.3.1 Normal Water Year

The normal water year is a year in the historical sequence that most closely represents median runoff levels and patterns. Table 7-4 shows the expected imported and recycled water supplies available over the planning period during an average/normal year and compares them to demands for the same period. The expected imported water supply is equivalent to IEUA's purchase order agreement amount with MWD. The expected recycled water supply is based on wastewater plant flow projections from Table 4-6.

The numbers in Table 7-4 demonstrate that the IEUA region anticipates adequate supplies for 2025 to 2045 under normal water conditions.

7.3.2 Single-Dry Year

The water supplies and demands for the IEUA service area over the 25-year planning period were analyzed in the event that a single-dry year occurs. FY 15/16 was selected as a representative single dry year since it was one of the last years of the historic 2011-2017 drought and was hydrologically dry year with low wastewater plant flows that still reflects current recycled water supply and demand trends. Table 7-5 shows the IEUA supply available to meet demands during a single-dry year based on its contract with MWD and 100% of the recycled water projections available during a normal year. As noted above, the imported supply is not expected to decrease during a 5-year drought. The recycled water supplies are based on the percentage of average influent water flows available during FY15/16. The 2015 IRP found that demand during a single dry year is expected to increase by up to 3.74% more than normal year demands by 2040. To account for this increase in demand, a demand increase factor was applied to each 5-year period, ramping up from a 0.62% increase in 2025 to a 3.74% increase in 2040. The 3.74% increase was also applied to calculate the increased demand for 2045.

Despite the demand increase, Table 7-5 still shows a surplus for each 5-year period under single-dry year conditions.

7.3.3 Multiple-Dry Year (5-Year)

The water supplies and demands for the IEUA service area over the 25-year planning period were analyzed in the event that a multiple-dry year occurs, specifically a 5-year drought period. This drought is considered to be equivalent to 5 years of conditions similar to FY 15/16. Table 7-6 shows the supply available to meet demands during a multiple-dry year. As noted above, the imported supply is not expected to decrease during a 5-year drought. The recycled water supplies are based on the percentage of average influent water flows available during FY 15/16. However, the 2015 IRP found that demand during a prolonged drought year is expected to increase by up to 5.98% more than normal year demands by 2040. To account for this increase in demand, a demand increase factor was applied to each 5-year period, ramping up from a 1% increase in 2025 to a 5.98% increase in 2040. This 5.98% increase was also used to calculate the increased demand for 2045.

Despite the demand increase, Table 7-6 still shows a surplus for each 5-year period for each year of the 5-year drought conditions.

Table 7-4: IEUA Service Area: Normal Year Supply and Demand Comparison – in Acre-Feet (DWR Table 7-2)

	2025	2030	2035	2040	2045
Supply totals	153,356	156,490	157,425	160,119	160,119
Demand totals	116,716	120,927	124,136	128,212	128,756
Difference	**36,640**	**35,563**	**33,289**	**31,907**	**31,363**

Note: Normal year based on the average of FY 2015/16- FY 2019/20 conditions.

Table 7-5: IEUA Service Area: Single Dry Year Supply and Demand Comparison - in Acre-Feet (DWR Table 7-3)

	2025	2030	2035	2040	2045
Supply totals	153,329	156,462	157,397	160,091	160,091
Demand totals	118,899	123,938	128,009	133,007	133,571
Difference	**34,431**	**32,524**	**29,388**	**27,084**	**26,519**

Note: IEUA considers FY 15/16 to represent the single dry year hydrologic conditions. The expected supply is 100% of normal year supply. The IEUA IRP forecasts a regional demand increase of 3.74% by 2040 for a single dry year due to above normal temperature and reduced wet periods (IEUA IRP Appendix E, 2016). Demand increase for prior years is interpolated (from 0.62% in 2015 to 3.74% in 2040). The demand increases for 2045 is assumed to be the same as 2040.

Table 7-6: IEUA Service Area: Multiple Dry Years Supply and Demand Comparison – in Acre-Feet (DWR Table 7-4)

Dry Years	Supply	2025	2030	2035	2040	2045
First year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	**33,124**	**30,710**	**27,079**	**24,212**	**23,635**
Second year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	**33,124**	**30,710**	**27,079**	**24,212**	**23,635**
Third year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	**33,124**	**30,710**	**27,079**	**24,212**	**23,635**
Fourth year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	**33,124**	**30,710**	**27,079**	**24,212**	**23,635**
Fifth year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	**33,124**	**30,710**	**27,079**	**24,212**	**23,635**

Note: IEUA considers FY 15/16 to represent each year of the multiple dry year hydrologic conditions. The expected supply is 100% of normal year supply. The IEUA IRP forecasts a regional demand increase of 5.98% by 2040 for a multi-dry year due to above normal temperature and reduced wet periods (IEUA IRP Appendix E, 2016). Demand increase for prior years is interpolated (from 1.00% in 2015 to 5.98% in 2040). The demand increases for 2045 is assumed to be the same as 2040. The supply and demand for each year of the multi-year drought is expected to be the same.

7.4 Summary of Comparisons

As shown in the analyses above, IEUA has adequate supplies to meet demands during normal, single-dry, and multiple-dry years throughout the 25-year planning period. Based on the reliability analysis completed by MWD for their 2020 UWMP, no decrease in imported water from MWD is expected during dry years due to MWD's extensive storage, transfer, and water supply management efforts. Recycled water supplies are also not expected to decrease overall during drought periods since wastewater flows are typically not significantly affected by drought periods. While IEUA does not expect a shortfall under the scenarios considered, they continue to support reduction in water use through demand management measures, as described in Section 8, and consideration of other supply opportunities to increase the resiliency of their water supply. IEUA is also aware of the potential disruption of supply due to water quality changes and is considering future actions that will help to mitigate any impacts, as discussed in Section 6.

7.5 Drought Risk Assessment

The California Legislature created the new Drought Risk Assessment (DRA) requirement for the 2020 UWMP in part because of the significant duration of recent California droughts and the predictions about hydrological variability attributable to climate change. The DRA requires suppliers to assess water supply reliability over a 5-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability under a reasonable prediction for 5 consecutive dry years. Table 7-7 shows the expected water use (in AF) and the expected total supplies for each year from 2021 to 2025 for both potable water from MWD and IEUA recycled water. As with the reliability assessment, the water supplies and demands only include imported water from MWD and recycled water. The water use for each year was found by interpolating between the 2020 actual water demand total (from the FY 19/20 Annual Water Use Report and the FY 19/20 Recycled Water Annual Report) and the 2025 projected water use during a multiple-year drought (from Table 7-6 above). The expected total supplies were calculated by interpolating between the average year supply estimate from Table 7-1 and the 2025 projected supply available during a multiple year drought (from Table 7-6 above).

As shown in Table 7-7, IEUA expects to have a surplus for each of the 5 years of the consecutive 5-year drought. Therefore, no Water Shortage Contingency Plan actions are required to be implemented. However, in the case of a shortfall in supply, the use reduction and supply augmentation measures described in the WSCP (see Appendix B) are available to be implemented. In addition, IEUA is aware of future impacts to their water supplies and is always considering additional potential opportunities for water supplies or use reduction. IEUA may explore the future water supply projects and programs described in Section 4-4 to further increase their resiliency to drought conditions.

Table 7-7: DWR Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b) (DWR Table 7-5)

2021	Total
Total Water Use (AF)	100,497
Total Supplies (AF)	148,650

2021	Total
Surplus/Shortfall w/o WSCP Action (AF)	48,153
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**48,153**
Resulting % Use Reduction from WSCP action	0%
2022	**Total**
Total Water Use (AF)	105,098
Total Supplies (AF)	149,806
Surplus/Shortfall w/o WSCP Action (AF)	44,708
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**44,708**
Resulting % Use Reduction from WSCP action	0%
2023	**Total**
Total Water Use (AF)	109,911
Total Supplies (AF)	150,972
Surplus/Shortfall w/o WSCP Action (AF)	41,061
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**41,061**
Resulting % Use Reduction from WSCP action	0%
2024	**Total**
Total Water Use (AF)	114,943
Total Supplies (AF)	152,146
Surplus/Shortfall w/o WSCP Action (AF)	37,203
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**37,203**
Resulting % Use Reduction from WSCP action	0%
2025	**Total**
Total Water Use (AF)	120,206
Total Supplies (AF)	153,329
Surplus/Shortfall w/o WSCP Action (AF)	33,124
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**33,124**
Resulting % Use Reduction from WSCP action	0%

Note: Years 2021 through 2024 are interpolated between the 2020 actual supply and use values and the 2025 projected supply and use for multi-year drought (from Table 7-4). 2020 actual supply is the average year supply from Table 7-1.

7.6 Description of Management Tools and Options

While IEUA does not anticipate any shortfall during drought periods, they are committed to supporting the water reliability of the region overall. Some of the management tools and options available to IEUA for increasing their regional water supply and reducing water demand have been described within other sections of this document. These tools and options include prioritizing maximizing the use of local water resources and minimizing the need for imported water due to the vulnerability of MWD imported water to climate change impacts such as changing precipitation patterns. IEUA also has a robust water use efficiency program detailed in Section 8 that identifies the most effective water use efficiency measures and partnerships for implementation in the region. This program coupled with savings from codes and standards and increased conservation-related messaging during drought periods can be a strong tool for reducing water use. IEUA has also made increasing the use of their recycled water a priority for future planning efforts, which will increase this source of supply for the region. Additional tools available to the region include water agency interconnections, service line capital improvements by MWD, and mutual aid agreements with other local agencies. Finally, enhanced groundwater management efforts and improvements in regional water management and coordination are also important for maintaining and enhancing the long-term overall resiliency of the region.

Section 8: Demand Management Measures

The purpose of the Demand Management Measures (DMMs) section of this UWMP is to (a) provide a description of the past water conservation programs that IEUA has implemented since 2015 to support its retail agencies in meeting their urban water use reduction targets and (b) describe the activities and actions IEUA may implement in the future.

8.1 Demand Management

For the purposes of this UWMP, DMMs are categorized as "Foundational" and "Other" DMMs. Listed below are those DMMs that the UWMP Act and Water Code specifically mention for wholesalers:

a) Metering
b) Public education and outreach
c) Water conservation program coordination and staffing support.

Activities in addition to the Foundational DMMs that encourage lower water use in the Agency's service area fall in the "Other DMM" category.

In addition, wholesalers must include a narrative description of its distribution system asset management and wholesale supplier assistance programs. In IEUA's case, the majority of its "Other DMMs" are included in the wholesale supplier assistance programs section (Section 8.7), which has been broken into the following categories: residential; CII; and landscape.

8.1.1 Legislative and Regulatory Requirements

As can be expected in a state with ongoing water resource challenges, California's governing entities have issued a number of regulatory requirements and policies over the past decade. Some of the regulations focus on manufacturing standards while others aim to achieve higher levels of water conservation.

State water use efficiency standards are included in SB X7-7, which requires 20% per capita water use reduction by 2020, and Assembly Bill 1881, the Model Water Efficiency Landscape Ordinance (MWELO). The Indoor efficiency standard is set at 55 gallons per person per day and the outdoor efficiency standard is set at 80% of the local evapotranspiration for existing landscapes (2015 WUEBP).

In 2018, the California State Legislature enacted AB 1668 and SB 606 to establish a new foundation for long-term improvements in water conservation and drought planning to adapt to climate change and the resulting longer and more intense droughts in California. The two bills were developed based on Governor Brown's "Making Water Conservation a California Way of Life" Executive Order B-37-16 signed in May 2016, which sets forth actions to use water wisely, eliminate water waste, strengthen local drought resilience, and improve agricultural water use efficiency and drought planning. The two bills provide requirements that affect water use efficiency and drought planning for urban water suppliers, agricultural water suppliers, and small water suppliers and rural communities. The bills also require water suppliers to develop a Water Shortage Contingency Plan and conduct 5-year Drought Risk Assessment every 5 years. IEUA's WSCP and Drought Risk Assessment are included in this UWMP (Appendix B and Section 7.5, respectively).

There are other relevant standards and regulations that establish water use requirements for water agencies and customers that are included in Table 2-8 in Section 2. IEUA's water use efficiency programs and planning efforts comply with all current state legislative and regulatory requirements and increase the resiliency and sustainability of the region's water supplies. IEUA plans to continue its demand management measures to meet any potential future WUE legislation and regulations.

8.1.2 COVID-19 Considerations for FY 19/20

As noted throughout the following sub-sections, the COVID-19 pandemic that began towards the end of FY 19/20 affected IEUA and its retail agencies' delivery and participation of in-person programs. Staff at the retail agencies and IEUA rethought delivery of each program to keep customers, staff, and contractors safe. Programs were adapted to be contactless or virtual where possible. It is a testament to the resiliency and creativity of IEUA's retail agencies and contractors that the programs were adapted and continued with minimal downtime. Despite the pandemic, activity actually increased year-over-year.

While the future remains uncertain, most agree that the impacts of COVID-19 will be felt for some time. As IEUA and its retail agencies look toward the implementation of WUE programs in this new environment, they remain committed to ensuring the health and safety of its personnel, contractors, and customers. The WUE programs will look to leverage this new normal and come up with fresh ideas for the implementation of traditional programs. Among the accommodations and new practices, IEUA foresees a continued shift towards virtual or video-based workshops and services, a greater emphasis of bill savings in promotional materials, and evaluation of alternative program formats such as online stores and direct delivery of free and discounted products.

8.2 Commitment to Water Use Efficiency

Over the last 5 years, the State of California, specifically the southern California region, has reached a critical point in water supply reliability with the convergence of several key factors that include unseasonably low rainfall, critically dry conditions, drought, economic recession, and significant population increases. As a result of these conditions, water use efficiency has become a statewide priority, and most State and local leaders recognize it as a vital component in meeting current and future water supply needs and reliability.

IEUA and retail agencies have recognized the need for developing programs that protect existing water resources so that adequate water supplies will be available for sustainability and future growth. The development of reliable local resources has been critical to maintaining current and future water supplies. In September 1991, IEUA became one of the first water agencies to sign the CUWCC's Memorandum of Understanding Regarding Urban Water Conservation (MOU), accepting and supporting to implement a prescribed set of urban water conservation BMPs. CUWCC is now known as the California Water Efficiency Partnership.

As the regional wholesale supplier of imported water for the area, IEUA has assumed the role of coordinating the region's activities and programs to reduce demand. IEUA has worked closely with IEUA's retail agencies to facilitate the installation of thousands of water saving technologies and devices, as well as the implementation of public outreach and education programs throughout the region. IEUA retail agencies, whose direct contact with retail customers is crucial to the implementation of water use efficiency measures, have co-funded these efforts with IEUA and taken a proactive approach in educating and working with their customers to conserve water.

In light of these circumstances, IEUA and its retail agencies' commitment to conservation has increased over the past 25 years as demonstrated through financial investments, policies, authorization of a broad range of WUE and conservation programs, expansion of the regional recycled water program, support for legislation, and local ordinance implementation. Moving forward, IEUA will continue to implement active and code-based BMP-related activities using strategies identified in the 2020 Regional WUEBP that is currently in development (discussed in the next section).

The future still presents uncertainties and significant challenges in maintaining regional water supply reliability, especially as the impacts of climate change begin to exacerbate the already existing challenges. The continued development of new and expanded local resources is vital to sustaining current and future water sources. Conservation and the efficient use of water is the most cost-effective source of water supply and essential to meeting the regions demand, today and for years to come.

8.3 Water Use Efficiency Business Plan

Over the past 28 years, IEUA and its regional partners have made great progress to attain environmental stewardship and sustainability through the development of local water supplies and reduced dependence on costly and increasingly unreliable imported water. A large part of that progress has come through the implementation of WUE programs and measures. WUE is universally regarded as the most cost-effective method to reduce water demand within a region. WUE encompasses a wide range of programs, services, devices, and innovations that IEUA captures in its Regional WUEBP, which is updated every 5 years. The most recent WUEBP is currently in development in collaboration with IEUA's regional partners. In general, the elements in the WUEBP may focus on using water more efficiently, eliminating water waste, and drought proofing the region through increased use of recycled water, groundwater, stormwater, and other local water supplies.

The WUEBP may focus on identifying target customers that are the most inefficient water users, educating them about WUE attainment, and providing a "road map" to accomplish this. To create the WUEBP, a thorough review of current, past, and potential new programs is being conducted, with calculations to be performed for costs, savings, and overall benefits to the region. The WUEBP may also evaluate developing WUE trends, emerging technologies, and potential MWD funding availability or other grants. The WUEBP may provide a portfolio of recommended programs with direct quantifiable and cost-effective water savings. Each retail agency may elect to modify the design of the programs presented in the WUEBP and may choose to participate in all programs or only a select few. IEUA collaborates with each retail agency to continually evaluate and modify the plan to meet the goals and objectives of the region.

Each year, IEUA prepares a comprehensive annual report that captures all the implemented activities from the past fiscal year. The annual report tracks the progress that has been made against the goals and objectives, identified in the WUEBP, and provides the retail agencies with service area specific data. As part of its annual report, IEUA quantifies the water savings by sector and by measure. The lifetime water savings by measure as of FY 19/20 are shown in Table 8-1. Savings from HETs dominate the lifetime water savings by measure table, at 42% of total savings, followed by turf removal and smart controllers.

The WUEBP is a working document and, as such, must be modified and updated as changes occur, and program years roll out. IEUA regularly reviews the plan and adjusts accordingly. Changes and/or reviews of the plan take place: when programs are added, subtracted, or modified; on an annual basis to meet the annual reporting requirements; every 5 years in parallel with UWMP updates; and as the State's framework policies are finalized.

The 2020 WUEBP in development may identify the future suite of water use efficiency programs for implementation and focuses on increased efforts in landscape management and reducing outdoor water use. Programs are designed to positively impact long-term behavior regarding efficient use of water. Those activities may include device rebates for residential and commercial customers, sprinkler system tune-ups, leak detection system rebates, turf replacement incentives, landscape evaluations, and landscape retrofits which incorporate hardware and climate appropriate plant recommendations that are consistent with landscape ordinances. This is combined with the ability to initiate a comprehensive marketing, education, and outreach program which includes the combined efforts of IEUA and its retail agencies. Details on the 2020 WUEBP in development and its possible selected programs are included in Section 8.9 and throughout the rest of Section 8.

Table 8-1: Lifetime Savings by Measure for Past Achieved Conservation

Measure	Lifetime Savings (AF)	Percent of Total Savings
High Efficiency and Ultra Low Flow Toilets (all markets)	47,448	42%
Turf Removal (all markets)	11,938	11%
Smart Controllers (all markets)	11,106	10%
Residential Landscape Retrofits (small & large)	8,554	8%
High Efficiency Sprinkler Nozzles (all markets)	8137	7%
Ultra-Low Volume Urinals	7,123	6%
High Efficiency Clothes Washers (all markets)	6,502	6%
Landscape Evaluations (all markets)	5,309	5%
Fontana USD Retrofits	4,170	4%
Plumbing Control Valves	476	0.4%
Water Brooms	416	0.4%
Pre-rinse Spray Valves	379	0.3%
X-ray Film Processors	304	0.3%

Measure	Lifetime Savings (AF)	Percent of Total Savings
Sprinkler System Tune-ups	284	0.3%
Laminar Flow Restrictors	247	0.2%
Pressure Regulating Valves	178	0.2%
Cooling Tower Controllers	155	0.1%
Leak Detection Devices	83	0.1%
Pool Covers	28	0.0%
Large Rotary Nozzles	22	0.0%
Air-Cooled Ice Machines	18	0.0%
Rain Barrels & Cisterns	13	0.0%
Total	**112,890**	**-**

Note: Water savings are active savings only.

8.3.1 Core Water Use Efficiency Strategies for the Region

There are five key elements to the WUE strategy within the IEUA region:

- **Promote Water Resource Management.** Manage effective WUE programs at a regional level using sound business decision-making practices to develop and implement strategies to meet water use efficiency targets and stretch limited water resources.

- **Develop and Implement Regional Programs.** Take advantage of economies of scale and stretch the limited regional WUE budget by implementing programs on a regional basis. It is recognized that some programs may only be implemented at the individual agency level, such as budget-based tiered rate structures and WUE ordinances.

- **Build IEUA Retail Agency Cooperation.** Foster cooperation, collaboration, and active participation of all IEUA retail agencies for the successful development and implementation of WUE programs. It is recognized that successful development and implementation of regional WUE programs requires retail agency cooperation in obtaining accurate water demand data, by customer class, in a timely manner, and promotion of cost-effective programs to customers.

- **Develop Incentive-Based Programs.** Develop effective incentive programs that encourage participation, provide public benefit, and achieve quantifiable water savings.

- **Public Recognition.** Provide recognition to customers who have implemented measures resulting in extraordinary water use efficiency achievements.

8.4 Foundational DMMs

8.4.1 Metering

IEUA does not have any direct connections to potable customers. All imported water supplied to the area through IEUA is delivered through direct connections owned by MWD.

8.4.2 Public Education and Outreach

Developed over the last 15 years and in cooperation with its local retail agencies, IEUA participates in and offers an array of regional educational outreach activities. These programs help provide support to the local retailers to help them meet their DMM requirements.

The following is a list of programs and activities implemented over the last 5 years that will continue to be foundational elements of IEUA's regional programs:

National Theater for Children (NTC) Program: Delivers a package of live theater, student curriculum, and teacher guides focused on uses of water, the importance of water, ways water gets polluted, and ways to conserve water to elementary schools throughout the region. In FY 19/20, NTC visited 40 elementary schools throughout the IEUA service area and conducted 74 shows.

Shows that Teach: Fun, theatrical-style productions which teach students about water science, the value of water, and the importance of conservation. Over FY19/20, this program conducted 23 performances at 12 schools. Retail agencies have decided to focus efforts on only one school education program moving forward and the Shows that Teach program will be eliminated.

Water Discovery Field Trip Program: Prior to the COVID-19 pandemic, IEUA provided free educational field trips to the Chino Creek wetlands and Educational Park to promote understanding of the value of natural treatment wetlands, the creation of habitat for endangered/sensitive species, and environmental stewardship. Due to the pandemic, IEUA shifted all education programs from in-person to virtual. In April 2020, IEUA launched Owlie's Virtual Adventures, a program featuring virtual tours, a series of At-Home Activities, how-to videos, and more.

Community Outreach: IEUA annually participates in the following community outreach activities in coordination with its retail agencies: San Bernardino County Water Conference, Landscape and Water Conservation Fair, CVWD's Earth Day, Earth Day at the Chino Creek Wetlands and Educational Park, and the Smart Irrigation Month Hose Nozzle Giveaway. IEUA also participates in other community outreach events that vary year to year.

IEUA's Social Media Outreach: IEUA continues to offer updates via Facebook, YouTube, Twitter, Instagram, and two educational blogs. On these social media platforms, IEUA provides up-to-the-minute information on events, news, education programs, drought updates, water-wise tips, park updates, and wildlife facts.

IEUA's Regional "Water is Life" Student Art/Poster Contest: IEUA hosts its annual "Water is Life" student art/poster contests for grades K-12. The theme "Water is Life" is used to help students express their creativity while focusing on the importance of water. IEUA typically receives over 500 entries annually. The top five winners from each category (K-5; 6-8; 9-12) are entered into MWD's regional contest.

Solar Cup Competition: The annual Solar Cup competition is held each year in May at MWD's Lake Skinner reservoir in the Temecula Valley. High school students from surrounding areas designed, built, equipped, and raced solar-powered boats. This competition encourages well-thought-out boat design, high speed, and endurance, which require participants to use an alternative power source in a real-world application. IEUA co-sponsors three local highs school teams annually. The May 2020 competition was transitioned to a virtual competition that consisted of 12 virtual challenges due to the health precautions related to the COVID-19 pandemic.

The Water Education – Water Awareness Committee: Since 1989, the committee promotes the importance of water conservation in southern California through coordination and participation in community outreach projects and providing grant funded opportunities for local educators. Projects include hosting booths at local resource and educational fairs, conducting water education workshops at local schools, offering grant and scholarship opportunities for educators and students, and sponsoring an annual water conservation video contest and broadcast media and digital art contest.

8.4.3 Water Use Efficiency Program Coordination and Staffing Support

IEUA's WUE Program consists of two full time employees and two interns. Consultants are also hired to help with reports and larger initiatives, like the 5-year WUEBP. In addition, IEUA collaborates with CBWCD, MWD, and two vendors for funding and implementation of specific WUE programs.

Currently, IEUA's WUE program budget is approximately $2.7 million annually, $1.6 million of IEUA funding and another $1.1 million of outside funding. These revenues are collected with the support and cooperation of the retail water agencies. IEUA's revenue collection for water use efficiency and conservation comes from a Meter Equivalent Unit charge, which is the number of active water accounts of each meter served by an IEUA retail agency. Over the past 5 years, IEUA has dedicated an average of $1,600,000 annually to Wholesale Assistance Programs, of which $300,000 goes to education and outreach programs. These local funds are augmented with external funding from sources such as MWD, DWR, and the U.S. Bureau of Reclamation, and other inter-agency partnering programs.

The 2020 WUEBP in development may provide annual regional WUE program budgets with line items dedicated to specific WUE activities for the next 5 years. The draft projected annual budget for each year is shown in Table 8-2. This budget is still in development and may be subject to change. The budget amount reflects the financial commitment of IEUA only and are exclusive of MWD or other external financial contributions. The budgets presented do not align exactly with actual costs because the figures are based upon estimated WUE programming activity that vary depending upon program participation rates.

Table 8-2: IEUA Annual Water Use Efficiency Programs Budget

Fiscal Year	Annual Water Savings (AF)
2020/21	$1,600,000
2021/22	$1,600,000
2022/23	$1,600,000
2023/24	$1,600,000

Fiscal Year	Annual Water Savings (AF)
2024/25	$1,600,000
Total	**$8,000,000**

Notes:
Budget includes IEUA regional program costs exclusive of outside funding.
Budget does not include administrative overhead costs.
Budget includes $300,000 per year for education and outreach programs.
Budget subject to change during 2020 WUEBP development.

8.5 Other DMMs

IEUA has also provided the following programs to support its retail agencies water use efficiency over the past 5 years:

Member Agency Administered Program: This program provides funding support for retail agency implemented local water use efficiency projects that demonstrate water savings. Members submit proposals that include a project scope of work, estimated water savings, and cost. Proposed project may not be duplicative of existing regional programs.

Technology Based Software: IEUA sponsored the development of agency-specific dashboards that allowed its retail agencies to locate high water use landscapes, identify over water-use parcels, track agency use against set State WUE objectives, and direct WUE programs to customer specific needs. These data analytics tools allow IEUA's retail agencies to identify customers more accurately with excess water usage and communicate with them on how their usage compares to accepted WUE standards.

Budget-Based Water Rates: This is one of the most cost effective WUE programs since there is no cost to implement. These rate structures allocate each individual account an amount of water that would be required for efficient indoor and outdoor water use, adjusted to real-time actual weather and customer characteristics. Customers are able to compare their individualized water budget with their actual usage and the appropriate economic signal rewards efficient use. With a clear financial incentive, the customer is motivated to maintain efficient use patterns. Over the last 5 years, three of IEUA's retail agencies have adopted budget-based rate structures within their respective service areas.

Additional "other" DMMs implemented by IEUA are described in the Section 8.7, Wholesale Agency Support.

8.6 Asset Management

IEUA does not own or operate a potable water distribution system, and therefore, does not have any potable water asset management programs.

8.7 Wholesale Agency Support

IEUA provides financial assistance to each of the local retail agencies in an effort to support local WUE implementation efforts. Each retail agency is eligible to receive an annual grant of

$2,000 to support special events, customer surveying, outreach materials, conservation devices, and vehicle magnets. In addition, IEUA covers dues costs for memberships in the Alliance for Water Efficiency and the California Water Efficiency Partnership on behalf of its retail agencies and conducts annual technical workshops that provide retail agencies with information related to specific water use efficiency initiatives, programs, BMP implementation and compliance with new statutory requirements. This is part of IEUA's commitment to the DMMs (Wholesaler Assistance Programs) which requires a wholesaler to provide financial and/or technical assistance to their local retail agencies to implement DMMs.

IEUA has an annual average WUE budget of approximately $1.6 million that is dedicated to supporting the local retail agencies in implementing WUE and conservation related programs. The following subsections detail residential, CII, landscape, and other programs offered by IEUA and its retail agencies over the last 5 years.

8.7.1 Residential Programs

Between 2015 and 2020, IEUA and its retail agencies continued implementing a variety of WUE and conservation programs and products that have led to significant accomplishments in demand reduction and sustained water savings. These programs have consisted of incentives for homeowners and businesses, landscape efficiency, and educational programs. Most of these programs have been very successful and others were introduced as pilots.

The following is a list of activities and programs that were accomplished by IEUA and its retail agencies from 2015 to 2020. Savings as reported by the WUE annual report for FY 19/20 are also included below. Additional details can be found in the annual report.

MWD SoCalWater$mart.com Residential Rebate Program: IEUA's foundational WUE rebate program for residential customers provides incentives for HETs, washing machines, sprinkler nozzles, weather-based irrigation controllers, and rain barrels. IEUA and its retail agencies dedicate funding specifically for enhancing MWD's base rate rebate amounts to attract greater customer participation. In FY 19/20, this program had an annual water savings of 57 AF for a total lifetime savings of 731 AF. A total of 7,051 devices, from over 1,500 residential and commercial customers, were rebated in FY 19/20. High efficiency sprinkler nozzles and HETs are the largest numbers of devices rebated by residential customers. This program has the lowest cost per AF of water savings.

Turf Replacement Program: As part of the Turf Replacement Program, residential customers within IEUA's service area are eligible for a $3 per square-foot rebate partially funded by MWD. In FY 19/20, approximately 184,286 square feet of residential turf was replaced, for an estimated annual water savings of 24 AF and a total lifetime savings of 243 AF.

Residential Pressure Regulation Program: This program, launched in June 2016, installs PRVs at meters, homes, or at the point-of-connection for irrigation systems to automatically reduce high incoming water pressure from water mains and provide a lower, more functional pressure distribution. PRVs ensure that end-use plumbing fixtures operate at the intended flow rate and reduce the incidence of excessively leaky pipes and fixtures. To date, this program has replaced 1,287 PRVs throughout the IEUA service area with projected savings of 4 AF per year and lifetime savings of 45 AF over the life of the devices. MWD completed a study of the water savings following installation of PRVs, these savings are lower than previously expected; however, IEUA's retail agencies have elected to continue with the program because of its highly valued customer service. The program is now provided on a case-by-case basis for customers experience issues with pressure.

Leak Detection Incentive Program: Recent studies of leak detection programs show a reduction in water use of 8% to 18%, with approximately 70% of customers finding leaks. This program, which was starting as a pilot program at the beginning of FY 19/20, provides a point of purchase discount for the Flume Smart Water System. The Flume app provides real time alerts notifying customers of excessively high volume or long duration water usage. It allows customers to better understand their water usage through user-friendly visuals. Demand for this program was unprecedented and the program is being expanded in FY 20/21. This program has an annual savings of approximately 8 AF per year and a lifetime savings of 83 AF.

IEUA Regional Residential Landscape Retrofit Program – DWR/MWD: Initially launched in April 2011, this program provides outdoor irrigation evaluations and retrofits of high efficiency landscape devices for residential water service customers with lot sizes of ¼ acre or larger. Since program inception, a total of 1,672 site retrofits were completed with annual water savings from device upgrades amounting to 932 AF per year and a lifetime savings of 7,962 AF.

IEUA Residential Education, Survey, and Controller Upgrade Program: Focused on the higher water use demographic within the small residential landscape sector, this program promotes an improved understanding of landscape irrigation control technologies while ensuring more efficient scheduling and operation of automated irrigation systems through required training class attendance, landscape evaluations, and smart controller technology upgrades. In FY 19/20, over 450 smart controllers were installed. Program water savings to date is approximately 20 AF per year for an average lifetime savings of 196 AF.

Santa Ana River Conservation and Conjunctive Use Program Smartscape Residential Tune-Up Program: This pilot program was starting in April 2019 to provide services to maximize the efficiency of a customer's existing irrigation system. In partnership with ConservInc., Orange County Coastkeeper, and Inland Empire Water Keeper, the program includes services such as sprinkler repairs, valve replacements, drip irrigation couplers and emitter replacements, minor lateral irrigation line repairs, and a general audit. Final water savings from the program are still being determined.

FreeSprinklerNozzles.com Voucher Program: Launched in April 2011, this program enabled residential and commercial customers within IEUA's service area to obtain a voucher for free high efficiency irrigation spray nozzles through a web-based portal. Since program inception, a total of 2,214 vouchers have been redeemed by residents for a total of 60,591 nozzles and an estimated water savings of 267 AF per year with a lifetime savings of 1,333 AF.

Water Softener Rebate Program: IEUA incentivizes customers through a rebate to remove residential self-regenerating water softeners. Over the course of the program, 901 water softeners have been removed, for water savings of approximate 17 AF per year in addition to the removal of more than 200 tons of salt.

8.7.2 Commercial, Industrial, Institutional Programs

IEUA's service area hosts a diverse range of CII activities, including numerous service industries (such as hotels and restaurants), manufacturing, agriculture and health care, and a large number of schools and colleges. Each of these sectors present unique opportunities to reduce water consumption. Although commercial accounts comprise only 5% of the total number accounts in the IEUA area, they use approximately 17% of overall demand.

The following is a list of activities and programs that were accomplished by IEUA and its retail agencies from 2015 to 2020:

MWD SoCalWater$mart.com CII Rebate Program: IEUA's foundational water use efficiency rebate program for CII customers provides incentives that include plumbing fixtures, landscaping devices, and some industry specific technologies. IEUA and its retail agencies dedicate funding specifically for enhancing MWD's base rate rebate amounts to attract greater customer participation. In FY 19/20, this program had an annual water savings of 93 AF for a total lifetime savings of 1,043 AF. Laminar flow restrictors and HETs are the largest numbers of devices rebated by commercial customers. This program has the lowest cost per AF of water savings.

Turf Replacement Program: As part of the Turf Replacement Program, commercial customers within IEUA's service area are eligible for a $3 per square-foot rebate, partially funded by MWD. In FY 19/20, approximately 318,778 square feet of commercial turf was replaced, for an estimated annual water savings of 42 AF and a total lifetime savings of 421 AF.

Garden in Every School Program: Each year, the Garden in Every School Program awards either a $4,500 grant per school for up to four schools for the establishment of a new water-wise garden or a $1,000 mini-grant to participating schools to support the sustainability of existing gardens. Due to the COVID-19 pandemic, the program was put on hold through FY 20/21.

8.7.3 Landscape Programs

The semi-arid climate of the IEUA service area, with only 15 inches of average rainfall, combined with the lush landscaping aesthetic that is popular in the region, creates a significant water demand for irrigation of outdoor landscaping. The IEUA service area reflects this demand, where outdoor water use is estimated to be nearly 60% of total demand across all sectors. Many of the residential programs detailed in Section 8.7.1 are landscape programs that are categorized as residential programs.

IEUA and its retail agencies have also completed the following list of activities and programs over the last 5 years:

Sprinkler Tune-Up Program: Begun as a pilot in FY 18/19, the program was operated during FY 19/20 by Conserv Inc, IEUA's existing vendor for smart controller installation programs. There was unprecedented customer demand for this program, with a 275% increase in activity year-over-year. The program provides customers with a free landscape irrigation tune-up that includes recommendations for repairs and upgrades, replacement or adjustment of sprinkler heads and nozzles, reparation of valves and bad wiring, controller programming and scheduling, and minor lateral irrigation line repairs. In FY 19/20, 450 tune-up services were performed, and the program achieved an annual water savings of 104 AF for a total lifetime savings of 209 AF.

IEUA/Chino Basin Water Conservation District Landscape Evaluation and Audit Program (LEAP): The LEAP program provides landscape and irrigation evaluations for residential and CII customers. This program was launched in 2007 through a grant from DWR and is available region-wide annually. In FY 19/20, 91 residential and 53 commercial properties were evaluated. The program has an annual savings of 43 AF and a total lifetime savings of 213 AF, the majority of which comes from commercial customers.

IEUA Regional Landscape Training Workshops: In a series of IEUA-sponsored courses, customers learn the latest ways to create sustainable landscape and improve landscape efficiency to reduce outdoor water usage through workshops. The courses cover information on landscape design and preparation, water wise landscaping, mulching, and composting, and more. Only four in-person workshops were held in FY 19/20, in part due to COVID-19 health precautions but also because of decline in customer demand.

Residential Landscape Transformation Program: From October 2012 to June 2016, this program offered residential participants contractor services that included landscape design, selection of climate appropriate plants, removal of living turf, installation of weed barriers and plants, and conversion of overhead sprinklers to drip irrigation. A total of 263 sites were completed removing 232,655 square feet of turf, resulting in an estimated water savings of 34 AF and a lifetime savings of 341 AF.

Landscape Design Assistance Program: This program delivers a comprehensive landscape design package to support front and backyard renovations at no cost to participants. The service has a market value of approximately $500. A partnership between IEUA, the CBWCD, and IEUA's retail agencies, this program is designed to provide participants with a clear and inspiring design that is easily usable by residents who have no experience reading landscape plans. Since the program launch in February 2018, 32 residential landscape designs have been created, eight turf replacement projects were completed, and 19 projects are in progress.

Residential Landscape Guidebook: The step-by-step instruction book includes "how-to's" on resilient landscape design, building healthy soils, selecting climate appropriate plants, and installing efficient irrigation systems. The Guidebook is located online at www.ieua.org/usewaterwisely/landscaping.

Water Saving Garden Friendly: This program helps customers find the resources they need to be water efficient in their landscape. The program developed a micro-website called "Water Saving Garden friendly in the Inland Empire", an online plant database climate specific to the region. The website also includes garden tours, a garden gallery, a search engine for plants, problem solving plant lists, plant and garden information report printouts, a garden resources section, and water conservation tips. The micro-site can be found at www.watersavinggardenfriendly.com.

8.8 Demand Management Achievements (2015-2020)

The above sections detailed recent savings for each program. Majority of these values come from the Alliance for Water Efficiency (AWE) Conservation Tracking Tool, which IEUA uses to plan for and track water conservation program activity and results. The tool helps estimate the effects of plumbing/appliance standards and planned conservation programs on future water use, utility costs and sales revenue, and average customer rates and bills. Data from the region's locally administered programs as well as MWD's regional rebate programs has been collected and entered into the AWE tracking tool for every year back to 1995.

Using the AWE Tracking Tool, for calendar year 2020, IEUA's annual water savings was approximately 408 AF and 3,292 AF over the life of the measures (excludes national plumbing standards). The majority of the annual water savings come from single-family and commercial programs, which are 49% and 44% of annual water savings, respectively. Table 8-3 shows the FY 19/20 lifetime savings by sector, the year's conservation savings through the lifespan of each measure, which varies measure by measure. Again, the single-family sector accounts for the majority of the water savings, at 64%, which comes predominantly through landscape measures, followed by 29% from the commercial sector. Due to the categorization of the programs, there are no annual water savings for the multi-family sector.

Table 8-3: Water Savings by Sector

Sector	Lifetime Water Savings (AF)	Percent of Total Water Savings
Single-Family	13,954	64%
Multi-Family	0	0%
Commercial	6,372	29%
Irrigation	1,515	7%
Total	**21,841**	

The eight major IEUA WUE programs with verifiable water savings are:

- SoCal WaterSmart Rebates (accounts for 37% of FY 19/20 annual savings and 54% of the lifetime savings)
- Sprinkler Tune-Ups (accounts for 25% of FY 19/20 annual savings and 6% of the lifetime savings)
- Turf Replacement (accounts for 16% of FY 19/20 annual savings and 20% of the lifetime savings)
- Landscape Audit and Evaluations (accounts for 11% of FY 19/20 annual savings and 7% of the lifetime savings)
- Smart Controller Upgrades
- Large Landscape Retrofits

- Leak Detection Incentives
- Pressure Regulation.

The quantifiable savings by program that have been achieved over the last 5 years are included in Table 8-4. As shown in these tables, HETs and turf removal have achieved the most savings both over the last 5 years and over all time (as shown previously in Table 8-1), followed by smart controllers and residential landscape retrofits. It should be noted that the HET program was phased out in FY 2015/16 but still are most of the lifetime savings.

Table 8-4: Savings by Program (FY 2015/16 – FY 2019/20)

Measure	Lifetime Savings (AF)	Percent of Total Savings
High Efficiency Toilets (all markets)	10,775	35%
Turf Removal (all markets)	9,027	29%
Residential Landscape Retrofits (small & large)	4,450	14%
Smart Controllers (all markets)	2,025	7%
High Efficiency Sprinkler Nozzles (all markets)	1872	6%
High Efficiency Clothes Washers (all markets)	890	3%
Landscape Evaluations (all markets)	704	2%
Plumbing Control Valves	476	2%
Sprinkler System Tune-ups	284	1%
Pressure Regulating Valves	178	1%
Laminar Flow Restrictors	142	0.5%
Leak Detection Devices	83	0.3%
Ultra-Low Volume Urinals	29	0.1%
Air-Cooled Ice Machines	14	0.0%
Cooling Tower Controllers	13	0.0%
Rain Barrels & Cisterns	12	0.0%
Total	**30,974**	-

8.9 2020 WUEBP and Future Demand Management Measures

IEUA recognizes that conserving water and increasing water use efficiency is an integral component of a responsible water management strategy. The IEUA region has achieved its 2020 SBX7-7 water use target largely by focusing on offering customers a portfolio of programs to increase indoor and outdoor water efficiency measures, developing building codes and landscape ordinances, and reducing demand for potable water by increasing recycled water supply. IEUA is committed to providing its customers with the education and tools to maintain and even lower their current water use.

The most recent WUEBP is currently in development and will be completed in 2021. The document may be split into two phases. The first phase may cover the WUE plans for the next 2 years. The second phase may be released as an addendum to the WUEBP and will cover the subsequent 3 years of the 5-year planning period. This potential breakdown into two phases would allow IEUA and its regional partners to collaborate more effectively and give more time to dive into its plans to meet upcoming water use regulations. In general, the elements in the WUEBP may focus on using water more efficiently, eliminating water waste, and drought proofing the region through increased use of recycled water, groundwater, stormwater, and other local water supplies. As of the time of this writing, the 2020 WUEBP is still in development; any information included in Section 8 related to the 2020 WUEBP is therefore, subject to change.

As part of the development of the 2020 WUEBP, a possible a portfolio of recommended programs and new technologies have been identified for implementation over the next 5 years that will help the region achieve a prolonged, increased level of water efficiency. While the IEUA regional alliance is currently exceeding water use targets set by SBX7-7, IEUA will continue to implement the DMMs to further lower water uses in anticipation of future water use objectives. The programs, policies, and technologies detailed in the WUEBP will assist in helping IEUA's retail agencies to maintain the conservation levels to allow them to stay in compliance with the SBX7-7 2020 target as described in Section 3 of this UWMP.

Along with continuing its education and outreach programs, the development of the 2020 WUEBP identified possible selected programs for implementation as shown in Table 8-5 below. The table also includes a summary of the reasoning behind the potential selection and the support actions required for each program. These selected programs are subject to change with the further development of the 2020 WUEBP.

Table 8-5: Selected Programs and Reasoning

Program	Reasoning	Support Actions
Landscape Evaluations	• Links customer with WUE Programs • Provides one-on-one customer education • Starts relationship with customer	• Prioritize large landscape customers – if possible, customers that are above their water budget allocation • Provide more in-depth cost/benefit information • Provide personalized follow-up and support
Sprinkler System Tune-Up	• Nearly all irrigation systems need repairs • Repairs are necessary before efficiency upgrades are made otherwise new products will not work as designed • There are millions of sprinkler nozzles in the IEUA territory that are not high efficiency and need to be retrofitted • Measures are professionally installed by qualified contractors	• Nearly all irrigation systems need repairs • Repairs are necessary before efficiency upgrades are made otherwise new products will not work as designed • There are millions of sprinkler nozzles in the IEUA territory that are not high efficiency and need to be retrofitted • Measures are professionally installed by qualified contractors
Large Landscape Retrofit	• Targets large water use • Site visit verifies there will be savings • Professional installations and programming of controller	• Identify customers through Tune-up Program • Additionally, market locally • Provide electronic follow-up with customer to ensure sustained savings

Program	Reasoning	Support Actions
Small Smart Controller Upgrade	• Offering to smaller lots provides bigger pool of potential customers • Site visits verifies there will be savings • Educational workshop ensures customer can program and maintain controller and therefore, sustain savings	• Use water budget and potential savings to show return on investment • Consider providing video conferencing for controller programming assistance • Consider customer co-pay to lower costs
Turf Replacement Incentive	• There are hundreds of thousands of square feet of irrigated turf in IEUA territory • Replacing turf with regionally appropriate plants aids in transforming the market • Program provides long term savings	• Provide easier access to support services • Link customers with design services • Follow up with customers to assist them through process
SoCal Water Smart Rebates	• MWD funding • MWD administration • Most cost-effective program • Ease of implementation	• Continue to add incentive dollars to priority measures • Promote through all other programs • Market locally
Leak Detection Incentive	• Many homes have leaks, currently industry estimates 10% • Most leaks go undetected and customers are not aware for months until they get their bill • Repairing water damage caused by leaks can cost thousands of dollars for a typical homeowner • Providing customers with data on their water use gives them the necessary information and motivation to make efficiency changes	• Finalize program delivery – standard rebate vs home delivery • Market locally
Low Income Leak Repair	• Addresses equity and affordability issues – especially increasing financial impacts of COVID-19 • Repairing water damage caused by leaks can cost thousands of dollars for a typical homeowner • Financially vulnerable population cannot afford to fix leaks • Customers value service and builds relationship with water agency • Program provides excellent PR	• Consider partnering with housing agencies or energy utility • Conduct outreach to targeted population • Identify leaks through water use analysis and preemptively reach out to customers
Pressure Regulating Valve Installations	• Many home plumbing systems have leaks and operate above the intended flow rate due to high pressure	• Consider customer co-pay option to lower costs • Target customers with complaints about high water pressure • Use as a means for promoting other conservation measures

Note: Information from Draft 2020 WUEBP, information subject to change.

The draft 2020 WUEBP currently estimates that its water conservation programs will save approximately 9,008 AF of water over the next 5 years, at a cost of $52/AF. This cost falls well below the region's cost of purchasing imported water from MWD, which is $1,122/AF. Table 8-6 shows the potential projected annual water savings to be achieved through the 5-year plan currently being outlined in the 2020 WUEBP. These plans are subject to change with further development of the 2020 WUEBP.

Table 8-6: Projected Annual Water Savings

Fiscal Year	Annual Water Savings (AF)
2020/21	691
2021/22	1,340
2022/23	1,851
2023/24	2,333
2024/25	2,792
Total	**9,008**

Note: Values from Draft 2020 WUEBP, information is subject to change.

These potential projected annual water savings come from the projected annual activity for each measure, shown in Table 8-7 below.

Table 8-7: Annual Activities by Measure (units vary)

Measure	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
SCWS Premium Efficiency Toilet Rebates	550	550	550	550	550
SCWS Res High Efficiency Clothes Washer Rebates	600	600	600	600	600
SCWS Res High Efficiency Sprinkler Nozzle Rebates	1,200	1,200	1,200	1,200	1,200
SCWS Res Smart Controller Rebates	600	600	600	600	600
Large Landscape Retrofit Program	200	200	200	200	200
SCWS Res Turf Removal Rebate - IEUA $1 (sf)	200,000	200,000	200,000	200,000	200,000
SCWS CII Premium Efficiency Toilet Rebate	2,000	2,000	2,000	2,000	2,000
SCWS CII Smart Controller Rebate	100	100	100	100	100
SCWS CII High Efficiency Sprinkler Nozzle Rebates	1,000	1,000	1,000	1,000	1,000
SCWS Laminar Flow Restrictor Rebates	1,000	1,000	1,000	1,000	1,000
CBWCD Res Landscape Evaluation	50	50	50	50	50
CBWCD CII Landscape Evaluation	50	50	50	50	50
SCWS Rain Barrel Rebates	50	50	50	50	50
SCWS CII Turf Removal Rebates - IEUA $1 (sf)	250,000	250,000	250,000	250,000	250,000
Pressure Regulating Valve Program	50	50	50	50	50
SCWS Plumbing Flow Control Rebates	350	350	350	350	350
Smart Controller Upgrade Program	250	250	250	250	250
Sprinkler Tune-Up Program	450	450	450	450	450
Landscape & Irrigation Pay for Performance Incentive	25	25	25	25	25
Leak Repair Program - DAC Low Income	100	100	100	100	100

Notes: SCWS = SoCal Water Smart. Res = Residential. CII = Commercial, Industrial, and Institutional.
DAC = Disadvantaged Communities
Information from Draft 2020 WUEBP, information is subject to change.

Section 9: Energy Intensity Reporting

9.1 Overview

Water and energy resources are inherently connected. The California Energy Commission estimates that the transport and treatment of water, treatment and disposal of wastewater, and the energy used to heat and consume water account for nearly 20% of the total electricity and 30% of non-power plant related natural gas consumed in California. In 2015, California issued new rules requiring 50% of its power to come from renewables, along with a reduction in greenhouse gas emissions to 40% below 1990 levels by 2030. In 2018, Governor Jerry Brown signed Senate Bill 100 (SB100) into law, committing California to 100% carbon-free energy by 2045. IEUA has voluntarily reported the energy intensity of its wastewater and recycled water operations to assist with this goal. IEUA does not own or operate any potable water facilities.

The methodology for calculating water energy intensity outlined in Appendix O of the UWMP Guidebook was adapted from the California Institute for Energy Efficiency exploratory research study titled “Methodology for Analysis of the Energy Intensity of California’s Water Systems” (Wilkinson 2000). The study defines water energy intensity as the total amount of energy, calculated on a whole-system basis, required for the use of a given amount of water in a specific location.

UWMP reporting is limited to energy intensity associated with water management processes occurring within an urban water supplier’s direct operational control. Operational control is defined as authority over normal business operations at the operational level. Any energy embedded in water supplies imparted by an upstream water supplier (e.g., water wholesaler) or consequently by a downstream water purveyor (e.g., retail water provider) is not included in the UWMP energy intensity tables. IEUA’s calculations for wastewater treatment and recycled water conform to methodologies outlined in the UWMP Guidebook and Wilkinson study.

The water supply energy intensity and wastewater and recycled water energy intensities were calculated for the 2019-2020 fiscal year (July 1st through June 30th). The energy use associated with the wastewater and recycled water processes is shown below in Table 9-1. IEUA’s administrative facilities do not have dedicated energy consumption meters and instead share meters with the connected wastewater and recycled water facilities. As such, the per facility energy usage below includes administrative energy use. Excluding imported electricity that may come from renewable sources, approximately 32% of the total energy associated with IEUA’s wastewater and recycled water operations came from renewable sources, specifically solar, wind, and biogas capture.

Table 9-1: Energy Use for FY 19-20 Wastewater and Recycled Water Processes

Facility	Electricity (kWh)	Natural Gas (kWh)	Diesel (kWh)	Propane (kWh)	Biogas (kWh)	Renewables (kWh)
Wastewater Operations (FY 19-20)						
CCWRF	6,093,490	2,491	20,515	3,643	-	291,104
RP-1	19,764,610	137,798	121,964	132,753	19,682,446	1,472,002
RP-2	2,127,332	51,597	67,851	607	7,164,301	-
RP-4	7,040,126	4,922	27,336	2,226	-	311,110
RP-5	8,612,362	2,288,982	23,293	607	-	1,938,054
Biosolids Handling	-	-	875,072	-	-	-
Montclair Lift Station	93,351	-	-	-	-	-
Philadelphia Lift Station	651,913	-	-	-	-	-
San Bernardino Lift Station	492,701	-	-	-	-	-
Prado Dechlorination Station	59,073	-	-	-	-	-
Prado Lift Station	893	-	-	-	-	-
Recycled Water Operations (FY 19-20)						
CCWRF	3,186,402	-	-	-	-	-
RP-1	6,910,814	-	-	-	-	-
RP-2	-	-	-	-	-	-
RP-4	2,614,994	-	-	-	-	-
RP-5	2,518,862	-	-	-	-	-
1630 E. Station	1,108,112	-	-	-	-	-

Notes:
1. Data collected for FY 2019/2020 from metered data.
2. Energy use data includes energy used for administrative buildings.
3. Diesel numbers are based on purchases and are an average of FY18-19 and FY19-20.
4. The Philadelphia Lift Station energy use is not included in the calculation of wastewater energy intensity; the lift station pumps high strength brine to the non-reclaimable wastewater system.

kWh = kilowatt-hour

9.2 Water Supply Energy Intensity

IEUA is a wholesale distributor of imported water and treats and delivers recycled water to retail agencies and some large retail agricultural customers for the purposes of agriculture, municipal irrigation, industrial uses, and groundwater replenishment. Recycled water is not included in the water supply energy intensity calculations but is included in the following section with wastewater. Since IEUA does not own any water supply infrastructure, it does not have any energy use related to its water supply and distribution, resulting in an energy intensity of zero kilowatt-hours per acre-foot. Table 9-2 (DWR’s Table O-1A) is included below with this information in the narrative section.

Table 9-2: Water Supply Energy Intensity

Urban Water Supplier: *IEUA*

Water Delivery Product (If delivering more than one type of product use Table O-1C)

Wholesale Non-Potable Deliveries

Table 9-2: Water Supply Energy Intensity

Table O-1A: Recommended Energy Intensity - Water Supply Process Approach								
Enter Start Date for Reporting Period: 7/1/2019 End Date: 6/29/2020	**Urban Water Supplier Operational Control**							
	Water Management Process						**Non-Consequential Hydropower (if applicable)**	
	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (AF)	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Energy Consumed (kWh)	*0*	*0*	*0*	*0*	*0*	*0*		*0*
Energy Intensity (kWh/AF)	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

Quantity of Self-Generated Renewable Energy

0 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

Narrative:

IEUA does not use any energy for stormwater management. Any energy associated with imported water is associated with the infrastructure owned and operated by MWD. IEUA therefore has no energy use associated with its water management process. Any energy associated with groundwater recharge is included in the wastewater and recycled water energy intensity calculations. Any upstream embedded energy consumed prior to IEUA taking control of its imported MWD water or downstream embedded energy consumed by IEUA's member agencies to treat or distribute this water is not included in this analysis.

9.3 Wastewater and Recycled Water Energy Intensity

IEUA manages regional sewage service within its 242-square mile service area to collect, treat, and dispose of wastewater delivered by contracting local agencies. A system of regional trunk and interceptor sewers conveys sewage to five regional wastewater treatment plants owned and operated by IEUA. Wastewater facilities use tertiary treatment to produce recycled water meeting Title 22 standards for non-potable reuse and groundwater replenishment. Recycled water that is not reused is discharged to the Santa Ana River. IEUA delineates wastewater from recycled water at the point following chlorination and prior to the recycled water pump stations.

In addition to wastewater and recycled water infrastructure, IEUA also operates the Prado Dechlorination Facility, Inland Empire Regional Composting Facility, and Chino Creek Wetlands & Educational Park. While operationally controlled by IEUA, the Inland Empire Regional Composting Facility and Chino Creek Wetlands & Educational Park are not directly related to the collection, treatment, or distribution of wastewater or recycled water and thus considered outside the reporting boundaries. While the UWMP Guidebook energy intensity definition considers the energy consumed for all Wastewater Management Processes (collect, treat, and discharge wastewater) and energy consumed for all Recycled Water Management Processes (convey, treat, and distribute recycled water supplies) IEUA has also included the energy consumption from administrative buildings, such as IEUA's headquarters facility, in the energy intensity calculation. This is because IEUA administrative facilities are directly connected to and share energy meters with wastewater and recycled water facilities. The energy associated with the NRWS is not included in the energy intensity calculations.

Over FY 19-20, IEUA collected and treated 55,245 AF of wastewater. 30,495 AF of recycled water was produced, of which 17,115 AF was distributed to retail agencies and retail customers and the remaining 13,381 AF was recharged. Any wastewater that was not recycled was discharged to the Santa Ana River; in FY 19-20 this volume was 24,750. Wastewater volume is based on metered data at the recycling plants.

Table 9-3 shows the energy intensity calculated for the wastewater and recycled water operations using the energy use provided in Table 9-1. The volume of wastewater entering the process is the amount of wastewater treated at the regional water recycling plants RP-1, RP-4, RP-5, and CCWRF. The wastewater is tertiary treated to recycled water meeting Title 22 quality standards for non-potable use and groundwater recharge. Of this volume, a portion is dechlorinated and then discharged to the Santa Ana River. There is no energy associated with the collection or conveyance of recycled; this energy is captured within the energy use for the wastewater operations collection and conveyance. The Philadelphia Lift Station conveys non-reclaimable wastewater to Los Angeles County; the volume and energy use associated with this lift station is therefore, not included in the wastewater energy intensity calculations.

A portion of the energy used in the wastewater and recycled water processes comes from self-generated renewable energy. In FY 19-20, the amount of renewable energy used was 30,859,017 kWh, of which 4,012,270 kWh was from renewable energy sources (solar and wind) and 26,846,747 kWh comes from the capture of biogas. A portion of biogas produced during wastewater treatment is captured and beneficially used as part of IEUA's treatment process. Unused biogas is flared to convert methane to carbon dioxide and reduce greenhouse gas emissions from the facilities. All the self-generated renewable energy is used in the wastewater treatment process. Not included in this amount of renewable energy is the portion of purchased electricity that is supplied through sustainable sources. IEUA purchases electricity from Southern California Edison. On average, 30% of the electricity purchased is considered sustainable.

Table updated 12/2/2021

Table 9-3: Wastewater and Recycled Water Energy Intensity

Urban Water Supplier: *Inland Empire Utility Agency*

Table O-2: Recommended Energy Intensity - Wastewater & Recycled Water				
Enter Start Date for Reporting Period: 7/1/2019	Urban Water Supplier Operational Control			
End Date: 6/29/2020	Water Management Process			
	Collection / Conveyance	Treatment	Discharge / Distribution	Total
Volume of Wastewater Entering Process (AF)	*56,384*	*56,384*	*25,889*	*56,384*
Wastewater Energy Consumed (kWh)	*586,945*	*88,867,952*	*0*	*89,454,897*
Wastewater Energy Intensity (kWh/AF)	*10.4*	*1576.1*	*0.0*	*1586.5*
Volume of Recycled Water Entering Process (AF)	*30,496*	*30,496*	*30,496*	*30,496*
Recycled Water Energy Consumed (kWh)	*0*	*15,231,073*	*1,108,112*	*16,339,185*
Recycled Water Energy Intensity (kWh/AF)	*0.0*	*499.4*	*36.3*	*535.8*

Quantity of Self-Generated Renewable Energy related to recycled water and wastewater operations

34,713,912 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

Volume of water entering process based on metered data. Metering completed at each wastewater treatment plant.

Narrative:

The volume of wastewater entering the process is the amount of wastewater treated at the regional water recycling plants RP-1, RP-4, RP-5, and CCWRF. The wastewater is tertiary treated to recycled water meeting Title 22 quality standards for non-potable use and groundwater recharge. A portion is dechlorinated and then discharged to the Santa Ana River. The Philadelphia lift station pumps brine to the non-reclaimable water system and is therefore not included in the wastewater energy intensity calculations. All other wastewater discharge flows by gravity to the Santa Ana River. There is no energy associated with the collection or conveyance of recycled water since the volume just moves within the regional water recycling plants.

A portion of the energy used in the wastewater and recycled water processes comes from self-generated renewable energy. In FY 19-20, the amount of renewable energy used was 34,713,912 kWh, of which 7,867,165 kWh was from renewable energy sources (solar and wind) and 26,846,747 kWh comes from the capture of biogas. This amount is approximately 32% of IEUA's total energy use. A portion of biogas produced during wastewater treatment is captured and beneficially burned as part of IEUA's treatment process. Unused biogas is flared to convert methane to carbon dioxide and reduce greenhouse gas emissions from the facilities. All the self-generated renewable energy is used in the wastewater treatment process. Not included in this amount of renewable energy is the portion of purchased electricity that is supplied through sustainable sources. IEUA purchases electricity from Shell and Southern California Edison (SCE). On average, 30% of the electricity purchased from Shell and SCE is considered sustainable.

IEUA also operates the Inland Empire Regional Composting Facility and the Chino Creek Wetlands & Education Park. While operationally-controlled by IEUA, these facilities are not directly related to the collecction, treatment, or discharge of wastewater or recycled water and are considered outside the reporting boundaries. Similarly, while much of IEUA's headquarters and vehicles are dedicated to supporting wastewater and recycled water operations, to maintain consistency with the UWMP Guidebook, energy consumption from these operations has been excluded.

9.4 Key Findings

Calculating operational energy intensities helps agencies understand the water-energy nexus as it relates to their operations and processes. However, there is still work that needs to be done to better understand upstream and downstream water-energy impacts. Reporting boundaries are important to consider when comparing energy intensities between providers and water supply sources, since these boundaries exclude any embedded energy impacts on downstream users. Engaging the upstream and downstream supply chain can lead to more informed decisions that benefit the environment and the engaged parties.

IEUA has taken advantage of its renewable resources by developing a diverse energy portfolio, but additional planning is needed to address changing environmental regulations that may dictate available technologies. To continue providing reliable services to the region while remaining a steward of the environment, IEUA completed a CCAP in 2018. This plan outlined four business goals: maximizing local water supplies, maintaining the health of the groundwater aquifer, maximizing system efficiencies, and measuring performance. These goals will not only guide the agency's energy use but will minimize the agency's impact on the environment. Excluding imported electricity from renewable sources, approximately 32% of the total energy associated with IEUA's wastewater and recycled water operations came from renewable sources, specifically solar, wind, and biogas capture.

Section 10: Seismic Risk Assessment

Per the Water Code Section 10632.5, suppliers are required to assess seismic risk to water supplies as part of their WSCP. The plan also must include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.

Pursuant to Water Code, the seismic risk assessment must include a description of the vulnerability of each of its water system(s) facilities. Suppliers are encouraged to assess the vulnerability of external facilities or components that extend outside the supplier's service distribution area (e.g., transmission pipes, delivery canals, surface water diversion pumps) since failure of them would still ultimately disrupt the supplier's ability to serve their customers.

As a wholesaler, IEUA does not own or operate any potable water supply infrastructure and therefore, did not conduct a seismic risk assessment. IEUA purchases imported water from MWD, which conducted a seismic risk assessment as part of its 2020 UWMP. A brief summary of MWD's Seismic Risk Assessment and Mitigation Plan (Appendix 9 of MWD'S 2020 UWMP) is included here.

MWD has developed a holistic strategy for seismic resiliency that includes providing a diversified water supply portfolio, establishing system flexibility and emergency storage, preventing damage to infrastructure during seismic or other extreme events, and minimizing water delivery interruptions through a dedicated emergency response and recovery organization. MWD's water conveyance and distribution facilities are designed either to withstand a maximum probable seismic event or to minimize the potential repair time in the event of damage. MWD's ongoing program works to evaluate the seismic risk of aboveground structures, dams, and pipelines based on the current state of practice, operating conditions, seismicity criteria, and asset management strategies. Infrastructure will be prioritized for rehabilitation based on the results of these evaluations. MWD also conducts special seismic assessments periodically to increase understanding of the vulnerability of its assets and operations to various seismic hazards. In addition, MWD is working with the State of California on the Delta Risk Management Strategy to reduce impacts of a seismic event in the Delta that would cause levee failure and disruption of SWP deliveries (MWD 2021). Further information on MWD's seismic risk assessment and resiliency plan can be found in MWD's 2020 UWMP, Appendix 9.

IEUA delivers imported water to its retail agencies via MWD's infrastructure. These retail agencies then distribute the imported water via their own collection and distribution system infrastructure. As part of each retail agencies' 2020 UWMP, they have conducted seismic risk assessments to identify any existing vulnerabilities and identify mitigation measures for implementation. Details of these risk assessments can be found within each respective agencies' 2020 UWMP.

IEUA designs, builds, and operates recycled water treatment and distribution system infrastructure. The recycled water infrastructure owned by IEUA is all designed and constructed in compliance with the most recent California Building Code (CCR Title 24, Part 2) and the standards and practices in place in the time of design. The majority of IEUA's recycled water infrastructure was constructed or retrofitted after 1994, when the 6.7 magnitude earthquake in Northridge occurred. This landmark earthquake motivated significant revisions to the California Building Code to include stronger seismic resilience design requirements, which were finalized in 1998. IEUA's first major regional recycled water pipeline was constructed in 1995 and a backbone recycled water distribution system was installed in Chino and Chino Hills from CCWRF in 1997. Some of its water recycling plants were constructed prior to 1994 but have since been updated to comply with the current seismic design standards.

Section 11: References

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Appendix A

UWMP Checklist

DWR Checklist for 2020 UWMP
Checklist Arranged by Subject

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location (e.g. Section(s), page number(s), table/figure number(s) or briefly describe why CWC section does not apply)
10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Chapter 5	Section 3; Tables 3-2, 3-3, and 3-4.
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.7.2	Section 3; Tables 3-2, 3-3, and 3-4.
10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.7	Section 3.1.2; Table 3-4.
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Sections 5.2 and 5.5.7	Not applicable.
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	Section 8.7.
10608.4	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	Section 3.1.2, Tables 3-3 and 3-4. Also Appendix F.
10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years.	Demand Management Measures	Sections 9.2 and 9.3	Not applicable.
10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3	Section 8.4, 8.5, 8.6, 8.7, and 8.8.
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Chapter 10	Not applicable.
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	Section 1.12; Tables 1-6, 1-7, 1-8. Appendix E.
10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Sections 10.3.1 and 10.4	IEUA will comply with this provision.
10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Sections 8.12, 10.4	Appendices B and Appendix E.
10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2, 10.3, and 10.5	Section 1.12; Tables 1-6, 1-7, 1-8. Also Appendices E and B.
10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Section 10.2	Section 1.12; Tables 1-6, 1-7, 1-8. Appendix E.
10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	Section 1.12; Tables 1-6, 1-7, 1-8. Also Appendix D. [pending]
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 1.12; Tables 1-6, 1-7, 1-8. Also Appendix D. [pending]
10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 1.12; Tables 1-6, 1-7, 1-8. Also Appendix D. [pending]
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2	IEUA will comply with this provision.

DWR Checklist for 2020 UWMP
Checklist Arranged by Subject

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location *(e.g. Section(s), page number(s), table/figure number(s) or briefly describe why CWC section does not apply)*
10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	IEUA will comply with this provision. Section 1.12; Tables 1-6, 1-7, 1-8. Also Appendix D.
10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	Appendix B.
10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.1	IEUA complies with this provision.
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.5.2	Section 1.12 and 1.13.
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.6	Section 1.12; Tables 1-6, 1-7, 1-8. Also Appendix E.
10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information.	Summary	Chapter 1	Section 1.
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	Section 1.5.1.
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	Section 1.10.
10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4	Section 1.6; Table 1-4.
10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.4	Section 1.7.
10631(a)	Describe the land uses within the service area.	System Description	Section 3.5	Section 1.9.
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4	Section 1.6.
10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 6.2.8	Section 4; Tables 4-3, 4-4, 4-5, 4-6, 4-8.
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	Section 4.2.2; Table 4-3.
10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Section 6.2	Section 7; Tables 7-2, 7-3, 7-4, 7-5, 7-6, 7-7.
10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6.1	Section 4.
10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.1	Section 4.4; Table 4-8.
10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2	Section 4.2.2.2.1.

DWR Checklist for 2020 UWMP
Checklist Arranged by Subject

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location *(e.g. Section(s), page number(s), table/figure number(s) or briefly describe why CWC section does not apply)*
10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.2.2	Section 4.2.2.
10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2	Section 4.2.2.2.1.
10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.2.3	Not applicable.
10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.4	Section 4.2.2.1; Table 4-3.
10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 6.2	Not applicable, IEUA does not pump groundwater.
10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6.7	Section 4.4.2.
10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single- dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.8	Section 4.4 and 7.6.
10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	Section 4.4.3.
10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	Section 2.5.1	Not applicable.
10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.5.1	Appendix E.
10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.2	Section 5.3; Table 5-1.
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2	Section 5.3; Table 5-1.
10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.2	Section 5.4 and 5.5; Table 5-2.
10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.2	Section 5.4 and 5.5; Tables 5-2, 5-3.
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.2	Section 5.7.
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2	Section 5.7.
10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	Section 2.3 and 2.5. Tables 2-1, 2-2, 2-3, 2-4, 2-5.
10631(d)(3)(A)	Report the distribution system water loss for for each of the 5 years preceding the plan update.	System Water Use	Section 4.3	Not applicable.
10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Section 4.2	Not applicable.
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.5	Not applicable.
10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8	Appendix B.
10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Section 8.2	Appendix B.
10632(a)(2)(B)	Provide data and methodology to evaluate the supplier’s water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Section 8.2	Appendix B.

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DWR Checklist for 2020 UWMP
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Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location *(e.g. Section(s), page number(s), table/figure number(s) or briefly describe why CWC section does not apply)*
10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Section 8.3	Appendix B.
10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Section 8.3	Appendix B.
10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Section 8.4	Appendix B.
10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4	Appendix B.
10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4	Appendix B.
10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state- mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Section 8.4	Appendix B.
10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Section 8.4	Appendix B.
10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Section 8.5	Appendix B.
10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Section 8.5, 8.6	Appendix B.
10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Section 8.7	Appendix B.
10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Section 8.7	Appendix B.
10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Section 8.7	Appendix B.
10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8	Appendix B.
10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8	Appendix B.
10632(a)(8)(C)	Describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought.	Water Shortage Contingency Planning	Section 8.8	Appendix B.
10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Section 8.9	Appendix B.
10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Section 8.10	Appendix B.
10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Section 8.11	Appendix B.
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4	Section 4.6.
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Chapter 7	Section 6; Tables 6-1, 6-2.

DWR Checklist for 2020 UWMP
Checklist Arranged by Subject

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location *(e.g. Section(s), page number(s), table/figure number(s) or briefly describe why CWC section does not apply)*
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	Section 7.3, 7.4. Tables 7-2, 7-3,7-4, 7-5, 7-6.
10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.3	Section 7.5; Table 7-7.
10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.3	Section 7.5.
10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.3	Section 7.2, 7.3, 7.4. Tables 7-2, 7-3, 7-4, 7-5, 7-6.
10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.3	Section 7.3, 7.4. Tables 7-2, 7-3, 7-4, 7-5, 7-6.
10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change condition, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.3	Section 1.11 and 4.5.
10631.2(a)	The UWMP must include energy intensity information as stated in the code.	System Suppliers, Energy Intensity	Section 6.4 and Appendix O	Section 9. Tables 9-2, 9-3.

Appendix B

Water Shortage Contingency Plan Dated June 2021

FINAL

June 2021

KJ 2044518*00

2020 Water Shortage Contingency Plan

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Kennedy Jenks

Kennedy Jenks

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Water Shortage Contingency Plan FINAL

29 June 2021

6/29/2021

Prepared for

Inland Empire Utilities Agency
6075 Kimball Avenue
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KJ Project No. 2044518*00

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Section 1: Overview of 2020 IEUA Water Shortage Contingency Plan

The Inland Empire Utilities Agency (IEUA) is a wholesale water agency that treats and delivers recycled water and purchases imported water supplies[1] from Metropolitan Water District of Southern California (MWD) and distributes it to its seven retail agencies. Two of IEUA's retail water agencies, [Fontana Water Company (FWC) and Cucamonga Valley Water District (CVWD)] purchase untreated water directly from IEUA and provide their own treatment. Five of IEUA's retail water agencies purchase treated water from the Water Facilities Authority (WFA). WFA purchases untreated imported water from IEUA, treats and delivers the water to the cities of Chino, Chino Hills, Ontario, Upland, and Monte Vista Water District. IEUA does not operate any facilities connecting its retail water agencies to MWD's system.

MWD water supplies account for approximately 25 to 30% of the region's annual water supplies, plus additional water is stored by MWD in the Chino Basin for use in dry years. Each of the retail agencies has other water sources including groundwater and local surface water. Each retail agency has agency-specific Water Shortage Contingency Plans (WSCPs) that account for the reliability of each suppliers' unique water portfolio. The IEUA WSCP focuses on a regional representation of the reliability of imported water supplied by MWD with additional supply reliability from IEUA's recycled water supplies and then outlines the actions that IEUA may take to support its retail agencies during water shortage conditions. The WSCP may also apply to more generalized water shortage conditions that are not necessarily attributable to imported water shortages.

This WSCP is founded on several IEUA source documents, including the 2020 Regional Drought Contingency Plan (2020 DCP, included in WSCP Appendix A), the draft 2020 Water Use Efficiency Business Plan (WUEBP), the Annual Water Use Efficiency (WUE) Reports, and the 2010 and 2015 Urban Water Management Plans. In addition, there is overlapping content with the 2020 UWMP, especially the Supply Reliability (UWMP Section 4). It also draws upon the MWD 2020 WSCP.

This WSCP covers the required elements as set forth by CWC Section 10632. It should also be noted that statute recognizes the WSCP as viable a tool for use during drought emergencies as noted in Water Code section 10632.3 indicating that the State defers to the locally adopted WSCP to the extent practicable.

[1] As of this writing, all MWD supplies are from imported water sources. However, MWD is considering a potential 150 mgd potable reuse project. For more information, please see mwdh2o.com/rrwp

Because IEUA is a wholesale urban water supplier, some of the elements that pertain only to retail water suppliers may not be addressed in this WSCP[2]. For example. IEUA's WUEBP, which is updated every 5 years and Annual WUE Reports, address monitoring and tracking of WUE measures implemented which is not a requirement of wholesalers.

This WSCP document contains 11 sections. The first section is an introduction that explains the purpose of the WSCP and gives background on IEUAs service area. Section 2 is a summary of the water reliability available to IEUA, pursuant to CWC Section 10635. Section 3 is a description of the Annual Water Supply and Demand Assessment (Annual Assessment). Section 4 explains the WSCP's six standard water shortage levels and the relationship to the DCP shortage stages. Section 5 describes the WSCP's shortage response actions that align with the defined shortage levels and the evaluation of effectiveness. Section 6 addresses communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding any current or predicted shortages and any resulting shortage response actions. Section 7 describes mechanisms to determine water use reductions. Section 8 is a description of the financial consequences of and responses for drought conditions. Section 9 describes actions to prepare for catastrophic interruption. Section 10 addresses reevaluation and improvement procedures for monitoring and evaluating the functionality of the WSCP. Section 11 describes the process to adopt, submit, and amend the WSCP.

It is important to note that outcomes of the various planning processes are not a "cast in stone" series of actions that become mandated procedures, requiring stakeholder adherence. Instead, the plan acts as a resource and general guide for IEUA and its retail agencies. It is understood that each retail agency has its own distinct supply portfolio, operating principals, and customer characteristics. As such, there may be instances when a retail agency is not experiencing the same drought or water shortage impacts and will choose to take a modified course of action. As summarized in WSCP Section 5 and detailed in the DCP, a Drought Response Taskforce of staff from IEUA and its retail agencies may be convened in the event of a water shortage to identify the specific actions of IEUA and the retail agencies as appropriate to the particular shortage condition.

1.1 Relationship to the Urban Water Management Plan

Water Code Section 10632(a) requires that every urban water supplier prepare and adopt a water shortage contingency plan as part of its urban water management plan. While the water shortage contingency plan is a stand-alone document it is updated and adopted in concert with the UWMP. Content of the WSCP is informed by the analysis of water supply reliability conducted pursuant to Water Code Section 10635 (contained in the UWMP). The reliability analysis of the UWMP considered under "normal", "single-dry", and "5-year drought" conditions.

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[2] WSCP elements that apply specifically to retailer water suppliers are: (1) a description of customer compliance, enforcement, appeal, and exemption procedures for triggered response actions [CWC Section 10632(a)(6)]; (2) a description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1 [CWC Section 10632(a)(8)(c)]; and (3) monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements [CWC Section 10632(a)(9)] (MWD 2020).

The analysis in the UWMP documents that the IEUA region has sufficient supplies to meet normal, single-dry, and multi-dry-year demands. An area of overlap between the UWMP and WSCP is a new requirement to prepare a Drought Risk Assessment (DRA) (Section 7.5 of the 2020 UWMP) to account for the significant duration of recent California droughts and the predictions about hydrological variability attributable to climate change.

The DRA requires suppliers to assess water supply reliability over a 5-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability under a reasonable prediction for 5 consecutive dry years. Table 1-1 (Table 7-7 in the UWMP) shows the expected gross water use [in acre-feet (AF)] and the expected total supplies for each year from 2021 to 2025. The water supplies and demands were aggregated on a regional basis to reflect the entire IEUA service area. The gross water use for each year was found by interpolating between the 2020 actual regional water demand total (from the FY 19/20 Annual Water Use Report and the FY 19/20 Recycled Water Annual Report) and the 2025 projected water use during a multiple-year drought (from UWMP Table 7-7).

As shown in Table 1-1, the IEUA region expects to have a surplus for each of the 5 years of the consecutive 5-year drought from 2021-2025. Therefore, no Water Shortage Contingency Plan actions are anticipated to be implemented. However, in the case of a shortfall in supply, the use reduction and supply augmentation measures described in Section 5 of this WSCP are available to be implemented.

Table 1-1: DWR Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b) (DWR Table 7-5)

2021	Total
Total Water Use (AF)	99,898
Total Supplies (AF)	148,650
Surplus/Shortfall w/o WSCP Action (AF)	48,752
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**48,752**
Resulting % Use Reduction from WSCP action	0%
2022	**Total**
Total Water Use (AF)	103,850
Total Supplies (AF)	149,806
Surplus/Shortfall w/o WSCP Action (AF)	45,957
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**45,957**
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use (AF)	107,958
Total Supplies (AF)	150,972
Surplus/Shortfall w/o WSCP Action (AF)	43,014
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**43,014**
Resulting % Use Reduction from WSCP action	0%
2024	**Total**
Total Water Use (AF)	112,228
Total Supplies (AF)	152,146
Surplus/Shortfall w/o WSCP Action (AF)	39,918
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**39,918**
Resulting % Use Reduction from WSCP action	0%
2025	**Total**
Total Water Use (AF)	116,667
Total Supplies (AF)	153,329
Surplus/Shortfall w/o WSCP Action (AF)	36,662
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	0
WSCP - use reduction savings benefit (AF)	0
Revised Surplus/(shortfall) (AF)	**36,662**
Resulting % Use Reduction from WSCP action	0%

Note: Years 2021 through 2024 are interpolated between the 2020 actual supply and use values and the 2025 projected supply and use for multi-year drought (from Table 7-4). 2020 actual supply is the average year supply from Table 7-1.

Section 2: Water Supply Reliability Analysis

This section addresses overall water supply reliability for IEUA and meets Water Code Section 10635. Information from the 2010 UWMP which focused on IEUA's role as a wholesaler, information from the 2015 UWMP which included IEUA and Water Facilities Authority (WFA), a retailer, and information from Section 4 of the 2020 UWMP, the 2020 DCP and MWD's draft WSCP issued in February 2021 are used to analyze supply reliability for this section. MWD has taken the lead in drought planning for the southern California region. This is particularly relevant to IEUA, as IEUA is a wholesaler of MWD water.

2.1 MWD Water Supply Reliability

As described in MWD's draft WSCP issued in March 2021, MWD continuously engages in planning for various aspects of its water management, including operations, long-term reliability, and emergency response. These MWD planning efforts include the 1996 Integrated Water Resources Plan (MWD IRP) and its three updates in 2004, 2010, and 2015; the 2020 MWD IRP (currently in development); the draft 2020 WSCP; the annual Water Surplus and Drought Management (WSDM) Plan; the Water Supply Allocation Plan (WSAP); the annually calculated Emergency Storage Objective; and the 2020 Seismic Risk Assessment and Mitigation Plan. These efforts provide a policy framework, operating guidelines, and resource targets for MWD to ensure regional water supply reliability. MWD's WSCP is designed to be consistent with its WSDM Plan and WSAP as described below.

2.1.1 Water Surplus and Drought Management Plan

In 1998, MWD's Board of Directors adopted the WSDM Plan, which addresses both surplus and shortage operating strategies (reference MWD WSDM Plan, April 1998). The WSDM plan reflects anticipated drought responses based on the water supplies available to Metropolitan. Similar in concept to MWD's WSCP, the WSDM Plan provides an overall vision for operational supply management and characterizes a flexible sequence of actions to minimize the probability of severe shortages and reduce the likelihood of extreme shortages. WSDM Plan principles guide the specific actions to be taken under MWD WSCP shortage stages. Data collection, continual analysis, and monthly reporting processes of WSDM Plan implementation will form the basis for MWD's Annual Water Supply Demand Assessment that will be provided annually to the state beginning in July 2022. Because managing MWD's water supply resources requires timely and accurate information on supply and demand conditions that change throughout the year, MWD evaluates available water supplies and existing water storage levels on a monthly basis to determine the appropriate actions identified in the WSDM Plan.

Table 2-1 (referenced from the 2010 MWD UWMP) lists the definitions used by MWD in the WSDM Plan for surplus, shortage, severe shortage, and extreme shortage conditions. Except in severe or extreme shortages or emergencies, MWD's resource management will allow imported water shortages to be mitigated without impacting municipal and industrial customers, including IEUA and IEUA's retail agencies. The WSDM Plan is detailed in Chapter 4 of the MWD UWMP.

Table 2-1: MWD WSDM Plan Definitions

Surplus	Metropolitan can meet full-service and interruptible program demands, and it can deliver water to local and regional storage.
Shortage	Metropolitan can meet full-service demands and partially meet or fully meet interruptible demands, using stored water or water transfer, as necessary.
Severe Shortage	Metropolitan can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation. In a Severe Shortage, Metropolitan may have to curtail Interim Agricultural Water Program deliveries.
Extreme Shortage	Metropolitan must allocate available supply to full-service customers.

The shortage stages presented in this section apply to IEUA's imported water supply only. The water shortage actions specific to IEUA's water shortage stages are discussed in Section 5.

2.1.2 Water Supply Allocation Plan

MWD's Board of Directors also adopted the WSAP in February 2008 in anticipation of possible water supply shortages. The WSAP provides guidance for allocating limited water supplies to member agencies should the need arise. The WSAP is integral to MWD's WSCP's shortage response strategy in the event that MWD determines that supply augmentation (including storage) and demand reduction measures would not be enough to meet a projected shortage.

MWD's WSAP was developed in consideration of the principles and guidelines in MWD's 1999 WSDM Plan. The WSAP's formula seeks to balance the impacts of a shortage at the retail level while still maintaining equity at the wholesale level for supply shortages of up to 50 percent (%). The formula takes into account the impact on retail customers and the economy, growth and population, changes in supply conditions, investments in local resources, demand hardening aspects of non-potable recycled water use, implementation of conservation savings program, participation in MWD's interruptible programs, and investments in facilities.

In order to implement the WSAP, the MWD Board annually determines the level of the regional shortage based on specific criteria each April; this information is incorporated into IEUA's Annual Water Supply and Demand Assessment discussed in MWD WSCP Section 3. MWD's allocations, if deemed necessary, go into effect in July of the same year and remain in effect for a 12-month period. The WSAP includes an annual review of all MWD supplies and regional shortages to determine overall reliability for the year under review.

The WSAP is MWDs policy and formula for equitably allocating available water supplies to the member agencies during extreme water shortages when MWD determines it is unable to meet all its demands.

2.1.3 Emergency Storage Objective

The MWD Emergency Storage Objective, which is the regional planning estimate for emergency storage, is based on the potential for a major earthquake that would damage all supply aqueducts, isolating Southern California from its imported water sources, or a similar disaster.

In 2019, MWD and its member agencies completed a process to update the planning estimate of MWD's Emergency Storage Objective. This emergency storage represents the amount of water that MWD would store for the region in preparation for a catastrophic earthquake that would damage the aqueducts that transport imported water supplies to Southern California, including: the Colorado River Aqueduct, both the East and West branches of the California Aqueduct of the State Water Project (SWP), and the Los Angeles Aqueduct. The emergency storage allows MWD to deliver reserve supplies to the member agencies to supplement local production. This helps avoid severe water shortages during periods when the imported water aqueducts may be out of service.

Beginning January 2020, CWC Section 10632.5 mandates that urban water suppliers include in their UWMP a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. For IEUA, this requirement was addressed as part of developing its resilience strategy and is presented in detail in MWD's seismic resiliency reports in Appendix 9 to MWD's 2020 UWMP.

2.2 IEUA Water Supply Reliability

IEUA's imported water supply reliability is directly tied to MWD's supply reliability and if imported shortages occur, MWD uses the WSAP to allocate the available water. Fortunately, IEUA's exposure to potential MWD shortages is minimized in that imported water represents only 25 to 30%of the total regional supplies. Member agencies have rights to local surface and groundwater for the remaining 70 to 75% of the supply needed. Moreover, IEUA provides recycled water and is able to capture stormwater during rain events to replenish the Chino Basin to maximize water reuse and offset potable water demands. The 2020 DCP included a detailed analysis to evaluate potential impacts of book end or worst-case water supply shortages in the IEUA service area; the DCP Scenarios 2 and 3 considered the following:

1. **Imported water was reduced by 67.5% (Shortage Allocation Index 9 of MWD's WSAP)** In the 2020 DCP Scenario 2 analysis, which assumed local supplies were still available, the region had an overall surplus of water supply, while three agencies that depend heavily on imported water resulted in potential shortages. The 2020 DCP Scenario 3 assumed reductions in imported and local supplies as a result of a 5-year drought. DCP Scenario 3 predicted that while two agencies showed surpluses, overall, the region has a deficit of 13% of demand with current supplies. Under DCP Scenario 3, the loss of 67.5% of the imported water supply will result in the increased reliance on local surface and groundwater sources with associated water quality impacts. The ability to use some local wells may be affected by two water quality factors as detailed in item 2 below. It should be noted that MWD's IRP indicates only one scenario in which significant shortages would be anticipated to occur; the scenario assumed no future investments which is a conservative assumption. In fact, MWD continues to provide investments towards the development of local supply projects and is considering investments in Delta conveyance and a 150 million gallon per day (mgd) Regional Recycled Water facility in-region that may further improve MWD's overall water supply reliability and minimize the occurrence of requiring a MWD WSAP Shortage Allocation Index 9. Additionally, it should be noted that demands on MWD for water supplies has dropped in half from a high of approximately 2.4 million acre-feet per year to approximately 1.2 million acre-feet today. This remarkable reduction in demand for

MWD's water supplies is due to reductions in water use at the customer level along with the development of local supply projects throughout MWD's service territory.

2. **Reductions in local supply, due to potential impairments to groundwater quality, pose the most significant water reliability risk to the IEUA service area**. Nearly all the retail agencies rely on local groundwater to meet their annual demands. DCP Scenario 3 results indicate that agencies with groundwater supplies that currently require blending lose higher quality imported blending water and agencies with impaired supplies that do not require blending would be required to blend as groundwater quality declines. Therefore, conditions related to groundwater quality and reduced water available for blending could reduce the availability and reliability of groundwater in the future. DCP Scenario 3 illustrates that reduced groundwater quality combined with a loss of imported water could cause significant shortages for multiple agencies within the service area.

It should be noted that the 2020 DCP is a forward-looking planning document that provides insight for potential future 2035 conditions for IEUA and its retail agencies. The Drought Risk Assessment for 2021-2025 presented in Section 1, is based on MWD's estimates of supply availability for the near future which does not anticipate that longer-term worst-case conditions as described in the 2020 DCP will occur.

Section 3: Annual Water Supply and Demand Assessment Procedures

This section describes annual supply and demand assessment procedures, known as the Annual Assessment, to be performed by IEUA and submitted to DWR each year starting on July 1, 2022. The information in this section is highly reliant on the analyses presented in the 2020 DCP and UWMPs. IEUA will coordinate with both MWD and its retail agencies to meet the annual water supply and demand requirements of Water Code Section 10632(a)(2).

3.1 Drought Monitoring

The framework for drought monitoring largely relies on the knowledge and expertise of IEUA's retail agencies in order to interpret real time local conditions and analyze future supplies. IEUA's role is to act as a facilitator and gather supply data from all retail agencies, consolidate all collected data, and calculate the supply-demand index. Additionally, IEUA tracks potential imported water shortages through MWD and the MWD Board's annual determination each April of the level of the regional shortage based on the WSAP criteria. It is important to note that supply types and portfolios within the IEUA service area are extremely diverse and availability of supply types are dependent on several different factors.

The four primary components of the drought monitoring framework are outlined in the IEUA 2020 DCP and are as follows:

- **Indicator Data Collection and Distribution.** Key imported water availability indicators will be compiled and provided to the retail agencies annually.

- **Member Agency Reporting**. Based on the provided indicator data and their own monitoring activities, participating retail agencies will provide their annual projections for supplies and demands within their service area once a year.

- **Regional Supply-Demand Index Calculation**. The agency projections will be combined to formulate a regional supply-demand ratio (or index). The Supply-Demand Index Calculation is further described in Section 3.2.

- **Shortage Classification.** The regional index will be used to classify the level of water shortage (if any).

The monitoring framework allows current and projected water supplies to be compared against current and projected demands. Should there be a downward shift in available water supplies or an increase in customer demand, IEUA and its retail agencies will determine the severity of the change, the categorized stage level, and the required response. Figure 3-1 gives a graphic representation of the monitoring framework.

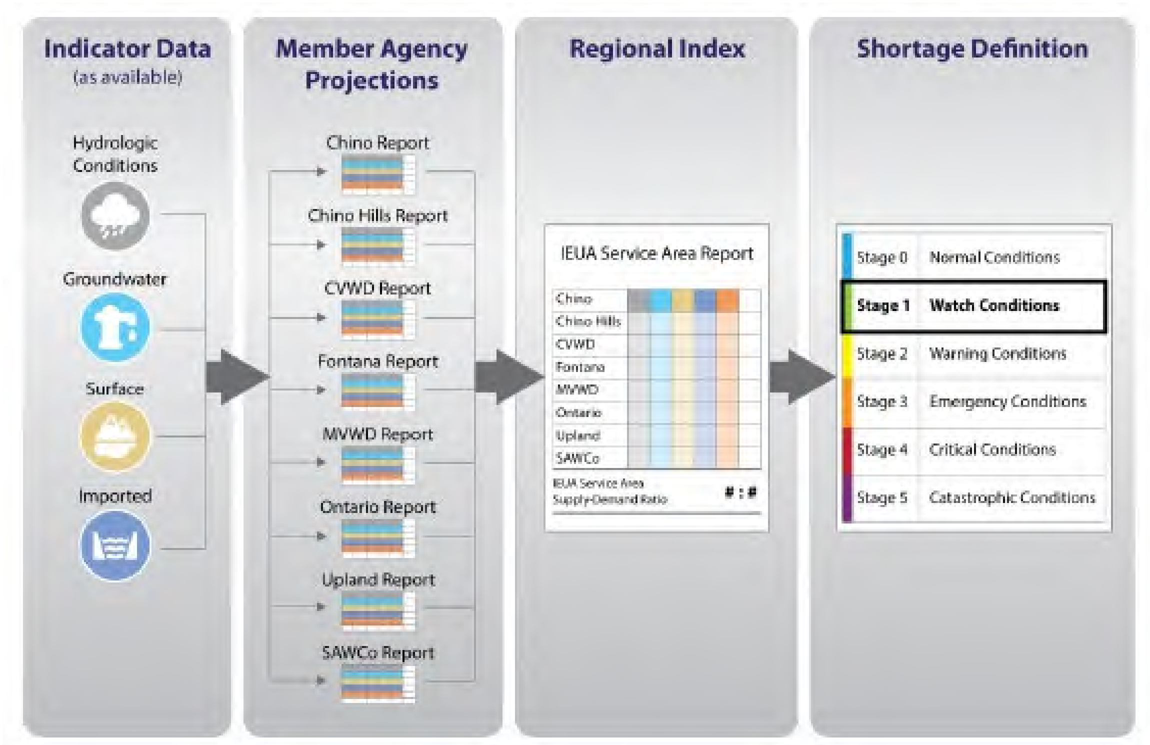

Figure 3-1: IEUA Regional Drought Monitoring Framework (2020 DCP)

3.1.1 Regional Collaborative Reporting Framework

IEUA has an established regular forum to provide and receive updates from the retail agencies on water supply conditions. Retail agencies submit annual data regarding water demands for the prior year between July and August of each year. IEUA hosts regular meetings with retail agency General Managers and IEUA also communicates with retail agency Water Managers in meetings that occur on an as-needed basis. Prior to 2020, the Water Managers typically met every 2 months. These meetings serve as a forum wherein the Water Managers review supply conditions, demand shifts, and regulatory changes that may impact supply. IEUA also prepares a Newsletter for retail agencies to communicate imported water and other regulatory conditions. If local circumstances or external drivers significantly shift, IEUA will request updated local supply data from respective retail agencies. As with the annual reporting, this information will be used to determine whether there is a regional water shortage due to these factors.

IEUA's monitoring process specific to drought will be based on an annual determination of potential drought shortage conditions, triggering the formation of a regional Drought Response Task Force that will meet periodically, as conditions warrant, and will trigger a two-step decision-making process as follows:

1. Key water supply indicators for imported water, discussed in Section 3.2, will be compiled into a standardized report and distributed to the water managers from each retail agency. A meeting with Water Managers' may be convened if needed. This will include projected deliveries of imported water from MWD as described in Section 3.2 in

addition to any potential forecasts for shortages. IEUA will also provide estimated demand projections to the participating retail agencies, as a reference or guide, based on a 5-year historical average.

2. Each retail agency will report their projected local supplies and demand for the coming year to IEUA. Table 3-1 below is a sample of the information obtained from each retail agency used to generate the supply-demand ratio.

Table 3-1: Sample Reporting Framework for IEUA Member Agencies (2020 DCP)

Agency	Local Groundwater	Surface Water	Imported Water	Annual Demand	Supply Shortage
Chino					
Chino Hills					
Fontana Water Company					
Ontario					
Upland					
Cucamonga Valley Water District					
Monte Vista Water District					
San Antonio Water Company					

This reporting process and structure was selected because it uses the annual reporting timeframe conducted by IEUA, the retail agencies, and MWD.

3.2 Imported Water WSAP Monitoring

IEUA began importing supplemental Colorado River water to the Chino Basin from MWD in 1951. In the late 1970's, MWD began delivering water from northern California via the State Water Project (SWP), offering IEUA an opportunity to connect to MWD's Rialto pipeline and switch to 100% SWP supplies after disconnecting from MWD's Upper Feeder pipeline as shown on Figure **3-2** that follows. The SWP became IEUA's exclusive source of imported water supplies in order to achieve groundwater quality requirements.

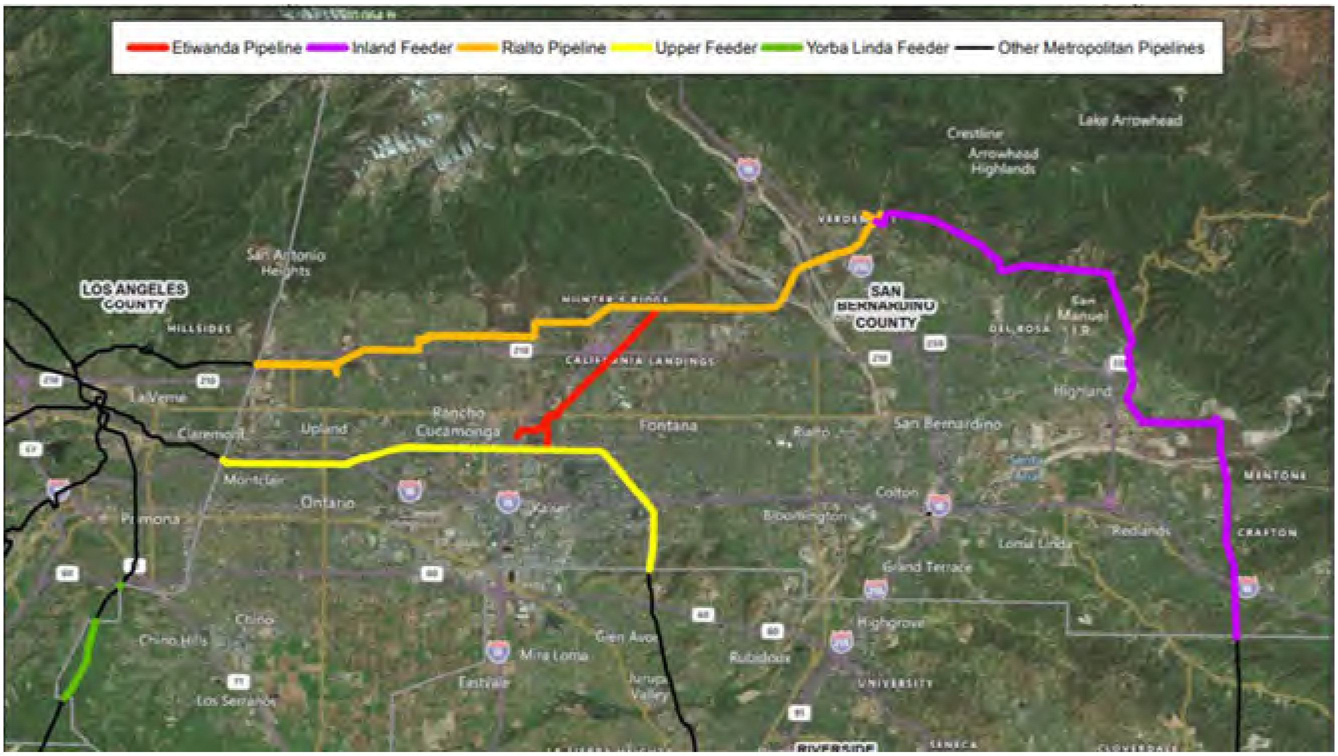

Figure 3-2: MWD Imported Water Pipeline Network

The SWP originates along the Feather River (a tributary to the Sacramento River) hundreds of miles north of IEUA. The SWP utilizes facilities to pump and convey water from the Sacramento-San Joaquin River Delta (Delta) to Southern California, as well as to the San Francisco Bay Area, the San Joaquin Valley, and the Central Coast. From 2009 to 2018, SWP imported water supplies delivered by MWD account for roughly 25-30% of the water supplies in the IEUA service area.

MWD actively monitors and manages the water supplies it imports to the region to assess availability and predict shortages. In response to critically dry conditions in the early 2000s and federal court rulings to protect the Delta Smelt in 2007 (which tightened regulations on Delta exports), as discussed in Section 2.1.2, MWD developed the WSAP to help manage uncertainty in the future water availability from their portfolio of sources and storage. Should a water shortage be declared by MWD's Board, the WSAP establishes MWD member agency supply allocations in a fair and reasonable way based on pre-determined formulas and key implementation elements needed to administer an allocation.

The framework of the WSAP includes an allocation year that spans from July to June, with a declaration in April. The key dates for MWD's WSAP monitoring and declaration process include the following:

January to March: Water Surplus and Drought Management reporting process provides updated information on storage reserve levels, projected supply, and demand conditions to the MWD Water Planning and Stewardship Committee meetings. Consideration of a potential allocation situation would be announced during this time.

April: Assuming supply conditions did not improve, MWD member agencies would report their projected local supplies for the coming allocation year (July to June) to update MWD's projected total supplies. Staff analysis of MWD storage reserves and projected supply and demand conditions would provide an allocation recommendation to the MWD Board of Directors. The allocation would be effective starting July 1 and held through the following June 30.

A 10-level WSAP Shortage Allocation Index would determine the Wholesale Minimum Allocation and the Maximum Retail Impact Adjustment. A "Wholesale Minimum Allocation" is defined as the minimum amount of MWD-supplied wholesale water service provided to each member agency. The Maximum Retail Impact Adjustment ensures that agencies with a high level of dependence on MWD do not encounter unequal retail shortages when experiencing a reduction in wholesale supplies.

In addition to the Wholesale Minimum Allocation and Retail Impact Adjustment, a Conservation Demand Hardening Credit and Minimum Per-Capita Water Use Credit would be considered to determine each Member Agency's WSAP Allocation. The allocation to an agency for its municipal and industrial retail demand is the sum of the above described four components, which are described in detail in the Appendix of the WSAP.

July to June: Member agencies would be requested by MWD to submit their local production on a monthly basis and certify the end of allocation year local supply use. Local production data must be reported to MWD by the end of the month following the month of use (i.e., use in July must be reported by the end of August). The production and supply use information is then combined with MWD sales information to track retail water use throughout MWD's service area. Each month, MWD reports on member agency water sales compared to their allocation amounts.

June 30: Allocation year would be complete.

August: MWD calculates potable water use based on supply certifications and actual sales data for the previous allocation year (July to June). Allocation surcharges are assessed for usage above a given member agency's final adjusted allocation.

It is important to note that while MWD's analysis focuses on combined SWP and Colorado River supply sufficiency, it is capable of focusing singularly on SWP-only supply sufficiency for IEUA and any other SWP-exclusive member agencies, if needed.

3.3 Supply/Demand Ratio

As detailed in the 2020 DCP, the supply and demand ratios for each year will be calculated based on the projections provided by the water managers. The data will be compiled into a singular supply-demand ratio for the IEUA service area and reported to the Water Managers. The regional supply-demand ratio calculation and a comparison to the DCP Drought Stages, discussed in Section 4 will then assist in determining whether there is a regional water shortage requiring action.

Figure 3-3 provides an example compilation of member agency projections and calculation of the regional supply-demand ratio. There will be considerations for expected shortages for individual retail agencies that may not be reflected in the regional ratio.

Between reporting periods, the participating retail agencies will continue their individual monitoring activities. Each of the retail agencies have developed their own approach to monitoring their supplies and have established unique definitions and responses for localized shortage conditions. "Appendix B: Summary of Member Agency Water Shortage Stages" in the 2020 DCP provides an overview of each agencies' shortage definitions and responses.

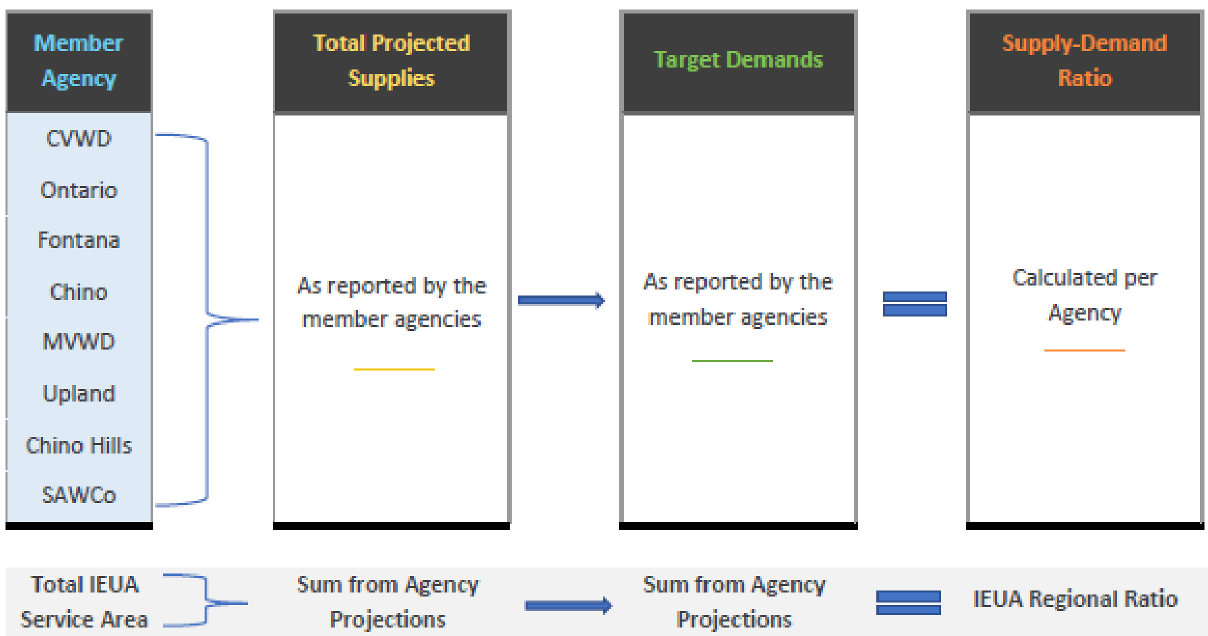

Figure 3-3: Annual Regional Supply and Demand Projections for IEUA Service Area (2020 DCP)

Section 4: Shortage Stages

This section describes the water shortage stages as defined by IEUA. The water shortage stages presented meet the requirements of Water Code Section 10632(a)(3).

4.1 Overview of Shortage Stages

The water shortage stages described in this section are in compliance with state legislation (SB 606 and AB 1668), which now requires drought plans to be standardized, as well as include six stages of drought severity. These stages were developed in consultation with each of the member agency's own definitions for local drought or water shortage levels and can be viewed in "Appendix B: Summary of Member Agency Water Shortage Stages" in the IEUA 2020 DCP. Additionally, each member agency may have their own Water Shortage Contingency Plan for use at the retail level.

The Water Shortage Stages are defined based on the calculated supply-demand ratios for the IEUA service area and are shown into DWRs shortage levels.

Table 4-1. These stages are used to help the Drought Response Taskforce identify the most appropriate regional responses for the anticipated shortages. Table 4-1 also contains the cross reference from the DCP shortage stage to DWRs shortage levels.

Table 4-1: IEUA Regional Water Shortage Stages (IEUA, 2020) Cross Reference with DWR Shortage

2020 DCP			2020 WSCP PER DWR	
Drought Stage	**Stage Descriptions**	**Triggers**	**2020 WSCP Level**	**Shortage Level**
Stage 0	Normal Conditions	No water shortages anticipated.	-	
Stage 1	Watch Conditions	IEUA regional ratio is predicting shortages between 1% and 5%.	1	≤10%
Stage 2	Warning Conditions	IEUA regional ratio is predicting shortages between 6% and 15%.	2	10 – 20%
Stage 3	Emergency Conditions	IEUA regional ratio is predicting shortages between 16% and 25%.	3	20 – 30%
Stage 4	Critical Conditions	IEUA regional ratio is predicting shortages between 26% and 50%.	4 5	30 – 40% 40 – 50%
Stage 5	Catastrophic Conditions	IEUA regional ratio is predicting shortages greater than 50%.	6	>50%

It is important to note that while the water shortage stage at the time of a drought is calculated and declared for the overall region, a local retail agency may have a water supply level that varies from the regional stage due to the uniqueness of their water supply mix. When this occurs, the local agency may develop customer messaging that is specifically applicable to their retail service area.

4.2 Water Shortage Stage Declaration

In the event of an emergency, IEUA may declare a Water Shortage Emergency and assemble the Drought Response Taskforce who will help inform the decision with tasks that include reviewing regional shortage conditions, deciding regional actions, budget generation and an implementation timeline. Coordination efforts may include retail agencies, MWD, Board of Directors, and regional stakeholders.

Typically, IEUA implements various stages of conservation actions based on the degree of water shortage before a state emergency is declared. If an emergency declaration is made, IEUA will coordinate with both its retail agencies and MWD to comply with all governing regulations. An unexpexted or sudden loss of water supplies may result in the expidited declaration of a water shortage emergency and associated activities.

Section 5: Shortage Response Actions (by Water Shortage Stage)

This section describes the water shortage stage response actions as defined by IEUA and are based on IEUA's definitions of the water shortage stages. The response actions presented in this section are heavily reliant on the 2020 DCP and its UWMPs. The response actions meet the requirements of Water Code Section 10632(a)(4).

5.1 Shortage Response Actions Overview

With growing populations and the inevitability of future drought cycles, IEUA, has invested in local supply and demand management programs with the aim of building regional, long-term resiliency to drought and climate change that will aid the region to be able to withstand future water shortages without extreme hardships.

By leveraging funding and programs from MWD and other regional stakeholders, IEUA and its retail agencies have partnered to help reduce per capita water use by re-shaping customers' attitudes about water use efficiency and their personal role in achieving water shortage resiliency. Through education, messaging, and investments of approximately $1.6 million, annually in water use efficiency programs, IEUA has been assisting customers to make significant equipment and lifestyle changes at their homes and businesses. The more our region is able to be self-sufficient with its water supplies, the less impactful any imported water supply shortages will be.

In 2018, California chaptered into law legislation (AB 1668 and SB 606) requiring all retail water agencies to annually establish a Water Use Objective (WUO) that will serve as a standard for assuring community-wide water-use efficiency. Each of IEUA's retail water agencies is required to submit their WUO's to a State agency by November 2023. If actual water use in their service territory is lower than their WUO, then that agency's customers are considered to be using water efficiently. Some assumed values in the calculation of the WUO will reduce over time, such as the assumed per capita water used indoors in residential properties, which will start at 55 gallons per capita per day (gpcd) in 2023 and reduce to 50 gpcd after 2030. The penalty for non-compliance is up to $10,000 per day per retail water agency.

Beyond regional efforts to establish efficient water-use practices and sustainable lifestyles, extraordinary conservation may be required during periods of droughts or during other water shortages, in order to reduce regional demands sufficiently to meet allocation goals. This will need to be driven by an escalation in marketing, increased programming and services, and enhanced incentives that increase as drought stages escalate. Also, MWD and potentially the retail agencies have the option to institute water pricing mechanisms to encourage reduced water use during shortage conditions.

Several response actions for achieving extraordinary conservation are available and can be deployed relatively quickly, including increased customer messaging content and frequency, expanded outreach channels, enhanced water-use efficiency incentives and programs, and as necessary, water usage restrictions and pricing mechanisms as detailed below. Future responses to future water shortage considerations should be mindful, however, of the effects that “demand hardening” will have on the customers’ ability to reduce water use. Demand hardening recognizes that as per capita water uses reduce down towards health and safety standards, there will be fewer discretionary uses of water that can be curtailed.

During water shortage conditions, IEUA makes itself available to assist retail agencies in implementing certain actions to alert the region to the need for extraordinary conservation by the measures identified below, , most of which are existing programs.

- **Messaging:** Creative and attention-grabbing content are needed to secure customers’ attention and motivate them to take action. Public Service Announcements (PSAs) are an effective tool for messaging the civic responsibility for undertaking extraordinary conservation efforts during water shortage conditions.

- **Expanded Outreach:** Customer attitudes and expectations continue to evolve over time. In our customer-centric world, water agencies are competing for attention. Grabbing attention requires a modern approach to outreach, including social media and potentially influencer marketing. As the need for reduced demands continues and intensifies, cities and counties and other large water users such as CalTrans will be encouraged to reduce irrigation of public lands and other highly visible reductions in water use may be required to intensify the call for reductions in per capita water use.

- **Programs:** Water efficiency programs provide customers with the means and guidance to lower their properties’ water usage. Customer-friendly programs, higher incentives, direct installation options, and strong support services drive stronger response rates. The greater the services and incentives, the greater the customer response.

- **Restrictions:** Watering restrictions further reduce water-use while reinforcing the message of community importance of “doing your part”, are highly effective in securing immediate water savings, and are a powerful tool for agencies. However, they set an authoritarian tone, which may result in negative public perceptions if the rationale is not well defined.

The Drought Taskforce, described in Section 5.7.2, can be convened to focus and coordinate the activities related to shortage response actions between IEUA and the retail agencies.

5.2 Strategy Per Drought Stage

Different drought stages require varying strategies. In general, drought actions will expand as drought stages escalate. As increased drought stages are declared, agencies may increase customer support and provide a higher level of program incentives and services.

Once a drought enters a specific stage, the Taskforce will assemble to finalize the Response Plan for that stage, begin the implementation process for target-marketing and increased outreach. The DCP stages and actions are summarized below and are included in Table 5-1 by stage and DWR’s defined drought response actions.

- **At DCP Stage Zero**, a non-drought stage, programs and incentives will continue to be offered to customers at standard levels. During this time, the goal will be to encourage and incentivize customers to create drought sustainable properties in advance of an emergency. The focus will be on turf replacement programs and customer education offerings.

- At **DCP Stage 1 (1-5% decrease),** customers and micro-target high potential customers will be profiled, utilizing messaging that will best resonate with those customers.

- The strategic focus for **DCP Stage 2 (6-15% decrease)** is to expand activity for irrigation equipment and direct installation programs, and to ramp up influencer marketing.

- Tactics for **DCP Stage 3 (16-25% decrease)** require incentive increases for landscape and irrigation measures, and an expansion in customer outreach.

- **DCP Stage 4 (26-50% decrease)** requires heightened messaging of urgency and put forth a community “call to action”. Additionally, there will be an increase in penalties, implementation of emergency alerts, and expanded news media coverage.

- During **DCP Stage 5 (water use for essential functions only), IEUA may consider modifying or suspending landscape and irrigation programs to focus** on indoor plumbing, property leak detection programs and other associated efforts. All landscape and irrigation programs will be suspended, and IEUA will implement crisis messaging, announcing water for essential use only.

Table 5-1 Demand Reduction Actions (DWR Table 8-2)

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap? *Include volume units used.*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
1	Expand Public Information Campaign	Minimum 1-5% of water use	Begin outreach, appealing to civic duty to reduce water use, identify high water waste reduction potential customers. Develop messaging that will best resonate with those customers	No
1	Provide Rebates on Plumbing Fixtures and Devices		SoCal WaterSmart Residential and Commercial Rebates	No
1	Provide Rebates for Landscape Irrigation Efficiency		Residential Irrigation Tune-Up, Home Surveys, Landscape Workshops, and Design Services	No
1	Provide Rebates for Turf Replacement		Turf Replacement Program	No
2	Expand Public Information Campaign	Minimum 6-15% of water use	Ramp up outreach messaging to emphasize importance of taking action. Continue targeting high water waste potential customers	No
2	Provide Rebates on Plumbing Fixtures and Devices		Implement direct installation programs	No
2	Provide Rebates for Landscape Irrigation Efficiency		Expand Landscape Design Services; offer more frequent landscape workshops and home surveys	No
2	Provide Rebates for Landscape Irrigation Efficiency		Continue Turf Replacement Program and consider increased funding	No

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap? *Include volume units used.*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
3	Expand Public Information Campaign	Minimum 16-25% of water use	Continue to expand outreach and marketing efforts to mid-tier water waste potential customers	No
3	Provide Rebates on Plumbing Fixtures and Devices		Continue base programs; Consider increase incentive amounts for certain programs; continue smart irrigation direct installation programs	No
3	Provide Rebates for Landscape Irrigation Efficiency		Continue Stage 2 Actions	No
3	Provide Rebates for Turf Replacement		Consider increase incentive amounts	No
4, 5	Expand Public Information Campaign	Minimum 24-50% of water use	Strengthen message of urgency and community call to action	No
4, 5	Provide Rebates on Plumbing Fixtures and Devices		Continue exploring incentive increase and smart irrigation direct installation programs	No
4, 5	Provide Rebates for Landscape Irrigation Efficiency		Continue Stage 2 Actions	No
4, 5	Provide Rebates for Turf Replacement		Consider increase incentive amounts	No

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap? *Include volume units used.*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
6	Expand Public Information Campaign	Minimum 50% of water use	Implement catastrophic messaging, explore essential use only	No
6	Provide Rebates on Plumbing Fixtures and Devices		Continue exploring incentive increase and smart irrigation direct installation programs.	No
6	Provide Rebates for Landscape Irrigation Efficiency		Consider modifying or suspending programs to support other efforts	No
6	Provide Rebates for Turf Replacement		Consider modifying or suspending programs to support other efforts	No

Note: Each IEUA retail agency has local authority to enforce local water waste ordinances; details of the restrictions by agency can be found in the 2020 DCP and each individual retail agency's 2020 WSCP. Additional details on drought response actions can be found in the IEUA's 2020 DCP and WSCP.

5.3 Supply Augmentation Actions

While IEUA and its retail agencies recognize the need for additional supply during drought years, as a wholesaler, IEUA is limited in its ability to implement water supply augmentation actions. The applicable DWR supply augmentation actions that may be available to IEUA during a water shortage condition are presented in Table 5-2.

Table 5-2: Supply Augmentation and Other Actions (DWR Table 8-3)

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap? *Include volume units used.*	Additional Explanation or Reference *(optional)*
1 through 6	Other actions (describe)	Undetermined amount	IEUA is always exploring opportunities for supplemental recycled water connections and conjunctive use to increase supply and flexibility.
6	Other purchases	Up to 23,531AFY (MWD Contract Amount)	Difference between Resolution No. 2014-12-1 imported amount of 69,752 AFY and MWD tier 1 imported water annual maximum of 93,283 AFY

Note:.

The supply augmentation actions overlap other long-term regional supply reliability activities identified in the IRP as described below; it should be noted that not all IRP activities address a specific water shortage condition in the region.

Additional stored water, in the form of new groundwater production facilities, Chino Desalters with new water transmission lines, pumping plants, and storage tanks significantly increase local supplies and reliability to meet shortages and emergency outages by individual agencies. Interconnections between utilities also allow for mutual supply arrangements and enhances local reliability.

Additionally, through the existing and ongoing regional plans, such as the IRP, there has been considerable effort and extensive stakeholder engagement aimed specifically at developing mitigation-type actions to improve regional water supply reliability.

The mitigation actions identified through the IRP fall into two core strategies.

1. **Invest in Cost-Effective Local Supplies**: As the availability of imported water potentially becomes less reliable in the future, it will be ever more important to continue to invest in cost-effective forms of local water supplies, including groundwater, surface water, and recycled water and conjunctive management of all supplies. It should be noted that MWD is considering investments in new supply projects, both in and out of region. As such, analysis should be undertaken to find the balance of supply-reliability being developed by MWD, IEUA and its retail agencies in any given moment. Building the right amount of local water supply capacity decreases reliance on imported supplies and improves resiliency for the regional water supply portfolio.

2. **Enhance Groundwater Availability**: Groundwater is the most heavily relied on local water supply type. The Chino Groundwater Basin provided approximately 40% of the regional water supply portfolio over the last decade. The vulnerability assessment for the DCP illustrated how compromised groundwater quality poses a significant threat to local water supply reliability and can be compounded as other supplies currently used for blending, such as imported water, become less reliable. Enhancing groundwater treatment and groundwater recharge opportunities will be crucial as groundwater quality issues mount within the basin and dependence on groundwater potentially increases as other sources become less reliable. Groundwater recharge with good quality water sources provides the benefits of both groundwater quality management and increased groundwater storage.

5.4 Prohibitions, Penalties, and Consumption Reduction Methods

This section describes several prohibitions, penalties, and consumption reduction methods including drought ordinances and restrictions.

5.4.1 Emergency Drought Ordinances within IEUA Service Area

IEUA does not have its own drought ordinances concerning drought measures. However, IEUA's retail agencies have several ordinances and measures in place concerning water waste, conservation efforts, and more. Table 5-3 from the DCP lists several ordinances for IEUA's retail agencies.

Table 5-3: Water Waste Ordinance by Agency (IEUA 2020)

Agency	Ordinance/Code Title
City of Chino	Municipal Code Water Conservation 13.-5.010 – 13.05.120
City of Chino Hills	Ordinance 300u
Cucamonga Valley Water District	Ordinance 2019-5-1
Fontana Water Company	San Gabriel Valley Water Company Rule No. 14 & Schedule 14.1
Monte Vista Water District	Ordinance 33
City of Ontario	Municipal Code Water Conservation Plan Title 6, Section 8A
City of Upland	Municipal Code 13.16.020 & 13.16.05.050

5.4.2 Voluntary and Mandatory Restrictions

Both voluntary and mandatory restrictions are coupled with public education campaigns to provide customers with information about the purpose for the restriction(s) and the call-to-action. Restrictions are typically highly publicized through local media, web pages, social media, mailings, and water bills.

Mandatory restrictions are a more effective tool for drought coping than voluntary measures; however, mandatory restrictions may create heightened negativity directed at the customer's water provider.

Common restrictions include partial or total prohibitions against using hoses to wash paved areas, limits on car washing and filling or refilling swimming pools, and restrictions on watering times.

As drought stages are declared, each agency will implement voluntary and mandatory restrictions as dictated by their respective Water Waste Ordinance. It is important to note the following:

1. Each ordinance is unique to a specific water provider and the ordinances differ slightly from one another.

2. Ordinance stages are locally declared and therefore, may not align with other agencies or a regionally declared stage.

Although enforcement is difficult to maintain, each agency is responsible for locally enforcing each ordinance. In order to accomplish this, agencies must add field staffing, coordinate with administration of the water waste ordinance, and manage the increased level of customer phone calls.

Enforcement has been critical to the integrity of the ordinance in the past and remains critical for future water shortages as well. Without action and penalties, the ordinance will not be taken seriously by customers, which then nullifies the effectiveness of the initiative. Typically, violations are reported by community members or visually seen by agency staff. Enforcement staff will then send letters, visit customer properties, and educate customers on the importance of adherence for both the resident and the overall community.

5.5 Operational Changes

IEUA does not operate any imported water systems and therefore, does not require operational changes during a water shortage. Changes to supply augmentation are described in Section 5.3 and consumption reduction methods are described in Section 5.4.

5.6 Customer Compliance, Enforcement and Appeal, and Exemption Procedures for Triggered Response Actions

IEUA does not have direct retail customers. However, IEUA is part of the Drought Response Taskforce (described in Section 5.7.2), which supports retail agencies with various resources for coordination, outreach, enforcement and more. The Taskforce coordinates with retail agencies and staff to identify resource and funding needs. Further explanation of the current funds and the funding process is described in the Regional Water Use Efficiency Business Plan (IEUA 2019).

5.7 Description of Legal Authorities to Implement and Enforce Shortage Response Actions

This section describes the legal authorities that implement and enforce shortage response actions, including their roles and responsibilities. Additionally, mutual aid agreements are described.

5.7.1 Roles and Responsibilities

IEUA: IEUA serves as the administrative facilitator of all components of the DCP. IEUA is responsible for developing regional demand and supply projections, calculating supply/demand ratio, communicating outcomes, convening the Drought Response Taskforce, implementing response strategies and actions as determined by the Drought Response Taskforce, conducting vulnerability assessments, evaluating and implementing IEUA controlled mitigation actions, and updating the plan.

Retail Agencies: Retail agencies are responsible for providing demand and supply projections, implementing agency-selected local mitigation actions, participating on the Drought Taskforce, and implementing response actions including local water waste restrictions.

5.7.2 Drought Response Taskforce Process

Once the drought monitoring framework indicates that the region has reached a specific stage of drought conditions, several actions will occur.

First, the Drought Response Taskforce (Taskforce) will assemble. The Drought Response Taskforce is the organizational group empowered to:

1. Create the Drought Response Plan blueprint.
2. Assemble the Taskforce to finalize strategic response actions during drought condition stages.
3. Work with their respective organization to implement response actions, according to plan.

The Taskforce is comprised of representatives from each of the retail agencies, in addition to personnel from IEUA. The group works in a collaborative effort to gain consensus on appropriate regional response actions.

The Taskforce will make decisions about the level of programming and services, restrictions, and messaging to regional customers. Additionally, the group determines the level taken for each element of the plan.

It is important to note that during a regional drought, an individual retail agency may not be experiencing a drought condition due to their local supply mix. In this circumstance, the agency may elect the capacity in which to participate on the Taskforce. The agency may determine how best to communicate with its customers when there are no water supply issues, locally while the region is undergoing a drought stage.

Moving forward, the Taskforce will work to balance the effectiveness of regional messaging with the differing needs of individual retail agencies. There are no pre-determined mandates regarding service offerings, restrictions, communications, or budgets. The Taskforce will collaborate on policies, while fully supporting flexibility for each agency.

The group will review the proposed actions set forth in the existing plan and make modifications, as necessary. The plan was intended to be flexible and changeable. Modifications to the plan might include a change in incentive levels or program delivery mechanisms. There may also be a new water-saving technology that may be available to customers. The Taskforce may be able to secure additional grant funds, as well. Once the action plan is finalized, the Taskforce will implement the programs, penalties, and communications plan, as agreed upon.

An overview of the DCP drought response process is provided on Figure 5-1.

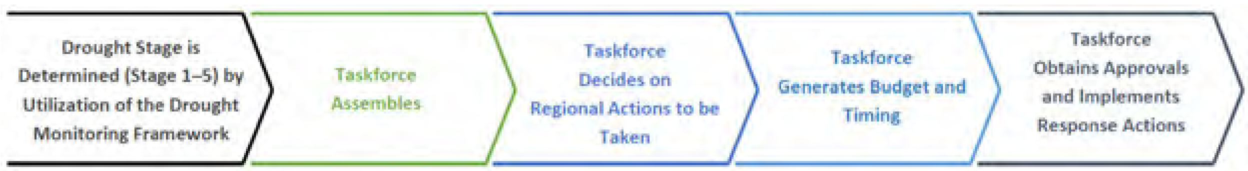

Figure 5-1 Drought DCP Response Process

5.7.3 Mutual Aid Agreements

IEUA currently has no mutual agreements except those concerning the sanitary sewer system. Additionally, retail agencies typically coordinate with other agencies to balance water uses.

5.8 Effectiveness of Shortage Response Actions (by Water Shortage Stage)

This section describes the annual review of the shortage response actions outlined in Section 5.1. Additional reviews for effectiveness are outlined in the WUE Business Plan (IEUA 2020), which is updated every 5 years.

The Drought Response Taskforce process described in Section 5.7.2 resulted in several programs that would address water shortages. The following process was used to determine the effectiveness of each program. It is important to note that the ranking process provides general consensus and structure for planning, but program ranking is fluid and, as circumstances evolve in the future, selected programs and priority levels may change.

1. Each of the selected programs addressing water shortages were ranked by agency representatives to determine its viability during each advancing drought stage. The selection process for these programs and services was conducted by having agency representatives individually rank viable programs as a high (3 points), medium (2 points), or low (1 point) at each respective drought stage level.

2. This ranking criterion was based on the level of feasibility, appropriateness, and overall impact provided by that program/service at each drought stage. Budgets and program scalability were additional considerations factored into the ranking process. The group also assessed the effect and motivation that escalating drought stages would have on customers and how that, in turn, might drive customers' response for each program/service.

3. The results were totaled and averaged for each program/service at each drought stage. Higher numbers reflected a greater expected effectiveness for that program or service. Lower numbers indicated reduced support for the program or service and less likelihood for inclusion in the list of program offerings.

4. Using the high, medium, or low point rubric program rankings were compiled and recorded.

In general, it was found that the higher the drought stage, the more program services were to be provided by agencies. It was also found that there is heightened customer response and program participation during higher drought stages. This is especially true when customers are provided with free installation and low-cost product or, as with turf incentives, the rebate level is enticingly high. Additionally, as stages escalate, agencies are prepared to ramp up activity for all programs, but will rely most heavily on Turf Replacement, FreeSprinklerNozzles.com, and direct installation of landscape measures. The number of home surveys, workshops, and design services may also increase. Home Leak Detection was ranked as the lowest priority program during Stage 0 and Stage 1, and only ramps up significantly in the later drought stages.

At each drought stage, it is anticipated that the highest-ranking programs will be those most actively promoted, and those offering attractive customer enticements to participate.

However, it is important to reinforce that the program and services rankings are not absolute and are a suggested template to be adjusted according to circumstances that exist at each actual drought stage. Actual incentives, services, and roll out schedules will be determined by the Taskforce when the drought stage is declared and the group is assembled.

Section 6: Communication Protocols

This section describes communication protocols as outlined in the 2020 DCP.

6.1 Messaging and Outreach

Communication and outreach play as crucial a role in the delivery of water savings as the programs themselves. A strong plan will ensure that IEUA reaches the target audience, boosts awareness, and ultimately, delivers water savings. For this reason, the Response Plan communication must:

- Be heard by the right customers, understood, and favorably received.
- Clearly inform the customer of the current stage, tell them what action is desired, and motivate them to respond to the request.

Ultimately, all forms of communications and outreach must work together throughout the region to raise response and increase water savings per household. The combination of regional drought messaging paired with the retail agencies' individual outreach efforts will create a stronger, more unified message.

6.2 Requirements for An Effective Message and Campaign

The key principles of a successful outreach and communication campaign are:

1. Know Your Customer.
2. Get the Message Right.
3. Craft an Outreach Plan that Drives Customer Response.

6.2.1 Know Your Customer

An organization must understand each customer's needs in order to provide the "I can't say no" offer. Companies experience much higher response rates when they understand and effectively respond to customers' needs.

Target audiences are single family households with high water-use and large landscape customers. Reaching these customers requires data analysis, creation of customer personas, and micro-targeting. There are numerous analytics programs available today that help agencies identify distinct customer groups and personas. Statistics show that micro-targeting greatly boosts customer response, which in turns leads to higher water savings as well.

6.2.2 Get the Messaging Right

Marketing campaigns are highly successful when they evoke emotion and resonate with a human need. An emotional message strategy uses feeling, which is a much more powerful motivator than logic, to sell. An outreach vehicle using this tactic will make the target audience feel an emotional connection to the agency, program, water efficiency measure, and/or call-to-action. IEUA will need to utilize the following messaging strategies to garner interest and participation from customers:

- **Emphasize the benefits**: What does this specific customer need? Present a solution to their problem.
- **Keep it simple**: A confused mind says “no.” People worry that deceit is hidden amongst complexity.
- **Make it Fun**: Draw customers in by using fun and catchy messaging, stories, eye-catching visuals, and humor.
- **Use Authority**: Influencing others is easier if customers view the person making the pitch as an authority figure. We all like to listen to and follow an expert. We trust that they know what they are doing.

6.2.3 Two Types of Messaging Required

There are reasons for creating and driving mass audiences through broad messaging as opposed to targeted action messaging directed to specific audiences. IEUA will need to effectively provide both types of communication during drought conditions.

1. **Broad Messaging:** Broad messaging (delivered via news stories, radio/TV ads, billboards, etc.) provides the widest reach and allows IEUA to communicate overarching messages including:
   a. Water Scarcity Issue
   b. Urgency to Act
   c. Commitment to continue to provide safe, reliable water supply.
2. **Targeted Action Messaging:** Targeted action messaging is typically aimed at specific groups of customers (i.e., those most likely to respond to your request for program participation or water-use reduction). To promote action, IEUA and the retail agencies must create messaging content and outreach such as those described below.
   a. Design messaging to motivate landscape changes for single family customers
   b. Post success stories: community members, people of prominence, business leaders
   c. Promote stories from micro-influencers: Q&A blogs with customers, homeowner success stories, “Did You Know?” educational snippets

d. Consider the utilization of third-party influencers: these individuals are more trusted than a company itself

e. Create a community call to action: “your community needs your help” messaging.

6.2.4 Craft an Outreach Plan that Drives Customer Response

Successful outreach campaigns utilize the following strategies:

- Profile your customers to understand customer’s persona
- Micro-target to prospect the right customers for each offer
- Incorporate your strong messaging and influencer authority figures in all offers
- Add personalization
- Demonstrate value and generous offer
- Include a call to action
- Make it easy for customers to say “YES”
- Follow up
- Track results
- As stages advance, increase frequency, urgency, and intensity.

IEUA and its retail agencies will need a creative and dynamic approach in order to increase customer response and water use reduction, especially during higher drought stages.

6.3 Successful Outreach Methods

There are major outreach mechanisms to be utilized for general categories of customers. Each outreach approach should be personalized to the group being targeted, as follows:

- Direct outreach to high users via personalized means (phone, letter, email, etc.)
- Regional outreach through broad media channels
- Earned media
- Social media
- Grassroots and community outreach.

6.4 Importance of Influencers and Relationships

Influencer marketing is another effective strategy to enhance response. Influencers are trusted individuals who have a large audience and can reach across media and social platforms. Because of their high level of “trust-ability”, they’re often able to persuade (or “influence”) readers and viewers to purchase products or endorse causes that they promote.

Influencer marketing is a highly effective way to reach interested customers and dramatically increase response. They act as a trusted and respected “friend”, as customers trust third party influencers more than a company itself. Those prominent in the Inland Empire include:

- Well known business owners/leaders
- Local sports or entertainment figures
- Elected officials
- Active Parent Teacher Association members
- High profile community organizers.

6.5 Drought Outreach Matrix

The urgency for communications increases as drought stages escalate. Because customers are essential to water-savings solutions, it is imperative that they understand each drought stage and what is required of them. Quality messaging will clearly communicate the current drought stage, define the condition, request a desired customer behavior, and direct them to tangible solutions. Table 6-1 shows the DCP drought outreach matrix for IEUA, which outlines the possible outreach methods for each water shortage stage.

Table 6-1: DCP Drought Outreach Matrix for IEUA

Stages	0	1	2	3	4	5
Messaging	Overall preparedness and drought resiliency. Drought will be regular occurrence.	What ***Watch*** Condition Means	What ***Warning*** Condition Means	What ***Emergency*** Condition Means	What ***Critical*** Condition Means	What ***Catastrophic*** Condition Means
Desired Behavior	Get customers to install drought resilient landscapes & smart irrigation prior to the next drought.	Minimum 1-5% decrease in water use.	Minimum 6-15% decrease in water use.	Minimum 16-25% decrease in water use.	Minimum 25-50% decrease in water use.	Water used for only essential functions.
Outreach Strategies	Evaluate your specific community and the customers in your service territory to determine a compressive plan using a combination of the following strategies and tactics. Each approach should be personalized to the group you are targeting. - Direct outreach to high users - Regional outreach through broad media channels - Social media outreach - Grassroots and community outreach					

Section 7: Mechanism to Determine Reductions in Water Use and to Meet State Reporting Requirements

Water Code Section 10632(a)(9) is not applicable for IEUA, as it is a requirement for urban retail water suppliers. However, the IEUA WUE Business Plan addresses methodologies for and the effectiveness of attaining water use efficiency. The IEUA WUE Business Plan is a working document and, as such, must be modified and updated as changes occur, and program years roll out. IEUA regularly reviews the plan and makes adjustments accordingly.

Changes and/or reviews of the plan take place in line with the following conditions:

- When programs are added, subtracted, or modified.
- On a yearly basis in order to meet the annual reporting requirements.
- Every 5 years to meet the Urban Water Management Plan report cycle.
- As the State's Framework policies are finalized.

Section 8: Impacts to Revenue

This section addresses Water Code Section 10632(a)(8).

If a drought is declared, financial impacts to the local retail water agencies will vary from one agency to another. As a wholesale water agency, IEUA is simply a “pass-through” wholesaler, so loss of revenue has no significant impacts. One exception may include the loss of revenue due to conservation programs that receive a portion of funding through a surcharge on each acre-foot of imported water sold. Otherwise, IEUA’s revenue is no longer based on water sales. Revenue is currently based on the number of meters as well as meter size within its area.

Current rates are outlined in Resolution No. 2019-6-1.

Section 9: Actions to Prepare for Catastrophic Supply Interruption

This section largely relies on the analyses performed in previous UWMPs and meets Water Code Section 10632(a)(3).

9.1 Planning for a Catastrophe

Southern California's three imported water supplies (State Water Project, Colorado River Aqueduct, and Los Angeles Aqueduct) cross the San Andreas Fault. Many other fault lines bisect major water facilities throughout the region. Experts consider it likely that one or more of these supplies will be disrupted in the event of a major earthquake. Given the great distances that imported supplies travel to reach the Inland Empire, the region is vulnerable to imported water interruptions along hundreds of miles of aqueducts, pipelines and other facilities associated with delivering the supplies to the region.

MWD has comprehensive plans for stages of actions it would undertake to address a catastrophic interruption in water supplies through its WSDM and WSAP. MWD also developed an Emergency Storage Requirement to mitigate against potential interruption in water supplies resulting from catastrophic occurrences within the southern California region, including seismic events along the San Andreas Fault. For MWD, the required planning is captured in its Emergency Storage Objective, Seismic Resiliency Reports, and Emergency Response Plans. For greater detail on MWD's planned responses to catastrophic interruption, please refer to MWDs 2020 UWMP.

MWD estimates that restoring service on any of these facilities following a catastrophic outage could take up to 6 months. This, in turn, could reduce annual deliveries by roughly up to 50% for MWD-supplied water. The UWMP requires agencies to consider the effect of a 50% cutback in water supplies. This corresponds approximately to the degree of cutback contemplated by MWD's earthquake disruption scenario.

IEUA is unique among MWD member agencies in that it only has access to imported water off the eastern branch of the State Water Project and does not have access to most of MWD's in-region surface storage supplies. Therefore, a catastrophic interruption of SWP supplies would be particularly impactful on IEUA.

In September 2005, IEUA adopted federal emergency response procedures called NIMS (National Incident Management System) which can be implemented by IEUA personnel for a localized event such as an accident at one of IEUA's facilities or on a broader based regional event such as an earthquake or flood. This system provides a consistent nationwide template to enable federal, state, and local governments (and local private sector and non-governmental organizations) to work together effectively and efficiently to prepare for, prevent, respond to, and recover from domestic incidents, regardless of cause, size, or complexity, including acts of terrorism. Complementary to NIMS, IEUA has completed Mutual Aid Agreements between itself and its local retail agencies (see Appendix R of 2010 UWMP).

9.2 Supply Augmentation Actions

The methods described in Section 5.3 will apply during emergencies.

9.3 Emergency Curtailment of Imported Water

In June 2004, MWD conducted an unplanned shutdown of the Rialto Feeder pipeline. The pipeline was discovered to be in danger of collapse and repairs were needed immediately. Because the Rialto Feeder is the only source of significant imported water deliveries to the IEUA and the Three Valleys Municipal Water District (TVMWD) service areas, the loss of that supply during the summer when municipal and industrial water demand was high, could have had a devastating impact on local agencies. The Rialto Pipeline Shutdown occurred from Monday, June 7, 2004 through Saturday, June 12, 2004.

To prepare their customers for the shutdown, the local agencies coordinated among themselves, MWD, and the local television and newspaper media. Water agencies asked their largest customers to stop irrigating their landscapes and stop all non-essential water uses during the 5-day shutdown for repairs. Also, local agencies asked their residential customers to eliminate landscape irrigation and to reduce or eliminate their non-essential water use practices. Because each local agency has a different resource mix, each agency was affected somewhat differently by the shutdown. Some retail agencies rely on imported water to supply a large portion (as much as 50%) of their demand during that time of the year.

One retail agency determined that the best course of action was to declare a “state of water supply emergency” and issued an emergency shutdown notice to all their customers. Their customers responded well to the request by reducing overall water use by 60% during the repairs. This response allowed CVWD to successfully meet all essential municipal and industrial demands, as well as fire flow requirements. Other local agencies saw similar responses from their customers.

In the weeks following the shutdown, MWD, IEUA, and TVMWD issued a survey questionnaire to the affected water agencies asking for their assessment of the way the shutdown was handled.

The responses to the survey showed, that overall, the lead agencies response to the shutdown and coordination with local media were reasonably successful. There was some confusion by commercial and residential properties owners on how to operate their irrigation controllers. As a result, a few landscapes remained watered during the first days of the shutdown. There was also some confusion by the public as to why several large landscapes in certain cities were being watered. As it turned out, these sites were using recycled water to irrigate. Ultimately, the irrigation was turned off to avoid further confusion.

Each of the agencies learned valuable lessons during this water emergency. Clearly, when the public is informed about the issue, water supply officials can expect a generally positive response from the public. The coordination with local agencies, the distribution of information, and conservation suggestions to the residents are the keys to maintaining credibility and confidence with the public.

MWD has initiated a program to rehabilitate 100 miles of pre-stressed concrete cylinder pipe (PCCP) on five at-risk major feeders with ongoing monitoring, evaluation, and prioritization for immediate repair and rehabilitation over 20 years. MWD is closely coordinating with IEUA and its retail agencies to help mitigate immediate emergency concerns on the Rialto Pipeline by continuing regular inspection and monitoring for stray currents and/or installation of cathodic protection and performing individual segment repairs as needed. MWD has also developed an extensive rehabilitation effort expected to cost over $600 million for the Rialto Pipeline alone that is in its early stages of planning and design.

Section 10: Reevaluation and Improvement Procedures

The WSCP is founded on several planning documents including the IEUA WUE Business Plan. The IEUA WUE Business Plan outlines methodologies and sets goals that measure the effectiveness of water use efficiency programming. The IEUA WUE Business Plan is a working document and, as such, must be modified and updated as changes occur and program years roll out. IEUA reviews the plan every 5 years in conjunction with the UWMP and adjusts accordingly. The WSCP will also be evaluated and updated on the same 5-year cycle.

IEUA is in the process of updating the 2015-2020 Water Use Efficiency Business Plan. The State is tentatively scheduled to finalize the new water use efficiency standard/objective and establish water use objectives for Retailers by 2023. IEUA's WUE Business Plan is being completed in two phases. Phase I will cover FY 2021-2023 and incorporate existing and newly proposed programs and measures. Phase II will cover FY 2023-2025, expand on Phase I existing and new programming, and develop a pathway to meet or exceed compliance with the new State regulations.

Section 11: Water Shortage Contingency Plan – Adoption Resolution

11.1 Overview

During the process of preparation of the UWMP, IEUA also reviewed related information from regional and local agencies and developed this WSCP, which was largely founded on the 2020 DCP. An extensive coordination effort occurred during the DCP preparation between September 2017 to September 2019 which included five workshops, as well as four Response Action Taskforce meetings. IEUA also encouraged public involvement in the UWMP and WSCP by holding a public hearing for residents to learn and ask questions about their water supply.

This section provides the information required in Water Code Section 10632(a)(c) related to adoption and implementation of the WSCP. Table 11-1 summarizes external coordination and outreach activities carried out by the IEUA and the corresponding dates.

Table 11-1: External Coordination and Outreach

External Coordination and Outreach	Date	Reference
Notification of Preparation; Encouraged public involvement	November 24 and 30, 2020	WSCP Appendix B
Notified city or county within supplier's service area that water supplier is preparing an updated UWMP (at least 60 days prior to public hearing)	April 5, 2021	WSCP Appendix C
Newspaper notice of public hearing and intent to adopt UWMP and WSCP	May 17 and May 24, 2021	WSCP Appendix D
Adopted UWMP and WSCP by Resolution	June 16, 2021	WSCP Appendix E
Submitted UWMP and WSCP to DWR (no later than 30 days after adoption)	By July 1, 2021	-
Made UWMP and WSCP available for public review (no later than 30 days after filing with DWR)	By July 1, 2021	-
Submitted UWMP and WSCP to the California State Library and city or county within the supplier's service area (no later than 30 days after adoption)	By July 13, 2021	-

The UWMP and WSCP was adopted by IEUA's Board of Directors on June 16, 2021. A copy of the adopted resolution is provided in WSCP Appendix E.

IEUA also notified any city or county within its service area at least 60 days prior to the public hearing. As indicated in Table 11-2, IEUA sent a Letter of Notification to the County of San Bernardino and cities within its service area in November 2020 and again in April 2021 to state that it was in the process of preparation to meet the DWR requirements (WSCP Appendices A and B).

Table 11-2:Notification to Cities and Counties (DWR Table 10-1)

☑	Supplier has notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
Table 11-2 of the WSCP	Provide the page or location of this list in the UWMP.	
	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	**60 Day Notice**	**Notice of Public Hearing**
Add additional rows as needed		
City of Chino	☑	☑
City of Chino Hills	☑	☑
Cucamonga Valley Water District	☑	☑
Fontana Water Company	☑	☑
Monte Vista Water District	☑	☑
City of Ontario	☑	☑
San Antonio Water Company	☑	☑
City of Upland	☑	☑
City of Rancho Cucamonga	☑	☑
City of Montclair	☑	☑
West Valley Water District	☑	☑
County Name	**60-Day Notice**	**Notice of Public Hearing**
Add additional rows as needed		
San Bernardino County	☑	☑

Notes: In addition, the following agencies were also given a 60-Day Notice and Notice of Public Hearing: Chino Basin Water Master, Chino Basin Desalter Authority, Local Agency Formation Commission for San Bernardino County, Metropolitan Water District, Santa Ana Regional Water Quality Control Board, Santa Ana Watershed Project Authority, Three Valleys Municipal Water District, and the Water Facilities Authority.
Notification letters were sent out in November 2020 and April 2021. Copies of these notification letters are included in WSCP Appendices A and B.

11.2 Public Participation

IEUA encouraged community and public interest involvement in the plan update through a public hearing and inspection of the draft document on June 16, 2021. Public hearing notifications were published in local newspapers. A copy of the published Notice of Public Hearing is included in WSCP Appendix D. The hearing provided an opportunity for all residents and employees in the service area to learn and ask questions about their water supply in addition to the IEUA's plans for providing a reliable, safe, high-quality water supply. Copies of the draft plan were made available for public inspection at the IEUA headquarters and website.

11.3 Agency Coordination

IEUA's water supply planning relates to the policies, rules, and regulations of its regional and local water providers. IEUA is dependent on imported water from MWD, its regional wholesaler. As such, IEUA involved the water providers in this 2020 UWMP at various levels of contribution as summarized in Table 11-3.

11.4 WSCP Submittal

IEUA's five-member Board of Directors reviewed and approved the Final 2020 WSCP on June 16, 2021 (Resolution No. 2021-06-10). See WSCP Appendix E for the resolution approving the Plan.

By July 1, 2021, the adopted 2020 WSCP was filed with DWR and posted to IEUA's website. By July 13, 2021, the adopted 2020 WSCP was filed with the California State Library, County of San Bernardino, and cities within its service area, if applicable.

Table 11-3: Coordination with Appropriate Agencies

Agency Name	Participated in Plan Development	Commented on Draft	Attended Public Meetings	Sent Notice of Plan in Preparation[a]	Received Copy of Draft Plan[b]	Sent Notice of Intent to Adopt[a]	Received Copy of Adopted Plan[b]
City of Chino	No	No	No	Yes	Yes	Yes	Yes
City of Chino Hills	No	No	No	Yes	Yes	Yes	Yes
Cucamonga Valley Water District	No	No	No	Yes	Yes	Yes	Yes
Fontana Water Company	No	No	No	Yes	Yes	Yes	Yes
Monte Vista Water District	No	No	No	Yes	Yes	Yes	Yes
City of Ontario	No	No	No	Yes	Yes	Yes	Yes
San Antonio Water Company	No	No	No	Yes	Yes	Yes	Yes
City of Upland	No	No	No	Yes	Yes	Yes	Yes
Chino Basin Desalter Authority	No	No	No	Yes	Yes	Yes	Yes
Chino Basin Water Master	No	No	No	Yes	Yes	Yes	Yes

Agency Name	Participated in Plan Development	Commented on Draft	Attended Public Meetings	Sent Notice of Plan in Preparation[a]	Received Copy of Draft Plan[b]	Sent Notice of Intent to Adopt[a]	Received Copy of Adopted Plan[b]
Chino Basin Water Conservation District	No	No	No	Yes	Yes	Yes	Yes
Formation Commission for San Bernardino County	No	No	No	Yes	Yes	Yes	Yes
Metropolitan Water District	No	No	No	Yes	Yes	Yes	Yes
City of Montclair	No	No	No	Yes	Yes	Yes	Yes
San Bernardino County Flood Control District	No	No	No	Yes	Yes	Yes	Yes
San Bernardino County Planning Department	No	No	No	Yes	Yes	Yes	Yes
Santa Ana Watershed Project Authority	No	No	No	Yes	Yes	Yes	Yes
Santa Ana Regional Water Quality Control Board	No	No	No	Yes	Yes	Yes	Yes
Water Facilities Authority	No	No	No	Yes	Yes	Yes	Yes

Notes:

(a) IEUA sent notice of plan in preparation in November of 2020 and notice of intent to adopt in April 2021. Both notices are included in WSCP Appendices A and B.
(b) IEUA posted the draft 2020 WSCP to its website on 11 May 2021 and the adopted final 2020 WSCP to its website prior to July 1, 2021.
(c) While stakeholders did not participate directly in the development of the WSCP, stakeholders participated in the development of the foundational 2020 DCP, provided supply and demand data, and/or provided input to the Draft 2020 Water Use Efficiency Business Plan.

References

Board of Directors of Inland Empire Utilities Agency. *Resolution No. 2019-11-2, Establishing Service Rates for Improvement District "C" for Fiscal Year 2020/21 and Fiscal Year 2021/22* (November 2019).

Board of Directors of Inland Empire Utilities Agency. *Resolution No. 2020-7-7, Establishing Imported Water Rates* (July 2020).

California Department of Water Resources (DWR). Urban Water Management Plans, Guidebook for Urban Water Suppliers (March 2021).

Inland Empire Utilities Agency. DRAFT Integrated Water Resources Plan (IRP) Regional Water Supply Infrastructure Model Technical Memorandum 2 (2020).

Inland Empire Utilities Agency. Regional Drought Contingency Plan (April 2020).

Inland Empire Utilities Agency. DRAFT Regional Water Use Efficiency Business Plan (2021).

Inland Empire Utilities Agency. Regional Water Use Efficiency Programs Report, Fiscal Year 2019-2020 (January 19, 2021).

Inland Empire Utilities Agency. 2015 Urban Water Management Plan (June 2016).

Metropolitan Water District of Southern California. 2021. MWD Urban Water Management Plan 2020.

WSCP Appendix A

Regional Drought Contingency Plan

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Inland Empire Utilities Agency Regional Drought Contingency Plan

April 2020

Contact Information:
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RECLAMATION

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Acronyms and Abbreviations

AF	acre feet
AFY	acre feet per year
CBWM	Chino Basin Watermaster
CCAP	Climate Change Action Plan
CCCA	California's Climate Change Assessment
CCWRF	Carbon Canyon Water Recycling Facility
CDA	Chino Basin Desalter Authority
CVWD	Cucamonga Valley Water District
Delta	Sacramento-San Joaquin River Delta
DCP	Regional Drought Contingency Plan
FWC	Fontana Water Company
IEUA	Inland Empire Utilities Agency
IRP	IEUA Integrated Water Resources Plan
Model	Chino Basin Regional Water Supply Infrastructure Model
MVWD	Monte Vista Water District
MWD	Metropolitan Water District of Southern California
OBMP	Optimum Basin Management Program
OSY	Operating Safe Yield
RCAs	Regional Contracting Agencies
RCP	Representative Concentration Pathways
RMPU	Recharge Master Plan Update
RWPS	Recycled Water Program Strategy
RWQCB	Regional Water Quality Control Board
SAR	Santa Ana River
SAWCo	San Antonio Water Company
SCAB	South Coast Air Basin
SRI	Sacramento River Index
SWP	State Water Project
TDS	total dissolved solids

USBR U.S. Bureau of Reclamation

UWMP Urban Water Management Plan

VOCs volatile organic chemicals

WFA Water Facilities Authority

WFMP Wastewater Facilities Master Plan

WSAP Water Supply Allocation Plan

IEUA is a wholesale distributor of imported water and a regional wastewater treatment agency, serving 875,000 residents over 242 square miles.

As a public agency, IEUA purchases imported water from the MWD Water District of Southern California (MWD) and is situated on the largest groundwater storage basin in Southern California.

IEUA wholesales water purchased from Metropolitan Water District of Southern California (MWD) to cities, municipal water districts, investor-owned utilities and special districts. IEUA's retail agencies include: the cities of Chino, Chino Hills, Ontario, and Upland, Cucamonga Valley Water District in the city of Rancho Cucamonga, the Fontana Water Company in the city of Fontana, Monte Vista Water District in the city of Montclair, and San Antonio Water Company in the city of Upland.

What Defines a Drought?

A *drought* is a natural prolonged period of abnormally low rainfall, leading to a shortage of water. Drought is a weather-related recurring feature in Southern California and the Inland Empire region.

While drought cannot be prevented by local water management, the impacts can be mitigated by preparing the region for the eventuality of a future drought cycle.

What Defines a Water Shortage?

A *water shortage* is the lack of sufficient available water resources to meet the demands of water usage within a region, either for a short-term or long-term duration. The shortage can be caused by a variety of reasons including groundwater contamination or other water quality constraints.

While noting the distinction between drought and water shortage, both of these conditions are impactful. The Inland Empire may find that there is a situation wherein there isn't a drought, but instead, a groundwater quality issue, causing a shortage that impacts the entire area.

IEUA and its member agencies are acutely cognizant that preparedness for either occurrence is critical to the region.

1 Introduction

A Look Back

IEUA created the 2009 Drought Plan at the time when the region was in the midst of a prolonged three-year drought. The main objective of the plan was to implement Metropolitan Water District's Water Supply Allocation Plan. This well-reasoned plan provided a fair and equitable process for allocating potential future limited water supplies.

Two years later, IEUA and its member agencies faced one of the most intense droughts in California history (2011 – 2017); with the period of late 2011 through 2014 being the driest in California's recorded history.

Gaining Insight

With tremendous collective efforts on the part of IEUA and retail member agencies, the region endured the demanding years of these drought cycles. Despite the many dead lawns and unwashed cars, thanks to regional and local response actions, adequate supply was never a question.

The numerous challenges that arose during this time period yielded much gained insight for water resource managers throughout the State.

It was clear that the great majority of customer sites were not drought resilient going in, or coming out, of the drought. Water savings came about predominantly through restrictions; not customer drought preparedness.

Breaking from this trend, customers in the IEUA service area did respond to the turf removal program; removing over 7 million square feet of turf AND customers rallied and reduced water usage by over 30%. While this occurred rather late in the drought cycle, the focus on long term drought preparedness was a welcomed sight.

The 2011 – 2017 drought illustrated the growing evidence that climate change is causing longer and more frequent droughts. The 2009 Drought Plan, while appropriate for its time, needed to be expanded.

USBR Grant Funding

Coinciding with the need for a more robust plan, the United States Bureau of Reclamation (USBR) provided a funding opportunity for development of Drought Contingency Plans (DCP), with the aim of building long-term resiliency to drought and climate change.

In 2016, IEUA submitted a proposal and received grant award for development of a DCP. The objectives of the planning process, as put forth by USBR, were to help resource planners to 1) recognize drought in its early stages; 2) identify the effects of drought or water shortages; and 3) provide water supply protection into the future.

As required under this grant, IEUA has documented the input and participation of our multiple stakeholders, factored climate change impacts to drought conditions, and identified potential drought mitigation and response actions, to enhance the IEUA region's resilience to drought, as exacerbated by climate change.

The DCP, as a federally sanctioned plan, not only provides the IEUA region with an increased level of proactivity and preparedness, it also better positions IEUA and its member agencies, should there be a need for federal emergency relief funds.

Goals of the Drought Contingency Plan

The DCP is a comprehensive plan, designed to:

- ✓ **Define regional shortage conditions** to tailored stages, responses, and mitigation actions for the IEUA service area needs and resources.
- ✓ **Build resiliency** by identifying and facilitating investment in local projects that strengthen and further diversify water portfolios within the service area (i.e. conservation, recycled water, interconnections, and groundwater recharge).
- ✓ **Facilitate consistent communication** for the service area to ensure consistency and effectiveness during times requiring reduced water usage.
- ✓ Maintain a commitment to **sustainability and environmental stewardship** by meeting the needs of the present without compromising the ability of future generations to meet their own needs.
- ✓ **Maintain consistency** with Metropolitan Water District's Water Shortage Allocation Plan and Dry Year Yield policies, as well as other IEUA and member agency water resource planning documents.
- ✓ Ensure **equity and fairness** throughout the service area.

Plan Components

There are five distinct components to IEUA's plan, as required by the USBR grant:

1. The Drought Monitoring Framework
2. The Vulnerability Assessment

3. Mitigation Actions
4. Response Actions (Drought Communications & Outreach Plan)
5. The Operational & Administrative Framework

The **Drought Monitoring Framework** provides the tools and data metrics necessary to determine the existence and severity of a drought or water shortage.

The **Vulnerability Assessment** identifies and quantifies the key factors that can negatively affect water supply reliability.

The **Mitigation Actions** are prioritized projects and strategies that can be implemented prior to a drought situation in order to lessen the risks and impacts of water shortages.

The **Response Actions** provide a blueprint for deployment of strategic response actions for each stage of water shortage or drought condition.

The **Operational and Administrative Framework** describes the roles, responsibilities and procedures to implement each element of the Plan.

Plan Development Process

The development of the drought plan was intentionally crafted to be a highly collaborative and inclusive process.

IEUA launched the project by assembling a taskforce, inclusive of each retail agency's management, planning and conservation staff as well as other regional stakeholders.

GEI Consultants, one of nations leading engineering firms with a known capability for drought planning, was awarded the contract to develop the plan.

Periodic taskforce meetings were held to present the outcomes of each planning component. Taskforce members were solicited for feedback, after which final technical memos were produced for:

1) Drought Monitoring
2) Vulnerability Assessment
3) Mitigation Actions

Additionally, consultant Maureen Erbeznik, a conservation program design and implementation expert, was hired to develop the response actions also known as the Communications & Outreach Plan. Four additional stakeholder workshops were convened with IEUA and retail member agency conservation staff. Over the course of the four workshops, the group ranked and selected programs best suited for drought response, established a strategy for restrictions & enforcement, identified communication tactics, and aligned these response actions with drought stages. The Communications & Outreach Plan was then integrated with the technical memos produced by the taskforce to create the final Drought Contingency Plan.

It is important to note that outcomes of the planning process are not a "cast in stone" series of actions that become mandated procedures, requiring stakeholder adherence. Instead the plan results act as a resource and general guide for IEUA and the member agencies. It is understood that each retail agency has its own distinct supply portfolio, operating principals, and customer characteristics. As such, there may be instances when a retail agency is not experiencing the same drought or water shortage impacts and will choose to take a modified course of action.

When the time comes and a regional drought is declared, a Drought Response Taskforce will be assembled with representatives from each agency. This group will review the recommended response actions for that particular drought stage, modify according to the "real life" conditions, set a budget, and finalize the drought response course of action.

Additional Benefits of the Plan

The USBR grant has allowed IEUA and the member agencies to create a plan that will deliver an increased level of proactivity and preparedness in advance of future water shortages. It integrates multiple local drought planning initiatives, tools and resources under one umbrella. At the same time, it increases the speed that drought response actions can be rolled out by providing a more detailed guide.

The plan provides a medium to document and attest to the completeness of drought planning activities. In addition, the plan meets federal and states "checklists" for drought and water shortage contingency planning. The DCP not only meets the requirements for USBR grants, but also directly aligns with the State of California's requirements for a Water Shortage Contingency Plan (WSCP).

In other words, the retail agencies are each required to create a WSCP as part of their Urban Water Management Plans. Should the agencies choose to create, instead, a Regional WSCP, the Drought Contingency Plan provides nearly all of the component requirements of the Regional WSCP.

Table 1 below lists and compares the contents of the DCP with the requirements of the WSCP:

Table 1 . DCP Components Compared to Water Shortage Contingency Plan Requirements

Contents	DCP	WSCP
Analysis of water supply reliability	✓	✓
Written decision making process to determine water supply reliability	✓	✓
Key data inputs and assessment methodology used to evaluate the water supply reliability	✓	✓
Unconstrained demand, considering weather, growth, and other influencing factors	✓	✓
Available supply, considering hydrological and regulatory conditions in the current year and one dry year	✓	✓
Existing infrastructure capabilities and plausible constraints	✓	✓
Evaluation criteria water supply and demand assessment	✓	✓
Description and quantification of each source of water supply	✓	✓
Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage	✓	✓
Water shortage response actions that align with the defined shortage level	✓	✓
Mandatory prohibitions against specific water use practices	✓	✓
Communication protocols and procedures	✓	✓
Description of the financial consequences of, and responses for, drought conditions	--	✓
Mitigation actions needed to address revenue reductions and expense increases	--	✓
Monitoring and reporting requirements and procedures	✓	✓
Monitoring and evaluating the functionality of the water shortage contingency plan to ensure mitigation strategies are implemented as needed	✓	✓

2 Background

2.1 IEUA Service Area

Formed in 1950, Inland Empire Utilities Agency was originally created with a mission to supply supplemental imported water purchased from the Metropolitan Water District of Southern California (MWD) to municipalities in the Chino Groundwater Basin.

Since then, IEUA has expanded its mission and, today is focused on providing the following key areas of service:

- Securing and supplying imported water.
- Collecting and treating wastewater.
- Producing high-quality renewable products such as recycled water, compost, and energy.
- Promoting sustainable use of groundwater and development of local water supplies.

The area is relatively flat alluvial valley from east to west and slopes from north to south at a one to two percent grade. Valley elevation ranges from about 2,000 feet above sea level in the foothills below the San Gabriel Mountains to about 500 feet near Prado Dam.

The IEUA service area almost entirely overlies the Chino Groundwater Basin and covers approximately 242 square miles in western San Bernardino County (see Figure 1).

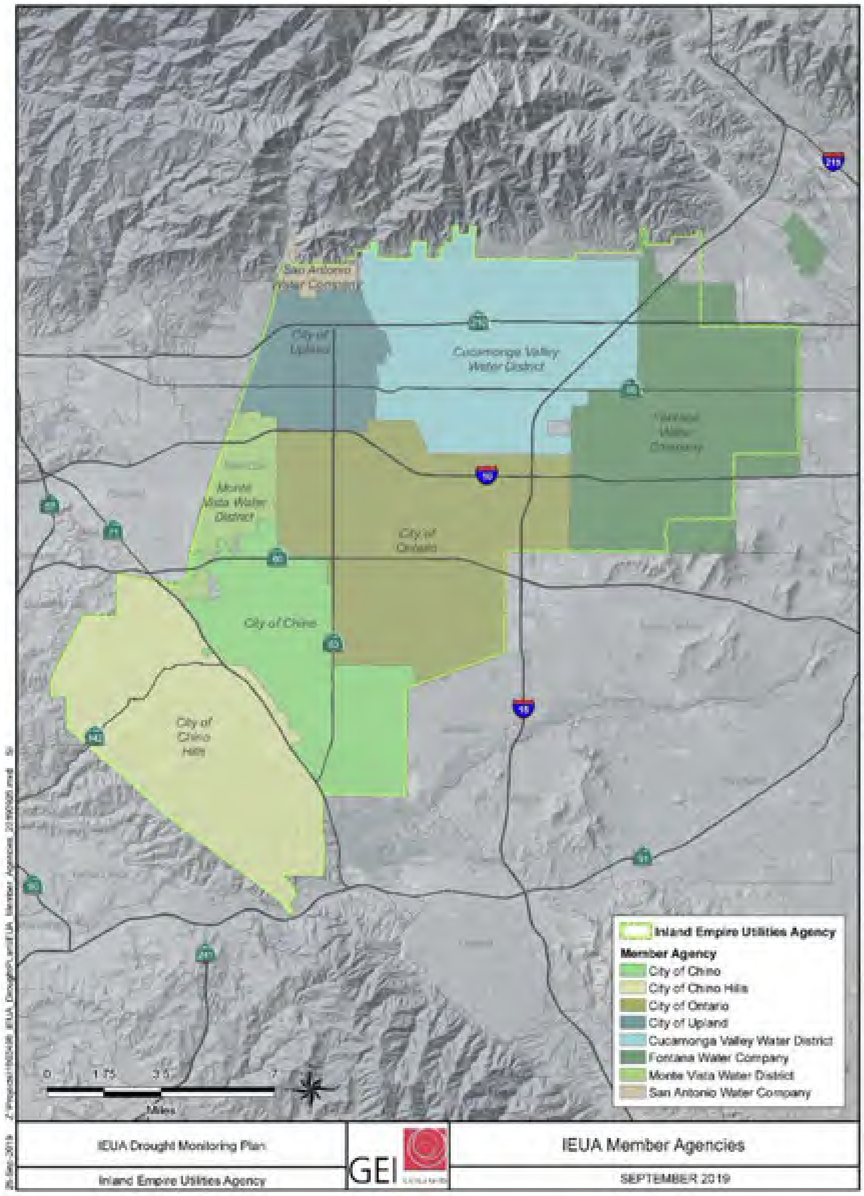

Figure 1. IEUA Service Boundary Map

2.2 CLIMATE

IEUA is located within the South Coast Air Basin (SCAB) that encompasses all of Orange County and the urban areas of Los Angeles, San Bernardino, and Riverside counties. The SCAB climate is characterized as "Mediterranean" with a semi-arid environment and mild winters, warm summers, and moderate rainfall. A summary of the annual precipitation is provided in Figure 2.

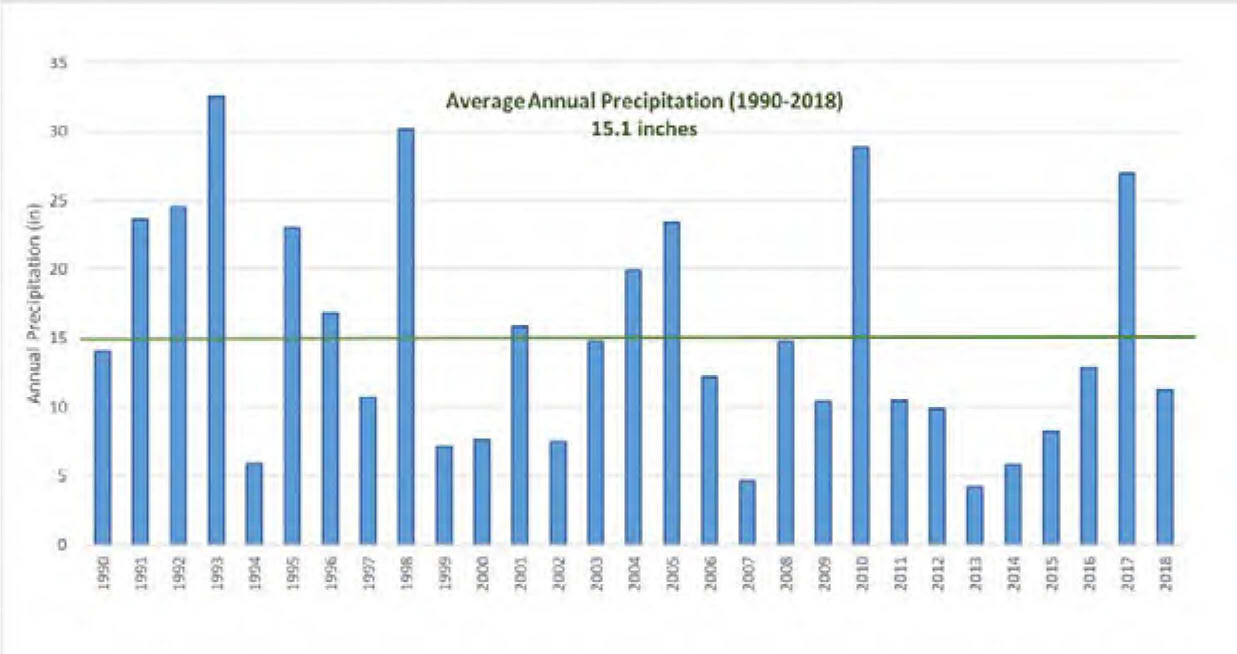

Figure 2. Historical Annual Regional Rainfall (Pomona CIMIS Station #78)

2.3 Regional Water Demand Forecasts

Within the IEUA service area, water demand since 1995 has increased by approximately 20 percent, despite a regional growth of 30 percent. This is indicative of new water use behaviors, including increasing efficiency in outdoor irrigation and indoor fixtures. This improved efficiency prolongs the availability of current regional water supplies into the future.

More recently, census data for 2014 to 2017 shows that annual population growth rates have been slightly less than one percent per year. Table 2 provides the regional municipal and industrial (M&I) water demand forecasts for 2020 and 2040 as reported in the IEUA 2015 Integrated Water Resources Plan (IRP). The IRP demand forecasts were developed based on the member agencies' Urban Water Management Plans (UWMPs). Three ranges of growth were reported based on varying assumptions related to future developments, housing density, and water practices.

Table 2. M&I Regional Demand Forecast (from 2015 IRP)

Total Regional Demand Forecast (AC-FT)	2020	2040
High Demand Forecast[1]	230,000	267,000
Medium Demand Forecast[2]	220,000	238,000
Low Demand Forecast[3]	212,000	217,400

1. *Traditional development and current usage patterns (55 GPCD indoor water use).*

2. *Higher density development based on the Southern California Association of Governments (SCAG) Regional Transportation Plan (RTP) average housing density. Existing outdoor use is limited to 70% of reference evapotranspiration (ETo). Future outdoor use is limited to 60% ETo, and indoor water use is reduced from 55 GPCD in 2015 to 35 GPCD by 2040 for new development.*
3. *High density development based on the SCAG RTP high housing density. Existing outdoor use is limited to 70% of reference ETo and future outdoor use is limited to 60% ETo. Indoor water use is reduced from 55 GPCD in 2015 to 35 GPCD by 2040 for new development.*

2.4 Planning Steps

The Drought Contingency Plan was developed following the USBR "*Guidance Regarding the Drought Contingency Planning Process"* as a framework. Below are the steps undertaken to develop the plan, resources utilized, and the associated deliverables.

Table 3. Planning Steps

Approach/Steps	Resources Utilized	Deliverable
Step 1		
Reviewed regional and local master planning documents and determined goals and factors impacting the DCP.	▪ 2009 IEUA Drought Response Plan ▪ 2015 IEUA Integrated Water Resources Plan ▪ 2015 IEUA Water Use Efficiency Business Plan update ▪ 2015 Urban Water Management Plans – local and regional ▪ Recharge Master Plan Update ▪ MWD Water Surplus & Drought Management Plan ▪ MWD Water Savings Allocation Plan ▪ Existing IRP modeling data	Drought Goals documented
Step 2		
Created a framework for predicting and confirming future droughts by establishing data metrics used to indicate drought conditions in the region.	▪ Input and collaboration from the *DCP Taskforce* meetings	Drought Monitoring Technical Memo
Step 3		
Evaluated the risks and impact of current and future drought in the IEUA service area. Assessed the region's vulnerabilities in terms of water supply reliability for each water supply type and effects by climate change, growth and other reliability factors.	▪ 2015 IEUA Integrated Water Resources Plan ▪ Chino Basin Regional Water Supply Infrastructure Model results	Vulnerability Assessment Technical Memo

Approach/Steps	Resources Utilized	Deliverable
Step 4		
Developed mitigation actions	▪ Chino Basin Water Master's Optimum Basin Management Program (2000) ▪ Chino Basin Organics Management Strategy (2001) ▪ Recycled Water System Feasibility Study (2002) ▪ Wastewater Facilities Master Plan (2002) ▪ 2015 IEUA Integrate Resource Plan	Mitigation Actions Technical Memo
Step 5		
Developed strategies and response actions for each stage of drought condition.	▪ Consensus outputs from *Response Actions Taskforce* meetings ▪ 2015 IEUA WUE Business Plan ▪ 2015 – 2018 WUE Program Activity and Final Reports ▪ 2011 – 2017 Customer Water Use	Drought Response Action Plan (Communications & Outreach Plan)
Step 6		
Developed and documented the roles, responsibilities and procedures for ongoing monitoring, vulnerability assessment, mitigation and response actions.	▪ Feedback and outcomes from taskforce meetings	Operational & Administrative Framework
Step 7		
Produced comprehensive Drought Contingency Plan.	▪ Drought Monitoring Technical Memo ▪ Vulnerability Assessment Technical Memo ▪ Mitigation Actions Technical Memo ▪ Drought Response Action Plan (Communications & Outreach Plan)	Drought Contingency Plan

The DCP was developed in coordination with IEUA's eight retail member agencies. IEUA invited representatives from each member agency's management, planning and conservation groups as well as other stakeholders including representatives from Chino Basin Watermaster, Water Facilities Authority and the Chino Basin Water Conservation District.

There were five workshops held over a two-year period, starting in September 2017 and concluding in September 2019. The Drought Contingency Taskforce members were given the opportunity to review and comment on technical memorandums for each plan component and the draft DCP, as well as to guide the development of the plan.

Below is the list of DCP Taskforce participants and their respective organizations:

IEUA	
Joshua Aguilar	*Elizabeth Hurst*
Andrea Carruthers	*Lisa Morgan-Perales*
Pietro Cambiaso	*Kenneth Tam*
Shivaji Deshmukh	
Sylvie Lee	

Retail Member Agencies	
May Atencio CITY OF FONTANA	*Courtney Jones* CITY OF ONTARIO
Joslyn Blakely CITY OF CHINO	*Mark Kinsey* MONTE VISTA WATER DISTRICT
Amy Bonczewski ONTARIO MUNICIPAL UTILITIES COMPANY	*Praseetha Krishnan* CUCAMONGA VALLEY WATER DISTRICT
John Bosler CUCAMONGA VALLEY WATER DISTRICT	*Teri Layton* SAN ANTONIO WATER COMPANY
Scott Burton ONTARIO MUNICIPAL UTILITIES COMPANY	*Brian Lee* SAN ANTONIO WATER COMPANY
Noel Castillo CITY OF MONTCLAIR	Michelle Licea MONTE VISTA WATER DISTRICT
Amanda Coker CITY OF CHINO	*Gisela Lopez* MONTE VISTA WATER DISTRICT
David Crosley CITY OF CHINO	*Jake Loukeh* CITY OF CHINO HILLS
Ron Craig CITY OF CHINO HILLS/RBF	*Michelle Madriz* CITY OF UPLAND
Gabriela De La Cruz MONTE VISTA WATER DISTRICT	*Dennis Mejia* ONTARIO MUNICIPAL UTILITIES COMPANY
Nicole deMoet CITY OF UPLAND	*Erin Morales* CUCAMONGA VALLEY WATER DISTRICT
Chris Diggs CITY OF POMONA	*Harrison Nguyen* CITY OF UPLAND
Kelley Donaldson MONTE VISTA WATER DISTRICT	*Jerry Perez* CITY OF FONTANA
Eduardo Espinosa CUCAMONGA VALLEY WATER DISTRICT	*Darron Poulsen* CITY OF POMONA

Retail Member Agencies (con't)

Cris Fealy FONTANA WATER COMPANY	*John Robles* CITY OF UPLAND
Raul Garibay CITY OF POMONA	*Justin Scott-Coe* MONTE VISTA WATER DISTRICT
Katie Gienger ONTARIO MUNICIPAL UTILITIES COMPANY	*Patrick Soto* FONTANA WATER COMPANY
Eric Grubb CUCAMONGA VALLEY WATER DISTRICT	*Josh Swift* FONTANA WATER COMPANY
Chris Hamilton FONTANA WATER COMPANY	*Kevin Watson* CITY OF UPLAND
Chuck Hays CITY OF FONTANA	*Mark Wiley* CITY OF CHINO HILLS
Rob Hills CUCAMONGA VALLEY WATER DISTRICT	*Braden Yu* CUCAMONGA VALLEY WATER DISTRICT
Rosemary Hoerning CITY OF UPLAND	*Seth Zielke* FONTANA WATER COMPANY
Van Jew MONTE VISTA WATER DISTRICT	

Other Regional Stakeholders

Chris Berch JURUPA COMMUNITY SERVICES DISTRICT	*Tom O'Neill* CHINO BASIN DESALTER AUTHORITY
Vivian Castro CHINO BASIN WATER CONSERVATION DISTRICT	*Jason Pivovaroff* WESTERN MWD
Terry Catlin WATER FACILITIES AUTHORITY	*Ben Peralta* THREE VALLEYS MWD
Leslie Cleveland UNITED STATE BUREAU OF RECLAMATION	*Steven Popelar* JURUPA COMMUNITY SERVICES DISTRICT
Lindsay Kaufman JURUPA COMMUNITY SERVICES DISTRICT	*Ryan Shaw* WESTERN MWD
Peter Kavounas CHINO BASIN WATERMASTER	*Jake Stepp* WATER FACILITIES AUTHORITY
Scott Kleinrock CHINO BASIN WATER CONSERVATION DISTRICT	*Elizabeth Skrzat* CHINO BASIN WATER CONSERVATION DISTRICT
Matthew Litchfield THREE VALLEYS MWD	*Edgar Tellez Foster* CHINO BASIN WATERMASTER
Nadia Loukeh WEST VALLEY WATER DISTRICT	*Kristen Weger* CHINO BASIN WATER CONSERVATION DISTRICT
Todd Minten CHINO BASIN DESALTER AUTHORITY	

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Samantha Adams	*Roger Putty*
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GEI CONSULTANTS	WILDERMUTH ENVIRONMENTAL INC.
Ashlee Casey	*Abhishek Singh*
GEI CONSULTANTS	INTERA
Maureen Erbeznik	*Mark Wildermuth*
MAUREEN ERBEZNIK & ASSOC.	WILDERMUTH ENVIRONMENTAL INC.

The first workshop on December 11, 2017, served as an initial kick-off meeting to review the purpose and scope of the DCP, as well as to establish the participants for future workshop. The subsequent four workshops were held to review the results for each component of the plan.

The dates and topics discussed for each of the workshops are shown in Figure 3. Also shown in Figure 3 are the interim draft materials that were shared for review and comment by the taskforce, including the:

- Annotated DCP outline
- Drought Monitoring Technical Memorandum
- Vulnerability Assessment Technical Memorandum
- Mitigation Actions Technical Memorandum

In addition, one-on-one meetings were held between IEUA and member agencies as needed in order to provide an added forum for discussion and clarification.

DCP Technical Taskforce Workshop Schedule

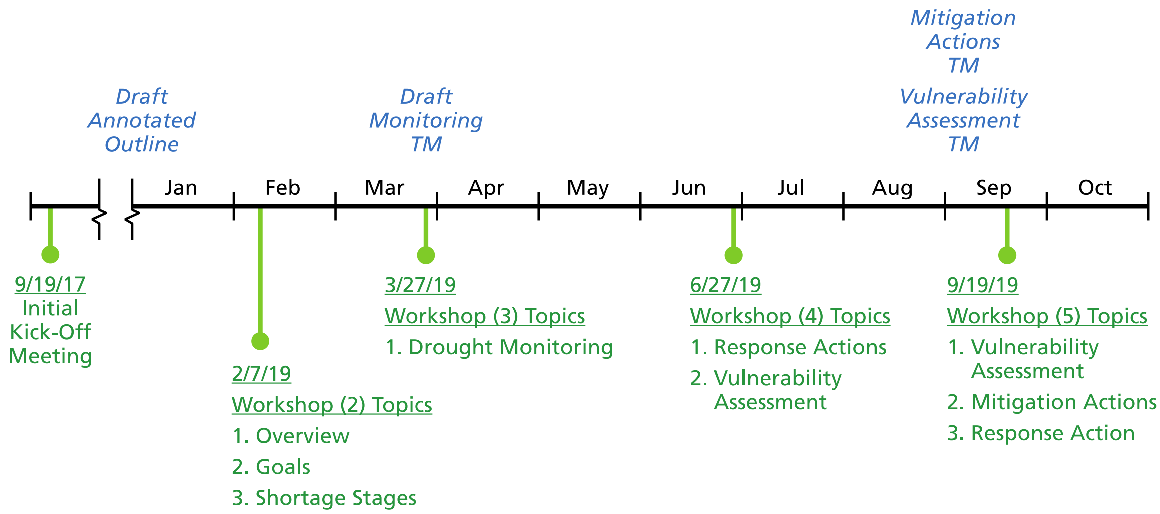


Figure 3. DCP Technical Taskforce Workshop Schedule

During this same time period, a Response Actions Taskforce was operating with the mission to create the Response Action (Communication & Outreach) Plan. The response action taskforce was comprised of retail member agency conservation staff and IEUA.

Below are the IEUA and Retail Agency participants:

Response Actions Taskforce Participants	
Lisa Morgan-Perales INLAND EMPIRE UTILITIES AGENCY	*Michelle Madriz* CITY OF UPLAND
Joslyn Blakely CITY OF CHINO	*Erin Morales* CUCAMONGA VALLEY WATER DISTRICT
Amy Bonczewski ONTARIO MUNICIPAL UTILITIES COMPANY	*Aaron Ramirez* INLAND EMPIRE UTILITIES AGENCY
Chris Garcia INLAND EMPIRE UTILITIES AGENCY	*Elizabeth Skrzat* CHINO BASIN WATER CONSERVATION DISTRICT
Gisela Lopez MONTE VISTA WATER DISTRICT	*Patrick Soto* FONTANA WATER COMPANY
Scott Kleinrock CHINO BASIN WATER CONSERVATION DISTRICT	*Kristen Weger* CHINO BASIN WATER CONSERVATION DISTRICT
Jake Loukeh CITY OF CHINO HILLS	

Over the course of the four workshops, the group ranked and selected programs best suited for drought response, identified a strategy for restrictions & enforcement, and aligned these response actions with drought stages.

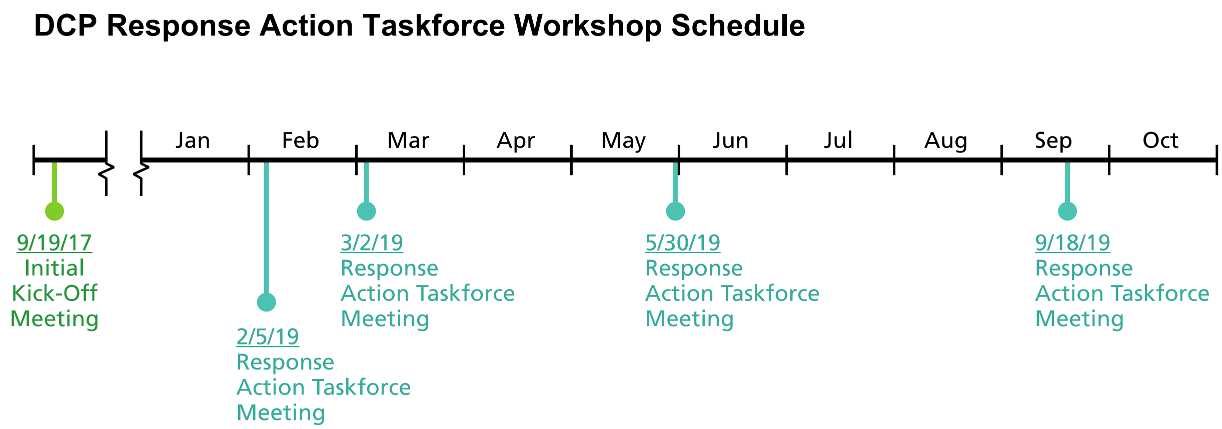


Figure 4: DCP Response Action Taskforce Workshop Schedule

3 Drought Monitoring

The **Drought Monitoring Framework** provides the tools to determine the existence and severity of a drought or water shortage.

This framework will rely largely on the knowledge and expertise of IEUA's member agencies for interpretation of real time conditions and prediction of future supply. IEUA's role is to act as the facilitator to, track potential water shortages through MWD, gather supply data from retail member agencies, consolidate the data and calculate the supply-demand index. It's important to note that the supply types and portfolios within the IEUA service area are extremely diverse, and the availability of supply types can depend on many factors.

There are four primary components to the drought monitoring framework:

1. **Indicator Data Collection and Distribution**- Key imported water availability indicators will be compiled and provided to the member agencies annually.

2. **Member Agency Reporting**- Based on the provided indicator data and their own monitoring activities, the member agencies will provide their annual forecast for available local supplies and demands.

3. **Regional Supply-Demand Index Calculation**- The agency projections will be combined to formulate a regional supply-demand ratio (or index).

4. **Shortage Classification**- The regional index will be used to classify the level of water shortage (if any).

Simply stated, the assessment looks at current and future projected water supplies as compared to current and projected water demand. Should there be a downward shift in available water supplies or an increase in customer demand, IEUA and its member agencies will determine the severity of the change, the categorized stage level, and the determine the required response.

This Drought Monitoring section:

- Provides background and operational information on the IEUA service area supply types and their conditions.

- Summarizes and describe the data to be used for monitoring each of the water supplies (also called indicators).

- Describes the member agency reporting process for the drought monitoring framework.

- Defines the water shortage stages to be implemented within the drought monitoring framework and associated regional supply-demand index calculation.

3.1 Drought Indicators

Given the diversity in the supply types and portfolios within the IEUA service area, the data available to inform water supply availability and conditions are abundant and often interconnected. The supply types reviewed here include Chino Basin groundwater, non-Chino Basin groundwater, imported water, and local surface water.

3.1.1 Groundwater

Chino Basin Groundwater

The Chino Basin is an adjudicated groundwater basin and is one of the largest groundwater basins in Southern California. San Bernardino County Superior Court created the Chino Basin Watermaster (CBWM) in 1978 as a solution to lawsuits over water rights. The CBWM is responsible for management of the Chino Basin in accordance with the Judgement, 2000 Peace Agreement, 2007 Peace II Agreement, and the Chino Basin Optimum Basin Management Program (OBMP).

Water rights in the Chino Basin are held by representatives of three stakeholder groups, called Pools. The three Pools are:

- Overlying Agricultural Pool: representing dairymen, farmers, and the State of California
- Overlying Non-agricultural Pool: representing area industries
- Appropriative Pool: representing local cities, public water districts, and private water companies

The court judgment allocates groundwater rights by establishing an annual pumping “safe yield” for each Pool. The Operating Safe Yield (OSY) is the annual amount of groundwater that can be pumped from the basin by the Pool parties, free of replenishment obligations. Annual groundwater production in excess of the OSY is allowed by the adjudication, provided that the pumped water is replaced and recharged back into the groundwater basin. In addition, stakeholders within the different Pools can reach agreements to exchange groundwater rights for other water sources. For example, there have been agreements between dairymen in the agricultural pool and purveyors in the appropriative pool to exchange recycled water for groundwater rights. The OSY and the average total groundwater production since 1978 for each Pool is summarized in Table 4.

Table 4. Chino Basin Groundwater Operational Safe Yield and Historical Production

Stakeholder Pool	Operational Safe Yield[1] (AF)	Average Groundwater Production[2] 1977-2017 (AF)
Agricultural	82,800	42,248
Non-agricultural	7,366	3,984
Appropriative	54,834	97,215
Total	145,000	143,447

[1] Values represent the OSY from 1978 to June 2018. The appropriative rights toward the safe yield were reduced by 5,000 AF to 49,834 AF in June 2018.
[2]Based on the 41st Annual Chino Basin Report (Fiscal Year 2017-18) (http://www.cbwm.org/rep_annual.htm**)**

The quantity of groundwater stored in the Chino Basin has been carefully managed by the CBWM. Currently, there are numerous efforts to increase the amount of groundwater recharge. There are 19 active spreading basins that are operated to capture stormwater, recycled water, and/or imported water for recharge into the Chino Basin. The safe storage for the groundwater basin was previously defined as 500,000 acre-feet (AF), and there are investigations underway regarding the feasibility of increasing that storage to as much as 1,000,000 AF.

The water quality in the southern portion of the Chino Basin has been impacted by historical agricultural uses and now has high levels of nitrate and total dissolved solids (TDS) in certain areas. There are also some areas that exceed standards for perchlorate and volatile organic chemicals (VOCs). Most recently, there have been growing concerns around the occurrence of perfluorinated chemicals (PFOS and PFOA) and there are efforts to understand their occurrence in the regional water supply as they may become subject to regulatory limits.

Lower quality groundwater requires additional treatment, and/or blending with higher quality imported water. The CBWM works in partnership with local municipalities, IEUA, and the Santa Ana Regional Water Quality Control Board to address these water quality issues. In addition, IEUA is part of a Joint Powers Agency, the Chino Basin Desalter Authority (CDA), which was formed to manage the production, treatment, and distribution of treated potable water. Treatment occurs at two plants – Chino I and II Desalters – to remove salts and volatile organic chemicals through reverse osmosis, ion-exchange, and air stripping. A detailed summary of the general conditions of the Chino Basin can be found in the 2016 State of the Basin Report on the CBWM website. The 2016 State of the Basin is an atlas-style report with maps and figures displaying the conditions and trends within the basin.

Because of these conditions, the availability of Chino Basin groundwater is largely driven by quality as opposed to quantity. For example, for the period of 2009 to 2018, Chino Basin groundwater comprised roughly 15 percent of the total water supply for the Chino Hills service area (not including the water received from the CDA, which comprised 26 percent of the annual supplies for the same time period). However, in 2018, quality concerns in their area required that all groundwater wells within the service area be taken offline for an extended duration and alternative water supplies be utilized. The resiliency of the regional supply portfolio and the interconnections between the member agencies facilitated access to alternative water supplies.

The availability of real-time groundwater quality data within the Chino Basin varies significantly depending on location, well type, and constituent of interest, complicating the selection of groundwater availability indicators for the IEUA drought monitoring framework. However, due to the active management and monitoring of the basin by the CBWM, along with each of the IEUA member agencies and other stakeholders, the conditions and availability of the groundwater are generally known by the stakeholders. The drought monitoring framework will rely on the collective expertise of the IEUA member agencies and their water managers to define groundwater availability conditions and inform the regional drought monitoring framework.

Non-Chino Basin Groundwater

There are four agencies within the IEUA service area that utilize groundwater from basins adjacent to the Chino Basin as a water supply source: Upland, Cucamonga Valley Water District (CVWD), Fontana Water Company (FWC), and San Antonio Water Company (SAWCo). The additional basins include Cucamonga, Rialto, Lytle Creek, Colton, and the Six Basins groundwater basins. The Six Basins are comprised of the Ganesha, Live Oak, Pomona, Lower Claremont Heights, Upper Claremont Heights and Canyon Basin. These basins combined provided approximately 13 percent of the regional water supply portfolio between 2009 and 2018.

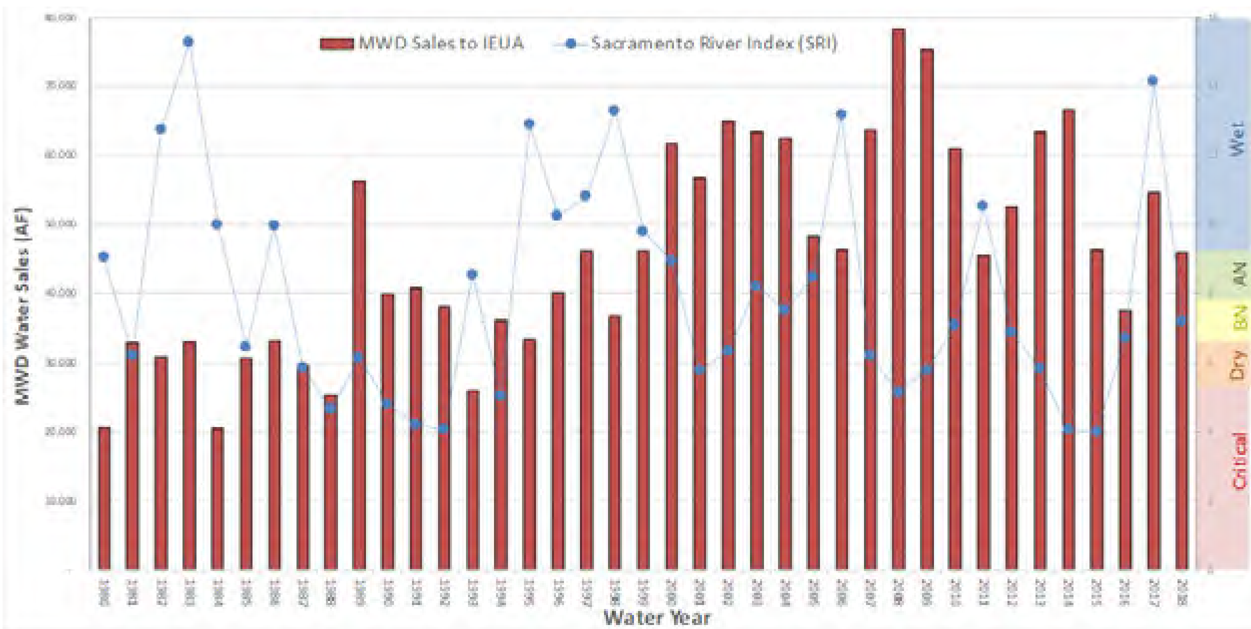
The trends and conditions in other groundwater basins are unique and the supply availability has specific implications for each member agency. The drought monitoring framework will allow the member agencies relying on non-Chino Basin groundwater to provide their insights into the conditions of each of the groundwater basins. The member agencies' individual insights will serve as the key indicators for non-Chino Basin groundwater.

3.1.2 Imported Water

IEUA began importing supplemental surface water to the Chino Basin from MWD in 1951. While MWD also imports water from the Colorado River, the State Water Project (SWP) is the primary source of imported water supplies delivered to IEUA. The SWP originates along the Feather River (a tributary to the Sacramento River), hundreds of miles north of IEUA, and includes facilities to pump and convey water from the Sacramento-San Joaquin River Delta (Delta) to Southern California as well as to the San Francisco Bay Area, the San Joaquin Valley, and the Central Coast. From 2009 to 2018, imported water supplies delivered by MWD have accounted for roughly 25 percent of the water supplies in the IEUA service area.

There are numerous conditions that contribute to the relative availability of the imported water supplies, including current hydrologic conditions along the Feather and Sacramento Rivers and in the Delta, the regulatory restrictions on Delta exports, the amount of water remaining in SWP storage facilities from previous years, the conditions of the conveyance infrastructure south of the Delta, the water management strategies of MWD, and numerous other operational and legal constraints. While some of these constraints can be difficult to quantify or consolidate, there are several metrics available to quantify the hydrologic conditions of the Feather and Sacramento Rivers that may be useful in predicting the availability of imported supplies.

The Sacramento River Index (SRI) published by DWR provides a quantification of Delta inflows from the Sacramento River by estimating the sum of runoff for the four major rivers within the river basin (Sacramento, Feather, Yuba, and American Rivers). The SRI is reflective of the overall water year and classifies each year as wet, above normal, below normal, dry, or critical. The historical relationship between imported water availability in the IEUA service area and the hydrologic conditions in the Sacramento River basin was examined by comparing the SRI to historical MWD deliveries to IEUA (see Figure 5). This comparison indicates that hydrologic conditions in the Sacramento River basin are not directly correlated with imported water deliveries in that year.



Note: A data request was fulfilled by MWD for all water sales to IEUA from water years 1980 to 2018. Categories include: Agricultural, Full Service, Interruptible Programs, Local Projects, and Storage Programs. Of these categories, Full Service and Interruptible Programs were summed to determine MWD deliveries that meet municipal demand. Agency Sales Report data for 29 water years (1980 to 2018).

Figure 5. MWD Water Sales to IEUA with the Sacramento River Index (SRI)

Since water year 2000, the largest and second largest MWD sales occurred in critical and dry years, respectively. Deliveries for water years classified as wet or above normal typically coincide with relatively average deliveries. This indirect relationship between hydrologic conditions and water deliveries is indicative of MWD and IEUA's long-term water management strategies, including use of carryover storage from year to year and real-time portfolio management to optimize use of available sources of water to meet water demands in any given year.

MWD actively monitors and manages the water supplies it imports to the region to assess availability and predict shortages. In response to critically dry conditions in the early 2000s and federal court rulings to protect the Delta Smelt in 2007 (which tightened regulations on Delta exports), MWD developed the Water Supply Allocation Plan (WSAP) to help manage uncertainty in the SWP's future water availability. The WSAP includes the specific formulas for determining member agency supply allocations in a fair and reasonable way and the key implementation elements needed to administer an allocation should a shortage be declared. The framework of the WSAP includes an allocation year that spans from July to June, with a declaration in April.

The key dates for the WSAP monitoring and declaration process are as follows:

January to March: Water Surplus and Drought Management reporting process provides updated information on storage reserve levels, projected supply, and demand conditions to the MWD Water Planning and Stewardship Committee meetings.

April: Member agencies report their projected local supplies for the coming allocation year (July to June) to update projected supplies. Staff analysis of storage reserves and projected supply and demand conditions provide an allocation recommendation to the MWD Board of Directors. This allocation is effective starting July 1 and held through the following June 30.

A 10-level Shortage Allocation Index determines the Wholesale Minimum Allocation and the Maximum Retail Impact Adjustment. Wholesale Minimum Allocation is defined as the minimum amount of MWD-supplied wholesale water service provided to each member agency. The Maximum Retail Impact Adjustment ensures that agencies with a high level of dependence on MWD do not encounter unequal retail shortages when experiencing a reduction in wholesale supplies.

In addition to the Wholesale Minimum Allocation and Retail Impact Adjustment, a Conservation Demand Hardening Credit and Minimum Per-Capita Water Use Credit are considered to determine the total WSAP Allocation. The allocation to an agency for its municipal and industrial retail demand is the sum of these four calculations, which are described in detail in the Appendix of the WSAP.

July to June: Member agencies are requested to submit their local production on a monthly basis and certify end of allocation year local supply use. Local production data must be reported to MWD by the end of the month following the month of use (i.e., use in July must be reported by the end of August). This information is combined with MWD sales information to track retail water use throughout MWD's service area. Each month MWD reports on member agency water sales compared to their allocation amounts.

June 30: Allocation year is complete.

August: MWD calculates potable water use based on supply certifications and actual sales data for the previous allocation year (July to June). Allocation surcharges are assessed for usage above a given member agency's final adjusted allocation.

Given the complexity of the various factors influencing the availability of imported water, the drought monitoring framework will rely on the monitoring efforts and allocation procedures of MWD to inform the availability of the imported supplies.

3.1.3 Local Surface Water

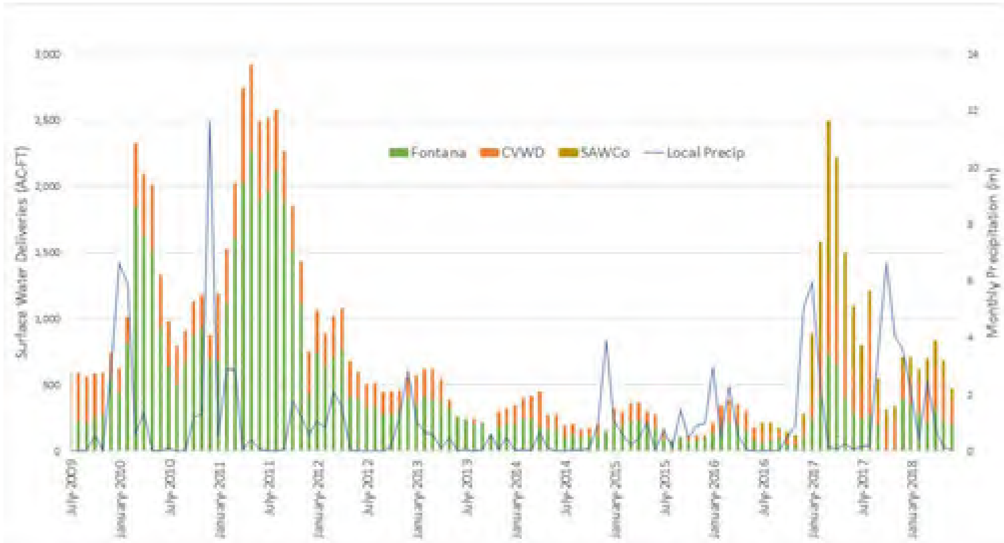
Three IEUA member agencies utilize local surface water supplies to meet demand, CVWD, Fontana Water Company, and SAWCo.

CVWD local surface water supplies come from streams, springs, and tunnels within canyons located in the northern area of the CVWD boundary. CVWD has rights to six sources of canyon water, three of which are currently utilized (Cucamonga Canyon, Day/East Canyon, and Deer Canyon). Based on historical data, CVWD estimates a reasonable available volume of 4,540 acre-feet per year (AFY) from local surface water supplies.

Fontana Water Company receives local surface water supplies from Lytle Creek, which is then treated at the Sandhill Plant. Lytle Creek supplies from 2011 to 2015 averaged 6,250 AFY. The Lytle Creek sum is augmented with water obtained from the Grapeland Tunnel. The Grapeland Tunnel has extensive collector lines in the Lytle Creek Canyon tributaries and a large line running below the streambed of Lytle Creek.

SAWCo has rights to surface flow from San Antonio Creek that are pre-1914 rights and over the years have been supported by Court Judgments per a confidential report entitled "Opinion Re Water Rights of San Antonio Water Company," dated June 1993. In 2011, a wet year, SAWCo diverted 8,800 AF from San Antonio Creek. The average diversion from 2012 to 2015 was 1,963 AFY.

Figure 6 compares the monthly local surface water deliveries for Fontana Water Company, CVWD, and SAWCo with monthly precipitation from a nearby weather station (CIMIS Station #78, Pomona). Local surface water supplies for each of these member agencies are highly reliant on local precipitation, and months of high local precipitation typically correspond with a greater volume of local surface water supply for the months to follow. Local precipitation provides a helpful predictor for local surface water availability and is a valuable indicator for the drought monitoring framework.



Note: Local precipitation was collected from CIMIS station in Pomona (#78). A Chino CIMIS station (#255) was added in March 2018 and could be used for future applications.

Figure 6. Historical Local Surface Water Supplies and Local Precipitation

3.2 DROUGHT MONITORING

The supply types and portfolios within the IEUA service area are extremely diverse, and the relative availability of supply types can depend on many factors. The IEUA drought monitoring framework will rely largely on the knowledge and expertise of IEUA's member agencies to interpret real-time conditions and predict and define regional water shortages due to the disparate nature of the indicators of drought conditions throughout the region. There are four key cornerstones of the IEUA drought monitoring framework as described below and shown in Figure 7.

- **Indicator Data Collection and Distribution.** Key imported water availability indicators will be compiled and provided to the member agencies annually.
- **Member Agency Reporting**. Based on the provided indicator data and their own monitoring activities, participating member agencies will provide their annual projections for supplies and demands within their service area once a year.
- **Regional Supply-Demand Index Calculation**. The agency projections will be combined to formulate a regional supply-demand ratio (or index).
- **Shortage Classification.** The regional index will be used to classify the level of water shortage (if any).

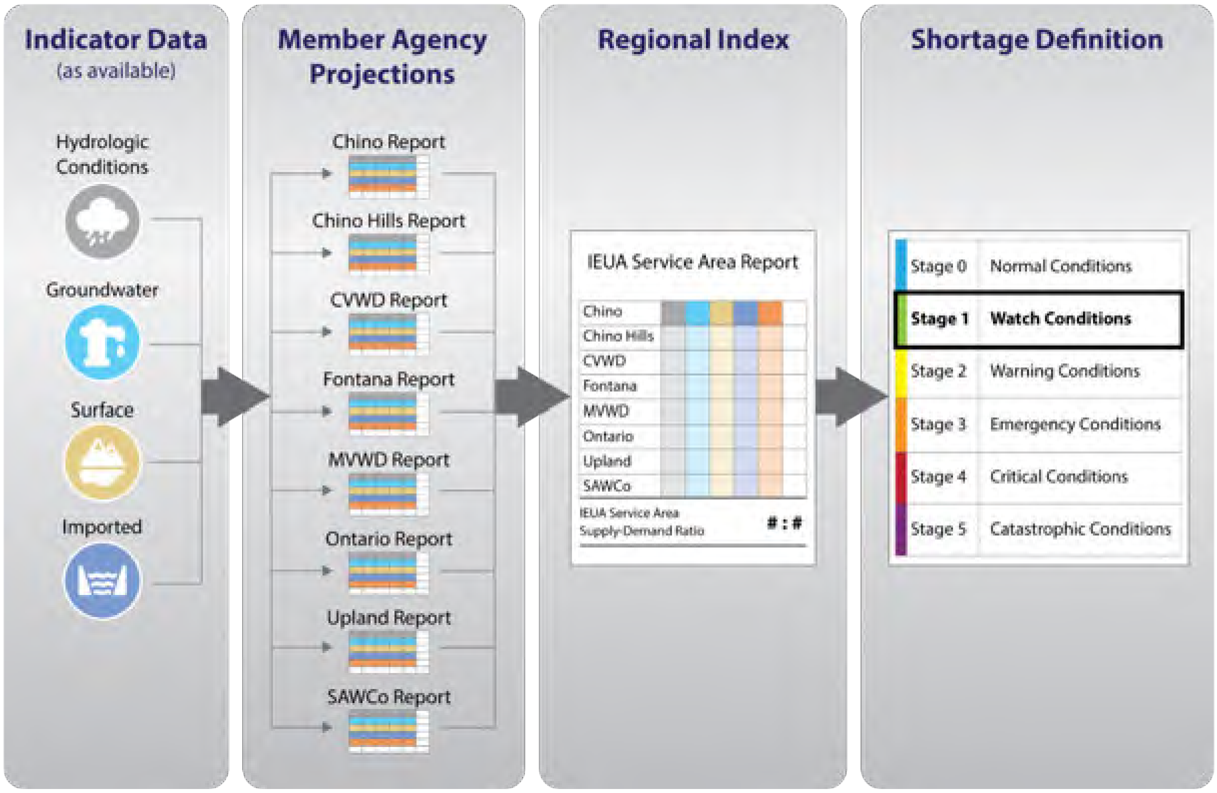


Figure 7. IEUA Regional Drought Monitoring Framework

3.2.1 Reporting Framework

The drought monitoring reporting will occur on an annual basis and will be a two-step process. First, key water supply indicators for imported water will be compiled into a standardized report and distributed to the water managers from each member agency. This will include projected deliveries of imported water from MWD in addition to any potential forecasts for shortages. IEUA will also provide estimated demand projections to the participating member agencies, as a reference or guide, based on a five-year historical average.

Second, each retail member agency will report their projected local supplies and demand for the coming year. Figure 8 below is the information obtained from each member agency that will be utilized to generate the supply-demand ratio.

Annual Supply Projections					
Agency	Local Groundwater	Surface Water	Imported Water	Annual Demand	Supply Shortage
Chino					
Chino Hills					
Fontana Water Company					
Ontario					
Upland					
Cucamonga valley Water District					
Monte Vista Water District					
San Antonio Water Company					

Figure 8. Sample Reporting Framework

This reporting time frame and structure was selected because it piggy-backs the annual reporting time frame conducted by IEUA, the retail member agencies and MWD.

As well, there is an additional review process. IEUA has an established monthly forum to provide and receive updates from the member agencies on water supply conditions. IEUA hosts member agency Water Manager meetings each month, where the managers review supply conditions, demand shifts and regulatory changes that may impact supply. If local circumstances or external drivers significantly shift, IEUA will request updated local supply data from respective member agencies. As with the annual reporting, this information will be used to determine if there is a regional water shortage due to these factors.

3.2.2 Supply and Demand Ratios

The supply and demand ratios for each year will be calculated based on the projections provided by the water managers. The data will be compiled into a singular supply-demand ratio for the IEUA service area. The regional supply-demand ratio will serve as the trigger to inform the regional water shortage.

Figure 9, on the following page, provides an example compilation of member agency projections and the calculation of the regional supply-demand ratio. There will be considerations for expected shortages for individual member agencies that may not be reflected in the regional ratio.

Between reporting periods, the participating member agencies will continue their individual monitoring activities. Each of the member agencies have developed their own approach to monitoring their supplies and have established unique definitions and responses for localized shortage conditions. *Appendix B:*

Summary of Member Agency Water Shortage Stages provides an overview of each agencies' shortage definitions and responses.

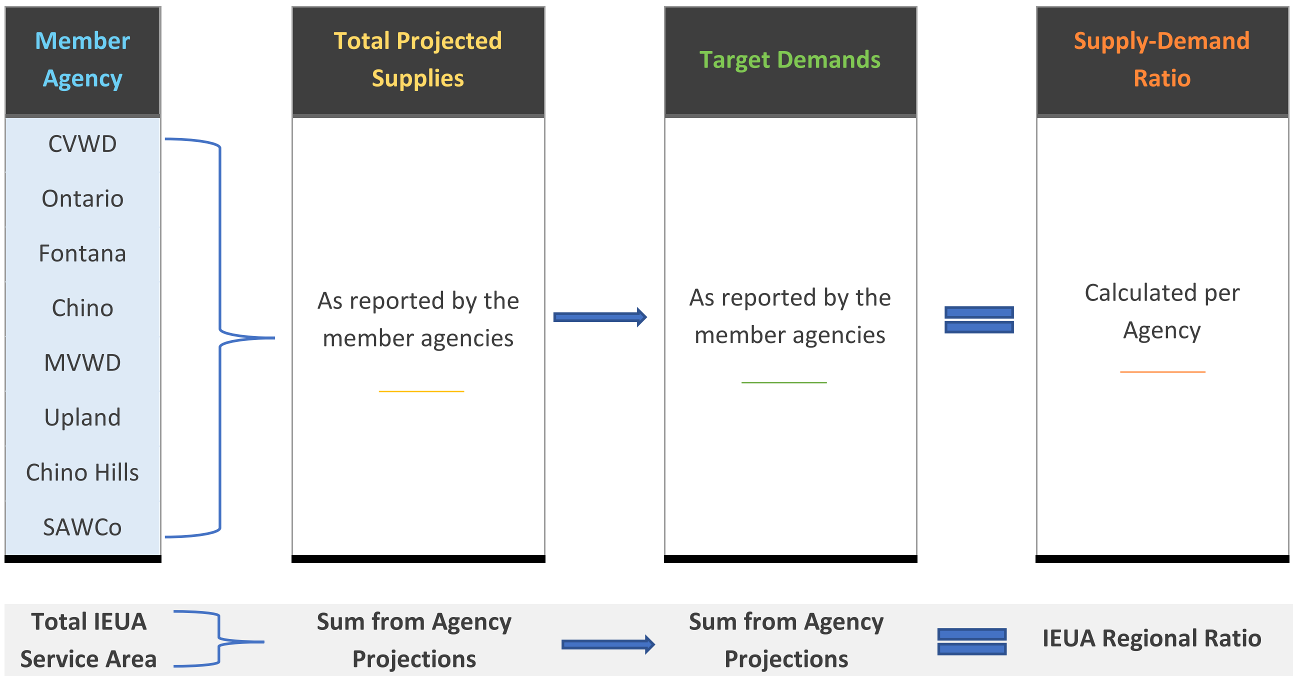


Figure 9. Annual Regional Supply and Demand Projects for IEUA Service Area

3.2.3 Water Shortage Stages

Stages will be defined based on the calculated supply-demand ratios for the IEUA service area. The water shortage stages and descriptions are shown in Table 5.

These stages will be used to help the Drought Response Taskforce identify the most appropriate regional responses for the anticipated shortages.

The stages are in compliance with the newly passed state legislation (SB 606 and AB 1668), which now requires drought plans to be standardized and include six stages of drought severity. These stages were developed in consultation with each of the member agency's own definitions for local drought or water shortage levels and can be viewed in *Appendix B: Summary of Member Agency Water Shortage Stages.*

It is important to understand that the stage is calculated and declared for the overall region, and at the time, a local retail agency may have a water supply level that varies from the regional stage due to the uniqueness of their water supply mix. When this occurs, the local agency may develop customer messaging that clarifies that their agency is not directly impacted to the same level as the region.

Water shortage stages and triggers for IEUA region are below:

Table 5. IEUA Regional Water Shortage Stages

Drought Stage:	Stage Descriptions:	Triggers:
Stage 0	Normal Conditions	No water shortages anticipated.
Stage 1	Watch Conditions	IEUA regional ratio is predicting shortages between 1% and 5%.
Stage 2	Warning Conditions	IEUA regional ratio is predicting shortages between 6% and 15%.
Stage 3	Emergency Conditions	IEUA regional ratio is predicting shortages between 16% and 25%.
Stage 4	Critical Conditions	IEUA regional ratio is predicting shortages between 26% and 50%.
Stage 5	Catastrophic Conditions	IEUA regional ratio is predicting shortages greater than 50%.

4 Vulnerability Assessment

In the western part of the United States, climate change is predicted to cause increased temperatures, less mountain snowpack, more severe and frequent droughts, changes in runoff patterns and overall negative impacts on regional water supplies.

Climate related factors may make it more challenging for water planners to manage demand needs. Add population growth into the mix and the picture becomes even more complicated.

A **vulnerability assessment** predictively identifies, quantifies, and prioritizes the potential susceptibilities of a region's complex and dynamic water supply sources. The assessment takes into consideration climate conditions, as well as other factors such as environmental and political policy, and population growth.

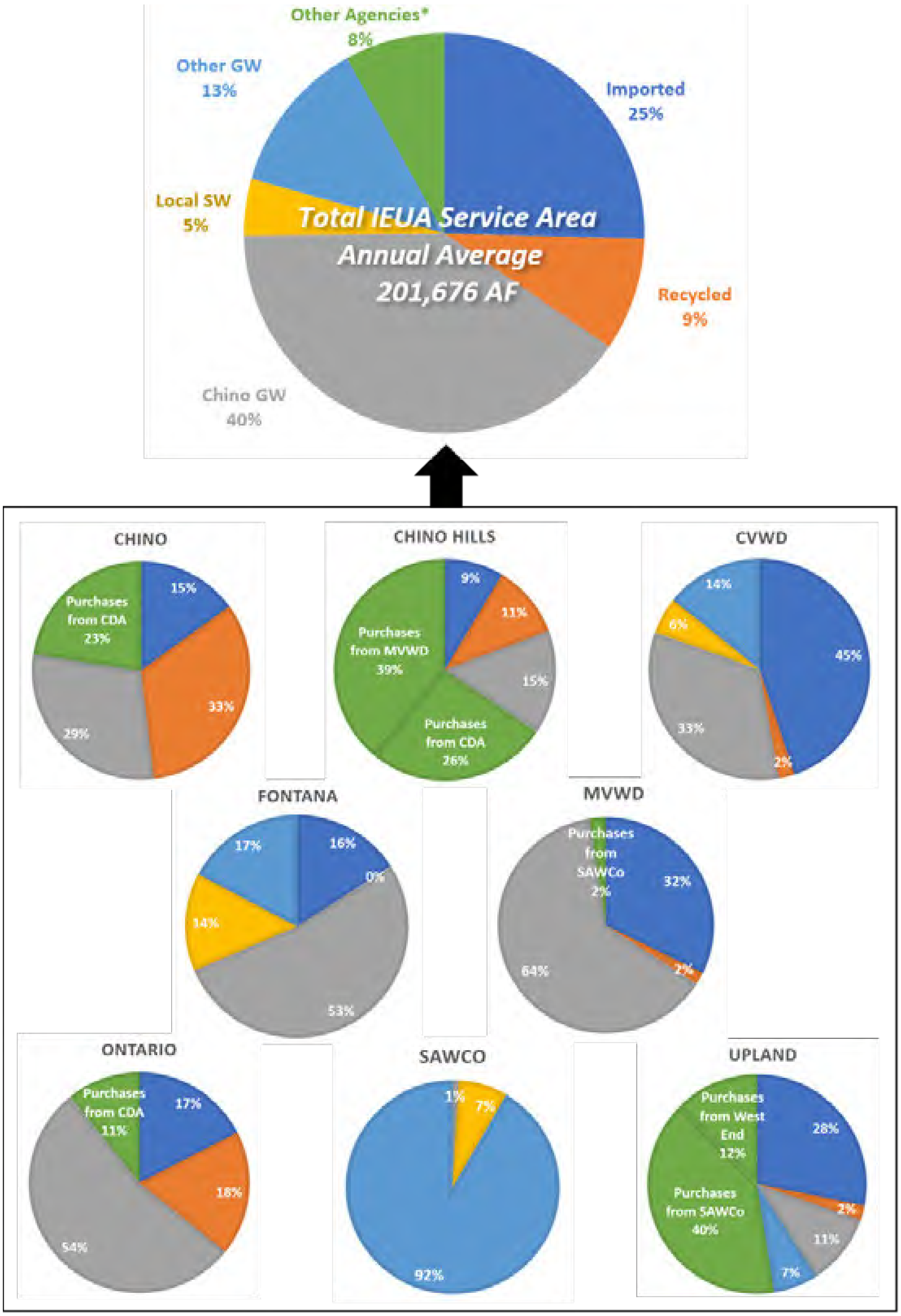
The desired outcome of the vulnerability assessment is to improve understanding of 1) the potential for, and 2) the characteristics of, future drought conditions.

This section is organized into four parts.

> **First**, the regional water resources are reviewed and described.
>
> **Then**, potential future conditions are discussed related specifically to climate change and growth and how they may impact each of the regional water supply types.
>
> **Next**, results from IEUA's Integrated Resource Plan modeling efforts, which explores the potential impacts to the regional water supplies based on simulated future scenarios, are presented.
>
> **Lastly**, the key vulnerabilities are reviewed and discussed.

4.1 Regional Water Supplies

As described in previous sections, the region relies on imported water, groundwater from both the Chino and non-Chino groundwater basins, IEUA-supplied recycled water, exchanges and purchases from other agencies, and local surface water from local creeks and canyons to meet demands. The composition of the regional and member agency supply portfolios based on the average annual deliveries from 2009 to 2018 are shown in Figure 10. Chino Basin groundwater provides the largest portion of the annual regional supply at 40 percent and imported water accounts for about 30 percent. Each of the member agencies also has their own unique portfolio as shown in Figure 10.



Note: "Other Agencies" in the regional portfolio are reflective of purchases from non-member agencies. The member agencies' supply portfolios show all purchases (whether from member or non-member agencies).

Figure 10. Regional and Member Agency Supply Portfolios (2009-2018 Averages)

4.2 Future Conditions

This section addresses predictive impacts to regional water resources and imported supply resulting from growth, climate change, and other possible factors. To support this process, resource information was gleaned from the following sources:

- California's Fourth Climate Change Assessment (2018 CCCA)
    - Mean and Extreme Climate Change Impacts on the State Water Project [CCCA SWP]
    - Los Angeles Region Report [CCCA LA]
- IEUA's Integrated Water Resources Plan (2015 IRP)
- IEUA's Climate Change Action Plan (2018 CCAP)

The CCCA's Los Angeles Region Report was utilized because it encompasses Los Angeles, Ventura and Orange counties, and most importantly, urbanized portions of San Bernardino County.

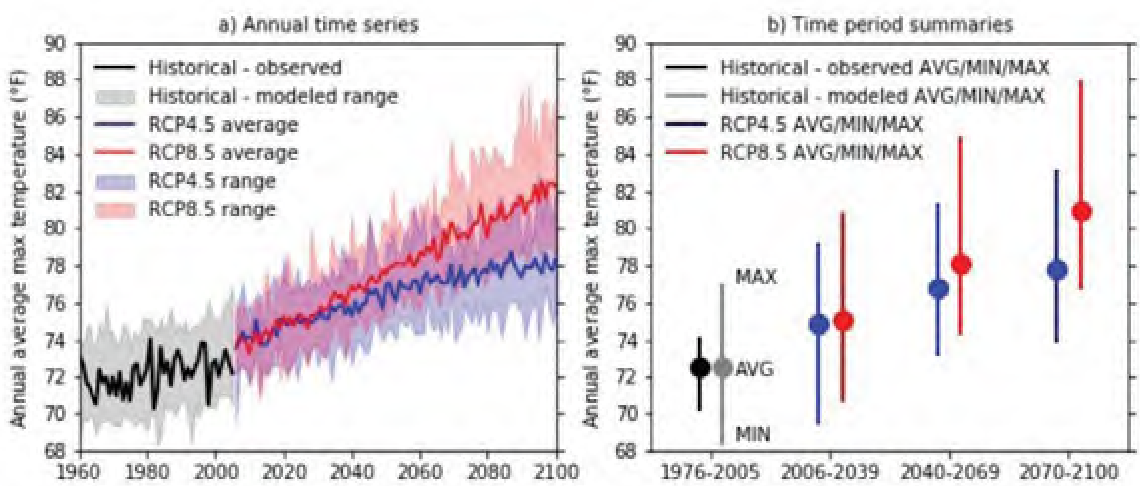
Los Angeles region topography and boundary definition as a solid red line, which encompasses Los Angeles, Ventura, and Orange Counties, and adjacent urbanized portions of San Bernardino and Riverside Counties.

Like the rest of the state, the Los Angeles region is expected to face a challenging combination of decreased water supply and increased water demand. The future reliability for IEUA's water resources are dependent upon climate conditions (both local and at the source of supplies), environmental and political drivers, and growth. Climate change-induced temperature increases, changes in runoff patterns, and drought are some of the key factors that will have a substantial impact on regional water supplies. Additionally, growth in the region will create new demand for potentially strained water supplies. The effects of climate change and growth are discussed in a general sense in Sections 4.2.1 and 4.2.2, respectively. Regional water supplies within the IEUA service are then summarized and analyzed through three lenses: climate change, growth, and other supply reliability factors.

4.2.1 General Effects of Climate Change

The effects of a changing climate are apparent throughout California, including increased temperatures, prolonged drought, rising sea levels, severe atmospheric river events, and extreme wildfires. Figure 11 shows the predicted trends for temperature in the Los Angeles area, as reported by the CCCA LA report, based on global climate models. In the figure, modeled scenarios are described as Representative

Concentration Pathways (RCP) 4.5 and 8.5. RCP4.5 represents a mitigation scenario where global CO_2 emissions peak by 2040, while RCP8.5 represents a "business-as-usual" scenario where CO_2 emissions continue to rise throughout the 21st century. Both scenarios show a predicted increase in average temperatures in the Los Angeles region. Though projections are similar during the early 21st century regardless of the emissions scenario, later in the 21st century the projections diverge as emissions continue to rise under RCP8.5 and they level off in the mid-century under RCP4.5. Based on the modeled results, average annual temperatures in the region could rise 4 to 5 degrees Fahrenheit by the mid-21st century, and 5 to 8 degrees Fahrenheit by the late 21st century.



Historical-observed (black), historical-modeled (grey), and projected future (RCP4.5 - blue, RCP8.5 - red) annual average maximum temperature over the LA region. (a) Annual time series of data (future projections begin in 2006), with solid lines representing model-averages and shading representing model spread. (b) Summary of model-average (circles) and spread (vertical lines) across four time periods: 1976-2005 (historical), 2006-2039 (early-21st century), 2040-2069 (mid-21st century), and 2070-2100 (late-21st century). Unit is °F.

Source: CCCA LA

Figure 11. Historical and Projected Temperatures for the Los Angeles Region

Annual precipitation in the Los Angeles/San Bernardino region is highly variable and a significant portion of the regional rainfall is concentrated in the winter months from November to April. Figure 2 (provided in Section 2) shows the annual precipitation from 1990 to 2018. As the figure shows, while the average annual precipitation is slightly more than 15 inches, there have been very few years that have reflected that average. There are typically years with much greater than average precipitation or much less. The climate science regarding the future magnitude and timing of precipitation in the region is still an active area of research, though the consensus is that dry and wet extremes are both expected to increase in the future (CCCA LA); meaning that, while the projected average annual precipitation may align with historical trends, the wet years will likely be wetter and the dry years drier, thus exacerbating an already highly variable water supply reliability factor.

The reliabilities of imported surface water, local groundwater, recycled water, and local surface water are all susceptible to the effects of climate change and are discussed in the following sections.

4.2.2 General Effects from Growth

Population growth within IEUA's service area creates new demand for water supplies, but regional planning efforts such as IEUA's 2015 IRP and 2018 CCAP provide a path forward that strives to decrease demands and optimize resource allocations. Through thoughtful planning and development, sustainable growth within IEUA is a probable outcome. In the 2015 IRP demand analysis, it was found that per capita water usage decreases as development trends shift toward higher density and smaller landscaped areas. Also, the public has shown a willingness to reduce total water usage in response to statewide calls for conservation. Both factors suggest that increases in population do not necessarily constitute substantial increase in water use.

4.2.3 Groundwater

Groundwater within the IEUA service area is, and will continue to be, crucial to the water supply portfolio. The Chino and non-Chino Basin groundwater supplies have accounted for 53 percent of the regional supply portfolio for the last decade. In addition, each of the member agencies rely, to some degree, on groundwater to meet their annual demands. Per the 2015 IRP, the baseline amount of groundwater production between 2020 and 2040 is assumed to be 91,300 AF for Chino Basin, and 22,000 AF for non-Chino basins.

Future conditions for Chino and non-Chino Basin groundwater are discussed below through the lenses of climate change, growth, and other reliability factors.

Climate Change Impacts

It is anticipated that the groundwater supply will likely be adversely impacted by climate change-induced temperature increases and drought. As discussed above, impacts of climate change for the Los Angeles/San Bernardino region are likely to include increased temperatures and more extreme precipitation events. Groundwater elevation and water quality within the region are both dependent upon rainfall and supplemental sources of recharge. Although the effect of climate change on precipitation in California is still unclear, more frequent occurrences of extreme events similar to the 2011 to 2017 drought could significantly decrease natural groundwater recharge. In addition, as other supplies become constrained in a drought situation, there is potential for less water availability for groundwater recharge purposes. Current supplies utilized for groundwater recharge include surface water, imported water, and recycled water. The 2015 IRP, which was informed by model simulations performed by Wildermuth Environment Inc., showed that natural groundwater recharge would decrease by 0.44 percent for each 1 percent decline in long-term precipitation. A key conclusion drawn from the simulations is that it is important to secure supplemental water when available to recharge the Chino Basin (through direct or in lieu practices) to enable increased groundwater production during droughts and emergencies (2015 IRP).

Groundwater quality is susceptible to climate change because as other sources become less available, groundwater will likely be more heavily relied upon, and if, in addition to those stresses, recharge is also reduced, the groundwater quality issues in the basin may be exacerbated.

Growth Impacts

The 2015 IRP assumed that baseline groundwater production between 2020 and 2040 to be 91,300 AFY, which is only 750 AFY more than the current baseline amount of groundwater production. This shows that groundwater pumping is not anticipated to ramp up to meet increased demand.

Future development patterns with increased hardscaping and more efficient irrigation practices (2015 IRP) also have the potential to impact the groundwater supply. Hardscaping and increased irrigation efficiency coupled with warmer surface air temperatures, will change urban landscapes. Lawns reliant on irrigation may be converted to low-water yards of mulch, rock, shrubs, and other ground cover (CCCA LA). These changes in urban landscapes have a dual effect – one lessens the demand and the other decreases the amount of recharge from deep percolation of applied water.

Other Reliability Factors

Other factors that will impact the future viability of local groundwater within IEUA include changes in stormwater volume and timing, as well as salinity, nitrogen, and other constituent build-up in the groundwater aquifer.

Stormwater caused by surface water runoff originating from both rain and snow in the San Gabriel Mountains and locally within the IEUA service area is an important source of groundwater recharge. Future conditions for stormwater are closely related to both climate change and growth as described above. As climactic events become more extreme, it is likely that there will often be times of minimal stormwater due to drought, and other times of far too much stormwater resulting from atmospheric rivers and other extreme storm events. Additionally, increased growth in the region will likely convert agricultural or non-developed land to hardscapes, which generate more surface runoff and, consequently, stormwater.

IEUA, the CBWM, the Chino Basin Water Conservation District (CBWCD), and San Bernardino Flood Control District will need to continue cooperative management of flood control channels to capture stormwater in adjacent detention basins. Runoff not captured during these large storm events will likely reach the Santa Ana River and the Pacific Ocean, resulting in a lost opportunity to recharge stormwater flows during large storm events. The CBWM Recharge Master Plan Update (RMPU) recommended projects to increase stormwater recharge increasing the recharge capacity by 6,400 AFY (2013 CBWM RMPU). Stormwater is an extremely valuable resource to the region because it is considered “free” once the necessary facilities to capture and use this water have been constructed. It is also a high-quality water source that can improve the quality of the groundwater supplies once it has infiltrated and become blended with the aquifer (2015 IRP).

Groundwater quality in the Chino Basin has historically been impacted by high salt, nitrate, and other constituent concentrations and water quality is therefore a crucial constraint on future groundwater production. Although much of the historical agricultural land within the IEUA service area has been urbanized, agricultural operations continue to use water supplies to irrigate crops and raise livestock. Reduced rainfall and increased groundwater withdrawal may lead to more salinity buildup in topsoil and increased concentrations within the aquifer posing problems for the region's salt-sensitive crops (CCCA LA), increasing the need to secure fresh water supplies for blending or to invest in advanced treatment technologies. In addition, the CDA is an important element of the long-term salinity management strategy for the basin.

4.2.4 Imported Water

The availability of imported water supplies is heavily dependent on the regional hydrology of the SWP as well as environmental regulations. This dependency can lead to high variability in the annual amount of water available to the Southern California region. For example, during the most recent California drought (December 2011 to March 2017), the California SWP was able to supply only five percent of its contract allocation in 2013-2014, which is a significant reduction from past allocations (2015 IRP).

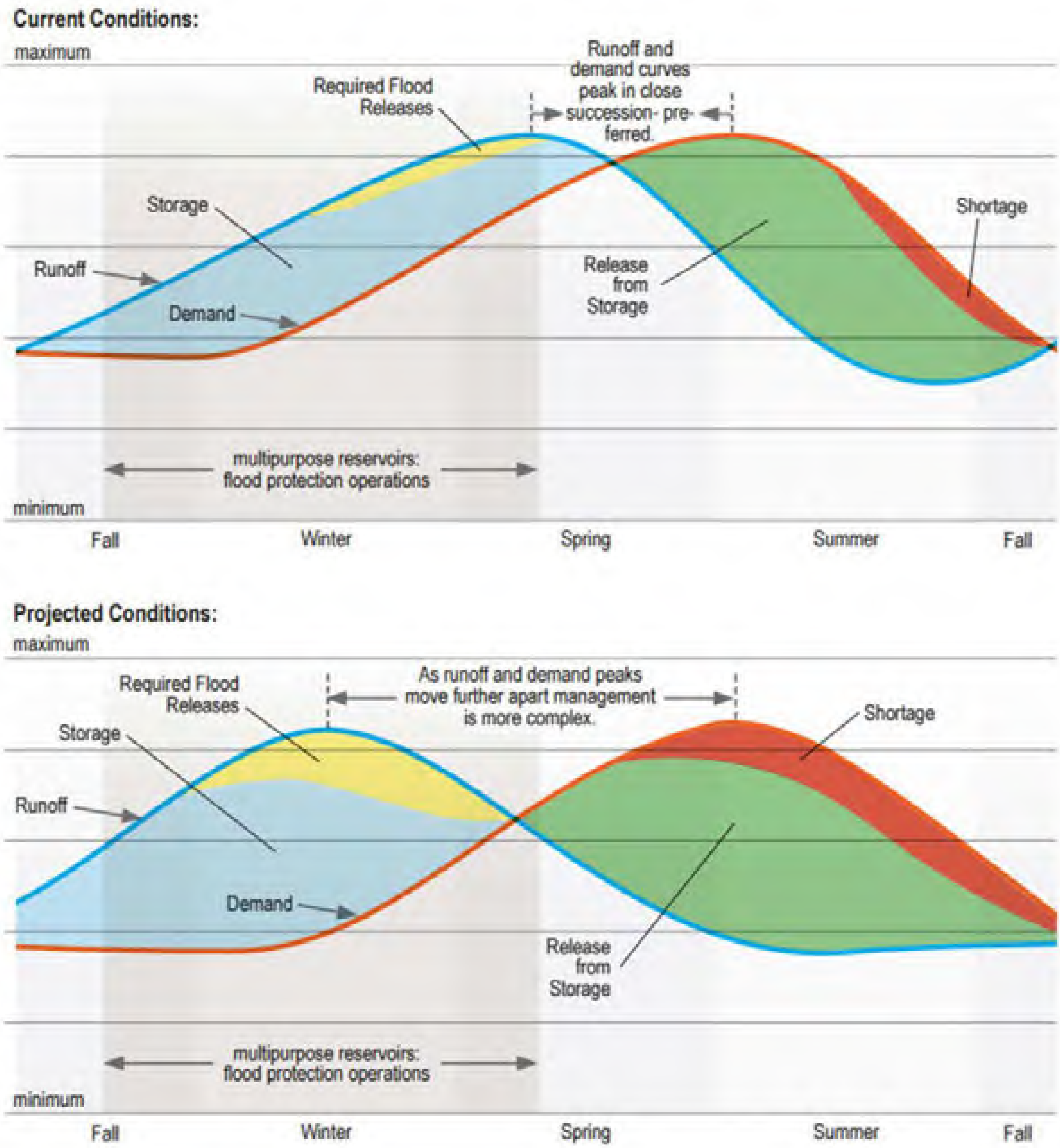
Imported water purchased from MWD is limited by a purchase order agreement. The agreement allows the region to purchase up to a total of 93,283 AFY at its lowest (Tier I untreated) rate. This limit is based on historical imported water purchases for municipal use by the member agencies and for regional groundwater recharge. The agreement includes an annual minimum purchase commitment of 39,835 AF, which is slightly less than the 40,000 AFY minimum needed to operate the region's water treatment facilities. The future of SWP supplies to MWD is uncertain, but it is projected that climate change and other factors will curtail allocations and ultimately increase the cost of water.

Future conditions for imported water are discussed below through the lenses of climate change, growth, and other reliability factors.

Climate Change Impacts

Climate change is expected to continue to significantly impact the timing and characteristics of snowpack, on which the SWP system depends. The SWP's infrastructure was designed to capture snowmelt from Sierra Nevada snowpack, and when snow melts during the warmer spring and summer months, a combination of reservoirs and conveyance facilities provides a steady water supply throughout the year. This system is particularly effective during the summer and fall seasons when water demands peak and the precipitation is limited. The reservoirs were sized based on the historical precipitation patterns, and as more precipitation falls as rain in the winter months, more water will be required to be released from the reservoirs. The challenge of the shifting snowmelt and resulting runoff patterns is illustrated in Figure 12. The reliability of imported SWP water has declined in recent years and climate change predictions appear to show further decreases in reliability.

The CCCA SWP reported that changing seasonal precipitation and flow patterns, combined with sea level rise, could result in an annual 500,000 AF reduction of Delta export as well as a roughly 25 percent decrease of north-of-Delta carryover storage by around 2060. The results also indicate that the extra runoff from early snow melting and higher percentage of rain in the winter and early spring is not conserved in reservoirs and thus cannot be used to meet the higher summer demand in the current SWP system. This extra water is released as flood water in the winter and early spring to become Delta outflow. Most climate models reviewed for the CCCA indicate that the south-of-Delta exports are anticipated to be reduced from 4 to 44 percent annually compared to historical deliveries (CCCA SWP).



Source: California Department of Water Resources

Figure 12. Changes in Runoff versus Demand for Reservoirs Dependent on Snowmelt

<u>*Growth Impacts*</u>

There are no specific challenges posed to imported supplies due to growth. The challenges associated with growth will be general in that the regional water demand increases as imported water supplies become less reliable.

Other Reliability Factors

The existing SWP infrastructure relies on the ability to pump water from the Sacramento-San Joaquin Delta where local water rights, environmental protections, and imported water conveyance are often in competition with one another. Because of these frequently competing interests and the factors described above, regulations and restrictions on Delta Exports could potentially increase in the future.

4.2.5 Recycled Water

IEUA owns and operates four water recycling plants. These facilities provide tertiary-treated wastewater, also known as recycled water. Recycled water supplies can be used for three different applications, direct non-potable uses, groundwater recharge for the Chino Basin, and other regional discharge obligations.

Recharge of recycled water is allowed by the Regional Water Quality Control Board (RWQCB) through the OBMP. In addition, the region secured several permits allowing for the direct use and groundwater recharge of recycled water. These permits define requirements for the use of non-potable recycled water, including, but not limited to, uses, water quality limits, and monitoring requirements.

The recycled water program is operated based on the following order of priorities for recycled water supply:

1. Regional discharge obligations (Santa Ana River Judgement, environmental, etc.)
2. Agency direct use demands
3. Regional groundwater recharge

Based on recent wastewater projections that were calculated as part of the Wastewater Facilities Master Plan (WFMP), treated flows are expected to increase to over 85,000 AFY by 2040. These flow estimates were based on current existing indoor water usage levels (to ensure that facilities and pipelines are adequately sized) and are consistent with the IEUA's upper demand forecast. However, indoor water use efficiency is increasing, and new plumbing code and appliance standards are being implemented. As a result, available wastewater flows by 2040 are expected to be lower than 80,000 AFY. These water flow trends are being carefully tracked by IEUA.

Because recycled water supplies, their uses, and additional source water needs are under development by IEUA and the Regional Contracting Agencies (RCAs), the DCP conservatively assumes these surplus recycled water supplies will generally be used for the purposes stated above and additional source water will be further defined by ongoing studies and reflected in IEUA's other planning efforts.

Future conditions for recycled water are discussed below through the lenses of climate change, growth, and other reliability factors.

Climate Change Impacts

The reliability of recycled water supplies is not negatively impacted by climate change. While the treatment and distribution of recycled water supplies for re-use is energy intensive, which does lead to climate change inducing greenhouse gasses, the treatment and distribution of recycled water is *less* energy intensive than imported water supplies, creating statewide reductions in greenhouse gas emissions (2015 IRP).

Growth Impacts

The volume of recycled water available to IEUA and its member agencies is dependent on indoor urban water use, which has historically steadily increased. Based on the 2015 IRP demand predictions, this trend is anticipated to continue and should provide IEUA with increased volumes of recycled water supply. However, trends in indoor water efficiency must be considered when projecting supply volume.

Current demands for recycled water include non-potable applications such as irrigation and groundwater recharge. Applications for recycled water face challenges in terms of changing wastewater quality and treatment requirements due to increases in indoor water use efficiency and outdoor water use efficiency standards and increasing regulatory and environmental requirements. Additionally, the use of recycled water is impacted by the groundwater quality of the Chino Groundwater Basin. Specifically, the applications for recycled water become constrained if the salinity in the basin rises beyond the Regional Water Board's specified limits. Maintaining and potentially expanding recycled water projects to manage these challenges will increase the resiliency of the regional water supplies. Therefore, the vulnerability of recycled water supplies diminishes with increased growth.

Other Reliability Factors

The ability to collect, treat, and reuse recycled supplies relies on infrastructure that is intertied with all the member agencies. The maintenance and continued expansion of collection pipelines, water treatment facilities, pumps, and distribution pipelines are necessary for the success of IEUA's recycled water efforts. In addition, for recycled water to be a reliable source of supply there must be a demand for the supply. Meaning that as regulations and public opinion evolves there is the potential for more, or less, demands for recycled water.

An additional factor related to recycled water use in the region is tied to the Chino Basin groundwater quality. Requirements from the Santa Ana Regional Water Quality Board and the State Water Resources Control Board necessitate ongoing implementation of regional salt management and reduction actions as a condition of the regional recycled water use permits for outdoor irrigation and groundwater recharge. The applications for recycled water become considerably constrained if it is expected that its use will exacerbate salinity issues within the Chino Basin.

4.2.6 Local Surface Water

Agencies located in the northern part of the IEUA service area have long-standing legal rights to divert and treat water from local creeks. The amount of water from these local surface supplies is variable depending on climate conditions, and currently accounts for approximately five percent of the regional water supply portfolio.

Local surface water is recognized as an important resource since the only cost to the member agencies is the operation of the facilities to capture, treat, and distribute this water. IEUA member agencies recognize the value of local surface water and are investing in the capture and treatment of these supplies.

Climate Change Impacts

Local surface supplies are dependent on precipitation and temperature, and each of these factors is predicted to be influenced by climate change, creating uncertainty from year-to-year. The predictions for precipitation in the Los Angeles/San Bernardino region, as discussed above, are still uncertain but it is expected that the extremes will be more severe, and temperatures are expected to increase.

Extreme precipitation events can result in short periods with high volumes of runoff that will be difficult to capture. Conversely, extended droughts and dry years will result in long periods without available local surface water supplies, which will increase demands on other supply types.

Higher temperatures also impact local surface water. Warmer temperatures cause more evaporation and transpiration, reducing the amount of soil moisture. This means that the soil may absorb and hold more water when rain occurs, and this can reduce the amount of water flowing into creeks and streams.

Growth Impacts

There are no specific challenges posed to local surface water supplies due to growth.

Other Reliability Factors

The ability to collect, treat, and use local surface water relies on infrastructure. The maintenance of collector pipelines, water treatment facilities, pumps, and distribution pipelines are necessary for the success of IEUA's local surface water use efforts.

4.2.7 Future Conditions Impacts by Sector

One of the major impacts to all sectors will be the new state legislation setting water use standards. On May 31, 2018, Gov. Jerry Brown signed into law two new bills that will require urban water providers throughout California to set new permanent water use targets for their service areas by 2022. Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman) provide a framework for setting water use targets, as well as implementing and enforcing the new water use requirements.

While many details for implementing the new water use requirements will be determined over the next several years, the overall framework includes:

- A standard for indoor residential water use of 55 gallons per person per day— dropping incrementally to 50 gallons beginning in 2030.
- A standard for outdoor water use (to be determined) based upon and the amount of irrigable landscaped area for a residential or dedicated irrigation commercial account and the community's climate.
- A standard for water loss due to leaks in water system pipes (to be determined).

These three standards will be calculated and added together to represent an overall water use target (in gallons) for the water provider. Although some IEUA member agencies base their rates on a water budget for each customer, the new state laws do not contain water use targets for individual residents or businesses. These laws outline an overall framework to guide urban water providers in setting water use targets, which must be approved by the State Water Resources Control Board. However, urban water providers will need to determine how their service area can best achieve the new water use target.

Impact to Residential Customer Base

The residential sector represents the largest number of customers within the IEUA service area. Future conditions indicate that shortages are likely to increase due to the combination of increased population growth and added strains on water supplies. The new state water use standards will require that customers use water more efficiently.

Newer high-density housing developments will likely include indoor water use appliances and fixtures with increased efficiencies.   Residential properties with irrigated landscaping will likely be faced with more stringent restrictions on irrigation. In addition, increased average regional temperatures, and longer and drier droughts, may pose challenges with maintaining green spaces within residential neighborhoods. Lost urban greenery can further increase urban temperatures.

There will be costs associated with achieving increased efficiency both indoors and outdoors, and while there are rebates and other financial incentives offered to customers some of these costs will be placed on individual residents. Water rates may also increase as supplemental and alternative supply types and are implemented.

Impacts to Commercial, Industrial, and Institutional Customer Base

Commercial, industrial and institutional (CII) customer represent approximately 14% of water consumption in the IEUA service area. While the new laws do not set specific water use targets for CII customers, they do outline a framework for creating new water efficiency performance measures for businesses. As with residential customers, the CII customer base will be required to use water more efficiently. Impacts of future shortages to the CII sectors may extend beyond the direct reductions in water supply.

Reduced water supply will impact industries which rely more heavily on water services such as food processing and other highly water dependent manufacturing. In addition, there may be increased costs for other materials and services due to water shortages and drought conditions (i.e. energy, agriculture). As with the residential sector, water rates may also increase as supplemental and alternative supply types are implemented.

Impacts for Irrigation at Schools, Parks and Other Large Landscape Properties

Dedicated irrigation meter accounts account for almost 14% of water consumption in the IEUA service area. The demands for irrigation are likely to increase in the future due to warmer temperatures and more variable precipitation. Meeting those demands with recycled water would offer a more drought resilient supply type. Additionally, other demands for recycled water may also increase (i.e. groundwater recharge, and regional discharge obligations) as supplies become more constrained. In the event of an extreme shortage, outdoor irrigation will become a lower priority to residential and commercial uses.

4.3 Vulnerability Assessment Modeling

Investigations performed as part of the regional IRP were used to inform this DCP vulnerability assessment. As part of the IRP efforts, the Chino Basin Regional Water Supply Infrastructure Model (Model) was developed to simulate existing and future conditions of the IEUA water supplies and infrastructure. The model incorporates existing regional and local potable water demands, supplies, key regional infrastructure, and interconnections allowing the movement of water from agency-to-agency within the IEUA service area.

In June 2019, the IRP team reported the modeling results for a 2020 baseline with five scenarios reflecting various future conditions. Two of the scenarios (Scenarios 2 and 3 referred to here as “DCP scenarios”) were developed in collaboration with the DCP team with the goal of bracketing potential future drought conditions from a moderate shortage condition with some consideration for climate change, and a more severe scenario beyond what has been experienced previously but which is possible based on current trends and research.

The two DCP scenarios that were modelled are described below and illustrate a range of potential drought severity conditions:

IRP Scenario 2	IRP Scenario 3
Imported Water Shortage (Level 9 WSAP)	***Import Water Shortage (Level 9 WSAP) & Local Supply Shortage***
An isolated water shortage condition for imported water while local supplies remain relatively unaffected.	A more widespread water shortage resulting from statewide drought conditions impacting both imported *and* local water supplies, including long-term groundwater impairment.

Recent California legislation requires urban water agencies to include considerations for a five-year drought in their water supply reliability planning efforts (SB 606 and AB 1668), and Scenario 3 is a helpful building block toward compliance. The following pages summarize the assumptions and results for each of the DCP scenarios. More information on the model and other results are provided in the Technical Memo "*DRAFT Integrated Water Resources Plan Regional Water Supply Infrastructure Model TM-2: 2020 Baseline and Evaluation of Water Supply Vulnerabilities for Scenarios 1 to 5,*" dated June 21, 2019, and will be provided in the forthcoming IRP update. It should also be noted that at this stage in the modeling efforts, the interconnections and the ability to transfer water between member agencies is not enabled. Later phases of the IRP modeling effort will explore opportunities for inter-agency transfers.

4.3.1 Scenario 2: Imported Water Shortage

Scenario 2 of the IRP modeling effort is intended to simulate potential reductions in imported water supply due to future drought and climate change conditions, while also considering that local conditions may *not* be impacted to the same degree as imported supplies. The assumptions for this scenario are based on historical deliveries for imported water, member agency projections, existing infrastructure, and recent research and climate models. Key assumptions and associated datasets are described below.

Scenario 2 Assumptions

Future Demands

The projected water demands for the year 2035 were used for Scenario 2. The projected demands from the 2015 IRP were used for each member agency, which assumed three ranges for future demands based on potential water use practices and ranged from low, medium, to high (Table 2). The medium demand forecast were used for the Scenario 2 simulation.

Imported Water Supplies

In the CCCA there are numerous predictions related to future conditions in the Los Angeles/San Bernardino region, specifically related to drought and the availability of imported water. Some predictions state that south-of-Delta exports by the SWP and the Central Valley Project could be reduced by 50 percent more than during historical droughts (Wang et al., 2018). Meaning that as drought intensity and frequency increases, strains on imported water supply will also intensify beyond what has been seen in the past. The reasons for the reductions are likely to be numerous, interconnected, and complicated, but the primary causes of the increased reductions are expected to be reduced carry-over storage in reservoirs as precipitation patterns shift and sea-level rise and the resulting increased salinity in Delta exports.

This prediction is corroborated by Delta supply water quality and MWD's SWP supply availability during the drought in water years 2015-17, which provides a benchmark for future drought conditions. During this time period, the IEUA region had the lowest three-year average of imported water deliveries. See Figure 13 for historical deliveries from MWD to IEUA. Due to a low SWP allocation of 0% which was increased to 5%, MWD implemented the WSAP, and deliveries to IEUA were reduced by 41% of the supplies delivered in 2008 (the highest year in the 2000-2017 record). As a result, Scenario 2 assumed a WSAP shortage level of 9 (67.5% reduction) as a representation for future drought conditions, reflecting the CCCA's predicted deeper reductions. See Table 6 for a summary of the ten WSAP levels.

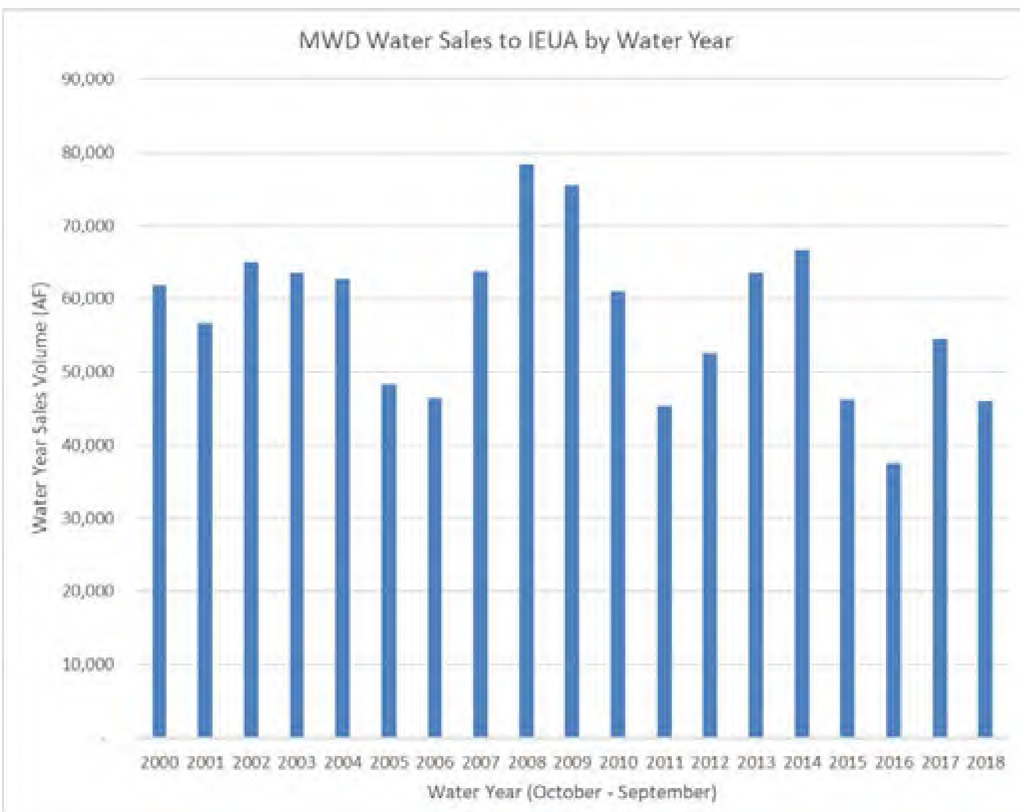


Figure 13. Historical MWD Deliveries to IEUA (Sum of Full Service and Interruptible Programs)

Table 6. MWD WSAP Shortage Allocation Index

Regional Shortage Level	Wholesale Minimum Percentage	Wholesale Reduction Percentage
1	92.5%	7.5%
2	85.0%	15.0%
3	77.5%	22.5%
4	70.0%	30.0%
5	62.5%	37.5%
6	55.0%	45.0%
7	47.5%	52.5%
8	40.0%	60.0%
9	32.5%	67.5%
10	25.0%	75.0%

Surface Water Supplies

Surface water supplies were simulated based on the 2035 projected availability as stated by each of the member agencies in their respective UWMPs. It is assumed that these supplies are unaffected by drought conditions in other areas of the State.

Groundwater Supplies

Local groundwater supplies were simulated at current available capacities and blending requirements. In addition, projected additional groundwater supplies for the year 2035 were included as reported in the member agencies' 2015 UWMPs. Details regarding how this information was collected and simulated are described in the August 2018 IEUA/INTERA Technical Memo titled *"IEUA Infrastructure Model and 2015 Baseline Scenario Results,"* and in a subsequent June 2019 Technical Memo (IEUA 2019).

4.3.2 Scenario 3: Five-Year Drought and Local Supply Shortage

Scenario 3 is intended to be representative of a severe five-year drought with a combination of shortages in imported supplies and local supplies. In a five-year drought condition, it is expected that imported water supplies would be drastically reduced as was simulated in Scenario 2 and the local surface and groundwater supplies would also be diminished. Key assumptions and associated datasets are described below.

Scenario 3 Assumptions

Future Demands

The 2035 demands from the IRP were used for Scenario 3 and are the same as for Scenario 2 (as described above).

Imported Water Supplies

The imported water supplies delivered by MWD to the IEUA service area for Scenario 3 are the same as for Scenario 2 and are set at WSAP Regional Shortage Level 9 (see Scenario 2 described above).

Local Surface Water

The local surface water supplies simulated for Scenario 3 were based on the projected supplies as reported by the member agencies in their respective 2015 UWMPs for a multiple dry year condition. In the UWMPs there was not an expected change in the projected surface water supplies from the single dry year or a multiple dry year. The multiple dry year surface water supplies were considered to be a reasonable source to represent a five-year drought condition.

Local Groundwater

In an extended five-year drought scenario, it is assumed that local groundwater supplies will be impaired due to quality as opposed to quantity. In the Chino Groundwater Basin there are trends of slowly rising TDS and nitrate levels, as well as new emerging constituents such as 1,2,3, - Trichloropropane (1,2,3 – TCP), PFOS, and PFOA, which could result in a future loss of available supply. In addition, in an extended drought scenario when other supplies like imported water are reduced, local groundwater will be relied on more heavily. Increased production from the basin could exacerbate water quality issues.

For Scenario 3, local groundwater was simulated based on current well capacities and the additional 2035 projected supplies as reported by the member agencies (as with Scenario 2). To simulate compromised groundwater quality, the wells with current blending requirements were removed from service. In addition, wells currently with noted impairment but without blending requirements, would have blending requirements of 50 percent.

4.3.3 Results

Scenario 2 Imported Water Shortage Results

The results of this modeling scenario indicate that under WSAP Shortage Level 9, three member agencies experience supply deficits ranging from 10 percent to 74 percent of 2035 demand with the current supply mix.

Other member agencies have surpluses and overall the region has a slight surplus of 2 percent of 2035 demand with current supplies, and a 10 percent surplus with 2035 projected new supplies.

The loss of imported water means that there is less water to blend, thus impacting groundwater quality. There are five agencies that use imported water for groundwater blending that would be impacted.

Scenario 3 Five-Year Drought and Local Supply Shortage Results

The results of this scenario indicate that under a severe, multi-year drought, six of the eight member agencies experience supply deficits ranging from 9 percent to 74 percent of 2035 demand with current supplies. Two member agencies have surpluses, but overall the region has a deficit of 13 percent of 2035 demand with current supplies, and 6 percent with projected 2035 supplies.

In this scenario, agencies with groundwater supplies that currently require blending lose that capacity and those with impaired supplies that do not currently require blending are impacted by a new 50 percent blending requirement.

4.4 Summary of Key Vulnerabilities

Based on the review of potential impacts to regional resources and the IRP modeling results, two key vulnerabilities are identified.

1. **Imported water will likely become less reliable in the future** and pose a considerable risk for overall regional water supply reliability. While within Scenario 2, the region showed an overall surplus, there are three agencies that currently depend more heavily on imported water and showed shortages in this situation. As Scenario 3 showed, while the region does not rely on imported water as heavily as it does local groundwater, there are ripple effects related to a loss of imported water. The loss of imported water could result in the increased reliance on local surface and groundwater sources, and increased groundwater production could cause groundwater quality issues to worsen in areas.

2. **Reductions, due to potential impairments to groundwater quality, pose the most significant water reliability risk to the IEUA service area**. All the member agencies, with the exception of SAWCo, rely on local groundwater to meet their annual demands. While groundwater has been a relatively reliable source of water in the past, conditions related to groundwater quality and reduced water available for blending may reduce the reliability of groundwater in the future. As the results from Scenario 3 illustrated, reduced groundwater quality combined with a loss of imported water could cause significant shortages for multiple agencies within the service area.

5 Mitigation Actions

Mitigation actions are projects, programs, and strategies implemented prior to a drought situation to lessen the risks and impacts of future water shortages.

IEUA and the retail member agencies developed and prioritized the list of mitigation actions through an inclusive and collaborative means as part of the IRP process. The mitigation projects were selected because they effectively address one or more of the key vulnerabilities; *future imported water supply reliability* and *ground water quality impairment*.

Both regional and local projects are included on the list. They include a combination of near- and long-term actions consisting of local supply and groundwater improvement, system interconnections, and capital improvement projects. A full list of the projects is included as an Appendix D to this document.

The timing and sequencing of project implementation is dependent on many factors. Although IEUA and member agencies will look to implementing the highest priority projects first, budget limitations and planning complexities will impact the actual timing. A lesser priority mitigation project may take precedence over a top priority one because, for example, there is outside funding available, resulting in expedited implementation.

The region is actively working on advancement of the mitigation actions included in this DCP. Through the 2015 IRP, IEUA and its member agencies explored and analyzed projects that resulted in the core recommendations discussed in this section.

This section provides an overview of the mitigation action planning efforts, strategy for mitigation action implementation, current regional planning efforts, and the context under which the actions will be advanced.

5.1 Planning Documents Utilized to Identify Mitigation Actions

Within the IEUA service area, there have been multiple planning efforts tasks initiated for the development of mitigation actions. In the early 2000s the region developed four foundational master planning documents. These historical documents illustrate how, for nearly the last 20 years, the region has recognized the increasingly uncertain future of imported water supply availability and the importance of local water supplies, particularly in changing climate conditions. As part of its response, the region has focused infrastructure investments on local water supply development strategies to reduce dependence on imported supplies and increase drought resiliency. These foundational documents are:

- Chino Basin Watermaster’s Optimum Basin Management Program (2000)

- Chino Basin Organics Management Strategy (2001)
- Recycled Water System Feasibility Study (2002)
- Wastewater Facilities Master Plan (2002)

More recently, the 2015 IRP further evaluated the resiliency of the region's water resources under future climate conditions and identified strategies for ensuring that the region's future water needs through 2040 can be sustainably met.

The 2015 IRP was considered Phase I of the IRP process and provided an extensive list of potential supply projects (both local and regional) based on regional collaboration. At the time of this DCP effort, the 2020 IRP (Phase II) is currently underway. Phase II will provide a regional implementation strategy for long-term water resource management, strategically positioning the region for funding opportunities.

5.2 Mitigation Actions Strategy

Through the existing and ongoing regional plans there has been considerable effort and extensive stakeholder engagement aimed specifically at developing mitigation-type actions to improve regional water supply reliability.

The mitigation actions identified through the IRP fall into two core strategies:

1) Invest in Local Supplies

2) Enhance Groundwater Availability

5.2.1 Invest in Local Supplies

As the availability of imported water becomes less reliable in the future, it will be ever more important to continue to invest in all forms of local water supplies, including groundwater, surface water, and recycled water. Building the local water supply capacity decreases reliance on imported supplies and improves resiliency for the regional water supply portfolio. The 2015 IRP had two major mitigation recommendations for increased local water supply capacity:

- **"Implement water use efficiency measures to decrease demand and enhance water supply resiliency."**
  Water use efficiency is universally regarded as the most cost effective method to reduce water demand and ultimately creates an additional water supply source since the water conserved can be applied to other demands.

- **"Continue investment in recycled water projects to maximize the beneficial reuse."**
  Recycled water provides one the most reliable supply types for the region. Current demands for recycled water include non-potable applications such as irrigation and groundwater recharge.

Applications for recycled water face challenges in terms of changing wastewater quality and treatment requirements due to increases in indoor water use efficiency and outdoor water use efficiency standards and increasing regulatory and environmental requirements. Additionally, the use of recycled water is impacted by the groundwater quality of the Chino Groundwater Basin. Specifically, the applications for recycled water become constrained if the salinity in the basin rises beyond the Regional Water Board's specified limits. Maintaining and potentially expanding recycled water projects to manage these challenges will increase the resiliency of the regional water supplies.

5.2.2 Enhance Groundwater Availability

Groundwater is the most heavily relied on local water supply type. The Chino Groundwater Basin provided approximately 40 percent of the regional water supply portfolio over the last decade. The vulnerability assessment for the DCP illustrated how compromised groundwater quality poses a significant threat to local water supply reliability and can be compounded as other supplies currently used for blending, such as imported water, become less reliable. Enhancing groundwater treatment and groundwater recharge opportunities will be crucial as groundwater quality issues mount within the basin and dependence on groundwater potentially increases as other sources become less reliable. Groundwater recharge with good quality water sources provides the benefits of both groundwater quality management and increased groundwater storage. The 2015 had several recommendations related specifically to groundwater recharge:

- **"Strive to acquire low TDS supplemental water to enhance groundwater quality to sustain production and reduce salinity."**
  It is important that water used for recharge helps to support the salinity management measures within the Chino Basin. Identifying and securing low TDS water will help to increase the resiliency of the local groundwater supplies.

- **"Strategically maximize the purchase of supplemental water for recharge or in-lieu when available."**
  Periods of surplus supplies from imported water, exchanges, or other sources provide an excellent opportunity to acquire additional water supplies for groundwater recharge, or to offset the groundwater demands at the time. Positioning the region in terms of awareness, finances, and infrastructure to be able to maximize the purchases of those supplies creates greater resiliency for the region's water supply portfolio.

- **"Continue to maximize stormwater recharge projects, including rainwater capture and infiltration."**
  Local precipitation in the region is highly variable seasonally and annually, and it is expected that future rain events will become more intense in terms of magnitude and duration resulting in large volumes of stormwater. Improving the regional infrastructure to capture and utilize stormwater provides a low TDS water supply for groundwater recharge.

5.3 Mitigation Action Project Evaluation

A comprehensive list of potential mitigation actions was developed through the IRP process based on numerous planning efforts, including:

- 2015 Recycled Water Program Strategy
- 2015 Wastewater Facilities Master Plan Update
- 2013 Recharge Master Plan Update
- 2015 Water Use Efficiency Business Plan
- FY15/16 Ten Year Capital Improvement Plan (TYCIP)
- Santa Ana River Conservation and Conjunctive Use Program (SARCCUP)
- 2013 Upper Santa Ana River Habitat Conservation Plan

A full list of the projects can be found in *Appendix D: 2015 IRP Mitigation Actions*.

During the IRP planning process, the Technical Work Group crafted **five water resource strategies**. Each strategy had an underlying theme to address the region's water supply vulnerabilities. Below are the five strategies:

***Strategy 1**:* Maximize Chino Basin groundwater, including prior stored groundwater.

***Strategy 2**:* Recycled water program expansion.

Strategy 3: Recycled water & conservation program expansions.

***Strategy 4**:* Maximize supplemental water supplies and recycled water supplies.

***Strategy 5**:* Maximize imported water supplies with moderate conservation.

Each of the strategies required building a mix of projects that would best meet the supply needs under the respective strategy.

In order to determine the value of each specific project, as well as its means of water supply creation, every project underwent a series of evaluation steps. First, the anticipated acre-feet yield was calculated for each of the 100 projects and, next, a determination of the number of years that it will take to yield the water.

From this, a list of the desired project outcomes was developed. These outcomes were selected because they specifically address the region's major water supply vulnerabilities. Projects were then assessed and tagged *yes, no, or neutral* on its ability to impact desired project outcomes. For example, *does the project provide increased groundwater*? *Does the project reduce TDS in the groundwater?*

These are examples of desirable project outcomes because they provide a positive contribution to local water supply.

Table 7 provides a list of the desired outcomes used as metrics to evaluate each potential mitigation action project.

Table 7. Desired Mitigation Project Outcomes

Desired Mitigation Project Outcomes	
▪ Increases groundwater storage	▪ Provides emergency local supply redundancy
▪ Increases water level in critical groundwater management zones	▪ Decreases reliance on local surface water during dry years
▪ Increases stormwater capture/recharge	▪ Reduces TDS and/or nitrates in groundwater
▪ Increases permeability or natural infiltration	▪ Decrease net energy consumption
▪ Provides additional recycled water	▪ Increases capacity for wet water years
▪ Reduces dependence on imported water during dry years	▪ Eligible for grant funding
▪ Increases local water supply	▪ Technical feasibility/ease of implementation

Once the projects were evaluated against the desired outcomes, they were uploaded into a data visualization software tool. The tool then created and compared theoretical combinations of various projects. After analysis, the tool generated the mix of projects that delivered optimum results for each of the five resource strategies developed by the Technical Work Group during the IRP planning process.

The highest performing mix of projects were selected as prioritized mitigation actions for retail agency implementation.

Although the planning process resulted in the optimal choices, actual timing and sequencing of project implementation is dependent on many factors. IEUA and member agencies will look to implement the highest priority projects first, however budget limitations and planning complexities will impact the actual timing. A lesser priority mitigation project may take precedence over a top priority one because, for example, there is outside funding available, resulting in expedited implementation.

6 Response Actions

With growing populations and the inevitability of future drought cycles, IEUA's and its member agencies' overarching goal is to create a water efficient region that can successfully withstand future water shortages without hardship.

IEUA and its member agencies have been arduously working to re-shape customers' attitudes about water sustainability and their personal role in achieving water shortage resiliency. Through education, messaging, and programs IEUA and its member agencies have been driving change, however, customers still have a way to go to fully make the transition. A percentage of customers have made significant equipment and lifestyle changes at their properties, but most have not.

Regional water sustainability can be achieved only when:

1. Customers fully understand the value of water and the unique conditions of the Inland Empire.
2. Customers create drought sustainable properties prior to emergency conditions.
3. Customers experience no water deprivation hardship during a drought cycle due to the sustainable landscape design of their properties and their water-consuming equipment.

While striving for full water efficiency is the goal, IEUA understands we're not there yet. With this knowledge, IEUA recognizes that water savings, during droughts or other water shortages, will need to be driven through an escalation in marketing, increased programs service offers, and enhanced incentives that rise as drought stages advance.

Table 8 provides a rough estimate of overall acre-feet savings necessary to meet the requirements at each drought stage. The calculations are based on the 2020 projected demand as well as single dry year and multiple year projected demands. The Acre-feet savings are calculated by using the highest percentage savings number desired for each stage. The table illustrates the need for sharp increases in incremental water savings from Stage 1 through Stage 5 during a potential future drought cycle.

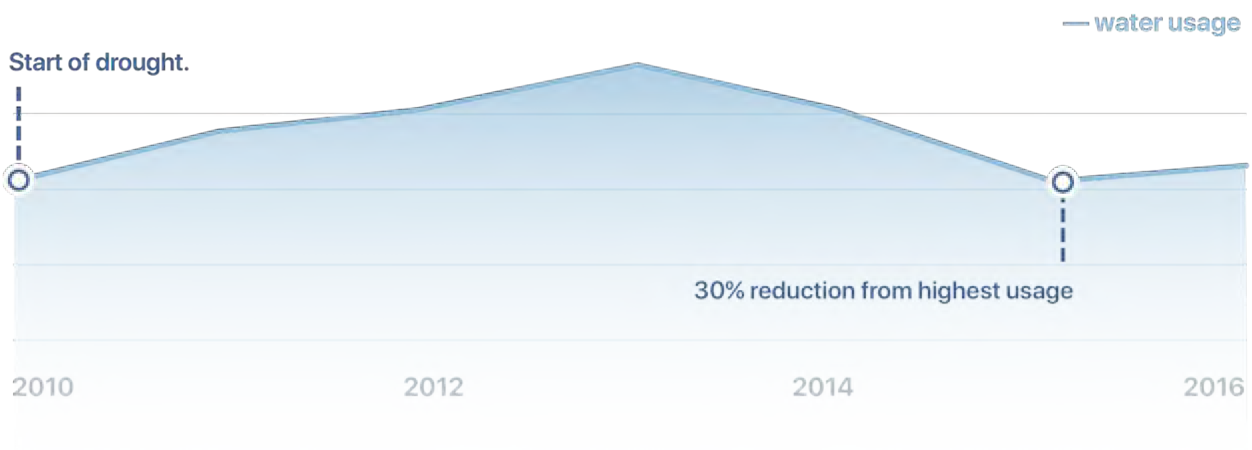
Table 8. Estimated Required Water Reduction per Drought Stage

	STAGE 1 **Est Savings (AF)** **5%** reduction	**STAGE 2** **Est Savings (AF)** **15%** reduction	**STAGE 3** **Est Savings (AF)** **25%** reduction	**STAGE 4** **Est Savings (AF)** **50%** reduction	**STAGE 5** **Est Savings (AF)** **50%+** reduction
Projected Demand	9,985	29,955	49,926	99,851	99,851+
Single Dry Year Projected Demand	10,529	31,588	52,647	105,294	105,294+
Multiple Dry Year Projected Demand	11,296	33,888	56,481	112,962	112,962+

6.1 Previous Droughts and Lessons Learned

Historical review is useful when conducting planning activities. By looking at the previous drought cycle, we see the quantity of water conserved over the course of the drought and customers' overall response time to reach reduction levels. This and other historical information were taken into account in the crafting of the Response Action Plan, as well as the Programs and Services.

The chart below provides a look-back at the annual total water usage for reporting years 2010-2016:



The take-aways that merit consideration in future planning include the following:

- Water use increased during the first couple of years of the drought.
- Customers' drought actions only reached an impactful level **late into the drought cycle,** in Year Four 2015-2016.
- Customers reacted when the situation became **extended and urgent**.
- The majority of **water savings were realized through mandatory restrictions** and water deprivation; not upgraded landscapes and efficiency equipment.
- During crisis times we need to **balance Carrots vs Sticks** in order to entice customers to make permanent changes**.**
- Today's **water usage has bounced back** to a volume above 2014 levels because the changes were not permanent.
- To drive **permanent savings** and **early response** it is desirable to have Messaging, Outreach and Programs that **Motivate vs Penalize.**

6.2 GOALS

The Response Action Plan described in the following sections, is modelled after the format of previous IEUA Water Use Efficiency Business Plans. The goals of the Response Plan are to:

- Increase the speed that drought response actions can be rolled out by pre-planning.
- Reduce workload for agencies by providing a blueprint for deployment of strategic actions as drought stages are declared.
- Provide recommendations on the optimal measures, activity levels, incentives, and services that will drive water savings according to need.
- Create an avenue for member agencies to provide input into a Regional drought response.
- Act as a starting point for creating a final plan of action during a drought event. The finalized plan may include adjustments from member agency input, new technologies, increased MWD Water District incentives, new grants, or other circumstances.

The plan is devised to balance *customer incentives and programs* with *prohibitions and penalties*. This balance between "carrot and stick" will give IEUA the flexibility to achieve quick-hit savings through restrictions, while enticing customers to move to long-term market transformation through program participation.

6.3 TYPES OF RESPONSE ACTIONS

There are a number of response actions available to IEUA agencies. These include escalation of customer messaging content and frequency, expanded outreach channels, enhanced water efficiency incentives and programs, and as necessary, water usage restrictions.

- **Messaging**
  Agencies can, and should, use creativity and attention-grabbing content to secure customers' attention and motivate them to take action.

- **Expanded Outreach**
  Customer attitudes and expectations have changed dramatically over the past decade, driven by consumers who have higher demands for expanded outreach vehicles. It's a customer-centric world and water agencies are competing for attention. This requires a modern approach to outreach including social media and influencer marketing.

- **Programs**
  Water efficiency programs provide customers with the means and guidance to lower their properties' water usage. Customer-friendly programs, substantial incentives, direct installation options and strong support services drive stronger response rates. The higher the services and incentives; the higher the customer response.

- **Restrictions**
  Watering restrictions further reduce water usage while reinforcing the message of community importance and "doing your part". They set an authoritarian tone, which can result in negative PR if the reasoning is not well communicated, however they are highly effective in securing immediate water savings and are a powerful tool for agencies.

6.4 DCP Response Process and Taskforce Operation

Once the drought monitoring framework indicates that the region has reached a specific stage of drought conditions, several actions will occur.

First, the Drought Response Taskforce will assemble.

The Drought Response Taskforce is the organizational group empowered to:

1) Create the Drought Response Plan blueprint.
2) During drought condition stages, assemble taskforce to finalize strategic response actions.
3) Work with their respective agency to implement response actions, according to plan.

The taskforce is comprised of representatives from each of the eight member agencies, and regional personnel from IEUA. The group works in a collaborative fashion to gain consensus on appropriate regional response actions.

The taskforce will make recommendations about the level of program and services, restrictions, and messaging to regional customers. These recommendations will be brought to each agency's respective management for approval.

It's important to note that, during a regional drought, an individual member agency may not be experiencing a drought condition due to their local supply mix. In this circumstance, the agency may elect in what capacity to participate in the taskforce and how to best communicate to their customers that locally there are no water supply issues, although the region is undergoing a drought stage.

Looking forwards, the taskforce will work to balance the effectiveness of regional messaging with the differing needs of individual member agencies. There are no pre-determined mandates regarding service offerings, restrictions, communications or budgets. The taskforce will collaborate on policies, while fully supporting flexibility for each agency.

The group will review the proposed actions set forth in the existing plan and make modifications as necessary. The plan was intended to be flexible and changeable. Modifications to the plan might include a change in incentive levels or program delivery mechanisms. There may also be a new water-saving technology that should be offered to customers. The taskforce might be able to secure additional grant funding, as well. Once the action plan is finalized and approved, the taskforce will implement the programs, penalties, and communications plan.

An overview of the drought response process is below:

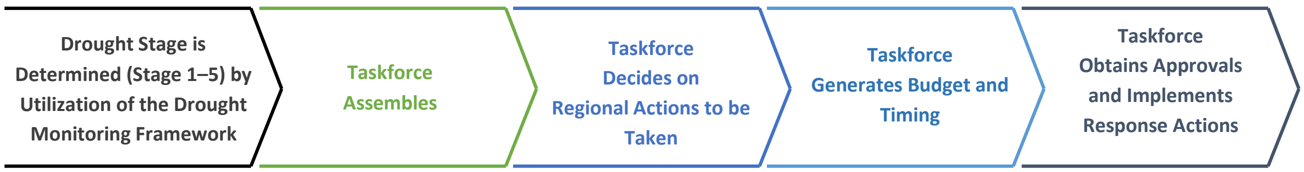


Figure 14. Drought Response Process

6.5 Response Action Plan Objectives

The objectives of the Response Plan are to integrate the drought response actions into a cohesive whole that improves the effectiveness of each component. The plan's objectives are to:

- Outline programs that are highly appealing to customers.
- Provide targeted marketing and communications for programs and restrictions.
- Guide escalation of response actions as drought stages increase.
- Allow for a consistent regional rollout that reduces customer confusion, raises response, and increases savings per household.
- Ensure communication, marketing, programs, and restrictions are interconnected and support each other in achieving water savings goals.

6.6 Response Plan Goals and Strategies

IEUA's overall goals are straightforward:

Agencies have long struggled to make significant water savings headway with high water users. To accomplish this goal, there are several strategies and tactics that must be successfully employed.

Provide Improved Target Marketing and Communications:

An essential portion of the Response Plan is deploying an effective customer marketing and outreach strategy. This is because the greatest contingency plan is worthless if the target audience is: 1) unaware of your offer, and 2) unresponsive. Retail water agency customers are widely diverse in their characteristics, desires, and motivations. The combination of regional drought messaging paired with the member agencies' individual marketing will create a stronger more unified message.

Target audiences are single family households with high water user and large landscape customers. Reaching these customers is best accomplished by first profiling and micro-targeting customers and then employing a targeted and creative messaging and outreach campaign. It has been shown that customers have a strong, positive response to respected influencers and member agencies should utilize this strategy as a part of their marketing and outreach.

Create Programs That Are Highly Appealing to Customers:

Today's customers have little patience with processes that are time consuming and complicated. Programs must be customer-friendly and provide easy access to knowledgeable individuals that can answer customer questions and guide them through difficult processes.

As experienced in the previous drought cycle, customers are motivated by generous incentives or direct installation services that make it worthwhile to commit their valuable time and resources to a program.

Scalable programs allow customers to participate with relative ease, avoiding long processing times and capacity limitations for customer sign-ups.

Reach Higher Water Savings:

As drought stages escalate, there is an ever-increasing need to "dig deeper" and reach a higher level of water savings per site.

To accomplish this, tactics need to be escalated to higher levels. This includes the deployment of customer communications that contain a heightened level of urgency and at increased intervals. It also means that restrictions and penalties must be increased, as well.

6.7 Strategy Per Drought Stage

Tactics will expand as drought stages escalate. Agencies will increase staffing capability, add more customer support, and provide a higher level of program incentives and services as increased drought stages are declared.

At Stage Zero, a non-drought stage, programs and incentives will continue to be offered to customers at standard levels. During this time, the goal will be to encourage and incentivize customers to create drought sustainable properties in advance of an emergency. The focus will be on turf replacement programs and customer education offerings.

Once a drought enters a specific stage, the taskforce will assemble to finalize the Response Plan for that stage and begin the implementation process for customer targeting and increased outreach.

At **Stage 1 (1-5% decrease),** the plan is to profile customers and micro-target high potential customers, utilizing messaging that will best resonate with those customers.

The strategic focus for **Stage 2 (6-15% decrease)** is to expand activity for irrigation equipment direct installation programs and ramp up influencer marketing.

Tactics for **Stage 3 (16-25% decrease)** require incentive increases for landscape and irrigation measures and an expansion in outreach to customers.

Stage 4 (26-50% decrease) requires IEUA and its agencies to heighten the message of urgency and put forth a community call to action. Additionally, there will be an increase in penalties, implementation of emergency alerts and expanded news media coverage.

During **Stage 5 (water use for essential functions only),** only indoor plumbing and property leak detection programs will be offered. All landscape & irrigation programs will be suspended and IEUA will implement crisis messaging, announcing water for essential use only.

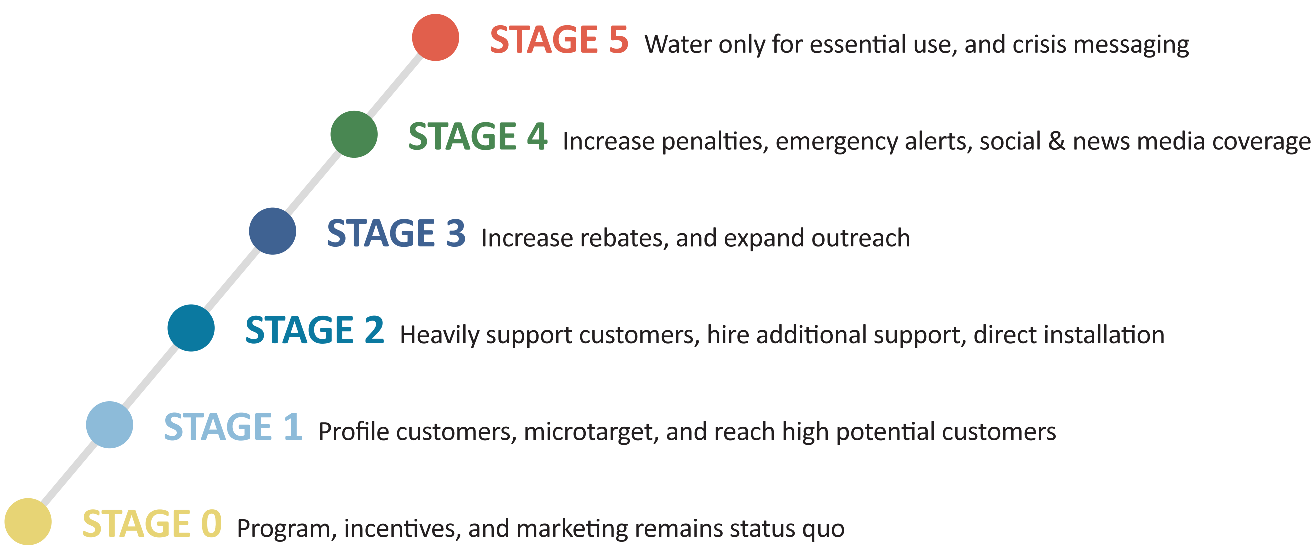


Figure 15. Drought Stage Strategy

6.8 Selected Programs and Services

There are numerous water-saving programs being offered to customers throughout the U.S. today. IEUA and its member agencies selected programs that best meet the needs of the Inland Empire during the next drought cycle.

These programs were selected because: *First*, they target the highest water savings opportunity which is outdoor water usage, and, *Second*, each program is fully scalable to meet escalating needs.

A scalable program Is designed to expand or contract *with ease* for the purpose of aligning with changing circumstances. This is particularly important during escalating drought stages where water agencies have an urgent need to drive increased participation and water savings.

A scalable program typically has mechanisms that can be ratcheted up or down without unbearable stress to the operating organization. Rebate programs are perhaps the most scalable incentive offering. Response can be driven up by increases in incentives and decreases in the complexities of program requirements. A scalable program has 1) market potential, 2) market readiness and 3) market momentum. Each of these has following characteristics:

Market Potential

- Large universe of potential customers
- A high potential for total water savings

Market Momentum

- Customers are interested
- Saturation is on the upswing

Market Readiness

- Sound technologies & solutions that are "tried and true"
- Technologies & solutions are readily available to customers

IEUA and the member agencies, through the plan development taskforce process, identified and selected seven programs and three support services as having the highest market potential, readiness and momentum.

The response programs are described below:

Table 9: Selected Programs

PROGRAMS	DESCRIPTION
Turf Replacement Incentives	$3 per sq. ft. incentive level for turf replacement.
Residential Irrigation Tune Up	Irrigation repairs, nozzle installations, and controller programming provided at no cost to the customer.
Residential Smart Irrigation Direct Installation	Customers receive installation of nozzles, controllers, and flow sensors.
School Smart Irrigation Direct Installation	Provide schools with installation of spray heads, nozzles, and controller programming.
FreeSprinklerNozzles.com	Online ordering and mail delivery of high efficiency nozzles.
Qualified Contractor Smart Irrigation Incentives	Provide approved contractors incentives for nozzles, controllers, drip, and flow sensors.
Home Leak Detection	Provide an incentive for a home leak detection device.

SUPPORT SERVICES	
Landscape Surveys	Provides homeowners with water savings recommendations and links to programs.
Landscape Workshops	Provides instruction on turf replacement & maintenance.
Landscape Design Services	Provides customers with help regarding irrigation system layout, plant selection, soil considerations, and overall design for their WE landscape upgrade project.

Recognizing that the future is unknowable, IEUA understands that unforeseen marketing and water savings opportunities may present themselves at some point during a drought cycle. For this reason, it is recommended to implement a mechanism to fund new, creative approaches or temporary resources.

This plan includes the creation of the WEFlex program which would offer IEUA's retail agencies funds for locally administered activities. The budget would be allocated to each agency based upon the water agencies size (or water sales). An agency could use the funds for local activities such as water waste enforcement and education or recycled water hook ups and permit fees. New technologies or other programs and services could be funded through WEFlex Fund, if approved by the drought response taskforce.

An agency will submit a description of the local activity, estimated costs and potential benefits or results. When accepted, the response taskforce will allocate the funds.

Program and Service Ranking by Drought Stage

Each of the selected programs was ranked by agency representatives to determine its viability during each advancing drought stage. The selection process for these programs and services was conducted by having agency representatives individually rank viable programs as a high (3 points), medium (2 points), or low (1 point) at each respective drought stage level.

This ranking criterion was based on the level of feasibility, appropriateness, and overall impact provided by that program/service at each drought stage. Budgets and program scalability were additional considerations factored into the ranking process. The group also assessed the effect and motivation that escalating drought stages would have on customers and how that, in turn, might drive customers' response for each program/service.

The results were totaled and averaged for each program at each drought stage. Higher numbers reflected a greater expected effectiveness for that program or service. Lower numbers indicated reduced support for the program or service and less likelihood for inclusion in the list of program offerings.

It's important to note that the ranking process provides general consensus and structure for planning, but program ranking is fluid and, as circumstances evolve in the future, the selections and priority levels may change.

Using the high, medium, or low point rubric program rankings were compiled and recorded as shown in the chart on the following page.

	STAGE 0	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
PROGRAMS						
Turf Replacement	1.71	1.86	2.14	2.43	2.71	2.71
Residential Irrigation Tune Up	2.00	2.14	2.43	2.29	2.43	2.43
FreeSprinklerNozzles.com	1.83	1.71	2.00	2.00	2.57	2.57
Qualified Contractor Smart Irrigation Incentives	1.67	1.67	1.67	1.86	2.29	2.29
Residential Smart Irrigation Direct Installation	1.57	1.86	2.14	2.43	2.57	2.57
School Smart Irrigation Direct Installation	1.80	2.20	2.17	2.43	2.57	2.71
Home Leak Detection	1.33	1.33	1.71	1.86	2.43	2.57
SERVICES						
Landscape Surveys	2.00	2.00	2.20	2.00	2.60	2.40
Landscape Workshops	2.00	2.00	2.14	2.43	2.57	2.57
Landscape Design Services	1.57	1.71	1.86	2.14	2.43	2.57

Figure 16. Program Evaluation per Stages

As is shown, generally, the higher the drought stage, the higher the level of program services to be provided by agencies. The reasoning for this is common-sense. Agencies need heightened customer response and they are much more likely to participate in a program when they are provided with free installation and low-cost product or, as with turf incentives, the rebate level is enticingly high.

At each drought stage, it is anticipated that the highest-ranking programs will be those most actively promoted, and those offering attractive customer enticements to participate.

As stages escalate, agencies are prepared to ramp up activity for all programs, but will rely most heavily on Turf Replacement, FreeSprinklerNozzles.com, and direct installation of landscape measures. The number of home surveys, workshops, and design services will also increase.

Home Leak Detection was ranked as the lowest priority program during Stage 0 and Stage 1, and only ramps up significantly in the later drought stages.

It's important to reinforce that the program and services rankings are not absolute and are a suggested template to be adjusted according to circumstances that exist at each actual drought stage.

Actual incentives, services, and roll out schedules will be determined by the taskforce, when the drought stage is declared, and the group is assembled.

6.8.1 Program Cut Sheets

IEUA and its member agencies collectively has selected seven customer programs to be offered during drought conditions. Each program is detailed in an individual write-up contained in Appendix E.

The components of each cut sheet are explained in the diagram on the following page. Following the guide is an example of a program cut sheet for the Turf Replacement Program.

Program Cut Sheet Guide

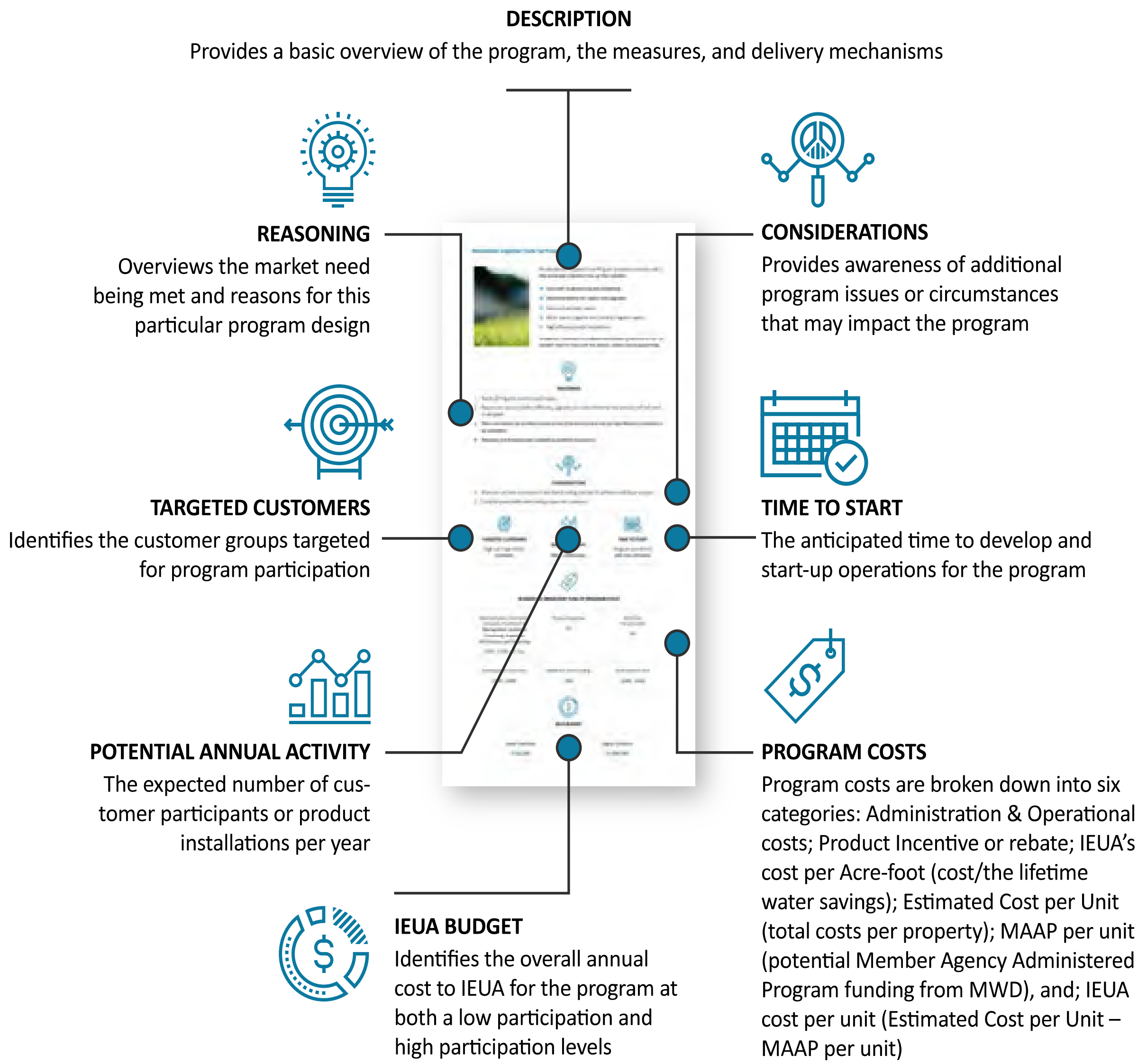
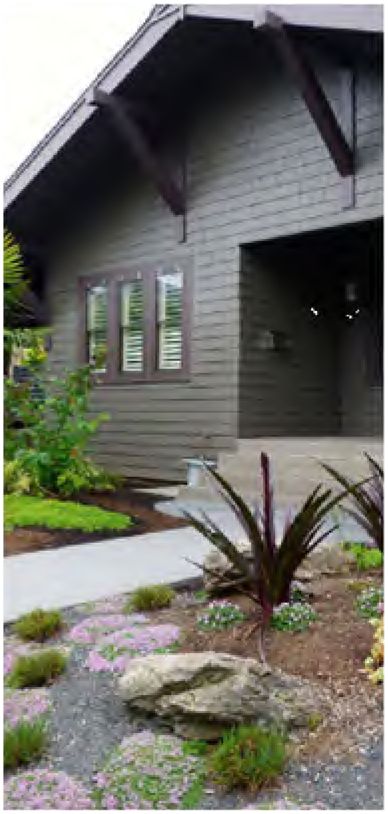


Figure 17: Program Cut Sheet Guide

PROGRAM CUT SHEET EXAMPLE- TURF REPLACEMENT PROGRAM

Turf Replacement Program



The Turf Replacement Program encourages customers to remove high water-consuming turf and replace it with alternative solutions such as low water-using, regionally appropriate plants and surfaces that allow for ground water infiltration and elimination of runoff. Qualifying applicants are eligible to receive $3 per square foot of turf removed with a maximum incentive of 5,000 square feet for residential customers and 50,000 square feet for commercial customers. Eligible projects must have:

- Three plants per 100 square feet of area transformed
- No hardscape within the transformed area, except permeable hardscape
- A stormwater retention feature
- Replacement or modification of overhead spray sprinklers

For reference, the historical program activity of square feet removed is listed below.

	Residential	Commercial	Total
FY 14/15	119,130	1,136,334	1,255,464
FY 15/16	1,596,789	3,337,120	4,933,909
FY 16/17	255,091	637,916	893,007

REASONING

1. There are hundreds of thousands of square feet of irrigated turf in the IEUA territory.
1. Replacing turf with regionally appropriate plants aids in transforming the market. In a recent analysis done by Western MWD, for every customer replacing their turf, another customer did so without an incentive.
2. Provides long term savings- Current studies have shown that savings increase after the initial plant stabilization period and persist over 10 years or more.

CONSIDERATIONS

1. Turf replacement has an extremely high cost per acre-foot.
1. The market acceptance is low during non-drought times.
2. There are numerous customer barriers: costs, concerns about the new look, and lack of ability to execute projects.
3. Contractors are not interested in projects smaller than 1,000 sf.

TARGETED CUSTOMERS	POTENTIAL ANNUAL ACTIVITY	TIME TO START
All customers with live turf	500,000 – 5 Million SF	Currently operational

TURF REPLACEMENT PROGRAM COSTS

Administration, Contractor Outreach, Enrollment & Management, Incentive Processing, Inspection Verifications, and Reporting	Product Incentive	IEUA Cost Per Acre-foot
Covered by Metropolitan through regional vendor	$3 per square foot	$769 ($ per sf)
Estimated Per Unit Cost	MAAP Per Unit Funding	IEUA Cost Per Unit
$3 per sf	$2.00 (regional rebate)	$1 per sf

BUDGET

Lower Incentive	Higher Incentive
$500,000	$5,000,000

Figure 18. Sample Cut Sheet – Turf Replacement Program

6.9 Messaging and Outreach

If you don't nail the messaging and outreach, the programs are meaningless.

Communication and outreach play a crucial a role in the delivery of water savings as the programs themselves. A strong plan will ensure that IEUA reaches the target audience, boosts awareness, and ultimately, delivers water savings.

For this reason, the Response Plan communications need to:

- Be heard by the right customers, understood, and favorably received.
- Clearly inform the customer of the current stage, tell them what action is desired, and motivate them to respond to the request.

Ultimately, all forms of communications and outreach need to work together throughout the region to raise response and increase water savings per household.

6.9.1 Requirements for An Effective Message and Campaign

The key principle of a successful outreach and communications campaign are:

1. Know Your Customer
2. Get the Message Right
3. Craft an Outreach Plan that Drives Customer Response

Know Your Customer

An organization needs to understand what each customer wants and then provide the I-can't-say-no-offer. Companies experience much higher response rates when they understand and effectively respond to customers' desires.

This requires data analysis, creation of customer personas, and micro-targeting to particular groups of customers. There are numerous analytics programs available today that will help agencies to identify distinct customer groups and personas. By knowing this, IEUA can target market services and program offers with intelligence and precision. Statistics show that micro-targeting greatly boosts customer response. For IEUA, this converts to higher water savings as well.

Get the Messaging Right

Marketing campaigns are most successful when they evoke emotion and resonate with a human need.

An emotional message strategy uses feeling to sell – and this is a much more powerful motivator than logic. An outreach vehicle using this tactic will make the target audience feel an emotional connection to the agency, program, water efficiency measure, and/or call-to-action.

IEUA will need to utilize the following messaging strategies to garner interest and participation from customers:

- *Emphasize the benefits* - What does this particular customer need? Present a solution to their problem.

- *Keep it simple.* - A confused mind says "no." People worry that deceit is hidden amongst the complexity.

- *Make it Fun* - Draw customers in by using fun and catchy messaging, stories, eye-catching visuals, and humor.

- *Use Authority*- Influencing others is easier if customers view the person making the pitch as an authority figure. We all like to listen to and follow an expert. We trust that they know what they're doing.

Two Types of Messaging Required

There are reasons for creating and driving mass audiences through broad messaging and other reasons for targeted action messaging directed to specific audiences. IEUA will need to provide both types effectively during drought conditions.

1. **Broad Messaging:** Broad messaging (delivered via news stories, radio/tv ads, billboards, etc.) gives the widest reach and allows IEUA to communicate overarching messages including:
    - Water Scarcity Issue
    - Urgency to Act
    - Commitment to continue to provide safe, reliable water supply

2. **Targeted Action Messaging:** Targeted action messaging is typically aimed at specific groups of customers, those most likely to respond to your request for program participation or water-use reduction. To promote action, IUEA and the member agencies will need to create messaging content and outreach such as below:
    - Design messaging to motivate landscape changes for single family customers
    - Post success stories – community members, people of prominence, business leaders
    - Promote stories from micro-influencers – Q&A blogs with customers, homeowner success stories, Did-You-Know educational snippets
    - Utilize 3rd party influencers – these individuals are more trusted than a company itself
    - Create a community call to action – "your community needs your help" messaging

Craft an Outreach Plan that Drives Customer Response

Successful outreach campaigns utilize the following strategies:

- Profile your customers to understand each customer's persona
- Micro-target to prospect the right customers for each offer
- Incorporate your strong messaging and influencer authority figures in all offers
- Add personalization
- Demonstrate value and generous offer
- Include a call to action
- Make it easy for customers to say YES
- Follow up and
- Track results
- As stages advance, increase frequency, urgency and intensity

IEUA and its agencies will need a creative and dynamic plan in order to increase customer response and water use reduction, especially during the higher stages.

It's important to note that most agencies still utilize antiquated marketing techniques, with little-to-no market research, standard messages and rudimentary outreach methods.

6.9.2 Successful Outreach Methods

There are major outreach mechanisms to be utilized for general categories of customers. Each outreach approach should be personalized to the group being targeted.

- Direct outreach to high users via personalized means (phone, letter, email, etc.)
- Regional outreach through broad media channels
- Earned media
- Social media
- Grassroots and community outreach

6.9.3 Importance of Influencers & Relationships

It's important to reiterate the essential need for influencers. Influencers are trusted individuals who have a large audience and can reach across media and social platforms. Because of their high level of trust-ability, they're often able to persuade (or "influence") readers and viewers to purchase products or endorse causes that they promote.

Influencer marketing is a highly effective way to reach interested customers and dramatically increase response. They act as a trusted and respected “friend” and customers trust third party influencers more than a company itself.

Who’s Prominent in the Inland Empire:

- Well known business owners/leaders
- Local sports or entertainment figures
- Respected church leaders
- Active PTA parents
- High profile community organizers

6.9.4 Drought Outreach Matrix

Communications and urgency increase as drought stages escalate. Since customers are the means to the water-savings solution, it’s imperative that they understand each drought stage and what’s required of them. Quality messaging will clearly communicate the current drought stage, define the condition, request a desired customer behavior, and direct them to solutions.

An overview of Drought Outreach per Stage is provided on the following pages.

<table>
<tr><th>Stages</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr>
<tr><td>Messaging</td><td>Overall preparedness and drought resiliency. Drought will be a regular occurrence.</td><td>What Watch Condition Means</td><td>What Warning Condition Means</td><td>What Emergency Condition Means</td><td>What Critical Condition Means</td><td>What Catastrophic Condition Means</td></tr>
<tr><td>Desired Behavior</td><td>Get customers to install drought resilient landscapes & smart irrigation prior to the next drought.</td><td>Minimum 1-5% decrease in water use</td><td>Minimum 6-15% decrease in water use</td><td>Minimum 16-25% decrease in water use</td><td>Minimum 25-50% decrease in water use</td><td>Water used for only essential functions</td></tr>
<tr><td>Outreach Strategies</td><td colspan="6">Evaluate your specific community and the customers in your service territory to determine a compressive plan using a combination of the following strategies and tactics. Each approach should be personalized to the group you are targeting.
☐ Direct outreach to high users
☐ Regional outreach through broad media channels
☐ Social media outreach
☐ Grassroots and community outreach</td></tr>
<tr><td rowspan="3">Tactics</td><td colspan="6">☐ Social media toolkit for community influencers
☐ Grassroots training program for community groups, local organizers and high school students to share messages in their community (includes toolkit)</td></tr>
<tr><td colspan="2">☐ Fact sheet describing each stage, the meaning and the impact to both current landscapes and drought resilient landscapes</td><td colspan="4">☐ Fact sheet describing the stage level and how that impacts customers – one per stage with need action for each level
☐ Social media posts with messages and steps for how customers can respond to the appropriate stage
☐ "How to respond" fact sheet for each stage</td></tr>
<tr><td colspan="2">☐ Case studies and feature pitches of successful landscape transformations (videos telling the stories, write-ups and photos)
☐ By-line articles by local influencers placed in local publications</td><td colspan="4">☐ News release about stage and actions that need to be taken</td></tr>
</table>

Stages	0	1	2	3	4	5
Tactics (con't)	☐ General informational flyers about drought resiliency and sustainable landscaping		☐ Website ☐ Bill inserts ☐ Social media reminders (some promoted posts)		☐ Wireless Emergency Alerts ☐ Personal Localized Alert Network ☐ Website ☐ Social Media	
Message Frequency	☐ Ongoing – worked into all regular organizational messages ☐ Plan for regular messaging		☐ Frequency escalates depending upon budget			

Figure 19. Drought Outreach Matrix

6.10 Voluntary and Mandatory Restrictions

Both voluntary and mandatory restrictions are coupled with public education campaigns to provide customers with information about the purpose for the restriction(s) and the call-to-action. Restrictions are typically highly publicized through local media, web pages, social media, mailings and water bills.

Mandatory restrictions are a more effective tool for drought coping than voluntary measures; however, mandatory restrictions can create heightened negativity directed at the customer's water provider.

Common restrictions include partial or total prohibitions against using hoses to wash paved areas, limits on car washing and filling or refilling swimming pools, and restrictions on watering times.

As drought stages are declared, each agency will implement voluntary and mandatory restrictions as dictated by their respective Water Waste Ordinance. It's important to note a couple details:

1. Each ordinance is unique to a specific water agency and the ordinances differ slightly from one another.
2. Ordinance stages are locally declared and therefore may not align with other agencies or a regionally-declared stage.

Table 10. Water Waste Ordinance by Agency

Agency	Ordinance/Code Title
City of Chino	Municipal Code Water Conservation 13.-5.010 – 13.05.120
City of Chino Hills	Ordinance 300u
Cucamonga Valley Water District	Ordinance 2019-5-1
Fontana Water Company	San Gabriel Valley Water Company Rule No. 14 & Schedule 14.1
Monte Vista Water District	Ordinance 22
City of Ontario	Municipal Code Water Conservation Plan Title 6, Section 8A
City of Upland	Municipal Code 13.16.020 & 13.16.05.050

Each agency is responsible for locally enforcing the ordinance, although enforcement is difficult to maintain. In order to accomplish this, agencies have to add field staffing, deal with administration of the water waste ordinance, and handle the increased level of customer phone calls.

Enforcement is critical to the integrity of the ordinance in the past and remains so for future water shortages. Without action and penalties, the ordinance has no teeth and customers soon recognize this thus nullifying the effectiveness of the initiative.

Typically, violations are reported by community members or visually seen by agency staff. Enforcement staff will then send letters, visit customer properties and educate customers on the importance of adherence for both the resident and the overall community.

The new WEFlex Fund (full description can be found in Appendix E. Response Action Program Cut Sheets) will be available to support agencies' enforcement costs. An agency will be required to present their plan and budget to the taskforce for approval of funds.

Below is a snapshot of each agency's water waste ordinance at respective stages as designated by that agency. As can be seen, not every restriction is required by every agency. Absence of a restriction is shown on the chart by a white square.

6.10.1 Restrictions by Agency

	Chino	Chino Hills	Ontario	Upland	CVWD	Fontana	MVWD
No irrigation run off	Stage 0	Stage 2	Stage 1	Stage 0	Stage 0	Stage 1	Stage 0 (BP)
No irrigation more than 10 minutes						Stage 1	

	Chino	Chino Hills	Ontario	Upland	CVWD	Fontana	MVWD
No irrigation more than 15 minutes	Stage 0	Stage 2					Stage 0 (BP)
No irrigation from 10am - 6pm				Stage 0			
No irrigation from 9am - 4pm					Stage 1		
No irrigation from 9am - 5pm						Stage 1	
No irrigation from 8am - 8pm							Stage 0 (BP)
No irrigation from 6am - 8pm	Stage 0		Stage 1 (6am-6pm)				
Irrigation only every other day	Stage 2			Stage 1 based upon address			
Irrigation only 2 days per week	Stage 1 4pm - 9am			Stage 2 based upon address			
Irrigation only one day per week				Stage 3 based upon address			Stage 2 Saturday only
Irrigation three days per week between 6pm - 6am; based upon address odd/even		Stage 2					
Irrigation two days per week between 6pm - 6am; based upon address odd/even		Stage 3					
Irrigation two days per week between 4pm - 9am; based upon address odd/even			Stage 2				
Irrigation only on Tuesday and Saturday							Stage 1
Irrigation only three days per week - Tues., Thurs., Sat.							Stage 1
Irrigation only 3 days per week depending upon street address						Stage 1	
Irrigation only 2 days per week depending upon street address						Stage 2	
Irrigation only 1 days per week depending upon street address						Stage 3	
No landscape irrigation		Stage 4	Stage 4			Stage 4	

	Chino	Chino Hills	Ontario	Upland	CVWD	Fontana	MVWD
Irrigation shall not exceed 75% of the amount of water used during the same billing period							Stage 1
Irrigation shall not exceed 50% of the amount of water used during the same billing period							Stage 1
Irrigation shall not exceed 33% of the amount of water used during the same billing period							Stage 2
Irrigation only every other day - May 1 - Sept 30	Stage 1						
No irrigation on rainy days	Stage 0	Stage 2 1/10" or more within a 48 hour period					Stage 0 (BP)
No irrigation during and for 48 hours after measurable precipitation		Stage 2			Stage 0	Stage 1	
No irrigation on turf areas public street medians					Stage 6	Stage 2	
No irrigation of landscapes outside newly constructed homes and buildings					Stage 6	Stage 2	
No washing down pavement	Stage 0	Stage 2	Stage 1	Stage 0 if runoff otherwise Stage 3	Stage 0 can use water broom	Stage 1	Stage 0 (BP) with waterbroom
No excess use - breaks and leaks	Stage 0	Stage 2 repair within 48 hours	Stage 1	Stage 0	Stage 0	Stage 1 repair within 48 hours Stage 2 repair within 24 hours Stage 4 repair immediately	Stage 0 (BP) within 7 days
No washing vehicles without bucket or shutoff nozzle	Stage 0	Stage 2	Stage 1	Stage 0	Stage 0	Stage 1	
Restaurants prohibited to serve water - except upon request	Stage 0	Stage 2	Stage 1	Stage 0	Stage 0	Stage 1	
Water fountain or feature without recirculated water prohibited	Stage 0	Stage 2	Stage 0		Stage 0	Stage 1	

	Chino	Chino Hills	Ontario	Upland	CVWD	Fontana	MVWD
Hotels/motels laundering sheets/towels everyday - except upon request	Stage 2	Stage 3		Stage 0	Stage 0	Stage 1	Stage 0 (BP)
No leaving water running while brushing teeth, shaving, soaping, shower or washing dishes						Stage 1	
Commercial car wash not using recirculated water	Stage 0		Stage 0	Stage 1 Also coin-op laundry			Stage 0 (BP)
Single-pass cooling systems	Stage 0		Stage 0				
New cooling towers, decorative fountain and car washes must have reuse system							Stage 0 (BP)
Industrial customer must evaluate their processes for ways to conserve water					Stage 0		
Restaurant using non-conserving spray valves	Stage 1						
Ornamental lakes/ponds filling or refilling - except to sustain aquatic life	Stage 1		Stage 1	Stage 1		Stage 3	
Filling or refilling pools only allowed from 4pm - 8am						Stage 1	
All decorative fountains and pools (non-swimming) shall be drained		Stage 4					
Irrigation of golf course fairways prohibited				Stage 1			
No use of water from fire hydrant other than fire fighting		Stage 2	Stage 1	Stage 1		Stage 1 allows utility maintenance	Stage 1
No vehicle washing except on designated outdoor water use days - Midnight - noon after sundown				Stage 1			
Only fill pool on allowed odd/even irrigation days		Stage 2	Stage 2				
Nurseries, golf courses and other water dependent industries only allowed to irrigate every other day			Stage 2				
No new meters - unless already permitted or to protect public health	Stage 3					Stage 4	

	Chino	Chino Hills	Ontario	Upland	CVWD	Fontana	MVWD
No commitments shall be made to provide water service as part of new land use entitlements		Stage 4					
Nurseries, golf courses and other water dependent industries only allowed to irrigate every third day			Stage 3				
No installation of new landscapes							Stage 2
No water used for construction and dust control		Stage 3 if recycled water is available			Stage 8		Stage 2
No vehicle washing				Stage 3			Stage 1
Nurseries, golf courses and other water dependent industries only allowed to irrigate with handheld			Stage 4				
No non-essential water use i.e. filling pools			Stage 4	Stage 1			Stage 1
				Stages are not numbered: Year round, Moderate shortage, High shortage	*Stages provide ability to mandate % reductions*		*Stages are not numbers: Best practices, Significant shortage, Critical, Emergency*

Figure 20. Water Waste Restrictions per Agency

6.11 Staging Strategy

As drought levels increase, more effort is required from agency customers.

This will happen only if IEUA and member agencies are effective in their mission to reach the right customers and provide the necessary incentive and support.

- Early profiling and micro-targeting of customers will provide great benefit in reaching the right customers, especially as drought stages escalate.
- Stage-by-stage increases in direct installation services, incentives, and penalties will drive higher water savings.
- Clear and frequent communications with customers is required at each stage to inform and motivate.

Below is a recap of the suggested strategic actions to be taken at each drought stage:

The Blueprint for Deployment of Strategic Actions

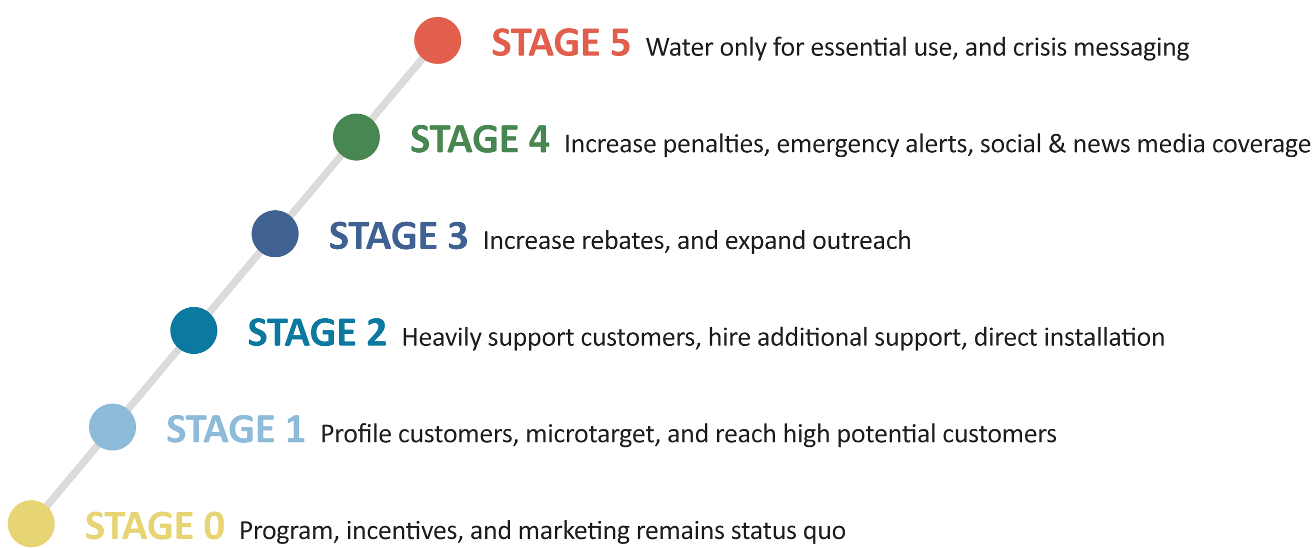


Figure 21. Blueprint for Deployment of Strategic Actions

On the following pages are snapshots of the programs, messaging, and activities for each drought stage:

STAGE 0

Goal: Customers to create drought sustainable properties prior to emergency conditions. Continue working towards goal with current strategies.

Programs:

- SoCal WaterSmart Residential and Commercial Rebates
- Turf Replacement Program
- Residential Irrigation Tune-up
- Home Surveys
- Landscape Workshops
- Design Services

Continue the success of the Residential Irrigation Tune Up Program. Work to increase response for the Turf Replacement Program through increased outreach and a higher level of linkage to support services. Implement the FreeSprinklerNozzles.com with online nozzle ordering and home delivery program. Implement the Leak Detection Pilot program.

Messaging: & Outreach: Reinforce the importance of creating/maintaining a water efficient property as preparedness for future water shortages.

Restrictions: Continue with current restrictions. Stage 0 restrictions vary agency-by-agency.

STAGE 1

Goal: Minimum 1 – 5% decrease in water use.

Programs: Programs remain the same.

Messaging & Outreach: Define ***Watch*** Condition and utilize in general customer messaging.

Begin profiling customers and micro-target high potential customers, utilizing messaging that will best resonate with those customers.

Restrictions: Consider escalation of local water waste prohibitions.

At this stage, agencies will communicate to their customers that there’s a need to increase water efficiency levels and will ask everyone to do their part to save.

STAGE 2

Goal: Minimum 6 – 15% decrease in water use.

Programs: Implement direct installation programs including the Residential Smart Irrigation Direct Installation and the School Smart Irrigation Direct Installation. Hire additional landscape designers to expand Landscape Design services. Hold more frequent Landscape Workshops. Increase the volume of Home Surveys performed.

Messaging & Outreach: Define ***Warning*** Condition to use in general customer messaging.

IEUA continues profiling and micro-targeting of high potential customers. Introduce influencer marketing (role models and respected community members).

Restrictions: Prepare WEFlex proposals and plans for expanded customer communication and enforcement administration.

STAGE 3

Goal: Minimum 16 - 25% decrease in water use.

Programs: Continue base programs and increase incentive amounts for turf replacement, high efficiency nozzles, smart controllers, laminar flow restrictor and plumbing flow control valves. Continue smart irrigation direct installation programs.

Messaging & Outreach: Define ***Emergency*** Condition and utilize as general customer messaging.

IEUA expands profiling and micro-targeting to include mid-range water users as well as high-water use customers. Ramp up influencer marketing.

Restrictions: Hire additional local staff and set up operations for expanded customer communication and enforcement administration.

STAGE 4

Goal: Minimum 25 - 50% decrease in water use.

Programs: Continue increased incentives and smart irrigation direct installation programs.

Messaging & Outreach: Define ***Critical*** Condition and use as general customer messaging

IEUA and Agencies strengthen the message of urgency and the community call to action.

Restrictions: Increase penalties, implement emergency alerts and new media coverage.

STAGE 5

Goal: Minimum 50% decrease in water use.

Programs: Only offer indoor plumbing and property leak detection programs. Suspend all landscape & irrigation programs.

Messaging & Outreach: Define ***Catastrophic*** Condition and utilize as general customer messaging.

Implement crisis messaging, announcing essential use only.

Restrictions: Conduct stringent enforcement of restrictions.

7 Operational and Administrative Framework

The general process and respective agency roles for each major plan component are documented in their respective sections. Additionally, this section provides a summarization of tasks and responsibilities as well as the process for updating the plan. The major tasks are:

- Conduct drought monitoring
- Investigate mitigation actions and capital improvement programs (long-term)
- Initiate regional response actions (short-term)
- Update the Drought Contingency Plan

7.1 Roles and Responsibilities

IEUA: IEUA acts as the administrative facilitator of all components of the plan. IEUA is responsible for developing regional demand and supply projections, calculating supply/demand ratio, communicating outcomes, convening the Drought Response Taskforce, implementing response strategies and actions as determined by the Drought Response Taskforce, conducting vulnerability assessments, evaluating and implementing IEUA controlled mitigation actions, and updating the plan.

Member Agencies: Member agencies are responsible for providing demand and supply projections, implementing agency-selected local mitigation actions, participation in the Drought Taskforce, and implementation of response actions including of local programs water waste restrictions.

7.2 Drought Response Taskforce Process

Once the drought monitoring framework indicates that the region has reached a specific stage of drought conditions, several actions will occur.

First, the Drought Response Taskforce will assemble.

The Drought Response Taskforce is the organizational group empowered to:

1) Create the Drought Response Plan blueprint.
2) During drought condition stages, assemble taskforce to finalize strategic response actions.
3) Work with their respective agency to implement response actions, according to plan.

The taskforce is comprised of representatives from each of the eight member agencies, and regional personnel from IEUA. The group works in a collaborative fashion to gain consensus on appropriate regional response actions.

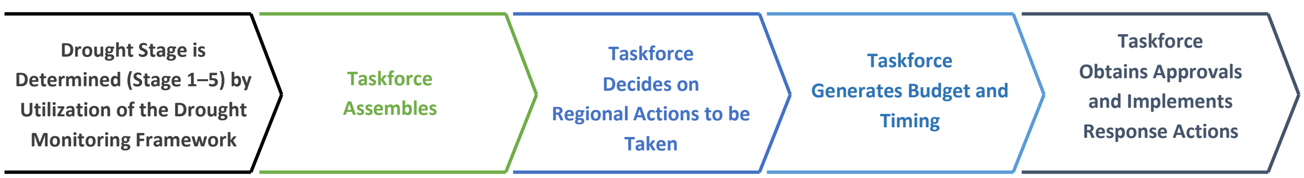
The taskforce will make decisions about the level of program and services, restrictions, and messaging to regional customers. Additionally, it's within the group's purview to determine the level of aggressiveness taken for each element of the plan.

It's important to note that, during a regional drought, an individual member agency may not be experiencing a drought condition due to their local supply mix. In this circumstance, the agency may elect in what capacity to participate in the taskforce and how to best communicate to their customers that locally there are no water supply issues, although the region is undergoing a drought stage.

Looking forwards, the taskforce will work to balance the effectiveness of regional messaging with the differing needs of individual member agencies. There are no pre-determined mandates regarding service offerings, restrictions, communications or budgets. The taskforce will collaborate on policies, while fully supporting flexibility for each agency.

The group will review the proposed actions set forth in the existing plan and make modifications as necessary. The plan was intended to be flexible and changeable. Modifications to the plan might include a change in incentive levels or program delivery mechanisms. There may also be a new water-saving technology that should be offered to customers. The taskforce might be able to secure additional grant funding, as well. Once the action plan is finalized, the taskforce will implement the programs, penalties, and communications plan, as agreed upon.

An overview of the drought response process is below:



7.3 Drought Contingency Plan Update

The Drought Contingency Plan is a working document and, as such, may be modified and updated as impactful changes occur such as another prolonged drought or increased legislative mandates. IEUA will regularly review the plan and make adjustments accordingly.

Changes and/or reviews of the plan should take place in line with the following conditions:

- Annually to assess the functionality and overall performance
- Updates to the Integrated Resource Plan
- Every 5 years to meet the Urban Water Management Plan report cycle
- As the State's Water Use Efficiency Framework policies are finalized

7.4 Operational and Administrative Summary

The table below overviews the activities, responsibilities, roles, for procedures for the operation and administration of the DCP.

Table 11. Operational and Administrative Framework

Activity	Responsibilities	Roles	Procedures
Monitoring	Collect and distribute indicator data	IEUA	Distribute identified data to member agencies via email, once a year.
	Develop annual demand projections	IEUA	Include demand projections with indicator data, annually.
	Report on projected annual supplies and demands	Member Agency Water Managers	Provide annual supply and demand projections, each year to IEUA via email.
	Review projection data and convene Taskforce (as needed)	IEUA	Determine the supply/demand ratio (regionally and for the individual member agencies) and if a regional shortage is predicted, convene the Taskforce within two weeks.
Mitigation Actions	Evaluate and prioritize mitigation projects	IEUA and Member Agencies	Continued support of regional planning efforts.
	Strategically pursue Implementation	IEUA and Member Agencies	Identify and secure funding for high-priority actions.
Response Actions	Review regional shortage conditions	Drought Response Taskforce	Once shortage is predicted, meet and review the regional conditions.
	Decide what regional actions to take	Drought Response Taskforce	Considering regional and agency-level shortage, formulate a strategy to achieve needed reductions based on consensus of the Taskforce.
	Generate budget and timing for implementation	Drought Response Taskforce	Based on consensus of the Taskforce.
	Obtain approval and implement actions	Drought Response Taskforce	Present proposed actions and budget to the IEUA Board and member agency Boards as appropriate.
Update DCP	Plan evaluation	IEUA	Annually conduct a review of the supply/demand projection reporting, identify data gaps and inefficiencies. Streamline and correct shortfalls. If response actions initiated, conduct review of results and modify plan.
	Updating the plan	IEUA and Member Agencies	Comprehensive review of DCP and updates to the framework as needed.

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Appendix A: Summary of Demand Projections Method and Rationale

IEUA Drought Contingency Plan

Demand Projections

There are numerous approaches available for projecting urban water demands. Both the 2015 IEUA Regional Urban Water Management Plan (UWMP) and the 2016 Integrated Water Resources Plan (IRP) applied elaborate data intensive methodologies to develop long-term projections within the service area for planning purposes. Included in these projections are varying levels of uncertainty as the time-horizon extends ten, fifteen, twenty, and out to thirty-five years into the future. Factors that influence demands include indoor and outdoor water use practices, urban development, annual precipitation, and population growth. Due to the nature of these uncertainties, the IRP provides ranges for future demands as low-, medium-, and high-projections.

For the purposes of the drought monitoring framework however, the demand projections are needed for very near-term planning and are intended to reflect the estimated water-use from one year to the next on a monthly time-step. Water demands are often strongly correlated from one year to the next as water practices are generally slow to shift to more or less efficient practices, and development is typically a gradual process. On the other hand, annual precipitation and other water restrictions can vary significantly from one year to the next.

The proposed approach for the IEUA drought monitoring framework demand projections would rely on the rolling average for the previous five years for each member agency. This approach is consistent with the timeframe used for wastewater projections which also relies on a five-year historical average. In addition, the five-year averages for the monthly demands were compared to the three-year averages for each of the member agencies and found to be relatively similar in most cases, though there were some variations. The member agency monthly averages for the previous three- and five-year periods are attached are on pages 3-5 of this Appendix.

For the drought monitoring framework, monthly demands for the five previous years would be averaged and used for the current year's monthly projections. These demand values would be provided as reference to the water managers when they generate their four-month supply projections for the drought monitoring purposes. If there are local circumstances or external drivers that have significantly shifted the expected demands from the historical averages, the water managers could adjust the demands as they saw necessary. For reference, Table 1 provides the five-year averages for each member agency based on data from the Chino Basin Watermaster for the fiscal years 2013/2014 through 2017/2018. In addition,

Table 2 shows an example of the projected 4-month demands for the City of Chino starting at the end of July 2019.

Based on further feedback from the member agencies, this approach for generating demand projections will be incorporated into the Drought Monitoring TM, and eventually the Drought Contingency Plan.

TABLE 1. FIVE-YEAR MONTHLY AVERAGES FOR IEUA MEMBER AGENCIES (AC-FT)

	Chino	*Chino Hills*	*CVWD*	*Fontana*	*MVWD*	*Ontario*	*Upland*	*SAWCo*
July	1,503	1,526	5,183	4,121	1,721	3,428	2,181	1,156
August	1,516	1,505	5,227	4,050	1,645	3,436	2,207	955
September	1,390	1,393	4,622	3,669	1,602	3,165	1,937	921
October	1,292	1,246	4,159	3,417	1,400	2,921	1,764	864
November	1,119	1,046	3,416	2,860	1,136	2,476	1,399	813
December	933	810	2,846	2,539	988	2,173	1,152	770
January	886	793	2,730	2,477	936	2,084	1,103	734
February	859	759	2,583	2,381	1,022	1,964	1,091	770
March	973	870	2,945	2,699	915	2,229	1,259	857
April	1,197	1,064	3,778	3,132	1,195	2,645	1,498	1,005
May	1,281	1,207	4,076	3,374	1,395	2,842	1,634	975
June	1,383	1,327	4,642	3,706	1,483	3,118	1,885	1,075
Total	14,332	13,545	46,206	38,427	15,437	32,481	19,109	10,894

TABLE 2. CITY OF CHINO 4-MONTH PROJECTION EXAMPLE – END OF JULY

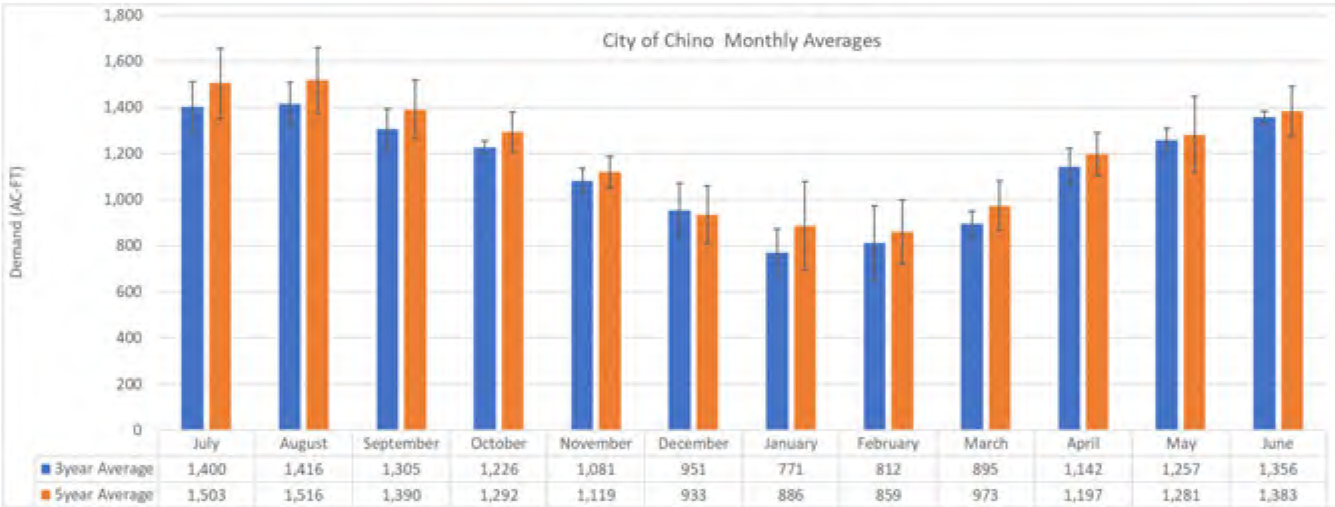
	Projected 2019			
Supplies	*Aug.*	*Sept.*	*Oct.*	*Nov.*
Chino Basin GW				
Other GW (CDA, desalted)	*To be provided by the Member Agency*			
Imported (IEUA, treated by WFA)				
Recycled[1]				
Shortage Verification	*Target (AC-FT)*			
Demand[2]	***1,516***	***1,390***	***1,292***	***1,119***
Supply/Demand Ratio				

[1] For information only (not used in calculation of Supply/Demand Ratio)

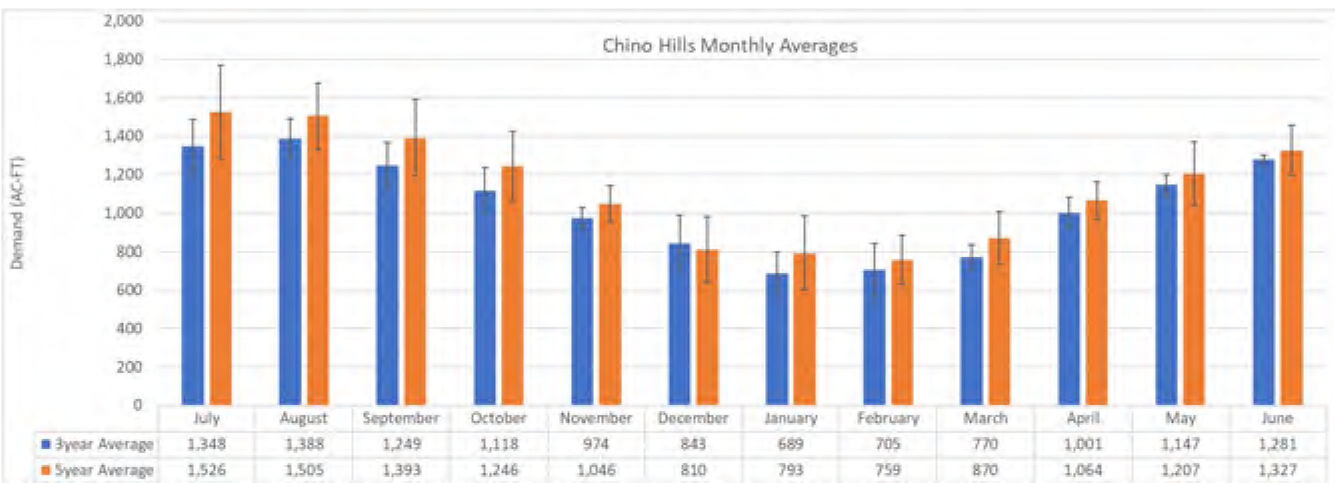
[2] Not including non-potable demands (i.e. purple pipe deliveries)

Monthly Demand Averages for IEUA Member Agencies

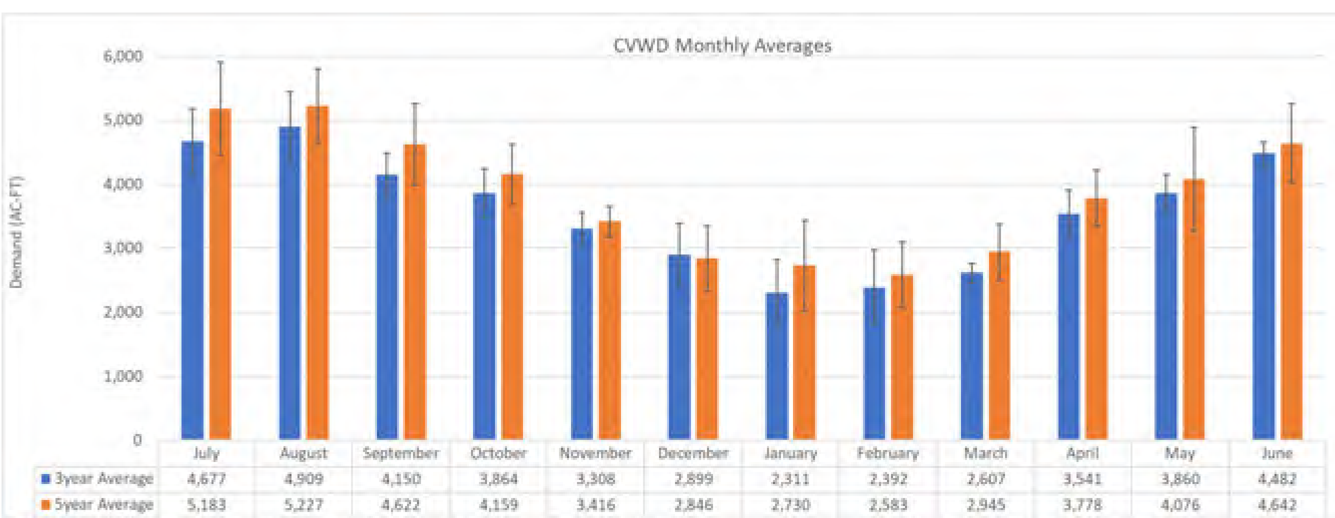
3-Year Average (FY15/16 -FY17/18) and 5-Year Average (FY13/14-FY17/18)



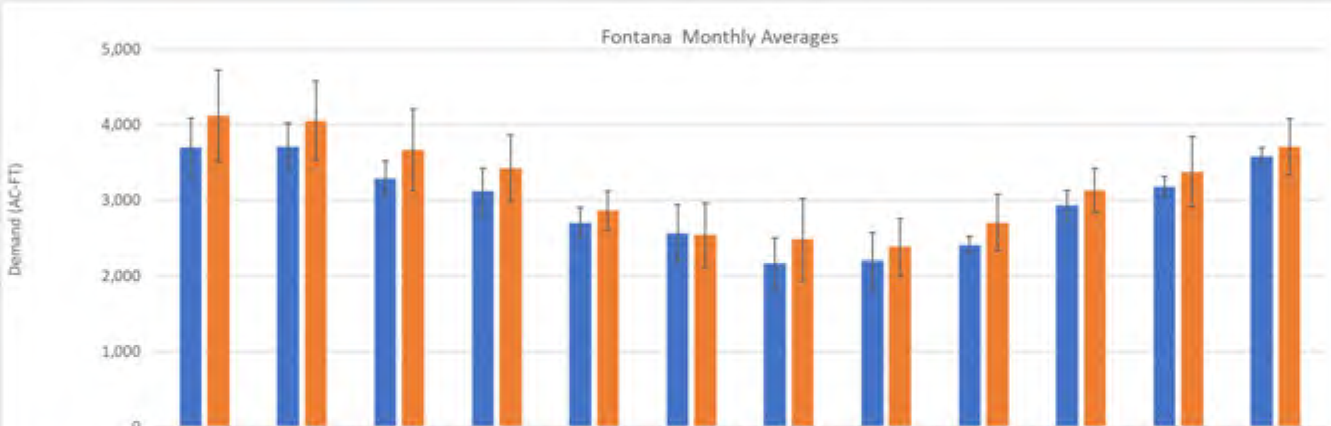
	July	August	September	October	November	December	January	February	March	April	May	June
3year Average	1,400	1,416	1,305	1,226	1,081	951	771	812	895	1,142	1,257	1,356
5year Average	1,503	1,516	1,390	1,292	1,119	933	886	859	973	1,197	1,281	1,383



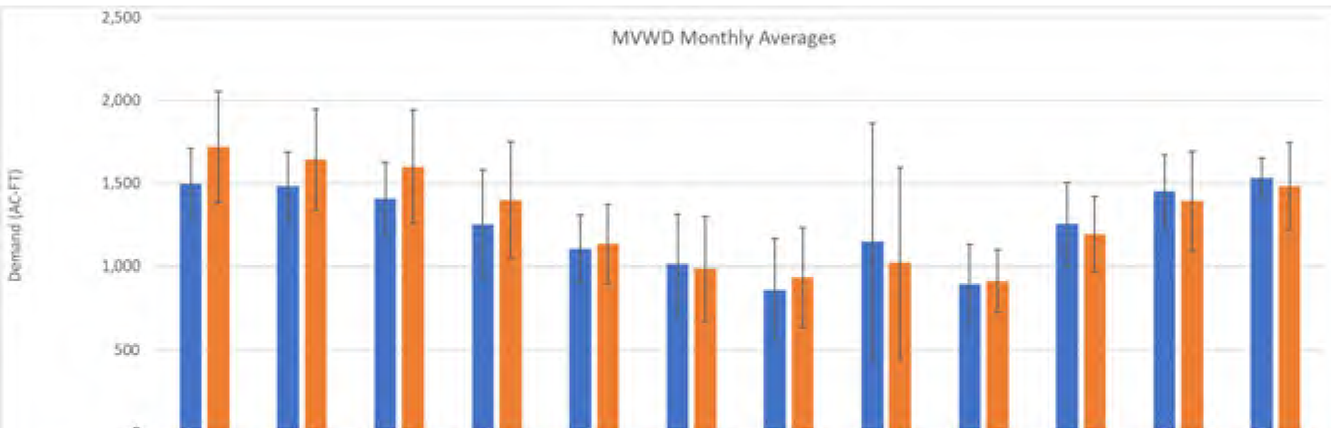
	July	August	September	October	November	December	January	February	March	April	May	June
3year Average	1,348	1,388	1,249	1,118	974	843	689	705	770	1,001	1,147	1,281
5year Average	1,526	1,505	1,393	1,246	1,046	810	793	759	870	1,064	1,207	1,327



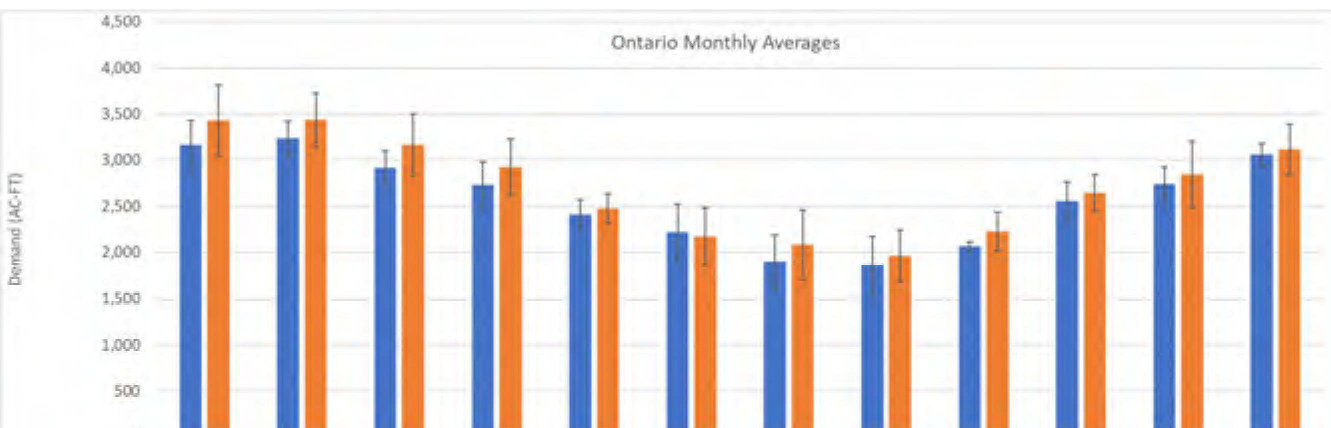
	July	August	September	October	November	December	January	February	March	April	May	June
3year Average	4,677	4,909	4,150	3,864	3,308	2,899	2,311	2,392	2,607	3,541	3,860	4,482
5year Average	5,183	5,227	4,622	4,159	3,416	2,846	2,730	2,583	2,945	3,778	4,076	4,642



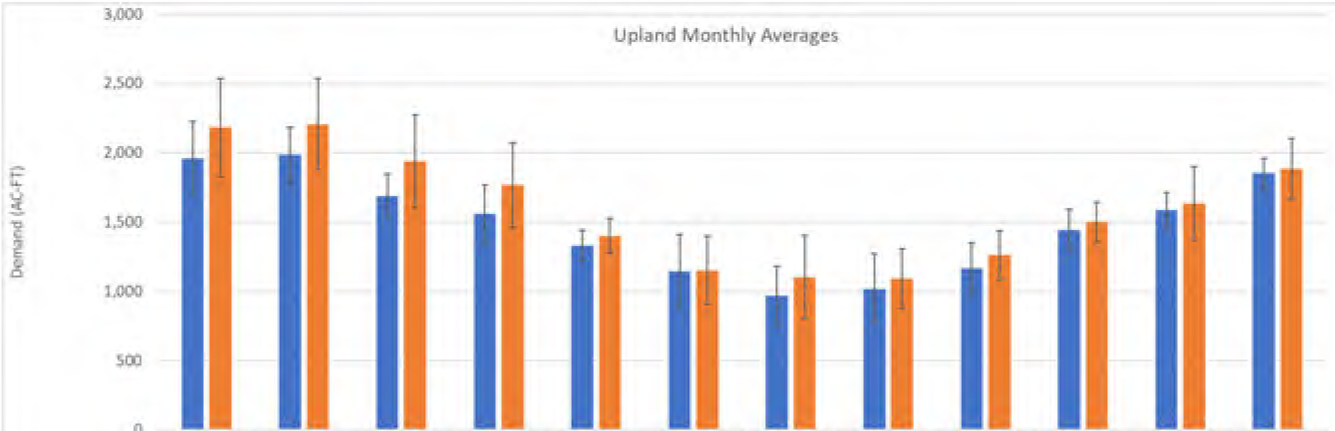
	July	August	September	October	November	December	January	February	March	April	May	June
3year Average	3,698	3,701	3,280	3,114	2,701	2,563	2,163	2,197	2,403	2,934	3,179	3,581
5year Average	4,121	4,050	3,669	3,417	2,860	2,539	2,477	2,381	2,699	3,132	3,374	3,706



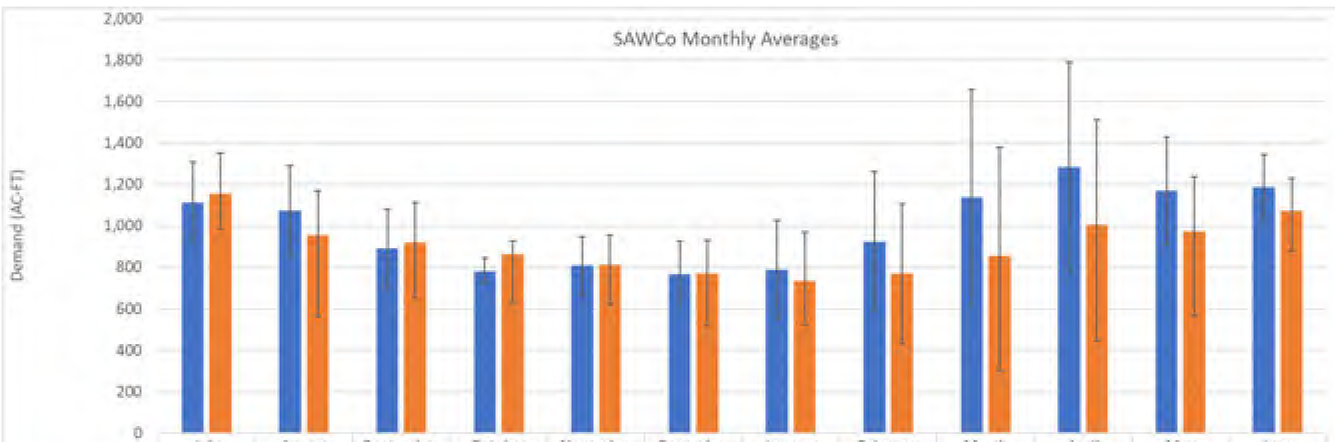
	July	August	September	October	November	December	January	February	March	April	May	June
3year Average	1,499	1,485	1,410	1,254	1,106	1,010	863	1,152	895	1,255	1,454	1,533
5year Average	1,721	1,645	1,602	1,400	1,136	988	936	1,022	915	1,195	1,395	1,483



	July	August	September	October	November	December	January	February	March	April	May	June
3year Average	3,164	3,233	2,919	2,729	2,411	2,215	1,894	1,857	2,063	2,556	2,737	3,058
5year Average	3,428	3,436	3,165	2,921	2,476	2,173	2,084	1,964	2,229	2,645	2,842	3,118



	July	August	September	October	November	December	January	February	March	April	May	June
3year Average	1,958	1,984	1,688	1,558	1,328	1,148	970	1,019	1,169	1,438	1,585	1,849
5year Average	2,181	2,207	1,937	1,764	1,399	1,152	1,103	1,091	1,259	1,498	1,634	1,885



	July	August	September	October	November	December	January	February	March	April	May	June
3year Average	1,112	1,073	890	782	808	767	789	924	1,137	1,285	1,168	1,187
5year Average	1,156	955	921	864	813	770	734	770	857	1,005	975	1,075

Appendix B: Summary of Member Agency Water Shortage Stages

IEUA Drought Contingency Plan

Cucamonga Valley Water District Existing Water Shortage Stages

Stage	Water Supply Condition*	Reduction (shortage imposed)	Response Action Type
1 - Encouraging Water Use Efficiency	Normal Supply	0%	Stage 1 = Mandatory Prohibited Water Practices.
2 - Water Watch	Supplies reduced by 10%	10%	In addition to Stage 1, reduce water usage by 10%, invoke outdoor watering conditions.
3 - Water Alert	Supplies reduced by 15%	15%	In addition to Stage 2, reduce water usage by 15%, invoke additional outdoor watering conditions.
4 - Critical Water Alert	Supplies reduced by 20%	20%	In addition to Stage 3, reduce water usage by 20%.
5 - Water Emergency	Supplies reduced by 25%	25%	In addition to Stage 4, reduce water usage by 25%.
6- Severe Water Emergency	Supplies reduced by 35%	35%	In addition to Stage 5, reduce water usage by 35% due to catastrophic event or severe drought, and additional end-user prohibitions.
7 - Water Crisis - Catastrophic	Supplies reduced by 50%	50%	In addition to Stage 6, reduce water usage by 50% due to catastrophic event or severe drought, and non-essential outdoor water may be prohibited and water for construction purposes curtailed.

* Supplies may be reduced below the planned levels due to such causes as extreme (worst case) drought conditions, unplanned outages of local and imported water supply facilities due to earthquakes or other major disasters, prolonged power outages, water contamination, or any other catastrophic loss of supply.

City of Ontario Existing Water Shortage Stages

Stage*	Water Supply Condition	Reduction (shortage imposed)	Response Action Type
0	Normal Supply	5%	Voluntary reductions for water use efficiency.
1	When water conservation goals not met through voluntary reduction or supplies reduced by 10%	Up to 10%	Stage 1 prohibitions implemented to reach 10% mandatory reduction (voluntary restrictions become mandatory).
2	Supplies reduced by 10% to 20%	> 15%	Stage 2 prohibitions implemented to reach at least 15% mandatory reduction.
3	Supplies reduced by more than 20%	> 20%	Stage 3 prohibitions implemented to reach greater than 20% mandatory reduction (includes no use of potable water for construction/grading).
4	Supplies reduced by more than 50%	Up to 50%	State 4 prohibitions implemented to reach up to 50% mandatory reduction (includes significant restrictions on landscape irrigation).

* Stage 0 prohibitions are entirely voluntary. Stages 1 to 4 prohibitions will be progressively implemented according to the severity of the water crisis.

City of Chino Existing Water Shortage Stages

Stage*	Water Supply Condition	Reduction (shortage imposed)	Response Action Type
0	Adequate Water Supply Conditions	0%	Permanent measures / restrictions to ensure water use efficiency.
1	When water conservation goals not met through voluntary reduction or supplies reduced by 10%	Up to 10%	Stage 1 restrictions implemented upon city council declaration of anticipated supply reduction of 10% or less (restricted outdoor irrigation and refill of lakes/ponds).
2	Supplies reduced by 10% to 20%	10% - 20%	Stage 2 restrictions implemented upon city council declaration of anticipated supply reduction of 10% to 20% (increased outdoor irrigation restrictions).
3	Supplies reduced by more than 20%	> 20%	Stage 3 restrictions implemented upon city council declaration of anticipated supply reduction of more than 20% (no water to new land development projects).

City of Chino Hills Existing Water Shortage Stages

Stage*	Water Supply Condition	Reduction (shortage imposed)	Response Action Type
1	Normal Supply	0%	Voluntary Water Conservation Alert: all elements of Stage 2-4 restrictions on voluntary basis.
2	Moderate Water Conservation Alert	Up to 10%	Stage 2 restrictions implemented upon city council declaration of anticipated supply reduction of 10% or less and voluntary conservation does not achieve the desired reduction (restrictions on outdoor irrigation and water features).
3	High Water Conservation Alert	10% - 25%	Stage 3 restrictions implemented upon city council declaration of anticipated supply reduction of 10% to 25% (no refilling of swimming pools or construction dust control).
4	Severe Water Conservation Alert	<25%	Stage 4 restrictions implemented upon city council declaration of anticipated supply reduction of more than 25% (no outdoor water use at any time).

* Stage 1 prohibitions are entirely voluntary. Stages 2 to 4 prohibitions will be progressively implemented according to the severity of the water crisis.

City of Upland Existing Water Shortage Stages

Stage*	Water Supply Condition	Reduction (shortage imposed)	Response Action Type
0	Adequate Water Supply Conditions	0%	Permanent measures / restrictions to ensure water use efficiency.
1	Significant Shortage	n/a	Stage 1 restrictions implemented upon city council declaration of anticipated supply not enough to meet demand (restrictions on outdoor irrigation).
2	High Shortage	n/a	Stage 1 restrictions implemented upon city council declaration of anticipated supply not enough to meet demand, despite Stage 1 restrictions (restrictions for washing vehicles and surfaces outdoors).

* percentages not associated with Stages 1-2

Fontana Water Company Water Shortage Stages

Stage*	Water Supply Condition	Reduction (shortage imposed)	Response Action Type
0	Adequate Water Supply Conditions	0%	Permanent measures / restrictions to ensure water use efficiency.
1	Water Alert	n/a	Stage 1 restrictions implemented if Commission, the utility, or authorized government agency determines that measures are needed to reduce water consumption (restrictions on timing and frequency of outdoor irrigation).
2	Water Shortage	n/a	Stage 2 restrictions implemented if Commission, the utility, or authorized government agency determines that measures are needed to reduce water consumption and further reduction is needed to provide utility service (increased irrigation restrictions).
3	Water Shortage - further demand reductions	n/a	Stage 2 restrictions implemented if Commission, the utility, or authorized government agency determines that measures are needed to reduce water consumption and further reduction is needed to respond to existing available water supply conditions (no dust control or filling of ponds / lakes).
4	"Emergency" Water Shortage	n/a	Stage 3 restrictions implemented upon Commission, the utility, or authorized government agency determines that measures are needed to reduce water consumption due to a critical water shortage emergency. Stage 1-3 are not sufficient to comply with demand reductions (no outdoor water use).

* percentages not associated with Stages 1-3

Monte Vista Water District Existing Water Shortage Stages

Stage*	Water Supply Condition	Reduction (shortage imposed)	Response Action Type
1	Adequate Water Supply Conditions	0%	Permanent measures / restrictions to ensure water use efficiency.
2	Significant Water Supply Shortage	10% - 25%	Stage 2 restrictions implemented if Board of Directors finds that current or near-term water supply conditions require a 10% to 25% reduction (outdoor irrigation restrictions).
3	Critical Water Supply Shortage	25% - 40%	Stage 3 restrictions implemented if Board of Directors finds that current or near-term water supply conditions require a 25% to 40% reduction (irrigation restrictions, no vehicle washing, no refilling of pools) .
4	Emergency Water Supply Shortage	> 40%	Stage 4 restrictions implemented if Board of Directors finds that current or near-term water supply conditions require greater than 40% reduction (no new landscaping, dust control for construction, or water to maintain pools and spas).

Appendix C:
2015 Integrated Water Resources Plan:
Water Supply & Climate Change Impacts 2015—2040

IEUA Drought Contingency Plan

2016

Integrated Water Resources Plan:

Water Supply & Climate Change Impacts 2015—2040

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

"Our climate is rapidly changing, our population is growing and more extreme weather looms on the horizon. Now is not the time to shirk from responsibility. Storage or conveyance alone will not solve all of our problems. Recycling, groundwater management and conservation, individually, won't get us there either. It will take all of the above. *We must think differently and act boldly* -- and that's exactly what California is doing."

—Governor Brown

Integrated Water Resources Plan:

Water Supply & Climate Change Impacts 2015—2040

Prepared by:

Inland Empire Utilities Agency

Technical Modeling by:

A&N Technical Services

RAND Corp.

Wildermuth Environmental Inc.

Technical Advisory Committee:

City of Chino

City of Chino Hills

City of Ontario

City of Upland

Chino Basin Water Master

Cucamonga Valley Water District

Fontana Water Company

Monte Vista Water District

Table of Contents

Acronyms

AF	Acre-Feet
AFY	Acre-Feet of water per Year
CBWM	Chino Basin Watermaster
CDA	Chino Desalter Authority
CUWCC	California Urban Water Conservation Council
CVWD	Cucamonga Valley Water District
DWR	Department of Water Resources
DYY	Dry Year Yield
EDU	Equivalent Dwelling Unit
ET	Evapotranspiration
GPD	Gallons per Day
IERCF	Inland Empire Regional Composting Facility
IEUA	Inland Empire Utilities Agency
IRP	Integrated Resource Plan
MGD	Million Gallons per Day
MG	Million Gallons
M&I	Municipal and Industrial
MVWD	Monte Vista Water District
MWD	Metropolitan Water District of Southern California
NPDES	National Pollutant Discharge Elimination System
NRW	Non-Reclaimable Wastewater
OBMP	Optimum Basin Management Plan
OSY	Operating Safe Yield
OWOW	One Water One Watershed

PEIR	Program Environmental Impact Report
RMPU	Recharge Master Plan Update
RTP	Regional Transportation Plan
SAWPA	Santa Ana Watershed Project Authority
SARCCUP	Santa Ana River Conservation and Conjunctive Use Project
SBCFCD	San Bernardino County Flood Control District
SCAG	Southern California Association of Governments
SFR	Single Family Residential
SRF	State Revolving Fund
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TYCIP	Ten-Year Capital Improvement Plan
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
WEAP	Water Evaluation And Planning Model
WFMP	Wastewater Facilities Master Plan
WUE	Water Use Efficiency
WUEBP	Water Use Efficiency Business Plan

1. Overview & Purpose

Project Background

Climate Change

Phases of the IRP

IRP Development

Planning Process

Agricultural fields, in the City of Ontario.

I. Overview & Purpose

PROJECT BACKGROUND

The 2015 "Integrated Resources Plan: Water Supply & Climate Change Impacts 2015—2040" (IRP) is our region's blueprint for ensuring reliable, cost-effective, and environmentally responsible water supplies for the next 25 years. It takes into consideration availability of current and future water supplies and accounts for possible fluctuations in demand forecasts and climate change impacts. This is the first time that the region's planning has gone beyond a regional Urban Water Management Plan (UWMP) and the cities and water agencies (Agencies) have worked collaboratively to develop a comprehensive water resources plan. The sphere of influence for the 2015 IRP is the Inland Empire Utilities Agency's (IEUA) service area which is in southwestern San Bernardino County shown in Figure 1-1.

Two key goals of this IRP are to integrate and update water resource planning documents in a focused, holistic manner and to develop an implementation strategy that will improve near-term and long-term water resources management for the region. In addition, the IRP evaluates new growth, development, and water demand patterns within the service area and conducts an assessment of water needs and supply source vulnerabilities under climate change.

Although this is the first IRP that the region has developed, from 2000 to 2002 the region developed four foundational master planning documents which, together, functioned as an IRP. These historical documents illustrated how, since 2000, the region has recognized the increasingly uncertain future of imported water supply availability and the importance of local water supplies, particularly now with changing climate conditions. As part of its response, the region has focused infrastructure investments on local water supply development strategies to reduce dependence on imported supplies and increase drought resilient water sources (see Appendix 1 for a detailed description of foundational planning documents). These foundational documents are:

1. Chino Basin Water Master's Optimum Basin Management Plan (2000)
2. Chino Basin Organics Management Strategy (2001)
3. Recycled Water System Feasibility Study (2002)
4. Wastewater Facilities Master Plan (2002)

These documents were linked together in the 2002 IEUA Facilities Master Plan Programmatic Environmental Impact Report (EIR).

Water resources management strategies were further updated as part of the 2005 and 2010 UWMP. Individual programs were developed in reports such as the 2002 Salinity Management Plan, 2005 Recycled Water Implementation Plan, 2007 Recycled Water Three Year Business Plan, 2013 Recharge Master Plan Update, 2015 Recycled Water Program Strategy, 2015 Facilities Master

Plan Update, 2015 WUE Business Plan Update, and 2015 Energy Management Plan. The number and scope of regional planning documents that have been developed in the past 15 years illustrate both the commitment to local resource development and the emphasis on water resources sustainability.

An additional driver for the creation of the IRP was the need to strategically position the region for upcoming funding opportunities. By leveraging these funding opportunities for local projects, the region will be less vulnerable to the anticipated imported water rate increases of 4-5% annually through the next decade (MWD 2016 Forecast). The past success of the region to secure grant funding of over $258 million has made the expansion of the groundwater recharge, recycled water, and conservation programs possible. Over the next two years, more than a billion dollars of state and federal grants and loans will be available to support additional water supply development. The IRP will help position the region to pursue these funding opportunities by identifying regional water resources programs and ultimately project priorities.

CLIMATE CHANGE

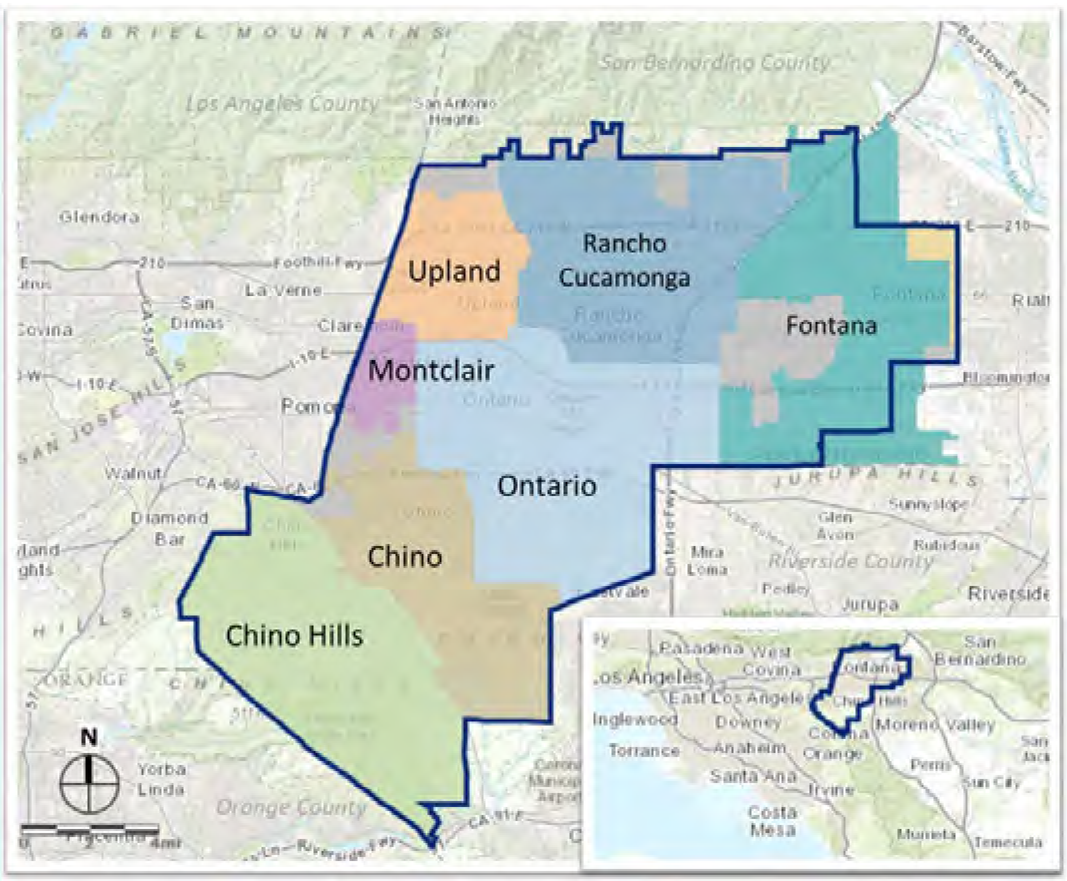
Climate change impacts have already started to create critical challenges for water resources management in Southern California. More intense storm events and the changing frequency and duration of drought years are becoming evident throughout the State and the West. This makes future water supplies available to the region more uncertain, particularly imported water resources that are uniquely vulnerable to changes in the state's snowpack.

General climate change trends projected for California are that temperatures will increase and precipitation will increasingly fall as rain rather than snow. These trends will impact water supplies in two ways: higher

The planning principal which guides the IRP is:

"... to plan for a deeply uncertain future and develop a robust strategy that can adapt and respond to a wide range of possible futures with changing conditions."

Figure 1-1: IRP Regional Planning Area Boundary



temperatures will cause increased water demands; however, infrastructure to capture rain runoff is limited as water infrastructure in California was designed to capture slow melting snowpack not rapid stormwater.

In addition, droughts are expected to occur more frequently, more intensely, and last longer. The Natural Resources Defenses Council (NRDC) estimates that if nothing is done to address the implications associated with climate change, between the years 2025 and 2100, the cost of providing water to the western United States will increase from $200 billion to $950 billion per year.

The IRP recognizes and incorporates an assessment of a range of impacts that climate change could have on water supplies for the State and region. This is done by using downscaled climate models from the Intergovernmental Panel on Climate Change (IPCC) Assessment. This IRP does not rely on historical hydrology to predict the future, but instead gathers data available from the latest climate models to project a wide range of possible future climate conditions. The information was used as a sensitivity analysis to help identify the most climate resilient water strategies and priorities for the region. This approach was selected to provide the region with a better understanding of how to effectively plan and prepare for how climate uncertainty affects our water supplies.

"Paleoclimate climate analysis has established that hydrology has the potential to vary far more widely than has been recorded in the observed record. This means that, given the scientific evidence supporting climate change, we need to look beyond historical observations to ensure that we have adequate water supplies."

"Strategies and Resources for Evaluating and Adapting to Climate Change Effects: Climate Change is Real –Now What?" Stanford Report. Fall 2014.

PHASES OF THE IRP

The development of the IRP is being done in two phases.

Phase 1 – Analysis and Recommendations: Phase 1 focuses on an extensive analysis of future projected water needs and water supply strategies under conditions of climate change and growth. Results from Phase 1 include summaries of the recommended regional water resource strategies; corresponding ranges of costs for the various supply categories; and a regionally developed, all-inclusive list of potential supply projects (local and regional). This information will be used to complete a Programmatic Environmental Impact Report (PEIR), which is needed to ensure that selected projects are grant eligible. The IRP report is the culmination of Phase 1.

Phase 2 – Implementation and Capital Improvement Program (CIP): Phase 2 will address additional detailed project level analysis including project scopes, costs, prioritization, and implementation scheduling. Phase 2 will also include the disaggregation of the regional demand and supply to the local retail level. Continued discussions will be facilitated through a Regional Water Forum. Phase 2 is anticipated to begin in Summer 2016.

IRP DEVELOPMENT

The IRP was developed from 2013-2015 by the IEUA Planning and Environmental Resources Department in conjunction with stakeholders including regional technical staff, water managers, and joint IEUA Board and Regional Policy Committee workshops.

IRP Technical Work Group: The IRP Technical Work Group consisted of IEUA member agencies, which includes the seven contracting sewerage agencies, and the retail water agencies within the IEUA service area. Meetings were held one to two times each month to discuss modeling assumptions, verify projections, establish project lists, and examine modeling results in detail. Modifications to methodology and clarifications were made with this group.

Water Managers Work Group: After technical items had been discussed and vetted, core findings and recommendations were presented at the monthly Water Managers Work Group meetings.

Joint Board and Policy Committee Workshops: The results from the IRP modeling and recommendations from the Technical and Water Managers Work Groups were presented to regional policy makers. These special joint workshops included members from IEUA's Board of Directors and the regional policy makers from the Regional Sewerage Policy Committee, as well as board members from the Monte Vista Water District (MVWD), and the General Manager from Fontana Water Company. These meetings served to update policy makers about the progress being made with the IRP as well as to receive policy direction.

Goals & Objectives: IRP Goals and Phase 1 objectives were developed by stakeholders during multiple workshops with the IRP Technical and Water Managers Work Groups, and joint IEUA Board and Regional Policy committee workshops. The overarching goals that guided the IRP process and analysis are:

- *Resilience* — Develop regional water management flexibility to adapt to climate change and economic growth and to any changes that limit, reduce, or make water supplies unavailable.
- *Water Efficiency* — Meet or exceed rules and regulations for reasonable water use.
- *Sustainability* — Provide environmental benefits, including energy efficiency, reduced greenhouse gas emissions, and water quality improvements, to meet the needs of the present without compromising the ability of future generations to meet their own needs.
- *Cost-Effectiveness* — Supply regional water in a cost effective manner and maximize outside funding.

Planning objectives for the 2015 IRP were also developed by the stakeholders. These objectives are:

- Identify key water resource supply vulnerabilities and evaluate different options that could reduce these vulnerabilities.
- Develop multiple water supply strategies to reduce future water supply imbalances.
- Evaluate strategies with different project combinations, or portfolios, to assess resiliency to climate change, including mega droughts and decadal drought impacts across future scenarios, and how the portfolios could improve regional supplies.
- Analyze portfolio results from the Water Evaluation and Planning (WEAP) model simulations to identify key tradeoffs among the portfolios.
- Develop a long-term grant application strategy for priority water resources projects.

PLANNING PROCESS

Phase 1 of the IRP was developed in three parts. The primary objective of Part I was to identity the water resource needs. Needs were developed based on an inventory of current and projected water supplies and demands. In Part 2, the IRP Technical Work Group discussed and developed regional water supply strategies that were then tested through modeling runs completed in Part 3. Individual Stages completed under each part are illustrated in Figure 1-2.

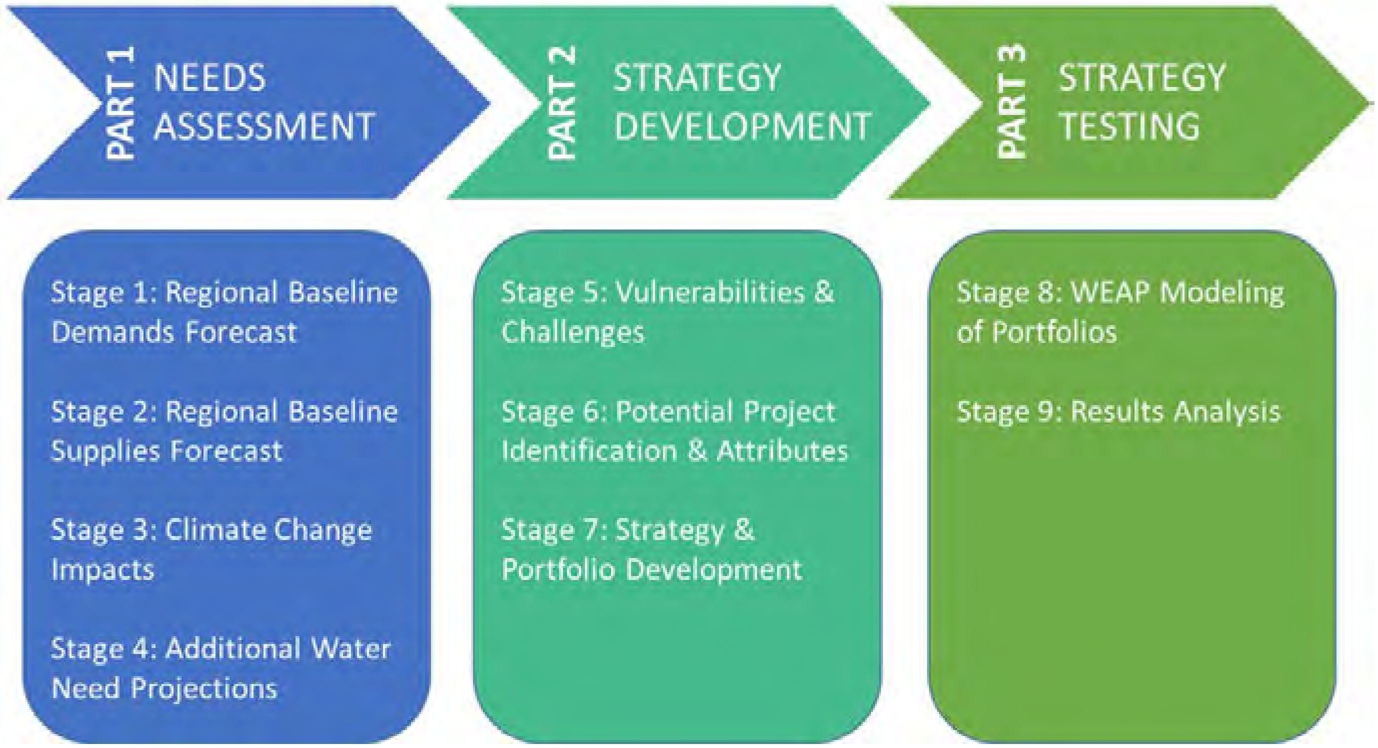
Part 1: Needs Assessment

Stage 1 - Regional Demand Forecast. Water demands for the region were projected from 2015 to 2040 using an econometric model that incorporated factors for economic conditions, growth, water efficiency, housing density, and conservation program investments approved in the FY15/16 Capital Improvement Program. Projected demands were displayed as a range to reflect trend uncertainties. The regional demand forecast is further described in Section 2 of the IRP. A complete technical description of the demand projection modeling by A&N Technical Services for this project is contained in Appendix 1.

Stage 2 - Regional Baseline Supply Forecast. Existing water resources utilized by the region were identified and analyzed to determine trends in water availability and usage through 2040. Water supplies from projects approved in the FY15/16 Ten Year Capital Improvement Program were included in this assessment. Together, these existing and new water supplies are defined as the baseline supplies through 2040.

Stage 3 - Climate Change Impacts. IEUA worked with the RAND Corporation to develop a water demand and supply model to evaluate the impact of climate change

Figure 1-2: IRP Phase 1 Planning Process Diagram



on the IEUA service area. The model, used as a baseline, tabular estimates of IEUA's supplies and demands. A set of 106 climate scenarios for the IEUA region were derived from downscaled general circulation model results used for the Intergovernmental Panel on Climate Change Assessment Reports 3 & 5. These data suggest that regional temperatures would likely increase between 0.5-3.5°F by 2040. Precipitation was highly variable and showed no clear trend across the ensemble of scenarios.

The climate scenarios and baseline water demands and supplies were then entered into a water management model developed in the Water Evaluation and Planning (WEAP) modeling system. The WEAP model used these inputs to estimate how water demands, supplies, runoff, flows, and storage would change under the 106 climate scenarios. This approach highlighted supplies that provided greater reliability and were resilient to climate change impacts. The WEAP model results are summarized in Section 3 of the IRP. A technical description of the modeling and climate assessment is presented in Appendix 3.

Stage 4 - Additional Water Need Projections. Based on the results from Stage 3, the IRP Technical Work Group evaluated the results of the climate modeling to identify the potential water supply shortfalls that the region would need to address to meet future demands. These potential shortfalls were used to develop regional water resources strategies and portfolios during Stage 7.

Part 2: Regional Strategy Development

Stage 5 - Vulnerabilities & Challenges. Key water resources vulnerabilities and challenges facing the region were identified and prioritized by the IRP Technical Work Group. Vulnerabilities and challenges for the region include:

- *Groundwater & Stormwater* — maintaining operational safe yield (OSY); preventing land subsidence; maintaining water quality; and preventing loss of natural infiltration
- *Recycled Water* — addressing increased total dissolved solids (TDS) as a result of indoor water use efficiency programs; regional interest in recycled water exceeding local supplies; competing uses of

existing supplies for direct use and for groundwater recharge; and energy intensity of additional treatment levels for direct potable.

- *Imported Water—* potential for catastrophic interruption; dependence on the MWD Rialto feeder pipeline; and constraints on supplies due to State Water Project (SWP) availability and Colorado River Basin over allocation and drought.
- *Other—* need for infrastructure redundancy; variability of surface water supplies; impact of new energy and water use efficiency standards; increasing salinity in source water; and avoiding stranded assets.

Stage 6 - Potential Project Identification and Attributes. A comprehensive list of potential water supply projects was developed based on previous and parallel planning efforts, including the Recycled Water Program Strategy, Wastewater Facilities Master Plan Update, 2013 Recharge Master Plan Update, Water Use Efficiency Business Plan (WUEBP), FY15/16 Ten Year Capital Improvement Plan (TYCIP), Santa Ana River Conservation and Conjunctive Use Program (SARCCUP), drought project list, and conceptual projects identified during the IRP process.

Individual projects were grouped into larger project categories. In some cases, categories were divided into multiple tiers which allowed the IRP Technical Work Group to either phase in similar projects over time or accelerate implementation by selected multiple tiers. Individual projects were also tagged according to their ability to address challenges and constraints facing the region.

Stage 7 - Strategy and Portfolio Development. Drawing upon information from Stages 3 and 4, the IRP Technical Work Group developed five water supply strategies to understand how combinations of projects could meet future water needs and address the challenges and constraints facing the region. A decision support tool, developed by the RAND Corporation and described in Appendix 3, supported this process. The five water supply strategies are:

- *Strategy 1:* Maximize Chino Basin groundwater, including prior stored groundwater
- *Strategy 2:* Recycled water program expansion
- *Strategy 3:* Recycled water & conservation program expansions
- *Strategy 4:* Maximize supplemental water supplies and recycled water supplies
- *Strategy 5:* Maximize imported water supplies with moderate conservation

A total of eight project portfolios were developed to test the five strategies under the WEAP model. Strategies and results are fully described in Section 4 of the IRP.

Part 3: Strategy Testing

Stage 8 - WEAP Modeling of Portfolios. Each portfolio was run through the WEAP model against the 106 climate scenarios. For comparison, a baseline portfolio that was limited to the baseline supplies identified in Stage 2, was also run through the WEAP model. WEAP model results were evaluated both in terms of the portfolio's ability to meet projected demands and whether surplus supplies were stored or used over time. Results are fully described in Section 4 of the IRP.

Stage 9 - Results Analysis. Portfolio performances were compared to the baseline portfolio results in order to determine the affect of the each portfolio on water supplies. Since there were 106 results per portfolio from the climate runs, it was beyond the scope of Phase 1 of the IRP to evaluate the nuances of the individual climate runs. Instead, the range of results that fell within 75% of the model runs were analyzed. The 75% criteria was chosen to eliminate outlier results which could have large cost implications.

Regional recommendations were developed based on: (a) the ability of a strategy to meet future demands and develop a surplus supply buffer and (b) input from the IRP Technical Work Group on the strategies that best met regional interests. Conclusions are discussed in Section 5 of the IRP. These recommendations will be used to target future grant applications. The development of future water resources projects will be done during Phase 2 of the IRP.

2. Water Demand Forecast

Introduction to Water Demands

Water Demand Setting

Methodology

Urban M&I Demand Projection Variables

Urban M&I Demand Forecast

Additional Water Needs Forecast

Total Regional Demand Forecast

View of single family residential homes in Chino Hills

II. Water Demand Forecast

INTRODUCTION TO WATER DEMANDS

Section 2 outlines the process used to identify water demands for the region through 2040. These water demands include urban, environmental, and regulatory needs. Urban demands, also known as retail municipal and industrial (M&I) demands, represent the full spectrum of urban water use within the service area including commercial, institutional, industrial uses, and residential service for approximately 844,000 people. In addition to urban demands, regional water demands also include environmental discharge obligations to the Santa Ana River and contractual water commitments.

WATER DEMAND SETTING

Since the 1990s, approximately 90% of the region's water demands have come from urban M&I users with the remaining 10% coming from agricultural users (source: 2010 IEUA UWMP). Overall urban water demand since 1995 has increased by approximately 20%, despite a regional growth of 30% (approximately 200,000 more residents). This is indicative of new water use behaviors, such as efficient irrigation and more efficient indoor fixtures, which prolong the availability of current regional water supplies into the future. The 2010 UWMP estimated total urban demand by the year 2015 to be approximately 272,000 acre-feet per year (AFY). However, actual demands have grown more slowly, increasing by only 3,000 acre-feet (AF) over the past four years from approximately 197,000 AFY in FY2010/11 to 200,000 AFY in FY2014/15 as shown in Figure 2-1. This is due in part to delayed growth as a result of the economic recession, as well as changes in plumbing code, implementation of water use efficiency programs, and responses to current water supply challenges such as the drought that California has been experiencing since 2012.

The impact of plumbing code changes and the implementation of water use efficiency programs was quantified in the recent 2015 WFMP flow monitoring. IEUA monitoring of new versus older residential developments showed that urban usage patterns have decreased from a regional indoor flow average of 55 gallons per capita per day (GPCD) down to 37 GPCD in new developments. This is consistent with new development trends throughout California (Codes and Standards Research Report: California's Residential Indoor Water Use. May 2015). This indicates that future developments will require less water, reducing the overall regional need for additional water supplies. This shift has significant implications for future wastewater and recycled water planning. Regional treatment plants may not need to be expanded for hydraulic capacity as quickly as previously thought (potentially saving regional capital); however, treatment plants will have to be expanded for treatment capacity for wastewater strength (because there will be greater concentrations of solids and TDS), and future available recycled water supplies may be lower than projected.

Outdoor water use provides the largest potential for improved water efficiency and additional water savings in the region. As part of the IRP, A&N Technical Services conducted a study to estimate the amount of indoor and outdoor water use in the region. The study, which used data from the City of Ontario, found that outdoor irrigation accounts for approximately 60% of total urban demand. (Refer to Appendix 3 for the full technical memo.)

METHODOLOGY

This IRP uses an econometric model to forecast urban water demands. This water demand model incorporates various influences which impact urban water demand such as population, employment, economics, weather, and conservation activities.

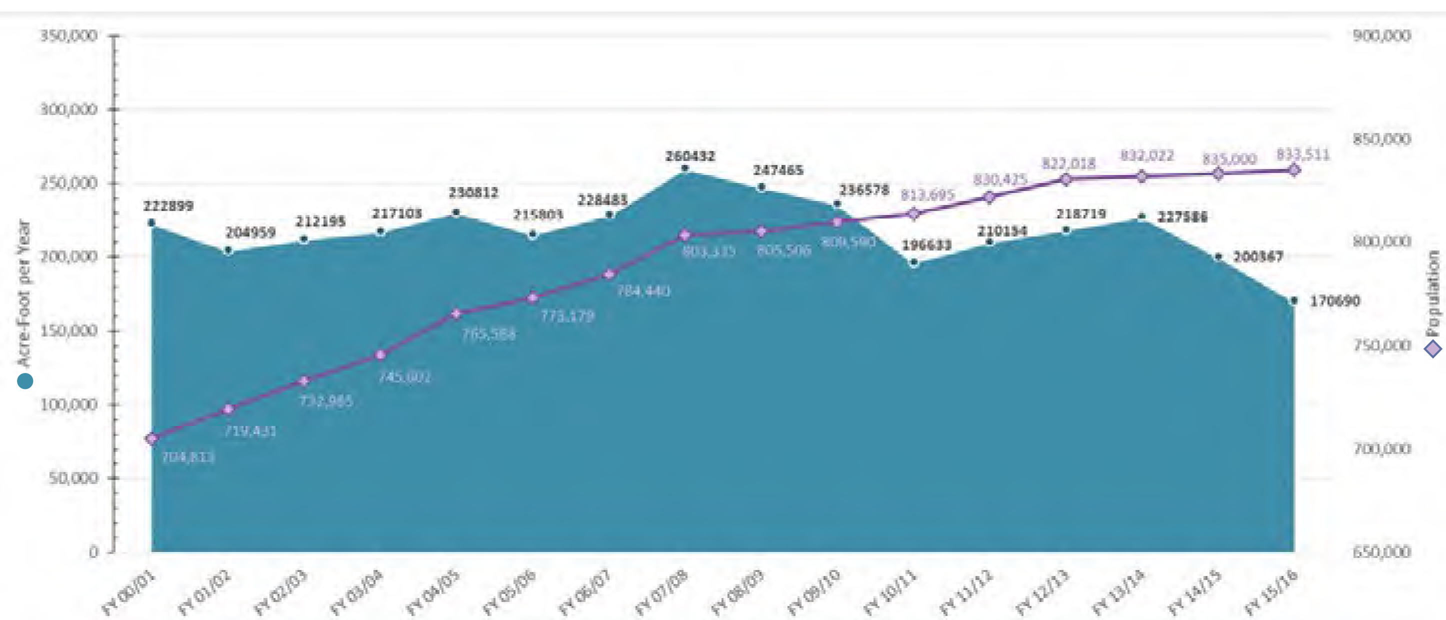
The IRP water demand model was developed by:

- Acquiring the latest regional demographic forecasts from the Southern California Association of Government "2012 Regional Transportation Plan".
- Inputting the demographic data into the econometric model equations to generate a base demand forecast.
- Calibrating the base demand forecast to identify corresponding water demand influences caused by factors including weather, employment, and economic cycles. For this IRP, a total of 12 factors were identified.
- Inputting the latest version of the Alliance for Water Efficiency (AWE) tracking tool for water savings that result from building codes and appliance standards (passive conservation) as well as regional programs that promote conservation (active conservation). Water savings are subtracted from water demand forecasts to ensure that water conservation is incorporated into the projections.
- Developing multiple water demand scenarios to plan for a range of possible futures.

URBAN M&I DEMAND PROJECTION FACTORS

To forecast urban M&I water demand through 2040, past and present urban water uses were assessed. This included an evaluation to determine which factors or influences impact demands and the corresponding

Figure 2-1: Regional Annual Water Use



Note: Annual water use includes imported water, surface water, groundwater, recycled and desalter production. FY 15/16 usage is projected based on 25% reduction from FY13/14 magnitude of their effect. A total of twelve water demand factors were identified along with their corresponding influence on water demand. Factors that influenced regional water demand were as follows:

1. Household size — single family residential (SFR), multi-family residential (MFR)
2. Land development and community density
3. Median household income
4. Customer response and water use behavior
5. Marginal water price
6. Active and passive conservation
7. Weather and climate change
8. Economic cycle
9. Short-term weather
10. Residential community mix of SFR and MFR
11. Weather and climate change
12. Conservation activities (demand management and water use efficiency)

Of the twelve factors, four were found to have a significant impact on regional urban M&I water demands and are described below. The remaining factors are described in Appendix 4. The four main factors were:

- ***Land Development and Community Density:*** regional development trends show that per capita water usage decreases with the shift towards higher density developments featuring smaller landscape areas.
- ***Weather and Climate Change:*** water use increases under hotter and drier conditions.
- ***Customer Response and Water Use Behavior:*** public increases conservation in response to statewide calls for conservation and permanent water use reductions.
- ***Economic Cycle:*** market conditions impact water usage, with recessions reducing water use and periods of growth increasing water use.

Land Development and Community Density

In the last decade, a relatively new type of housing development has emerged with higher housing densities. This is a national as well as a regional trend. These developments feature medium to large single family homes, usually built with minimal landscaping on small lots, also known as “zero-lot-line” housing. Irrigable landscaped areas in these developments are much smaller than traditional developments in the region have been. As a result, the higher density housing caused by these type of development trends lead to lower water use per housing unit because the reduced space for landscaping requires less irrigation.

For comparison purposes and to help anticipate a range of uncertain futures, Tables 2-1 and 2-2 summarize the sources of land use data and ranges of housing density incorporated into the demand forecast model. Land use data was sourced from the General Plans of the cities in the region, the Metropolitan Water District’s (MWD) 2010 water demand model (2010 MWD_MAIN), and regional growth plans such as SCAG’s 2012-2035 RTP/ Sustainable Communities Strategy (SCS) (2012 RTP/SCS).

Land use density is the variable that will have the largest impact on future demands. Comparing the demand forecast from the cities’ General Plan data to the forecast presented in the 2010 Urban Water Management Plan (UWMP), there is a difference of at least 60,000 AF in total urban M&I demand by the year 2040.

This difference is further heightened when the UWMP urban M&I demand forecast is compared to the demands tied to higher housing density values described in recent General Plan EIR amendments throughout the region. These higher densities are also consistent with SCAG’s 2012 SCS density levels. For example, when the 2010 UWMP demands are compared to the demand associated with high density presented in Tables 2-1 and 2-2, there is a difference in total urban M&I demand in the year 2040 of approximately 105,000 AF.

Weather and Climate Change

Weather has a large impact on the amount of water that customers need. Under hotter and drier conditions, water use increases at the same time that supplies may be constrained. With climate change, this trend is likely

Table 2-1: Single Family Housing Density Variability

Data Source	Low (Units per Acre)	Average (Units per Acre)	High (Units per Acre)
General Plans	1.2	2.7	4.2
2012 RTP/SCS	2.3	3.7	5.4
2010 MWD_MAIN	3.2	3.2	3.2

Table 2-2: Multi-Family Housing Density Variability

Data Source	Low (Units per Acre)	Average (Units per Acre)	High (Units per Acre)
General Plans	9.7	13.5	17.3
2012 RTP/SCS	8.4	13.5	17.0
2010 MWD_MAIN	10.9	10.9	10.9

Table 2-3: Climate and Weather Effect on Water Demands

By Year	Increase in Temp. (F)	Effect on Water Demand	Probability
2040	3.6 degrees	+4.3%	80th percentile
Multiple Dry Years		+5.98%	Varies by climate run

to be exacerbated in the near future.

In fact, climatologists have changed the way they view drought in years past and now recognize ongoing higher temperatures and longer drought conditions may be the "new normal" for California. A study conducted by scientists at Stanford University entitled "Anthropogenic Warming Has Increased Drought Risk in California" has linked climate change with "more frequent occurrences of high temperatures and low precipitation that will lead to increased severe drought conditions" (Stanford, 2015). In addition, over the past two decades, droughts have occurred more frequently than in the previous century, with 14 droughts occurring between 1896 and 1994, and six occurring between 1995 and 2014.

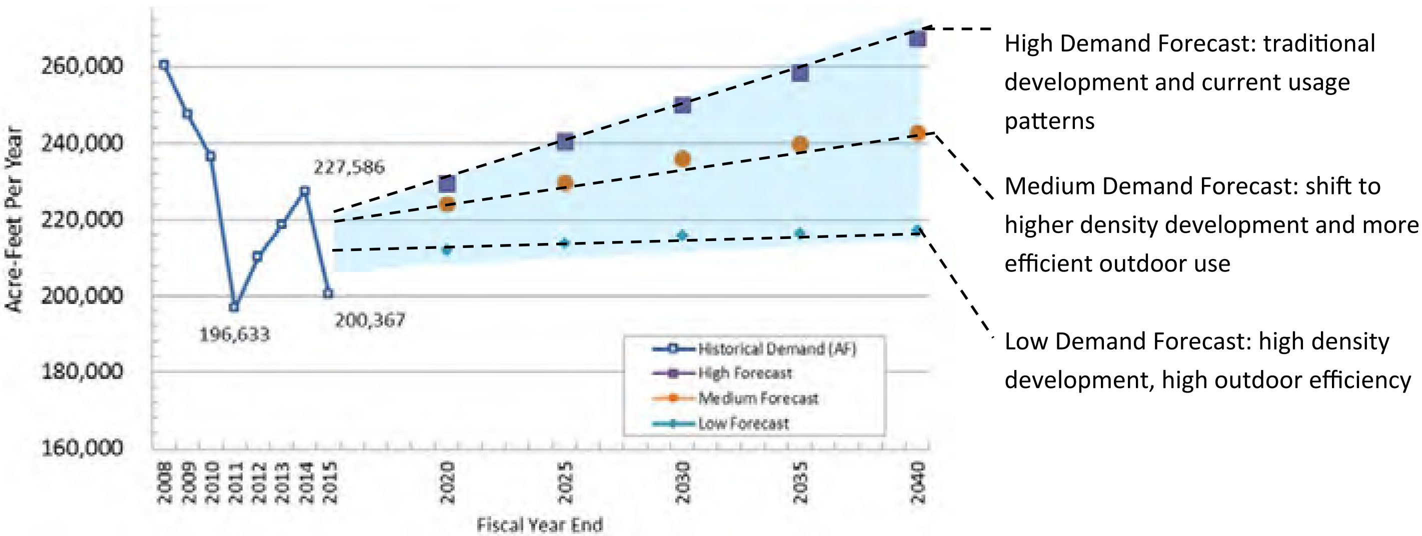
Weather-induced change in demands was accounted for in two ways. First, an adjustment was made for long term climate change based on the National Oceanic and Atmospheric Administration (NOAA) Technical Report, the National Environmental Satellite, Data, and Information Service (NESDIS) 142-5: Regional Climate Trends and Scenarios for U.S. National Climate Assessment. The report stated that increased atmospheric emissions have the potential to increase water use by as much as 4.3%.

As a result of these outlooks on future climate conditions and recent weather trends, the 2015 IRP demand forecast model includes outdoor water demand adjustments to account for climate change. IEUA performed a series of sensitivity analyses of urban outdoor demand and weather conditions. By 2040, IEUA estimates that one dry year would increase demand by 5.6%. Similarly, a one wet year would decrease outdoor demand by 5.6%. A longer period of dry weather (3-years) would increase demand by 8.9%. Separately IEUA estimates the long-term effect of warming on outdoor

Table 2-4: Urban M&I Forecast

Urban M&I Forecast	2015	2020	2040
High Forecast	225,000	230,000	267,000
Medium Demand Forecast	225,000	220,100	238,600
Low Demand Forecast	225,000	212,000	217,400

Figure 2-2: Regional Urban Water Demand Forecast



demand. It was found that for each degree temperature increase (in Celsius), outdoor demand would increase by 3%. Together these factors were applied to the climate scenarios to estimate how outdoor demand could change due to weather in the future.

Table 2-3 summarizes the climate and weather factors applied to urban outdoor demand used during WEAP modeling outlined in Section 4.

Customer Response and Water Use Behavior

Since 2012, Southern California has been challenged by drought conditions. This led to calls for voluntary and mandatory water use reductions from Governor Brown, numerous news articles about water supply conditions, and massive public outreach campaigns from water agencies across the State. Increased public awareness of water supply conditions resulted in measurable water savings across the State.

Regionally, these behavioral changes reduced urban M&I demands by 4.6% in FY14/15. Lifestyle changes in combination with the anticipated permanent state water restrictions are expected to keep demands suppressed.

For the purpose of the IRP demand forecast model, it is assumed that changes in water use behavior will continue into the future and will maintain a reduced demand by 4.6% through the year 2040.

Economic Cycle

The economy is also susceptible to change and it is likely to continue to change between strong and weak market conditions. During weak market conditions, urban M&I demands decrease by 7%; conversely, during strong market conditions, demands increase by 7%.

Although this is a significant impact, for the purpose of the 2015 IRP M&I demand forecast model it is assumed that the market conditions remain normal and so no adjustment was incorporated.

URBAN M&I DEMAND FORECAST

The IRP developed a range of demand possibilities to accommodate for future uncertainty caused by the various demand factors. To determine a range of urban demand possibilities, three water demand forecasts were created:

- *High Demand Forecast* – utilized housing densities from each city's General Plan and assumed that new development would use water consistent with current usage patterns—no change for outdoor, 55 GPCD indoor.
- *Medium Demand Forecast* — utilized 2012 SCAG RTP average housing density for occupied housing units and applied indoor and outdoor landscape efficiency standards established by Assembly Bill 1881 (also known as the Model Water Efficient Landscape Ordinance) for existing and future development. For the medium demand forecast, existing outdoor use is limited to 70% of evapotranspiration (ETo). Future outdoor use is limited to 60% ETo, and indoor water use is reduced from 55 GPCD in 2015 to 35 GPCD by 2040 for new development.
- *Low Demand Forecast* – utilized 2012 SCAG RTP high housing density and applied indoor and outdoor landscape efficiency standards established by AB 1881. For the low demand forecast, existing outdoor use is limited to 70% of ETo. Future outdoor use is limited to 60% ETo, and indoor water use is reduced from 55 GPCD in 2015 to 35 GPCD by 2040 for new development.

The range of urban water demand possibilities for the region through 2040 are shown in Table 2-4. When compared to historical demands, the region has experienced over 25,000 acre-feet (AF), or 12% reduction since FY2013/14 as shown in Figure 2-2. This is due in part to delayed growth as a result of the economic recession, but primarily from customer response from continued drought conditions and the State mandated water use restrictions. If demand continues to trend at FY2014/15 levels, the 2015 IRP demand model (which was created in 2014) will need to be updated to account for this regional shift in water use behavior. Additional technical data is provided in Appendix 1 which includes technical memorandums that detail the process used to develop the econometric water demand model.

To prepare the region for future uncertainty and to ensure sufficient water resources and adequate infrastructure capacity, the high urban water demand forecast was selected by the IRP Technical Work Group. This planning assumption was recognized to be a conservative forecast as recent residential developments within the region are currently more efficient (given that they use less water for indoors and outdoor landscaped areas) than presumed in the model.

The benefits of using this conservative forecast for the baseline demand are that it:

- Provides a sizeable water supply buffer which protects the region from future uncertainties.
- Allows conservation to be counted as a future water supply in the demand model.

Table 2-5: Additional Continuing Operational Water Needs Forecast

Additional Water Needs Forecast	2015	2020	2040
SAR Discharge Joint Obligation (Chino Basin share)	17,000	17,000	17,000
Management Zone 1 Supplemental Recharge	6,500	6,500	0
Chino Desalter Replenishment	1,145	2,290	11,035
Total Additional Demand	**24,645**	**25,790**	**28,035**

Figure 2-3: Total Regional Demand Forecast

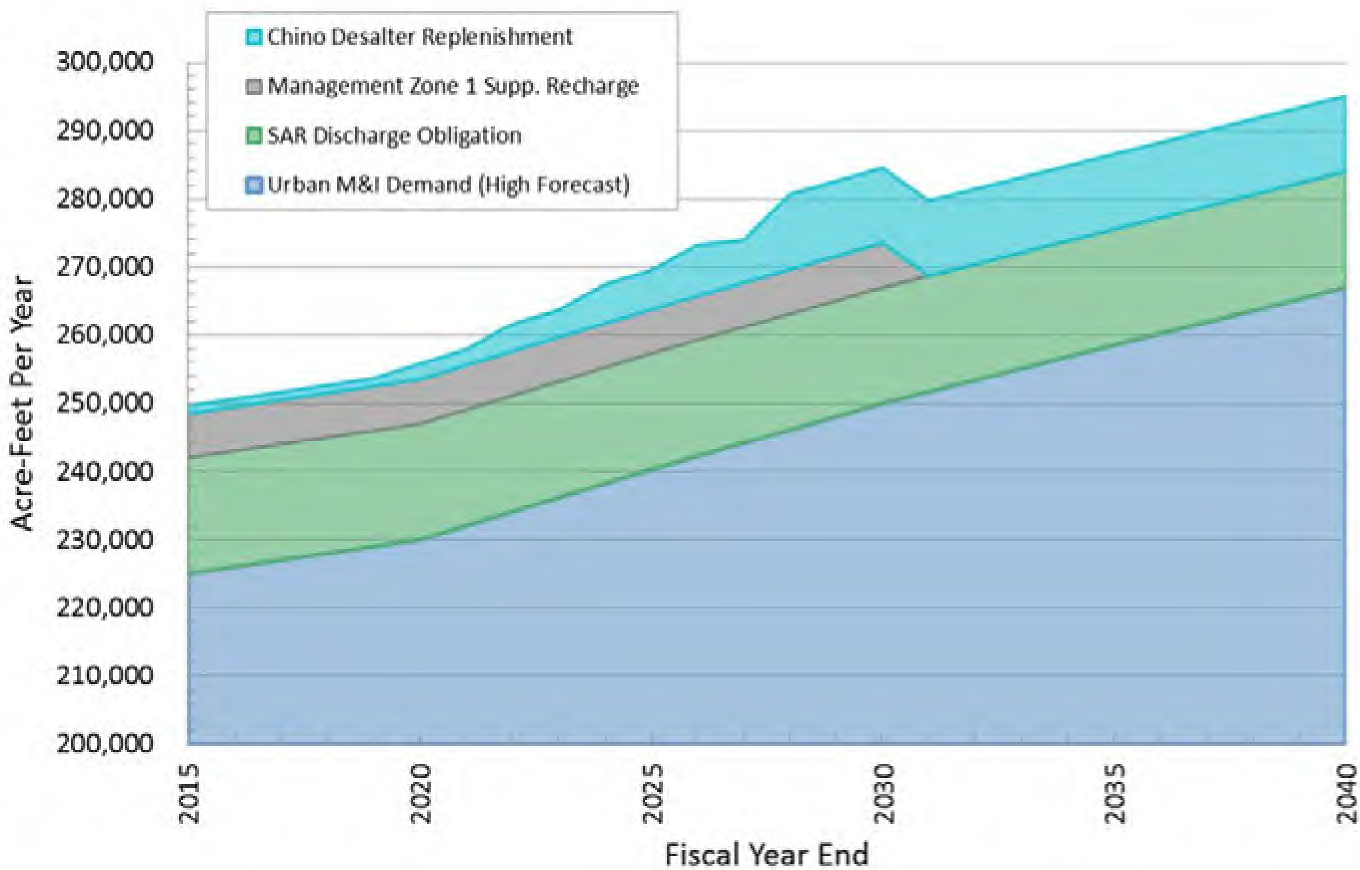


Table 2-6: Total Regional Demand Forecast

Total Regional Demand Forecast	2015	2020	2040
Urban M&I Demand (High Forecast)	225,000	230,000	267,000
Additional Continuing Operational Water Needs	24,645	25,790	28,035
Total Regional Demand	**249,645**	**255,790**	**295,035**

ADDITIONAL CONTINUING OPERATIONAL WATER NEEDS FORECAST

Current and future water demands include regional environmental and/or contractual stream flow obligations. These continuing operational water needs are not subject to the same variables as the urban M&I demands and instead are tied to standing contractual agreements and legal requirements. The water demand and supply models incorporate the following assumptions into the IRP forecasts:

- **Santa Ana River (SAR) Discharge Obligation** Santa Ana River (SAR) Discharge Obligation is a regional obligation that requires annual water discharges to the Santa Ana River above Prado dam. For the purposes of the IRP, 17,000 AFY is used as the Agency's requirement to fulfill the obligation through 2040. This is half of the 34,000 AFY minimum obligation shared with Western Municipal Water District. The region currently meets this obligation by discharging treated wastewater to the Cucamonga and Chino Creeks.

- **Management Zone 1 Supplemental Recharge** pursuant to the Peace II Agreement, Section 8.4. For the purposes of the IRP 6,500 acre-foot per year will be used to fulfill the supplemental groundwater recharge obligation within Management Zone 1. The obligation is met by Chino Basin Watermaster through recycled water recharge and/or imported water recharge.
- **Chino Desalter Replenishment** pursuant to the Peace II Agreement, Section 6.2. For the purposes of the IRP, Exhibit C dated August 16, 2015 of the safe yield reset implementation plan will be used for the groundwater replenishment obligation.

TOTAL REGIONAL DEMAND FORECAST

Regional water demands for the 2015 IRP Phase 1 are the sum of the high urban M&I demand forecast and the total additional continuing operational water needs forecast. Total water needs for the 2015 IRP are shown in Table 2-6. By 2040 it is projected that 45,400 AFY of additional supply will be needed to accommodate regional growth and other environmental and/or legally obligated stream flows.

Low water use plants, including succulents, on display at a local garden center

3. Resources Inventory

Water Resource Setting

Potential Water Resource Projects

Chino Basin Groundwater

Stormwater

Recycled Water

Chino Basin Desalter

Local Surface Water

Non-Chino Groundwater

Imported Water

Conservation

A bio-swale slowly infiltrates stormwater runoff after a winter rain event in the City of Chino.

Resources Inventory

WATER RESOURCE SETTING

The region relies on imported and recycled water supplies provided by IEUA in addition to groundwater from both the Chino and non-Chino basins and local surface water from various creeks flowing through the service area which originate in the San Gabriel Mountains. As a response to the series of droughts that have impacted Southern California over the past 100 years, including the current drought that has lasted since 2012, the region has developed a sophisticated network of water supply facilities.

Climate change is one of the key factors that will have a substantial impact on water supplies. While recent droughts in California have been significant, climate change trends indicate a future of unprecedented “megadroughts” that have the potential to last multiple decades (Science Advances, 2015). To analyze the impact of potential climate change, RAND Corporation (a nonprofit research organization) evaluated IEUA’s supply and demand balance under 106 climate scenarios that were selected from the IPCC Assessment Reports 3 & 5. Climate simulations were downscaled for the region and indicated that temperatures in the region would increase between 0.5-3.5°F. Indications for changes in precipitation varied greatly and had no clear trend.

Baseline water resource supplies were stress-tested across the 106 climate simulations to determine supply availability from 2015 to 2040 in order to establish annual expected resources. The simulations included water demand and supply inputs and calculated how demands, supplies, runoff, flows, and storage would function under each climate scenario. The individual sections of this section provide the results which illustrate the impact of climate change on future water supply. For a complete technical description of the climate simulation work by RAND, see Appendix 2.

This Resources Inventory section provides an overview of the water supplies that the region relies upon:

- Chino Basin Groundwater
- Stormwater
- Recycled Water
- Chino Basin Desalter
- Local Surface Water
- Non-Chino Basin Groundwater
- Imported Water
- Water Use Efficiency

Each supply section includes an overview of current supply use, management, and prioritization; baseline assumptions through 2040; supply challenges that may impact the future availability; additional potential water resource projects by supply type; and water management implications for the region.

POTENTIAL WATER RESOURCE PROJECTS

Future water resource projects were identified through the IRP Technical Work Group discussions. These projects are listed by category of supply. Many of these proposed projects were culled from existing planning documents, such as the Recharge Master Plan Update (RMPU) and the Recycled Water Program Strategy. The list includes conceptual projects as well as those that have been under development but have not yet been included in adopted regional Ten Year Capitol Improvement Plans (TYCIP). For the full project list compiled by the IRP Technical Work Group, see Appendix 2.

The proposed projects include capacity building and reliability investments, as well new sources of supply. Due to technical constraints, the Phase I RAND climate simulations focused on the water supply benefits of these projects and to what extent they meet water demands. This information was used to identify opportunities and build portfolio scenarios where new supplies were added to the baseline annual supplies to assess water supply resilience in 2040. These scenarios are described in Section 4.

California Buckwheat growing near San Antonio Dam

CHINO BASIN GROUNDWATER

Resource Overview

The Chino Basin is one of the largest groundwater basins in Southern California containing approximately 5,000,000 AF of water with an unused storage capacity of approximately 1,000,000 AF (source: CBWM website). Groundwater from the Chino Basin accounts for approximately 40% of regional water supplies.

San Bernardino County Superior Court created the Chino Basin Watermaster (CBWM) in 1978 as a solution to lawsuits over water rights. CBWM is responsible for management of the Chino Basin in accordance with the 1989 Judgement, 2000 Peace Agreement, 2007 Peace II Agreement, and the Chino Basin Optimum Basin Management Program (OBMP).

Water rights in the Chino Basin are held by representatives to three stakeholder groups, called Pools. The three Pools are:

- **Overlying Agricultural Pool**: representing dairymen, farmers, and the State of California
- **Overlying Non-Agricultural Pool**: representing area industries
- **Appropriative Pool**: representing local cities, public water districts, and private water companies

Although groundwater is an important local supply, the water quality in the lower Chino Basin area has been impacted by historical agricultural uses and now has high levels of nitrate and total dissolved solids (TDS). There are also some areas that exceed standards for perchlorate and volatile organic chemicals (VOCs). This lower quality water requires additional treatment, and/or blending with higher quality imported water. The Chino Basin Watermaster works in partnership with municipalities, IEUA, and the Santa Ana Regional Water Quality Control Board to address these water quality problems, including construction and operation of the Chino Basin Desalters.

The Chino Basin is subdivided into five groundwater zones, referred to as management zones. Each management zone has unique groundwater management issues. Management zones 1, 2, and 3 comprise the Chino North Management Zone. Management Zones 4 and 5 are outside of the IEUA service area. Throughout these management zones, there are 19 active spreading basins that are operated to capture stormwater, recycled water, and/or imported water for recharge into the Chino Basin.

Baseline Supply

The court judgment allocates groundwater rights by establishing an annual pumping "safe yield" for each Pool. The Operating Safe Yield (OSY) is the annual amount of groundwater that can be pumped from the basin by the Pool parties free of replenishment obligations. For planning purposes, controlled overdraft for the Appropriative Pool was not included in the IRP. Annual groundwater production in excess of the OSY is allowed by the adjudication, provided that the pumped water is replaced and recharged back into the groundwater basin.

The baseline amount for groundwater production between 2015 and 2020 is assumed to be 90,550 AFY, based on historical production of the appropriative pool parties within the IEUA service area. This amount of groundwater pumping includes recharge from natural rainfall, stormwater capture, and recharge. It does not include recharge from recycled water.

Baseline groundwater production between 2020 and 2040 is assumed to be 91,300 AFY, which is the Agencies' share of the forecasted OSY for this period and increased stormwater (SW) recharge from the Chino Basin Facilities Improvement Project. The Baseline does not include stormwater recharge from the proposed 2013 RMPU projects or recharged recycled water.

Climate

Chino Basin groundwater is dependent on rainfall and supplemental sources for recharge. Groundwater supply is impacted by climate change given that warmer temperatures and droughts increase the dryness of soil which results in less absorption when precipitation occurs and with predicted more intense periods of rainfall, water runoff will increase instead of percolating into the soil. Simulations by Wildermuth Environment Inc. showed that natural groundwater recharge (GWR) would decrease by 0.44% for each 1% decline in long-term precipitation. Groundwater supply is also impacted by development patterns (increased hardscaping) and

Table 3-1: Chino Basin Groundwater Supplies & Projects

Baseline Chino Groundwater			
Project Name	**Description**		**AF**
Baseline Chino Basin Groundwater -2015 – 2020	Baseline groundwater production through 2020 is assumed to be 90,550 AFY, based on historical groundwater production by the Agencies from 2009-2014. Includes replenishment from natural rainfall, SW capture, and recharge.		90,550
Baseline Chino Basin Groundwater	Baseline groundwater production from 2020 through 2040 is assumed to be 91,300 AFY: Includes Agencies' share of OSY (71.9%) of 127,000 AFY. Does not include SW from the 2013 CBWM RMPU or recycled water recharge as these are accounted for separately and in addition to the baseline Chino groundwater.		91,300

Chino Basin Groundwater Projects			
Project Name	**Description**	**ID**	**AF**
Groundwater Treatment (Rehab)-Increment 1, 2	This project category will rehabilitate existing groundwater production wells decommissioned due to water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over OSY). Increased well operation could supplement annual demands or help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production. Increment 1 & 2 will provide up to 10,000 AF.	1	5,000
		2	5,000
Groundwater Treatment (new)-Increment 1, 2	This project category will construct a new groundwater production well and treatment facility to address water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over OSY). Increased well operation could supplement annual demands or help offset losses in another water supply. Each increment will provide 5,000 AF. If all increments are selected, there is a potential of up to 10,000 AFY of production.	3	5,000
		4	5,000
Production Wells-Increment 1, 2, 3, 4	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over OSY). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Each increment will provide 5,000 AF. If all increments are selected, there is a potential of up to 20,000 AFY of production.	5	5,000
		6	5,000
		7	5,000
		8	5,000
Desalter Recovery Improvement	The existing Chino Basin I Desalter (CD-1) recovers approximately 75 percent of water. Improvements could be done to increase recovery to approximately 90 percent. This water would be conveyed through the existing potable water system.	18	1,500
Six Basin Water Transfer	This project would explore the idea of developing a water transfer agreement with Six Basins. One concept is to purchase imported water for recharge into Six Basins and get in return equal volume of groundwater underflow plus agreed amount of stormwater. For example, 10,000 AF of imported water could be purchased in exchange for 10,000 AF of groundwater plus 7,000 AF of stormwater. Assume benefit 1 in 5 years.	38	17,000
Cucamonga Basin Improvements	This project category will identify projects that would result in additional groundwater production benefits coming into the IEUA service area from the Cucamonga Basin. Includes recharge facilities, treatment and production facilities to maximize supply coming into the Chino Basin.	62	2,500
Prior Stored Chino Groundwater	This category will allow supply to be taken from groundwater stored in the Chino Basin, pre 2014. It is estimated that approximately 400,000 AF of stored groundwater is available, of which 280,000 AF is made available for Agencies. This supply category will be managed on a case by case basis as selected into the Regional supply portfolios. The supply will be limited, but can be used annually or intermittent as needed.	87	8,400
Watershed Wide Water Transfers	This category of projects will construct or arrange other water transfers external to the Chino Basin. For example, dry weather flow exchange of recycled water to Orange County Water District for an equivalent amount of purchased imported water. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability and/or quality. To occur annually or intermittent. Resiliency and flexibility benefit only.	98	5,000
Chino Basin Water Transfers	This category of projects will construct or arrange other water transfers within the Chino Basin. Projects to also include inter-agency interties for increased reliability. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability. To occur annually or intermittent.	99	5,000
Reliability Production Wells	This project category will construct new production wells needed to replace lost production or under-performing facilities. These projects will maintain current annual groundwater production deliveries and are intended to increase operational flexibility and reliability. Increment 1 varies in capacity and will be determined on a case by case basis as selected into each of the regional supply portfolios.	100	5,000

more efficient irrigation practices.

A key conclusion drawn from the simulations is that it is important to secure supplemental water when available to recharge the Chino Basin (through direct or in lieu practices) to enable sustained or allow increased groundwater production during droughts and emergencies.

Supply Challenges
Supply challenges facing the Chino Groundwater Basin include the need to address:

- Sustainability or increased OSY for the Chino Basin.
- Loss of natural infiltration caused by higher density development, reduced outdoor landscaping, and irrigation efficiency measures.
- Targeting of groundwater recharge or limiting localized groundwater production in specific areas to help mitigate and/or prevent land subsidence.
- Recognition that different management practices may be required for groundwater recharge in each of the five management zones.
- Identification of additional supply sources for groundwater recharge to help meet Chino Basin recharge goals.
- Slowly rising levels total dissolved solids and nitrate levels in groundwater basin and corresponding potential future loss of available supply caused by this long term trend.
- Consideration of possible additional treatment infrastructure for groundwater.
- Containment of existing groundwater contamination plumes.

Supply Opportunities
The IRP process identified the potential projects listed in Table 3-1. Potential projects range from conceptual to well-developed proposals. Each project has the ability to increase the amount of supply available for groundwater recharge and/or increased groundwater production.

Implications
Groundwater stored in the Chino basin increases regional water supply reliability and resilience with minimal impacts from climate. It is important that the region account for diminished natural recharge resulting from climate and/or development impacts and take action to minimize these losses and to secure replacement sources. Otherwise future groundwater production will exceed sustainable levels. In addition, water quality is a key future constraint on groundwater production. The region will need to evaluate water quality improvement actions including the identification of potential blending water sources for recharge to attain long term salinity management and reliability goals.

Key implications for the Chino Basin groundwater supplies:

- Are not impacted by climate once water is stored in the groundwater basin.
- Are slightly impacted by receiving reduced natural recharge within the basin resulting from climate and/or development impacts.
- Can be sustained or increased through use of supplemental water for groundwater recharge (through in lieu or direct recharge) when these resources are available.
- Are a vital local emergency resource to help mitigate abnormal or catastrophic events through additional groundwater production.
- Are a climate flexible supply that can be tapped to offset either short- or long-term water supply needs.
- Provide a means for sustainable regional water management by enabling exchanges and transfers among agencies within the watershed.
- Are generated locally and are the region’s least energy intensive water supply and have minimal greenhouse gas emissions relative to imported water.
- Are cost effective relative to imported water supplies.
- Are critical to improving the region’s water self-reliance and reducing dependence on climate variable supplies such as imported water.

STORMWATER

Resource Overview

Stormwater is water that originates during rainfall and snow melt. In the region, stormwater comes primarily from surface water runoff from rain and snow starting in the San Gabriel Mountains and moving down through the Santa Ana watershed. In undeveloped areas, the soil absorbs some of the runoff and helps replenish the groundwater basin. However, developed areas with a significant amount of hardscape tend to concentrate and accumulate stormwater runoff in large quantities in a relatively short amount of time. Stormwater also runs off roofs, through streets, and into stormdrains, where these flows are largely diverted into the region's flood control channels.

The Chino Basin has 6 main flood control channels spread throughout the region. These channels collect and manage the stormwater generated within the watershed. Major flood control channels that convey stormwater within IEUA's service area include:

- San Sevaine Creek
- Day Creek
- Deer Creek
- Cucamonga and West Cucamonga Creek
- San Antonio Creek

Located on and adjacent to the channels are detention basins that are operated under a multiple-use agreement for both flood control and groundwater recharge operations. IEUA, Chino Basin Watermaster, and other agencies work closely with the San Bernardino Flood Control District to maximize the amount of stormwater that can be captured and recharged into the Chino groundwater basin. These channels also carry dry weather runoff from excessive outdoor irrigation.

Runoff that is not captured by these detention basins ultimately flows to the Santa Ana River. While there are efforts by agencies further downstream to capture these storm flows, large amounts of water can discharge to the ocean during large storm events.

Baseline Supply

The baseline amount of water that is available for stormwater recharge from existing projects is already included in the groundwater supply, described under the Chino Basin Groundwater resource sub-section. To ensure there is no double-counting in the IRP simulations, this part of the supply is not counted in the stormwater baseline.

The stormwater supply projection through 2040 includes additional water captured as the result of the construction of projects listed in the 2013. As a result, the baseline stormwater supply assumed to be available between 2020 and 2040 is 6,400 AFY as in the 2013 RMPU.

Climate

Stormwater supplies may also be impacted by temperature. Warmer temperatures cause soils to dry out through evaporation. This can lead to two competing effects. Because it is more difficult for water to penetrate dry soil, water runoff could increase. However, once the water is in the soil column, the ground retains this moisture until the soil is saturated which helps to replenish groundwater supplies. This outcome is also consistent with other larger basin studies performed by the Bureau of Reclamation and the Colorado River District. During dry conditions, IEUA has documented reductions in the expected amount of runoff from rain events into the groundwater recharge basins.

In absence of more detailed information on how future stormwater would vary with respect to precipitation, a regression formula was applied to develop baseline supplies as well as any additional supply that was selected as part of a water management strategy (see Section 4). Based on the results of the climate simulations, the 6,410 AFY baseline stormwater supply could vary from 2015 and 2020 between 900 AFY to 7,400 AFY.

Supply Challenges

Supply challenges facing stormwater supplies include the need to address:

- Dependence of these supplies on annual rainfall and snow melt.

Table 3-2: Stormwater Supplies & Projects

Stormwater Baseline		
Project Name	**Description**	**AF**
Baseline Stormwater 2015-2020	0 AF through 2020: Estimated completion of 2013 RMPU is 2020, therefore no new stormwater supply will be available until after 2020.	0
Baseline Stormwater 2021-2040	6,410 AFY for 2020 thru 2040: New stormwater supply generated from additional stormwater recharge from the recommended projects included in the 2013 CBWM RMPU.	6,400

Stormwater Projects			
Project Name	**Description**	**ID**	**AF**
Day Creek SW Capture	Modify existing basins along Day Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept of approximately 2,500 AF. Assume benefit 1 in 5 years.	54	2,500
San Sevaine Creek SW Capture	Modify existing basins along San Sevaine Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept of approximately 2,500 AF. Assume benefit 1 in 5 years.	55	2500
Regional LID-Increments 1, 2	Construct or modify urban development to better manage and infiltrate rainfall at the source. Projects could include bioswales and or pervious concrete installation in parking lots, street drainages. Each increment could provide up to 5,000 AFY of recharge for a total of up to 10,000 AFY recharge.	58 59	5000 5000

- Supply variability such as storm frequency, intensity, seasonality of rainfall events which are exacerbated by climate change.
- Reductions in natural infiltration into the groundwater basin caused by channelization, new development, hardscape, increased outdoor water efficiency, and open space conversion.
- Construction of additional stormwater recharge facilities in a highly urbanized area where available land may not be available or not available in the right places to capture and recharge significant volumes of water.
- Compliance with Municipal Separate Storm Sewer System (MS4) Permit low impact development (LID) stormwater retention/recharge requirements for new and existing development and quantification of corresponding water supply benefits.

Supply Opportunities

The IRP process utilized the list of potential stormwater projects shown in Table 3-2. Potential projects range from conceptual to well-developed proposals. Each project has the ability to increase the amount of supply available from stormwater by improving diversions to existing basins, constructing new basins and pumping facilities, and through on-site MS4 low impact development improvements.

Implications

Stormwater is an extremely valuable resource to the region because it is considered a "free" once the necessary facilities to capture and use this water have been constructed and maintained. It is also a high quality water source that can improves the quality of the groundwater supplies once it has infiltrated and become blended within the aquifer. Stormwater has and will likely continue to be an important element of the region's water resources as it can be stored and subsequently used. To capture large storm events additional infrastructure should be constructed. In addition, to help offset lost infiltration from increased urbanization and more efficient outdoor landscaping, increasing regional investment in MS4-compliant low impact development projects will be necessary.

Key implications for stormwater supplies:

- Are generated locally, are the least energy intensive water supply and have minimal greenhouse gas emissions relative to imported water.
- Are cost effective relative to imported water supplies.
- Are highly dependent on weather and impacted by climate.
- Will be significantly reduced during droughts when below average precipitation and drier conditions

exist.

- Require well-designed facilities that can operate under a wide range of flows.
- Are a high quality water supply and provide a supplemental source of water to blend with and improve groundwater quality.

RECYCLED WATER

Resource Overview

IEUA owns and operates four water reclamation plants: Regional Plant No. 1 (RP-1), Regional Plant No. 2 (RP-2), Regional Plant No. 4 (RP-4), Regional Plant No. 5 (RP-5), and the Carbon Canyon Water Reclamation Facility (CCWRF). These facilities provide tertiary-treated wastewater, also known as recycled water. Recycled water supplies can be used for direct non-potable uses, groundwater recharge for the Chino Basin, and for other regional discharge obligations.

Recharge of recycled water is allowed by the Regional Water Quality Control Board (RWQCB) through the OBMP, and currently provides approximately 17% of the region's urban water supply. The region secured a number of permits allowing for the direct use and groundwater recharge of recycled water. These permits define requirements for the use of recycled water (both direct use and recharge), including, but not limited to, uses, water quality limits, and monitoring requirements.

The recycled water program makes up approximately 15% of the regional water portfolio and is operated based on the following order of priorities for recycled water supply:

- Regional discharge obligations (Santa Ana River Judgement, environmental, etc.)
- Agency direct use demands
- Regional groundwater recharge

Although recycled water is an important component of the groundwater recharge program, not all of the recharge basins are able to use recycled water. Currently, 10 of the region's 16 groundwater recharge basins are permitted to receive recycled water.

During FY2014-15, the 4 regional water reclamation plants produced approximately 62,000 AF of recycled water. Based on recent wastewater projections that were calculated as part of the Wastewater Facilities Master Plan (WFMP), treated flows are expected to increase to over 85,000 AFY by 2040 as shown in Table 3-4. It is important to note that these flow estimates were based on current existing indoor water usage levels in order to ensure that facilities and pipelines are adequately sized, and are consistent with the IRP's upper demand forecast (see Section 2). However, indoor water use efficiency is increasing and new plumbing code and appliance standards are being implemented. As a result, available wastewater flows by 2040 are expected to be lower than 80,000 AFY. These water flow trends are being carefully tracked by IEUA.

Baseline Supply

As part of the 2015 Recycled Water Program Strategy (RWPS), regional direct use demand forecasts were developed. Direct use for recycled water is defined in the RWPS as the amount of water needed for landscaping, agricultural, and industrial processes. The forecasts indicate that by 2025 direct use demands will increase by 5,000 AFY. The projects required to achieve the direct use demand forecast by 2025 are included in IEUA's FY2015-16 Ten Year Capital Improvement Plan (TYCIP).

The TYCIP includes recycled water projects that will allow the region to increase both direct use and groundwater recharge deliveries. These projects will provide 30,640 AFY of direct use (including approximately 1,700 AF agriculture use) and 18,700 AFY of groundwater recharge supply by 2025. Because the TYCIP includes recycled water projects with prior commitments from the region, the corresponding amount of recycled water supply from those projects is considered baseline recycled water supply for the IRP.

In summary, the baseline recycled water supply for direct use demands is assumed to be:

- Near Term (2015 to 2020) = 25,000 AFY by 2020
- Mid Term (2020 to 2030) = 28,960 AFY by 2025
- Long Term (2030 to 2040) = 28,960 AFY by 2025

Recycled water deliveries for groundwater recharge were also updated as part of the 2015 RWPS. Similar to

Table 3-3: Wastewater Projection

	2015	2020	2030	2040
Regional Recycled Water Supply	63,900 AF	66,300 AF	77,500 AF	85,500 AF

direct use deliveries, projects required to contribute 18,700 AFY to the groundwater recharge program by 2025 are included in the TYCIP.

Therefore, baseline recycled water supply for groundwater recharge is assumed to be:

- Near Term (2015 to 2020) = 16,900 AFY by 2020
- Mid Term (2020 to 2030) = 18,700 AFY by 2025
- Long Term (2030 to 2040) = 18,700 AFY by 2025

Table 3-4 summarizes the baseline assumptions compared to the total available recycled water supply produced by the four water reclamation plants. Beyond 2025, there is a significant amount of recycled water supply that can be delivered for beneficial reuse. Additional projects will need to be constructed to increase the baseline amount of recycled water beneficially used to help meet the urban water demand for the region. Additional projects for increasing recycled water reuse are outlined below.

Climate

Under the climate simulations, wastewater flows were not impacted by climate. As a result, recycled water is the most climate resilient water supply available to the region.

Supply Challenges

Supply challenges facing recycled water supplies include the need to address:

- Projected available wastewater supply is not adequate to fulfill future demands for recycled water.
- Changes in the future amount of available wastewater as well as increases in wastewater strength (total dissolved solids and nitrate levels) and changes in treatment resulting from trend towards more efficient indoor water use.
- The efficient use of recycled water for outdoor irrigation (both urban and agriculture) and whether this use should be consistent with existing state efficiency standards.
- Increased energy needs for treatment and delivery of recycled water.
- Increasing regulatory and environmental issues for construction and operation of recycled water systems, in particular surface recharge of recycled water.

Supply Opportunities

The IRP process identified the following list of potential projects. Potential projects range from conceptual to well-developed proposals. Each project has the ability to increase the amount of supply available for recycled water direct use and groundwater recharge.

Implications

Due to its reliability and climate resilience, recycled water is one of the most valuable water supplies for the

Table 3-4: Recycled Water Supply & Baseline Demands

	2015	2020	2025	2030	2040
Recycled Water Supply[1]	60,200	64,300	69,700	75,100	82,900
SAR Discharge Obligation[2]	17,000	17,000	17,000	17,000	17,000
Direct Use Demands[3,4]	24,700	28,800	30,700	30,700	30,700
Groundwater Recharge [3]	14,500	16,900	18,700	18,700	18,700
Remaining Recycled Water Supply	***4,000***	***1,600***	***3,300***	***8,700***	***16,500***

Notes: (1) Regional supply per Wastewater Facilities Master Plan, includes 3% loss due to treatment waste streams.
(2) Minimum discharge required by SAR Obligation is 16,850 AFY. For planning purposes, assume 17,000 AFY
(3) Per 2015 Recycled Water Program Strategy and Agency FY2015/16 TYCIP.
(4) Includes agricultural demands.

Table 3-5: Recycled Water Supplies & Projects

Recycled Water Baseline		
Project Name	**Description**	**AF**
Baseline Recycled Water for Groundwater Recharge 2015-2020	14,500 AFY by 2015 based on 5-year historical average from 2009-2014	14,500
Baseline Recycled Water Direct Use 2015-2020	16,100 AFY by 2015 based on 5-year historical average from 2009-2014	16,100
Baseline Recycled Water for Groundwater Recharge 2021-2025	2,400 AFY of additional Recycled water by 2020 for groundwater recharge per IEUA FY15-16 TYCIP	2,400
Baseline Recycled Water Direct Use 2021-2025	8,900 AFY of additional Recycled water direct use by 2020 per IEUA FY15-16 TYCIP	8,900
Baseline Recycled Water for Groundwater Recharge 2026-2040	1,800 AFY of additional Recycled water for groundwater recharge by 2025 per IEUA FY15-16 TYCIP	1,800
Baseline Recycled Water Direct Use 2026-2040	4,000 AFY of additional Recycled water for direct use by 2025 per IEUA FY15-16 TYCIP	4,000

Recycled Water Projects			
Project Name	**Description**	**ID**	**AF**
WRCRWA Recyled Water Intertie	The Western Riverside County Regional Wastewater Authority (WRCRWA) Plant intertie would allow for the delivery of recycled water from the WRCRWA Plant to be used in the IEUA southern service area. This would also allow additional recycled water to be delivered into the northern service area groundwater recharge basins by reducing the demand from the RP-1 930 pressure zone pump station. Intertie would occur within the 800/930 Pressure Zones.	9	4,500
Rialto Recycled Water Intertie	The Rialto intertie project would allow for delivery of recycled water from the Rialto Wastewater Treatment Plant (WWTP) to be used in the IEUA service area. The intertie could occur near the RP-3 groundwater recharge basins. This concept could involve the Inland Valley Pipeline, LLC to convey water between Rialto WWTP and IEUA's recycled water distribution system. Supply could be used for direct, groundwater recharge, or other reuse strategy.	10	4,500
Pomona Recycled Water Exchange/Transfer	The City of Pomona does not currently use all of the treated effluent from the Pomona Water Reclamation Plant. One concept would involve partnering to develop and expand their recycled water facilities in exchange for an agreed amount of their Chino Basin groundwater right. Could include other supply transfer agreement such as reclaimable waste and/or groundwater.	11	2,500
RP-1 Recycled Water Injection-Increment 1, 2, 3	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increments 1-3 facility would be sized for 7,500 AFY.	12 13 14	2,500 2,500 2,500
Satellite Recycled Water Injection-Increment 1, 2, 3	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing, and volume to be produced will be determined as part of the portfolio development process. Increments 1-3 facility or facilities would have a capacity of 7,500 AFY.	15 16 17	2,500 2,500 2,500
Recycled Water Direct Use Expansion-Increment 1, 2, 3, 4	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond IEUA's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035, and potential recycled water interties. Each increment would increase direct use beyond baseline supply by 5,000 AFY. Increment 1-4 facilities would increase direct use beyond baseline supply by 20,000 AFY.	19 20 21 22	5,000 5,000 5,000 5,000
Existing Groundwater Recharge Basin Improvements beyond RMPU-Increment 1, 2, 3, 4	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1-4 facilities would increase recharge at existing basins within the Chino Basin by an additional 15,000 AF.	23 24 25 26	2,500 2,500 5,000 5,000

Table 3-6: Recycled Water Projects Continued

Recycled Water Projects (*continued*)			
Project Name	**Description**	**ID**	**AF**
Construct New Groundwater Recharge Basins-Increment 1, 2, 3, 4	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water, and/or imported water for groundwater recharge. Increment 1-4 would provide up to an additional 9,800 AFY of recharge capacity, which is approximately 4 new basins at 350 AF per month for 7 months of operation.	27 28 29 30	2,450 2,450 2,450 2,450
Direct Potable Reuse-Increment 1, 2	This project would construct an advanced water filtration and treatment (e.g. process treatment that combines micro or ultrafiltration) facility at a Regional Plant. The treatment process would allow the recycled water to be introduced into the potable water system. Increment 1+2 facility would have a capacity of 10,000 AFY.	60 61	5,000 5,000
RP-1 NRWS Treatment	The north Non-Reclaimable Wastewater System (NRWS) discharges approximately 3.5 MGD of brine to Los Angeles County annually. The project would construct a treatment facility to allow the Region to reuse this supply into the recycled water system. Requires plant expansion and partial reverse osmosis for blending.	65	3,920
Watershed Wide Water Transfers	This category of projects will construct or arrange other water transfers external to the Chino Basin. For example, dry weather flow exchange of recycled water to Orange County Water District for an equivalent amount of purchased imported water. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but will increase reliability and/or quality. To occur annually or intermittently. Resiliency and flexibility benefit only.	98	5,000 AF
Chino Basin Water Transfers	This category of projects will construct or arrange other water transfers within the Chino Basin. Projects to also include inter-agency interties for increased reliability. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but will increase reliability. To occur annually or intermittently.	99	5,000 AF

region and is a high priority for additional investment. The region needs to account for the trend towards increased indoor water efficiency and evaluate opportunities to bring in supplemental wastewater flows through construction of collection systems in non-sewered areas and collaboration with neighboring jurisdictions to optimize regional infrastructure. Further, the region needs to improve efficiency of direct recycled water use to maximize its availability to all Agencies. This is particularly important for outdoor irrigation as improved efficiency can help make more recycled water available during the summer and fall when demands for recycled water are at their highest.

Implications for recycled water supplies:

- Are not impacted by climate making recycled water the region's most climate resilient water supply.
- Are needed to maximize supplemental water for groundwater recharge.
- Are generated locally and can be beneficially used by all Agencies.
- Are critical to improving the region's water self-reliance and reducing dependence on climate variable supplies such as imported water.
- Are being impacted by indoor water efficiency trends so the region must anticipate the amount of supply that is likely to be available in the future and the changes in treatment that may be required to maintain the water quality of these supplies.
- Are a supplemental water source for the entire region with infrastructure that can be intertied with that of neighboring agencies to optimize availability and use of recycled water.
- Generally require a higher level of energy than other water supplies for treatment and distribution, but are less energy intensive than imported water supplies and use of this water can contribute to statewide reductions in greenhouse gas emissions.

CHINO BASIN DESALTER

Resource Overview

The Chino Basin Desalter Authority (CDA) was formed to manage the production, treatment, and distribution of highly-treated potable water to cities and water agencies throughout the southern Chino Basin. A Joint

Powers Agency, the CDA was formed by the Jurupa Community Services District; Santa Ana River Water Company; Western Municipal Water District; the Cities of Chino, Chino Hills, Norco, and Ontario; and the Inland Empire Utilities Agency to treat saline groundwater extracted from the southern portion of the Chino Basin. Saline water is water that has more salt (about 1000 ppm of total dissolved solids) than fresh water, but not as high as seawater (about 3000 ppm of total dissolved solids).

The CDA operates two desalters: Chino I Desalter which began operation in 2001 and Chino II Desalter which began operation in 2006. The treatment processes at the Chino I and Chino II Desalters include Reverse Osmosis (RO) and Ion-Exchange (IX) for removal of nitrate and total dissolved solids (TDS). The Chino I Desalter also includes air stripping for removal of volatile organic chemicals (VOC).

These facilities serve three purposes. First, they convert unusable groundwater into a reliable potable water supply for the region and are part of a long-term pollution cleanup strategy for the Chino Basin. Second, they provide hydraulic control over the lower Chino Basin, which prevents the migration of poor quality water into the Santa Ana River as well as downstream impacts on groundwater basins in Orange County. Third, they maintain and enhance groundwater yield for the Chino Basin.

The Desalters are a critical component of a long-term salinity management strategy that enables the region to use recycled water in the Chino Basin. The Peace Agreement, OBMP, and Maximum Benefit Plan approved by the Santa Ana Regional Water Quality Board and the State Water Resources Control Board require ongoing implementation of regional salt management and reduction actions as a condition of the regional recycled water use permits for outdoor irrigation as well as for groundwater recharge. CDA accounts for approximately 5% of the regional water supply portfolio.

Baseline Supply

Chino I Desalter and Chino II Desalter currently produce 25,000 AFY of treated groundwater. These facilities are being expanded and will have the capacity to treat 35,200 AFY by 2017. The amount of water received by member agencies within IEUA's service area is approximately 50% of the total production from these facilities. The remaining water is sent to agencies within the Western Municipal Water District service area.

Member agencies that receive water from the Desalter facilities within IEUA's service area are:

- City of Chino
- City of Chino Hills
- City of Ontario

Based on information from the CDA, the baseline Chino Desalter supply for the Agency's service area is assumed to be 17,300 AFY through 2040.

Climate

The effect of climate on water supply produced from the Chino Desalter facilities was not modeled as part of the IRP. Climate impacts were considered to be negligible as the quantity of water produced is dependent upon the capacity of the desalter facility and is not supply limited.

Supply Challenges

Supply challenges facing the Chino Desalters include the need to address:

The outstanding groundwater replenishment obligation to the Chino Basin of 152,900 AF through the duration of the Peace Agreement that must be fulfilled by the region.

Increased energy needs and costs for the expanded treatment of saline water and brine disposal

The location of Desalter production wells near existing contamination plumes in the groundwater basin, including potential costly impacts on Desalter treatment processes as well as opportunities to use the Desalters as part of a groundwater clean-up strategy.

Supply Opportunities

The IRP process identified of potential projects that are listed in Table 3-7. Each project has the ability to increase the amount of supply available, treated, or produced by the Desalter facilities.

Implications

The Chino Desalters provide a new source of potable water supplies for the region by treating currently unusable groundwater, as well as providing hydraulic control of the southern Chino Groundwater Basin. This infrastructure is critical to the continued use of recycled water in the region as well as improving groundwater quality and yield in the Chino Basin.

Key implications for the Chino Desalter water supplies:

- Are not impacted by climate.
- Are critical to improving the region's water self-reliance and reducing dependence on climate variable supplies such as imported water.
- Generally require a higher level of energy than other water supplies for treatment and distribution.
- Are an essential component of the regional commitment to remove salt and nitrates in the Chino Basin.
- Are critical to the continued use of recycled water in the region for groundwater recharge.
- Provide hydraulic control for the Chino Basin which prevents poor quality water from migrating into the Santa Ana River and downstream groundwater basins.
- Are managed under the Peace Agreement and the Optimum Basin Management Plan, which require fulfillment of a groundwater replenishment obligation of 152,900 AF.
- Are limited on the amount of water that can be produced based on the capacity and performance of the Desalter facilities.

LOCAL SURFACE WATER

Resource Overview

Agencies located in the northern part of the region have long standing legal rights to divert and treat water from local creeks in the Santa Ana River watershed, including San Antonio Canyon, Cucamonga Canyon, Day Creek, Deer Creek, Lytle Creek, and other small surface creeks and tunnels. The amount of water from these local surface supplies is variable, depending on climate conditions, and currently accounts for approximately 5% of the regional water supply portfolio.

The quality of local surface water is typically quite high as the creeks are filled by rainfall and snowmelt from the San Gabriel Mountains. However, the surface water must receive treatment to comply with state and federal drinking water quality standards before it can be served for public use. Large storm events can cause sedimentation levels to rise to levels that impact the water treatment plants. During these times, water is bypassed downstream where it may be available for groundwater recharge.

Baseline Supply

The most recent local surface water production data received from Agencies was used to forecast the baseline water supply. The amount of local surface water supply was established using a 5-year average of production during the period of FY2009-10 through

Table 3-7: Chino Basin Desalter Baseline & Projects

Baseline Chino Desalter Projects		
Project Name	**Description**	**AF**
Baseline Chino Desalter	Phase 2 Chino Basin Desalter production for IEUA service area	15,000 AF
Baseline Chino Desalter	Phase 3 Chino Basin Desalter production for IEUA service area	2,730 AF

Chino Desalter Projects			
Project Name	**Description**	**ID**	**AF**
Desalter Recovery Improvement	The existing Chino Basin I Desalter (CD-1) recovers approximately 75 percent of water. Improvements could be done to increase recovery to approximately 90 percent. This water would be conveyed through the existing potable water system.	18	1,500 AF

FY2013-14. This period of time includes 3 consecutive years of below average precipitation and 2 years of normal or above normal precipitation, providing a conservative projection. Baseline local surface water before considering climate modeling effects is therefore assumed to be 11,700 AFY through year 2040.

Climate

Local surface supplies are highly impacted by climate. Due to their dependence on precipitation and snow melt, the amount of water that can be obtained from local surface sources is highly variable from year to year.

Historical variability in local surface supplies is highly correlated with precipitation but also temperature. Annual surface water supplies are highly dependent on the weather and susceptible to changes in climate and were modeled under climate influences. Based on the results of the climate simulations, the projected baseline local surface water supplies available between 2015 and 2020 ranges from 2,000 to 12,600 AFY.

Local surface supplies may also be impacted by temperature. Higher temperatures cause more evaporation, reducing the amount of soil moisture. This means that the soil is more likely to absorb and hold water when rain occurs and this can reduce the amount of water flowing into creeks and streams.

Records indicate that local surface flows have declined and projections indicate that flows will decline in the near future from at least 2021 to 2040 (Seager 2012).

Supply Challenges

Supply challenges facing local surface water supplies include the need to address:

- High variability due to their dependence on rainfall and snow melt .

Supply Opportunities

The IRP process identified potential projects listed in Table 3-8. Each project has the ability to increase the amount of supply available from local surface water by either diversion and/or treatment improvements.

Implications

Local surface water, when available, is an extremely valuable resource because it is considered relatively "free", with the cost to the Agencies being the operation of the necessary facilities to capture and use this water. Where possible, use of local surface water should be maximized.

Key implications for local surface water supplies:

- Are generated locally and are the region's least energy intensive water supply and have minimal greenhouse gas emissions relative to imported water .
- Are cost effective relative to imported water supplies.
- Are highly dependent on weather and driven by climate.
- Will be significantly reduced during droughts when below average precipitation and drier conditions exist.
- Are a high quality water supply and provide a supplemental source of water to blend with and improve groundwater quality.
- Are highly variable and require facilities to operate under a wide range of flows .

NON-CHINO BASIN GROUNDWATER

Resource Overview

Member agencies pump groundwater from basins adjacent to the Chino Basin. These basins include Cucamonga, Rialto, Lytle Creek, Colton, and the Six Basins groundwater basins. The Six Basins are comprised of the Ganesha, Live Oak, Pomona, Lower Claremont Heights, Upper Claremont Heights and Canyon Basin. These basins currently provide approximately 10% of the regional water supply portfolio.

There are four agencies within the IEUA service area that include non-Chino groundwater as a water supply source. These agencies are the City of Upland, Cucamonga Valley Water District, Fontana Water Company, and San Antonio Water Company.

Baseline Supply

The most recent water production data was used to forecast the baseline water supply. The amount of non-

Chino Basin groundwater supply was based on a five-year production average from FY2009-10 to FY2013-14. Baseline non-Chino groundwater supply is assumed to be 22,000 AFY through 2040.

Climate
Climate effect on non-Chino Basin groundwater was not evaluated as part of the IRP. However, it is expected that climate will have a slight impact on these groundwater supplies based on the climate simulations performed on the Chino Basin. The non-Chino Basin groundwater baseline supply is assumed to remain constant at 22,100 through 2040.

Supply Challenges
These groundwater basins face similar supply challenges to those identified for the Chino Basin. Challenges include reduced natural infiltration, safe yield operating constraints, and water quality issues.

Supply Opportunities
The IRP process identified the following list of potential projects. Each project has the ability to increase the amount of supply available for groundwater recharge and/or increased groundwater production.

Implications
Groundwater basins outside of the Chino Basin face similar implementation hurdles as the Chino Basin.

Key implications for non-Chino Basin groundwater supplies:

- Are not impacted by climate once water is stored in the groundwater basin.
- Are slightly impacted by receiving reduced natural recharge within the basin resulting from climate and/or development impacts.
- Can be sustained or increased through use of supplemental water for groundwater recharge (through in lieu or direct recharge) when these resources are available.
- Are a vital local emergency resource to help mitigate abnormal or catastrophic events through additional groundwater production.
- Provide a means for sustainable regional water management by enabling exchanges and transfers among agencies within the watershed.
- Are generated locally and are the region's least energy intensive water supply and have minimal greenhouse gas emissions relative to imported water.
- Are cost effective relative to imported water supplies.
- Are critical to improving the region's water self-reliance and reducing dependence on climate variable supplies such as imported water.
- Reduce the water resource needs in the Chino Basin.

IMPORTED WATER

Overview
IEUA was originally formed in 1950 as a municipal wholesale water district for the purpose of providing municipalities in the Chino Basin with supplemental

Table 3-8: Local Surface Water Baseline & Projects

Baseline Local Surface		
Project Name	Description	AF
Baseline Local Surface	11,700 AF based on 5-year historical average from 2009-2014.	11,700 AF

Local Surface Projects			
Project Name	Description	ID	AF
Dry Weather Flow Diversions	Capture and treat urban dry weather flow from Chino, Cucamonga and San Sevaine Creek into the Regional Plants. For the purposes of the IRP, a volume of 3,500 AFY was assumed as total available dry weather flow.	48	3,500 AF
Maximize Local Surface Water	This category of projects will construct facilities needed to capture additional local surface water. Projects to be defined by IEUA's Agencies. For example, increase surface flows off Lytle Creek in wet years. Assume benefit 3 in 5 years.	88	1,000 AF

imported water purchased from the Metropolitan Water District of Southern California (MWD).

MWD is a contractor to both the State Water Project (SWP), which imports water from northern California, and Colorado River Aqueduct (CRA) systems. The availability of imported water supplies is heavily dependent on hydrology and environmental regulations. This dependency can lead to high variability in the annual amount of water available to the Southern California region. For example, in the midst of the great drought, the California State Water Project was able to supply only 5 percent of its contract allocation in 2013-2014, which is a significant reduction from past allocations.

Due to salinity management concerns in the Chino Basin, the region can only use imported water from the State Water Project. Imported purchases from MWD in recent decades have averaged about 70,000 AFY, providing about 30% of the water supply for the service area.

Imported water purchased from the MWD is limited by a purchase order agreement. The agreement allows the region to purchase up to a total of 93,283 AF per year at its lowest (Tier I) rate. This limit is based on historical imported water purchases for municipal use by the member agencies and for regional groundwater recharge. The agreement includes an annual minimum purchase commitment of 39,835 AF. Note that this amount is slightly less than the 40,000 AFY minimum needed for the operation of the region's water treatment facilities.

There are four water treatment plants that treat imported water purchased from the MWD. These treatment facilities include:

- Water Facilities Authority's Agua de Lejos Treatment Plant (81 mgd capacity)
- Fontana Water Company's Sandhill Surface Water Treatment Plant (29 mgd capacity)
- CVWD's Lloyd W. Michael Water Treatment Plant (60 mgd capacity)
- CVWD's Royer-Nesbit Water Treatment Plant (11 mgd capacity)

Each agency is allocated an annual portion of MWD's available Tier 1 water supply (shown below). The allocations do not confer a contractual right to MWD imported water but are used to determine the price paid for the water. Purchases in excess of the Tier 1 allocation are assessed by MWD at a higher Tier 2 rate.

- Water Facilities Authority - 31,384 AFY
- Cucamonga Valley Water District - 28,368 AFY
- Fontana Water Company - 10,000 AFY
- Inland Empire Utilities Agency/Chino Basin Watermaster – 23,531 AFY

Imported water currently accounts for approximately 25% of the regional water supply portfolio. The amount available to IEUA and/or the Chino Basin Watermaster is used only for groundwater recharge.

Baseline Supply

The baseline supplies for imported water are based on IEUA Resolution 2014-12-1. Supplies were set as follows:

- Current imported purchases by Agencies are assumed to be 65,000 AFY (consistent with FY2014/15 purchases).
- Imported water purchases between 2020 and 2040 are assumed to be 69,752 AFY.
- Minimum imported purchases are assumed to be 40,000 AFY to meet retail agency water treatment operational requirements .

Climate

The State Water Project's infrastructure was designed to capture snowmelt from snowpack in the Sierra Nevada Mountains. When the snow melts during the warmer spring months, this combination of reservoirs and conveyance facilities provides a steady water supply throughout the year but especially during the summer and fall when water demands peak and precipitation is limited.

However, climate change is expected to continue to significantly impact the timing and characteristics of snowpack on which the SWP system depends. Predicting MWD's ability to supply specific amounts of imported water to IEUA were beyond the scope of climate simulation. Instead, the IRP considered a wide range of potential changes in imported supply availability,

Table 3-9: Non-Chino Basin Groundwater Supplies & Projects

Non Chino Basin Groundwater Baseline		
Project Name	**Description**	**AF**
Baseline Non-Chino Groundwater	22,100 AF Amount of water produced by an Agency from outside the Chino basin	22,100 AF

Non Chino Basin Groundwater Projects			
Project Name	**Description**	**ID**	**AF**
Maximize Other Groundwater	This project category will identify Agency projects that would result in additional groundwater production benefits coming into the IEUA service area outside of the Chino Basin. Such projects may have the potential of an additional 5,000 AF.	63	5,000 AF

including assumptions in which SWP supplies decline by 2040. To explore a range of possible climate effects of MWD supplies, the analysis varied the amount of reduction of the Tier 1 water above the minimum purchase level. Two levels were selected—a 40% reduction and an 80% reduction. This corresponds to a range of reduction of 17% to 34% in total MWD Tier 1 supplies.

An interesting finding from the climate modeling was the identification of times, particularly in the next ten years, when imported MWD water may not be needed to meet regional demand. This water, if purchased, could be placed into the Chino Basin for storage and made available during future droughts, or catastrophic events (see Figure 3-11). The modeling also shows that beyond the first ten years there are periods when there is shortage in the MWD supply, and available water is lower than the baseline assumption.

Supply Challenges
Supply challenges facing imported water supplies from MWD and the SWP include the need to address:

- Catastrophic interruption—for example, an earthquake affecting the Delta or Tehachapis, or a break along the Delta levee, MWD feeder, or pump station.
- Maintenance interruptions—for example, Rialto line repairs.
- Operational constraints without improvements to the Bay Delta conveyance, such as the Delta Fix proposed by the Department of Water Resources.
- Colorado River over-allocation and the status of Lake Mead, including the potential impact on availability of MWD supplies which could constrain distribution of water from the State Water Project.
- Cost of MWD supplies that are expected to increase 4-5% annually during the next decade.
- Vulnerability to climate change conditions, such as warmer temperatures, reduced snowpack, and more frequent droughts that will reduce supplies available from CRA and SWP given that both infrastructure projects are designed to capture slow melting snowpack.

Supply Opportunities
Additional opportunities for increasing supplemental water supplies from imported sources, both through MWD and from other locations, were identified during the IRP process and are summarized in Table 3-10.

Implications
Climate conditions, conveyance reliability, and the need to improve SWP infrastructure all affect the future availability of imported water to the region. Due to its high quality, including having low TDS, SWP water should be purchased when it is available to enhance groundwater recharge and to leverage other water supply programs that benefit the region.

Key implications for imported water supplies:

- Are less reliable now than they have been in the past and may further decrease in reliability with climate change and continued uncertainty about infrastructure improvements.
- Are not fully reliable, and it will be important to develop alternative supplies so that the region has the flexibility to withstand reduced SWP supply caused by extended years of limited/reduced snowpack.
- Are not fully reliable, and so additional investments may need to be made to meet water quality restrictions if low-salinity imported water is not available, such as considerations to include CRA supply.
- Should be leveraged, when available in the near-term, by the region for storage, groundwater recharge, exchanges, transfers, or in-lieu.
- Will be more expensive. The cost of supplies is expected to increase 4-5% annually during the next decade .

CONSERVATION

Overview

Unlike traditional water supplies, efficient use of water reduces demand in ways that are quantified indirectly. Demand is reduced through changes in consumer behavior and savings from water-efficient fixtures like toilets and showerheads. These water savings come from both "active" and passive "code-based" conservation efforts. "Active" efforts are Agency funded programs such as rebates, installations, and education. "Code-based" conservation consists of demand reductions attributable to more water-efficient plumbing codes and appliance standards and from customer response to higher water costs and rates that encourage water efficiency.

Over the past 24 years, since signing the 1991 California Urban Water Conservation Council's (CUWCC) memorandum of understanding (MOU) regarding Urban Water Conservation, the region has been committed to developing and implementing conservation programs that serve as a key component in the overall water resource management portfolio for the region. Such active conservation programs have traditionally included rebates for water saving devices such as ultra-low-flow toilets and high efficiency clothes washers, which are primarily administered through MWD's "Save Water-Save A Buck" program for commercial, residential, and multi-family properties. Other programs include educational programs such as the award-winning

Figure 3-11: Potential Climate Change Impact on SWP Supplies

Table 3-10: Imported Water Baseline & Projects

Baseline Imported Water		
Project Name	Description	AF
Baseline Imported Water	Agencies can purchase up to 69,750 AFY per the Member Agency Tier 1 purchase limit per Resolution 2014-12-1	69,750 AF

Imported Water Projects			
Project Name	Description	ID	AF
Existing Groundwater Recharge Basin Improvements beyond RMPU-Increment 1 ,2, 3, 4	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1 and 2 would increase recharge at existing basins within the Chino Basin by 2,500 AFY each. Increments 3 and 4 are 5,000 AF each. If all increments are selected there is a potential of up to 15,000 AFY of production.	23 24 25 26	2,500 AF 2,500 AF 5,000 AF 5,000 AF
Construct New Groundwater Recharge Basins-Increment 1, 2, 3, 4	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Each increment would provide up to an additional 2,450 AFY of recharge capacity, which is approximately one new basin at 350 AF per month for 7 months of operation. If all increments are selected, there is a potential production of 9,800 AFY.	27 28 29 30	2,450 AF 2,450 AF 2,450 AF 2,450 AF
ASR wells MZ1 and MZ2	Construct aquifer storage and recovery (ASR) wells to increase imported water groundwater recharge within management zone 1 and 2. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.1 and 3 for CVWD and the City of Ontario.	31	11,500 AF
ASR wells MZ3	Construct ASR wells to increase imported water groundwater recharge within management zone 3. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.2 for JCSD.	32	3,500 AF
Maximize ASR wells	Construct other ASR wells to increase imported water recharge by 3,500 AFY within the Chino Basin during wet and dry years. Assume benefit 40% of the time (2 in 5 years). Storage to be dependent on supplemental water availability in wet years.	33	3,500 AF
Cadiz IW Transfer	The Cadiz project would allow for the import of unused groundwater from the remote Fenner Valley near Cadiz, California. For the purposes of the IRP, a 5,000 AFY increment of water is assumed. The Cadiz supply would be transferred and taken as SWP water into the Chino Basin.	34	5,000 AF
Secure SWP IW transfer outside MWD	Imported water supply is solely from MWD via the SWP and is limited by the Agency's purchase order. Other permanent, temporary or seasonally available imported water supplies could be purchased and wheeled into the Chino Basin. The volume of water available varies depending on the source of water and timing. Supplies could be purchased from various Irrigation Districts or secured via Ag Transfer. Assume benefit 1 in 10 years.	35	5,000 AF
SBVMWD IW Transfer	As a SWP contractor, San Bernardino Valley MWD (SBVMWD) has a Table A allocation. This option would involve constructing an intertie between SBVMWD's imported water system. The supply would be temporary or seasonally available and could be purchased and wheeled into the Chino Basin. Assume benefit 1 in 5 years.	36	5,000 AF
Ocean Desalination Exchange	This project category would involve a partnership with another water agency pursuing ocean water desalination; through in-lieu exchange, the Chino basin would obtain an agreed amount of imported water. For the purposes of the IRP, a volume of 5,000 AFY was chosen. Opportunity to invest in upcoming ocean desalination plants includes Huntington Beach, Carlsbad and West Basin.	37	5,000 AF
Water Banking Facility	This project category would invest into the Semitropic Groundwater Storage Bank in Kern County or similar program. The Chino Basin could bank additional purchases of wet year water when these supplies are available and Chino Basin facilities are capacity limited.	56	5,000 AF

Table 3-10: Imported Water Baseline & Projects *(continued)*

Imported Water Projects (*continued*)			
Project Name	**Description**	**ID**	**AF**
Max Tier 1 MWD Imported Water-Increment 1, 2, 3	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Each increment would allow for the purchase of an additional 7,850 AFY. If all increments are selected up to 23,550 AFY could be purchased purchased annually or intermittently.	89	7,850 AF
		90	7,850 AF
		91	7,850 AF
Max Tier 2 MWD Imported Water-Increment 1, 2, 3	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Each increment would allow for the purchase of an additional 5,000 AFY . If all increments are selected up to 15,000 AFY could be purchased annually or intermitently.	92	5,000 AF
		93	5,000 AF
		94	5,000 AF
MWD Replenishment or discount wet year water-Increment 1, 2, 3	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Each increment would allow for the purchase of an additional 10,000 AFY. If all increments are selected up to 30,000 AFY could be purchased annually or intermittently. Assumes benefits after 2 consecutive wet years (approx. 1 in 15 years)	95	10,000 AF
		96	10,000 AF
		97	10,000 AF
Watershed Wide Water Transfers	This category of projects will construct or arrange other water transfers external to the Chino Basin. For example, dry weather flow exchange of recycled water to Orange County Water District for an equivalent amount of purchased imported water. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability and/or quality. To occur annually or intermittent. Resiliency and flexibility benefit only	98	5,000 AF
Chino Basin Water Transfers	This category of projects will construct or arrange other water transfers within the Chino Basin. Projects to also include inter-agency interties for increased reliability. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability. To occur annually or intermittent.	99	5,000 AF

Garden in Every School Program, National Theatre for Children, monthly water conservation tips, landscape audits, and turf-grass removal programs.

Water conservation, also called water use efficiency strategies, have changed dramatically over the past few years as a result of state and local policies that require increased conservation and improved efficiency, technological improvements that increase water savings potential, and advancements in methods of communication that provide new opportunities to engage and educate the public. To address the shift, regional efforts include securing funding for technology-based software and supporting the development of sustainable water rate structures. Both technology-based software and sustainable rate structures establish an efficiency standard for each individual customer based on their existing indoor and outdoor water use profile. These programs also have the added benefit of targeting outdoor water use, which accounts for approximately 60% of urban M&I demands.

Baseline Supply

Conservation baseline supplies are water savings from existing conservation programs' active and passive savings. Baseline conservation savings are embedded in the demands forecast, based on current annual savings (see Table 3-11). These programs are expected to continue through 2040.

Climate

Climate does not appear to impact water supply savings from conservation.

Supply Challenges

Supply challenges facing conservation programs include the need to address:

- Existing development will need incentives such as conservation rebates to meet state regulations.
- Existing development will also need targeted messaging based on state established efficiency standards to meet responsible water use and establish a new water use practices.

"And it never failed that during the dry years the people forgot about the rich years, and during the wet years they lost all memory of the dry years. It was always that way."

—John Steinbeck
East of Eden

- Current efficiency standards do not include recycled water use.

Supply Opportunities
The IRP process identified potential projects that are listed in Table 3-11. Efficiency savings beyond baseline are shown as new water supplies because they offset water demands. Conservation project savings are tied to the IRP's upper demand forecast; therefore if actual demands are lower, there will be a corresponding reduction in projected water savings.

Implications
This is a key climate resistant water supply that has the best potential to augment and extend current available supplies. Since outdoor irrigation makes up 60% of urban M&I demands, this supply category has the largest potential impact for the region. The region will need to evaluate how to achieve targeted efficiency goals.

Key implications for water conservation programs:

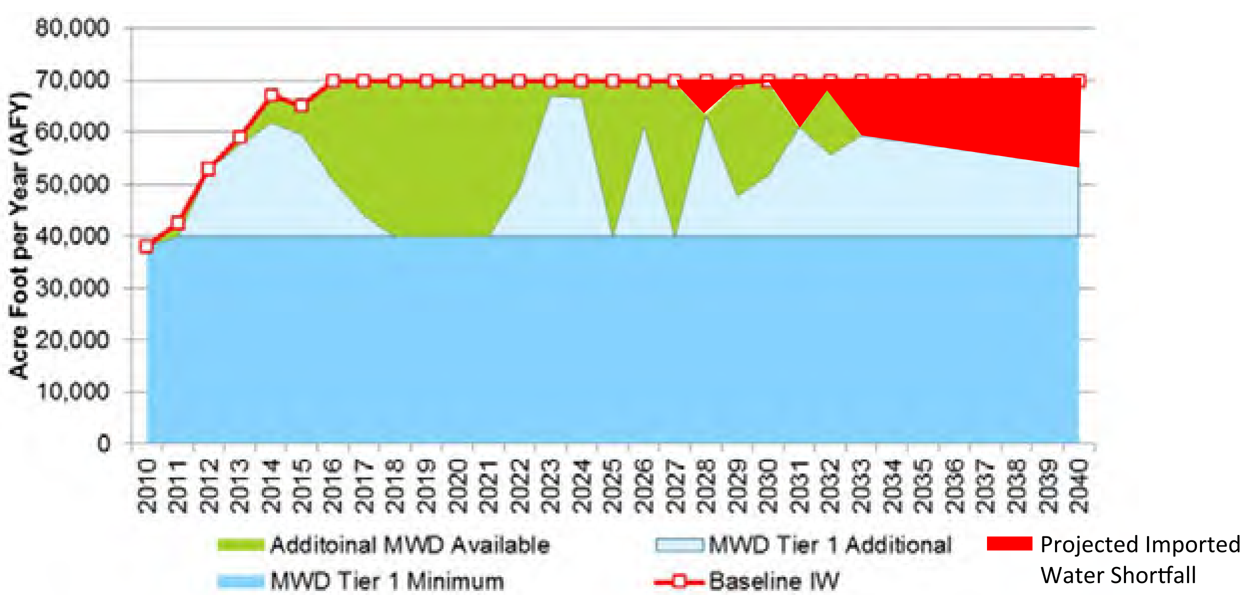
- Are cost effective relative to imported water supplies.
- Extend other water supplies and delay the need for additional system expansion because it is a demand offset.
- Are instrumental for the region to reduce dependence on climate variable supplies such as imported water.
- Are not impacted by climate change or water quality concerns.

Table 3-11: Water Use Efficiency Baseline & Projects

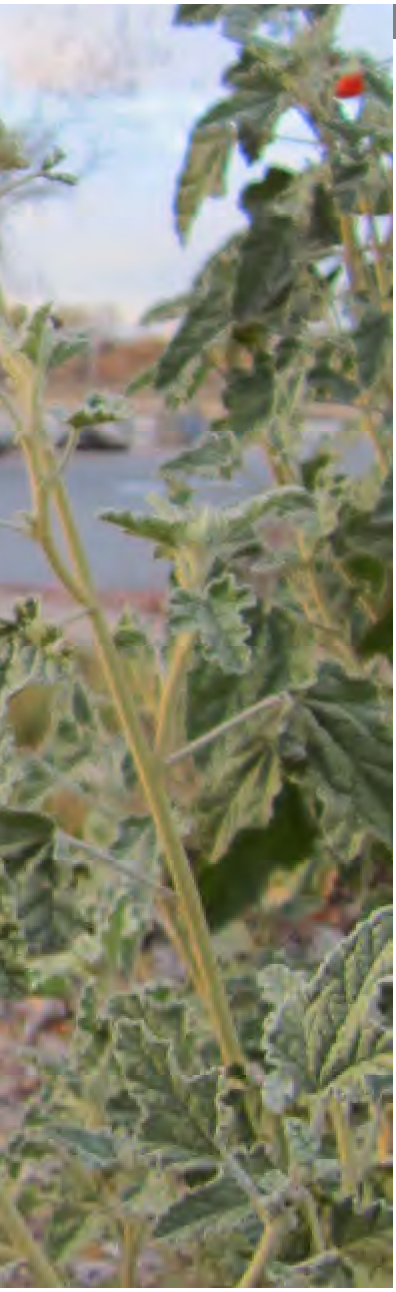
Water Use Efficiency Baseline		
Project Name	**Description**	**AF**
Baseline Conservation	1,000 AF per year from existing conservation programs' active and passive savings.	1,000 AF

Water Use Effiency Projects			
Project Name	**Description**	**ID**	**AF**
Expand WUE Devices	Implement additional targeted device related savings to reduce demand beyond current annual water use efficiency (WUE) savings. Provide incentives and pilot programs to roll out extremely high efficient indoor fixtures and toilets. To be verified with Water Use Efficiency Business Plan (WUEBP).	39	5,000 AF
WUE - Turf Removal-Increment 1, 2, 3	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Each increment would provide up to 5,000 AFY of savings. If all are selected, they can result in up to 15,000 AFY savings	40 41 42	5,000 AF 5,000 AF 5,000 AF
WUE - Budget Rates-Increment 1, 2, 3	Implement water budget based rates for 2 Agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Each increment would provide up to 13,350 AFY of savings. If all increments are selected, they can result in up to 40,050 AFY savings.	43 44 45	13,350 AF 13,350 AF 13,350 AF
WUE- Recycled Water Demand Management-Increment 1, 2	Implement demand management devices and programs for direct recycled water customers. Does not generate additional supply, aids in managing the supply during peak demand. Each increment would provide 2,500 AF of demand management. If both are selected they could provide 5,000 AFY additional recycled water. This supply could be used for increasing direct use demands, groundwater recharge or other reuse strategy	46 47	2,500 AF 2,500 AF
WUE - Advanced Metering Technologies	Install advanced metering infrastructure (AMI) between retail meters and a utility provider. Will provide real-time data about consumption and allow customers to make informed choices about usage.	66	5,000 AF

Figure 3-12: Sample Model Run of Climate Impacts on Imported Water Supply Availability



4. Supply Portfolio Themes



Baseline Assessment

Single Variable Tests

Water Resource Strategies

The desert globemallow, which requires very little water, grows in a low water use landscape.

Supply Portfolio Themes

Section 4 presents the different water resource strategies developed through the IRP Technical Work Group. The purpose of each water resource strategy is to increase future water supplies, including water efficiency as a source of supply, to reduce the region's vulnerability to climate change and to ensure that future water needs for the region are met.

First, a baseline assessment was conducted to evaluate the ability of the baseline water supplies, established in Section 3, to meet projected baseline water demands. To do this, a water management mass balance model was developed by IEUA's technical consultants (see Appendix 2) to compare projections of water demand and supply under historical and future climate change conditions. Three demand scenarios were then evaluated across 106 different projections of future climate derived from two archives of downscaled global circulation models simulations. The results were reviewed to assess the extent to which baseline water supplies could NOT fulfill demands (described as supply shortfalls) under each future. This baseline assessment provided the foundation for the Work Group to identify the additional water resources needed to meet future demands.

Next, single variable tests were conducted to determine how well specific types of new water supplies could help the region meet projected demands under climate change. Single variable tests added individual supplies to the baseline to determine how well that single change performed under each of the 106 climate scenarios in the model.

Based on the outcomes of the single variable tests, the IRP Technical Work Group crafted 5 water resource strategies for further evaluation. Each strategy had an underlying theme, such as maximizing the use of recycled water or securing additional supplemental water supplies for groundwater replenishment. These 5 strategies were turned into project portfolios by selecting representative projects from proposed lists of future projects (see Section 3) that could be implemented to increase future water supplies above the baseline projections.

Finally, the performance of each water resource strategy was compared to the baseline assessment. The evaluation focused on two IRP criteria: (1) the ability of the scenario to generate sufficient water to meet future regional water demands under climate change conditions and (2) the amount of surplus water produced, defined as water not needed to meet demand, and placed into long-term groundwater storage.

BASELINE ASSESSMENT

The regional baseline supplies and demand projections were developed in the first part of the IRP planning process. To establish how this baseline could be impacted by climate change, these projections were modeled and stress-tested under 106 separate climate scenarios, as referenced above and included in Appendix 2.

As a reminder, each of the 106 climate scenarios yields an independent model result and is depicted with a separate colored line in the figures below. Note that no one run is "more accurate" than another. However, some of the runs stand out as "outlying" results that are either higher or lower than the majority of the runs. These results are not included in the scenario evaluations. For the purposes of the IRP, the analysis focused on the range of results for the majority (75%) of the climate scenarios.

Figure 4-1 shows the amount of unmet demand through 2040 under the baseline assessment with climate change. For the purposes of the IRP, unmet demands are defined as those times when demands exceed available water supplies. For the baseline conditions with climate change, the range of unmet demand is 0 AFY to 60,000 AFY. Note that the amount of unmet demand is smaller in the near term (about 20,000 AFY by 2030) and increases to 60,000 AFY by 2040. It is also important to note that without additional water supply development the region would struggle to meet future

Figure 4-1: Baseline Unmet Demands

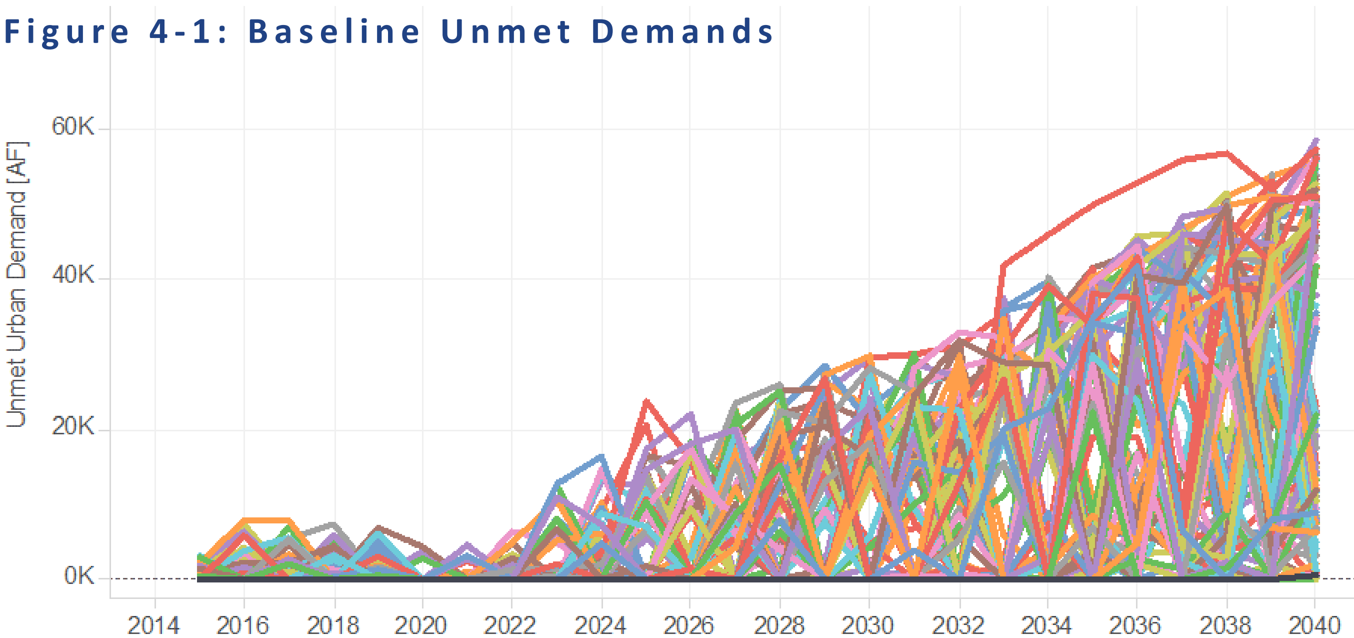
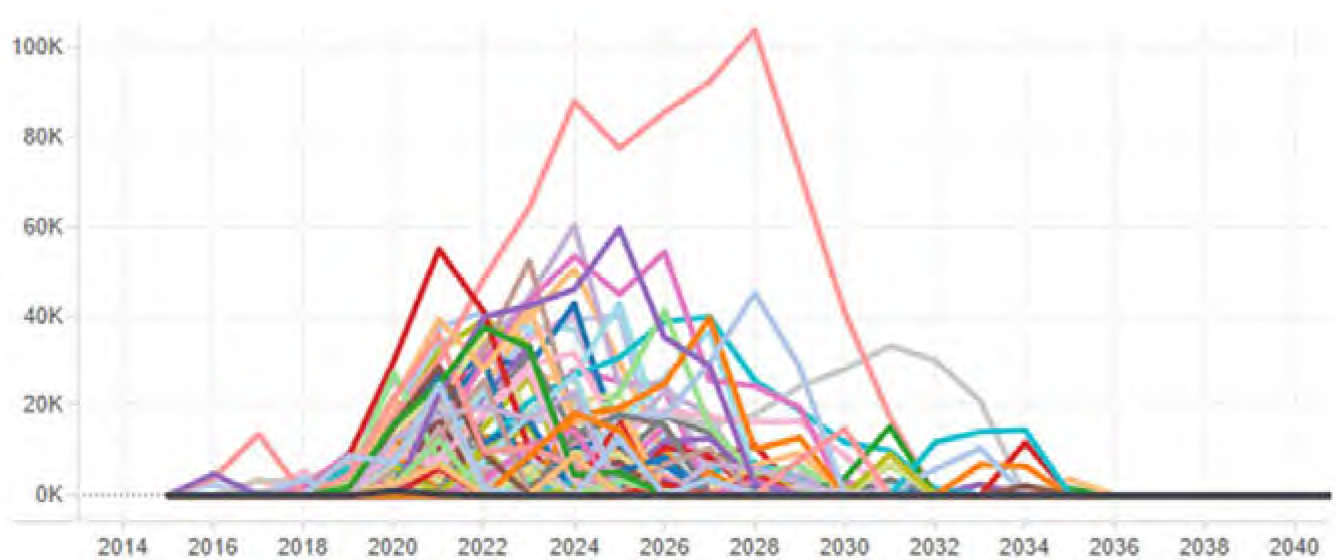


Figure 4-2: Baseline Stored Water Balance



water demands under climate change conditions.

In each climate run, there may be periods when water supplies exceed demands, creating surplus water supplies. The WEAP model tracks these surplus supplies by allocating the water to a groundwater storage account.

The IRP uses the 2014 groundwater storage level as the baseline for tracking the addition of surplus water to groundwater storage. Similarly, during periods when demands exceed supplies, the model deducts water from groundwater storage tracking account but cannot lower the groundwater below its 2014 level.

Figure 4-2 illustrates how stored water accumulates under each climate scenario through 2040. A positive or upward slope on the graphic indicates water surplus conditions and the excess water is added to the storage tracking account. A negative, or downward slope, indicates that demand is exceeding supplies, and water is pulled out of storage to meet, in whole or in part, the excess demands. As a result, the stored water creates a buffer supply that can be used offset future shortfalls. The model shows "unmet demands" only when demands exceed supplies AND no water remains in the storage tracking account created by the model.

For comparison, the thick black line in Figure 4-2 represents baseline assessment conditions without climate change. Note there is no accumulation of surplus supplies and therefore all available water supplies are needed to meet the regional demand, and no water is stored for future use.

Results of the baseline assessment with climate change indicate that the following is likely to be experienced by the region:

- 79% of the regional water demands are met by 2040.
- Water supply shortages, or unmet demand, will be more intense and frequent under climate change.
- Climate will drive unmet demand to 25,000 AFY by 2030 and up to 60,000 AFY by 2040.
- Significant water supply shortfalls could occur as soon as 2022.
- A "do nothing" approach is not sustainable, as projected demands exceed supplies under all scenarios.
- It may be possible to accumulate additional groundwater under baseline conditions, but the amount would depend on future climate scenarios (e.g., more rainfall, less variability, cooler temperatures) than currently predicted.

SINGLE VARIABLE TESTS

To evaluate how the addition of a new water supply could enhance the region's current, or baseline water supplies under climate change, a series of four single variable tests were evaluated. These tests were used to determine the potential improvement of implementing an isolated or single water supply source to help improve baseline conditions impacted by climate change.

The four single variable tests are:

1. Maximizing the Use of Prior Stored Chino Basin Groundwater
2. Maximizing the Purchase of MWD Imported Water
3. Maximizing Recycled Water Supply for Groundwater Recharge
4. Reducing Urban Water Demand by Increased Conservation and Water Use Efficiency

Conclusions from comparing the tests to the baseline assessment are summarized below.

1 — Maximizing the use of prior stored Chino Basin groundwater.
Test 1, Maximizing the Use of Prior Stored Chino Basin Groundwater does not produce new water supplies because it relies only on prior (pre-2013) stored groundwater. It is assumed that up to 8,400 AFY of groundwater can be pumped above baseline levels, and that the total amount of additional groundwater pumping cannot exceed 280,000 AF.

Results of this test are illustrated in Figure 4-3. If the region only relies upon the addition of prior stored Chino Basin groundwater to meet future water resource needs:

- 91% of regional demands are met by 2040.
- Water supply shortages, or unmet demands, will be moderately improved by 2040 over baseline conditions.
- Unmet demand would be reduced to approximately 18,000 AFY by 2030 and 40,000 AFY by 2040.
- Significant water supply shortfalls could occur as early as 2024.
- The approach is not sustainable given that a significant amount of prior stored groundwater is needed to meet regional demands through 2040. The median of the climate scenarios shows a reduction in this storage from 280,000 AFY to approximately 130,000 AFY by 2040, with scenarios dropping as low as 80,000 AF.
- It may be possible to accumulate more stored water under this strategy, but the amount would depend on more benign future climate scenarios (e.g., more rainfall, less variability, cooler temperatures) than currently predicted.

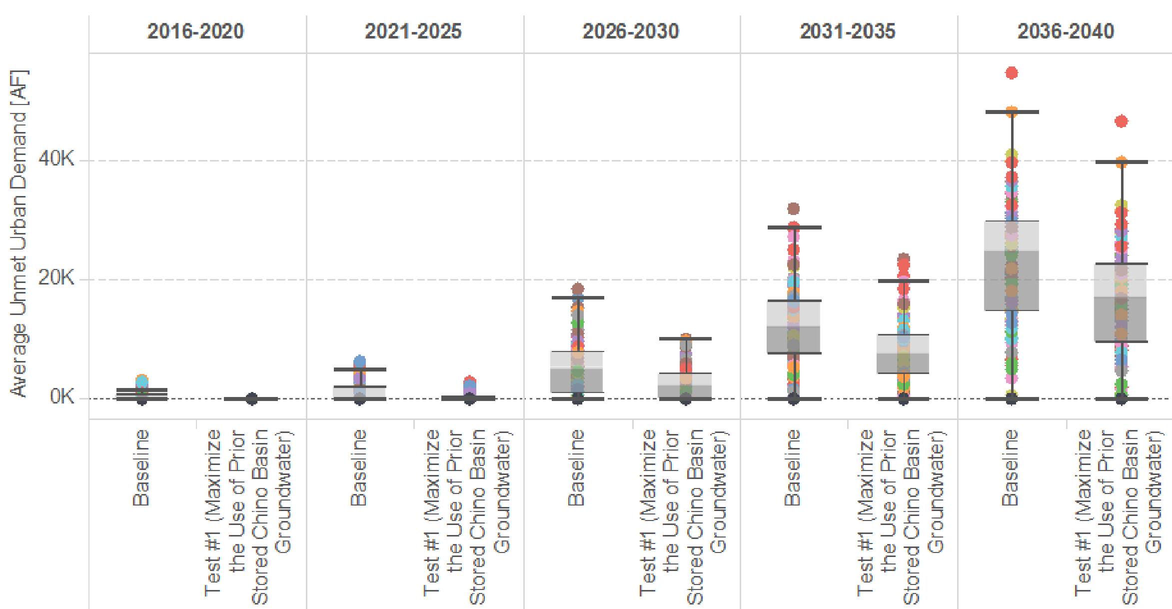
2 – Maximizing the Purchase of Metropolitan Water District (MWD) Imported Water

IEUA member agencies (agencies) have the ability to purchase up to 70,000 AFY of imported water from the MWD. As discussed in Section 3, the baseline modeling assumption for imported water is that member Agencies could purchase up to 69,752 AFY (consistent with Resolution 2014-12-1), with a minimum total purchase of 40,000 AFY.

Due to the cost of imported water, agencies typically only purchase the amount of water needed to meet their operational requirements or fulfill water demands that cannot be met through local supplies. This means there may be times when agencies don't need the imported water but could decide to purchase this water and place it into storage for future use.

The approach of Maximizing the Purchase of MWD imported water does not add new imported water supplies to the baseline supply. However, the region's agencies will purchase all of the water available, up to 70,000 AFY. This purchase would occur even if water supplies exceed demand. In years where agencies make these purchases, the additional water would be put into storage via groundwater recharge or in-lieu of

Figure 4-3: Baseline vs Test 1 Unmet Demand Comparison



groundwater pumping. The quantity of supply would be dependent on imported water availability.

Results of this test are illustrated in Figure 4-4. If the region relies only upon maximizing imported water purchases to meet future needs:

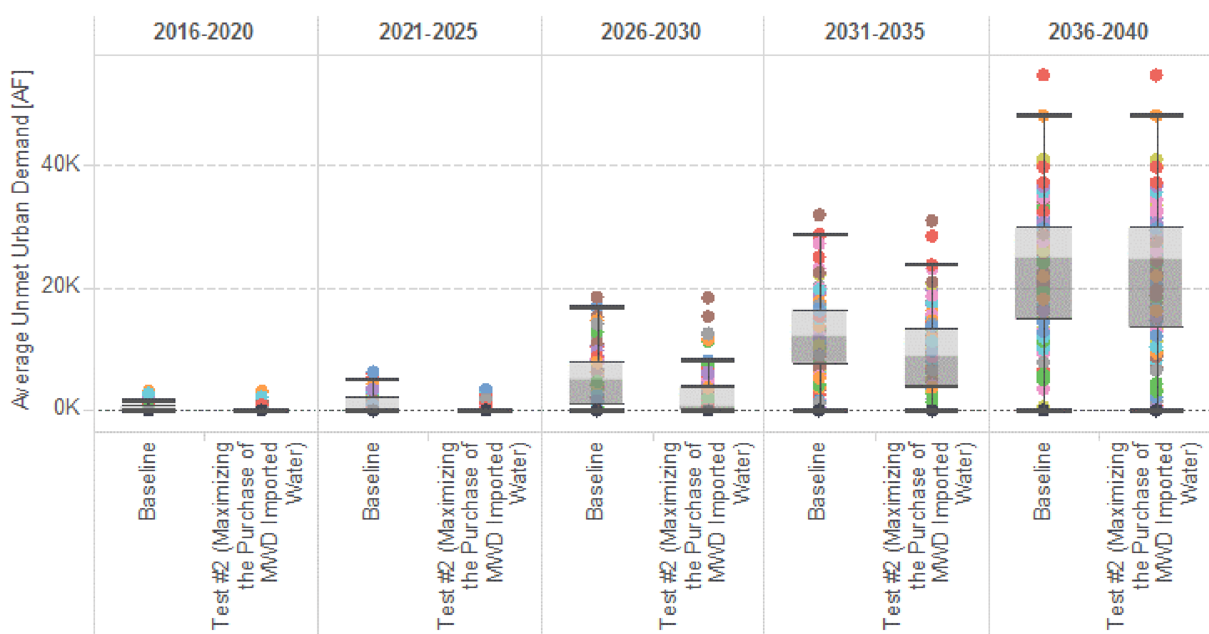
- 85% of regional demands are met by 2040.
- Water supply shortages, or unmet demands, will be slightly improved by 2040 over baseline conditions because imported water availability is adversely impacted by climate change.
- Unmet demand would be reduced to 22,000 AFY by 2030 and 55,000 AFY by 2040.
- Significant water supply shortfalls could occur as soon as 2024.
- This approach is not sustainable as a stand-alone approach and must be combined with other water resources to improve water supply conditions for the region.
- It may be possible to accumulate more stored water under this strategy, but the amount would depend on more benign future climate scenarios (e.g. more rainfall, less variability, cooler temperatures) than currently predicted.
- This approach could increase the region's dependence on imported water supplies, which could make the region more vulnerable to climate change.

3 – Maximizing Recycled Water Supply for Groundwater Recharge

The region has developed a successful regional Recycled Water Program for both direct use (landscaping, agricultural irrigation and industrial processing uses) and indirect use (groundwater recharge). In 2000, the region identified recycled water as a critical resource needed for drought-proofing the region and maintaining its economic growth.

The approach of Maximizing Recycled Water Supply for Groundwater Recharge builds on the successful regional Recycled Water Program. As discussed in Section 3, the baseline assumption for available recycled water is 47,700 AFY by 2025. As the region continues to grow, new communities will be sewered and additional recycled water supplies will be generated. It is estimated that there will be approximately 85,500 AFY of recycled water supply from regional development by 2040.

Figure 4-4: Baseline vs Test 2 Unmet Demand Comparison



Therefore, this will deliver 37,800 AFY of additional recycled water to the groundwater recharge program.

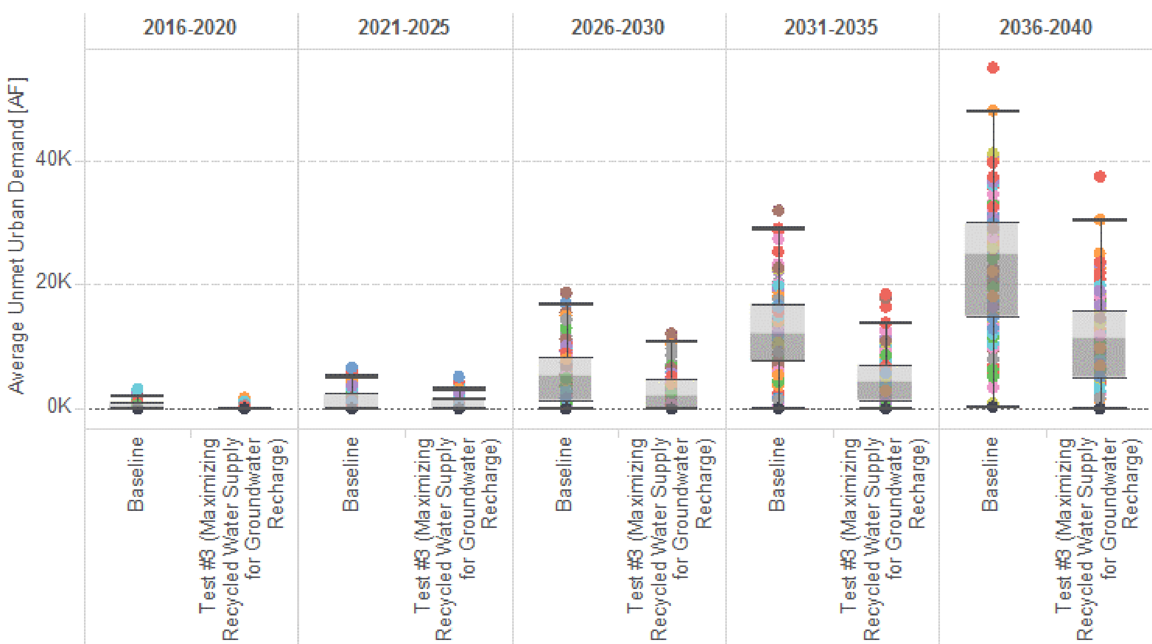
Results of this test are illustrated in Figure 4-5. If the region relies only upon maximizing recycled water supply for groundwater recharge for future water needs:

- 95% of the regional demands are met by 2040.
- Water supply shortages, or unmet demand, will be greatly improved by 2040 over baseline conditions.
- Unmet demand would be reduced to 10,000 AFY by 2030 and 17,000 AFY by 2040.
- Although water supply shortfalls are reduced, they could occur as early as 2024.
- Maximizing recycled water for groundwater recharge is sustainable as a stand-alone strategy, but would provide greater benefits if combined with other programs to enhance water supply conditions for the region.
- Provides flexibility by maximizing the amount of water stored in the Chino groundwater basin for future use.
- Recycled water is the most climate resilient water supply available to the region.
- It may is possible to accumulate more stored water under this strategy, but the amount depends on more benign future climate scenarios (e.g. more rainfall, less variability, cooler temperatures) than currently predicted.
- The volume of future recycled water supply is impacted by the amount and timing of new development in the region and indoor water efficiency trends. Additional tracking of wastewater flows is needed to accurately anticipate the amount of recycled water that will be available by 2040.

4 – Reducing Urban Water Demand by Increased Outdoor Water Use Efficiency and Conservation
Approximately 60% of the region's urban water use is for outdoor irrigation, particularly lawns. The IRP Technical Work Group requested a scenario to evaluate the implications of an increased outdoor efficiency and conservation program.

The approach of Reducing Urban Demand by Increasing Water Use Efficiency assumes that the region achieves a level of water savings that will reduce residential outdoor water usage to levels consistent with the requirements of the Department of Water Resources State Model Water Efficiency Landscape Ordinance (AB

Figure 4-5: Baseline vs Test 3 Unmet Demand Comparison



1881). This could be achieved by programs such as budget-based rates and continuation of active conservation programs. The region currently has one water agency on budget based rates.

This test assumed that four retail agencies would implement budget based rates structures by 2020. The savings are estimated to be 27,000 AFY from the rate structure changes and 11,000 AFY from active potable and recycled water conservation programs. Combined these measures are assumed to reduce urban demands by approximately 17% from 2013-14.

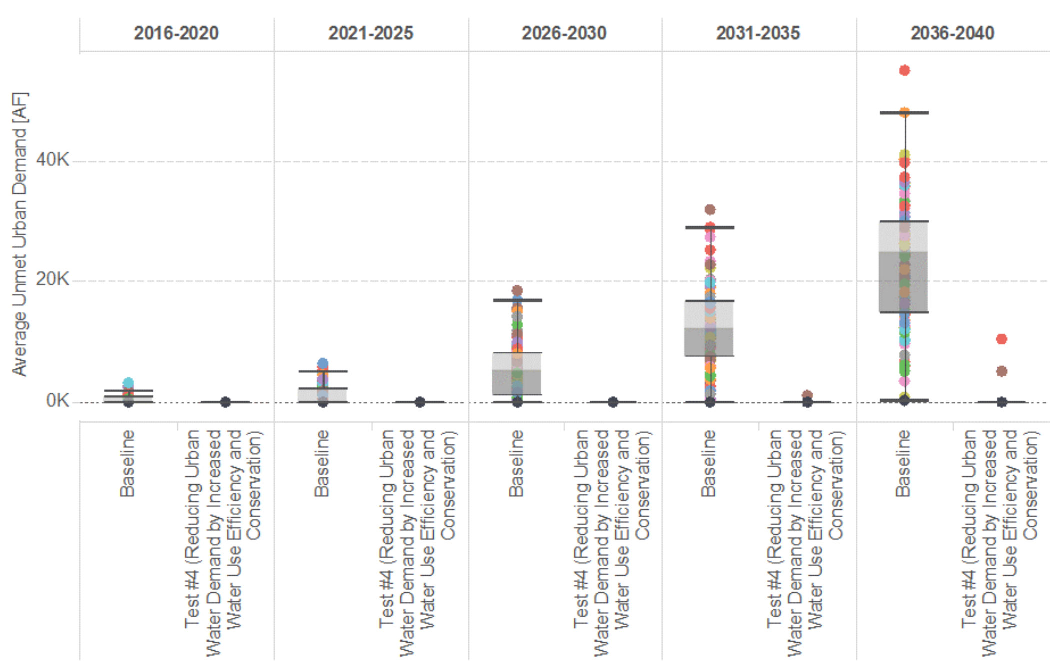
Results of this test are illustrated in Figure 4-6. If the region relies upon only reducing urban water demand by Increased Outdoor Water Use Efficiency and Conservation to meet future water needs:

- 100% of the regional demands are met by 2040.
- Water supply shortages, or unmet demand, would be eliminated by 2040.
- Water supply shortfalls are delayed beyond 2040.
- Accumulation of stored water is very likely to occur, with more than 50% of the climate scenarios producing over 200,000 AFY of stored water by 2040.
- Regional recycled water supplies would not be impacted because this approach targets outdoor conservation.
- Reduces dependence on climate dependent supplies and reduces the volume of additional water supplies needed to meet future demand.
- Requires expansion of water efficiency programs to support transition to budget based rate structure to achieve outdoor efficiency standards.

Single Variable Test Conclusions
Results from the four single variable tests show that all of the strategies helped to reduce and delay water supply shortages when compared to baseline conditions under climate change. Notably, water efficiency/ conservation is the only water supply approach that could eliminate water supply shortages through 2040 as a "stand-alone" approach. However, the expansion of local supplies such as recycled water and storm water ensures that the region is insulated from unforeseen or cataclysmic conditions.

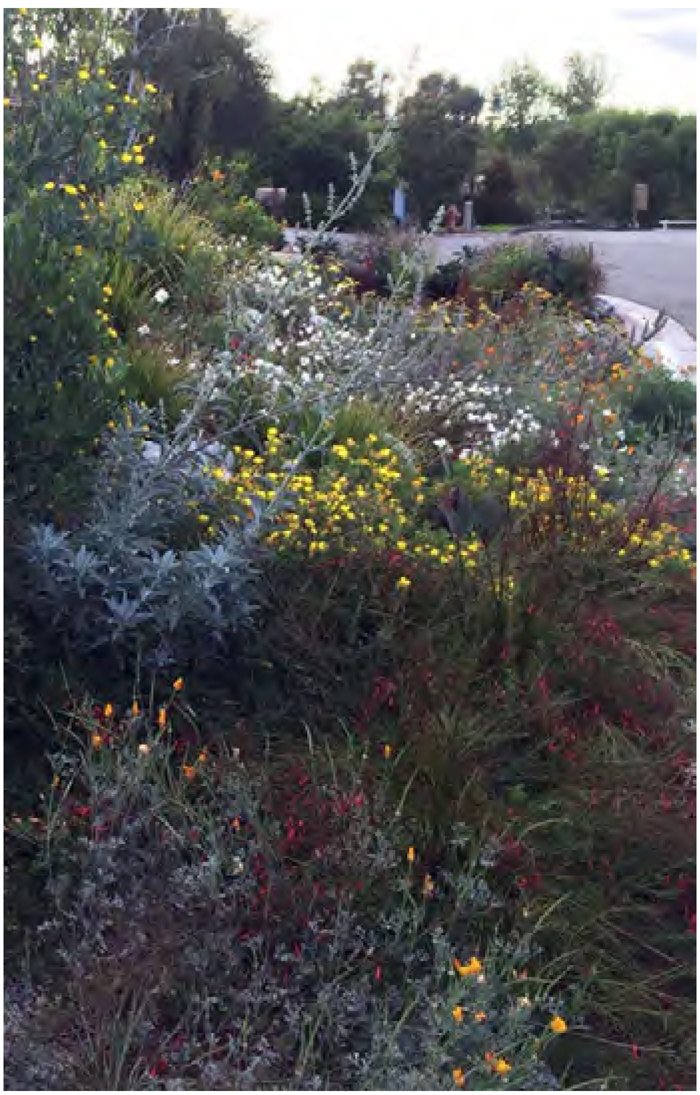
The recommended approach in the IRP is to diversify the region's water supplies. The following conclusions were

Figure 4-6: Baseline vs Test 4 Unmet Demand Comparison



used as the basis for developing the next step in the IRP, the creation of water strategies:

- Water use efficiency and conservation provides the region with the greatest level of water supply reliability and resiliency.
- Diversification of region's water supplies minimizes the potential for water shortages under climate change and from catastrophic events.
- Increasing water supplies for Chino groundwater recharge increases storage and provides a supply buffer, enhancing the region's water supply flexibility and resilience.
- Implementing outdoor water use efficiency and conservation minimizes climate change impacts on urban water demand.



WATER RESOURCE STRATEGIES

Each water resource strategy is a combination of water supply and conservation projects or opportunities that the region could pursue to achieve the goals of the IRP. Five water resource strategies were developed during the course of the IRP workshops, with a total of eight project portfolios. Each portfolio was modeled to determine performance and resiliency across the 106 climate scenarios. These strategies and portfolios are as follows:

Strategy A – Increase Chino Basin Groundwater Production

- ***Portfolio 1**:* Maximize the Use of Prior Stored Groundwater

Strategy B– Recycled Water Program Expansion

- ***Portfolio 2:*** Maximize Recycled Water (Including External Supplies) and Local Supply Projects and Implement Minimal Water Efficiency
- ***Portfolio 3:*** Portfolio 2 Plus Secure Supplemental Imported Water from MWD and Non-MWD Sources

Strategy C– Recycled Water & Water Efficiency Program Expansions

- ***Portfolio 4:*** Maximize Recycled Water (Including External Supplies) and Implement Moderate Water Efficiency
- ***Portfolio 5:*** Portfolio 4 Plus Implement High Water Efficiency

Strategy D– Increase Groundwater Recharge Supplies

- ***Portfolio 6*:** Maximize Supplemental Water Supplies and Recycled Water Supplies

Strategy E – Maximize Imported Water Supplies with Moderate Water Efficiency

- ***Portfolio 7***: Maximize the Purchase of Imported Water from MWD and Implement Minimal-Moderate Level of Water Efficiency
- ***Portfolio 8***: Portfolio 7 Plus Maximize Recycled Water

Table 4-1: Supply Totals for Portfolio 1

Supply Type	Baseline	Portfolio 1
Chino Groundwater	91,300	8,400
Stormwater	6,400	-
Recycled Water		-
Locally Developed[(1)]	64,700	-
External Supplies		-
Chino Desalter	17,700	-
Local Surface	22,100	-
Non-Chino Groundwater	11,600	-
Imported Water		-
MWD	69,750	-
Other		-
WUE [(2)]	1,000	-
add'l supplies subtotal		*8,400*
Total Water Supply	**283,550**	**291,950**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

Strategy A – Increase Chino Basin Groundwater Production (Portfolio 1)

Under Strategy A, the IRP Technical Work Group explored the implications of expanding groundwater production without bringing in additional water resources. Strategy A is similar to Single Variable Test 1 – Maximizing the Use of Prior Stored Chino Basin Groundwater. It includes capacity building projects, the use groundwater that was previously stored in the Chino Basin, and the implementation of water efficiency programs for direct recycled water customers. Although strategy this does not generate additional recycled water supply, it allows for additional recycled water to be used for groundwater recharge. One water supply portfolio, Portfolio 1, was developed for Strategy A, with additional supply amounts shown in Table 4-1.

Portfolio 1 assumes that an additional 8,400 AFY of groundwater supply would be pumped from the Chino Basin, with a 2040 “not-to-exceed” limit of 280,000 AF. Since new supplies in Portfolio 1 are limited to 8,400 AFY from stored Chino Basin groundwater the results are identical to the first test strategy. Implicit in this scenario, when there are periods where the portfolio’s water supplies exceed demands, the resulting surplus water supplies is assumed to be recharged into the groundwater basin. When this occurs, the stored water can be used at a later time.

Figure 4-7 shows unmet demands for Portfolio 1 in comparison to the baseline model run. Potential shortfalls begin to appear around 2022, which is the same as the baseline. In the majority (75%) of model runs, Portfolio 1 reduces unmet demands by 2040 from up to 27,900 AFY to 12,500 AF.

Stored water balances are shown in Figure 4-8. As illustrated, groundwater balances begin to accumulate in Portfolio 1 by 2020 with storage peaking around 2025. Stored groundwater starts to be used to meet demands by 2028 and continue to be drawn down through 2040.

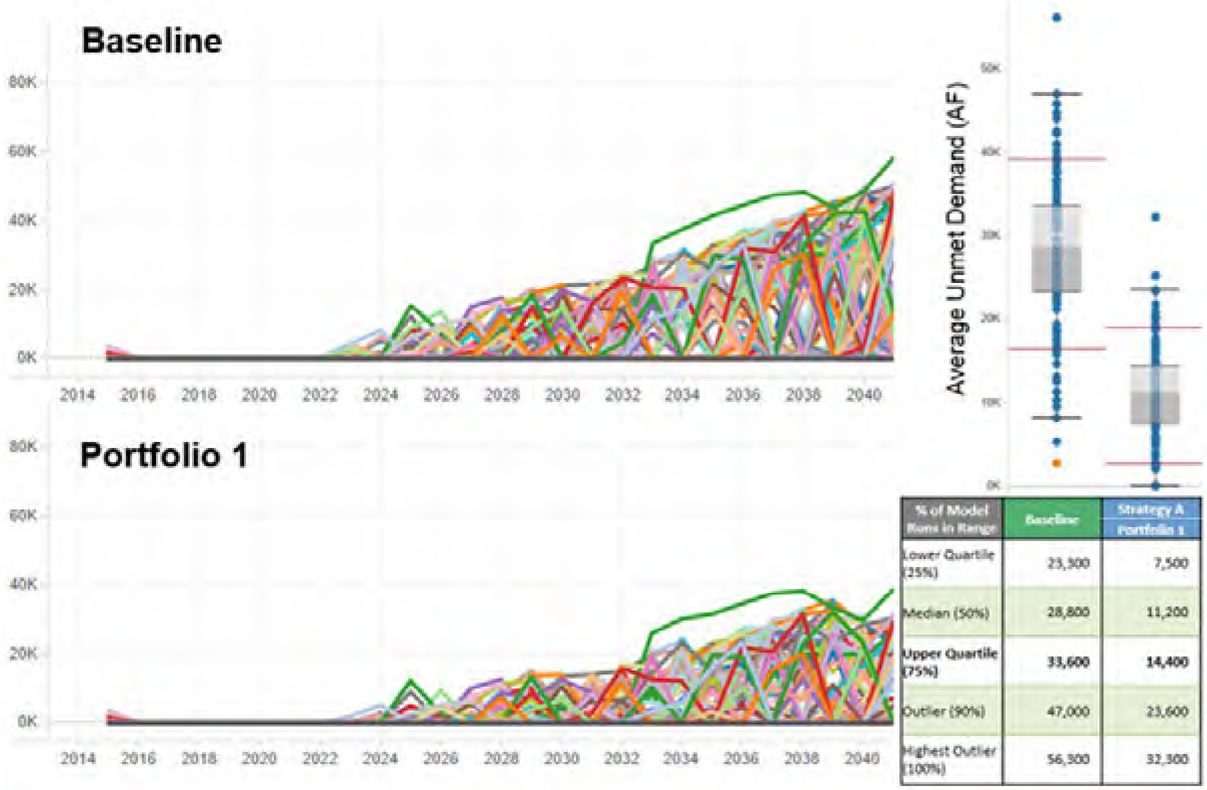
In summary, Portfolio 1

- Provides 95% of the demands under majority of climate scenarios
- Shows a 5% improvement over baseline conditions by utilizing existing stored groundwater on an annual basis
- However, the groundwater pulled from storage is a finite resource and due to the continued drawdown, this strategy is not sustainable without additional projects to replenish the storage or reduce demands.

Strategy B– Recycled Water Program Expansion (Portfolios 2 & 3)

Under Strategy B, the IRP Technical Work Group explores the continued expansion of the recycled water program. Strategy B focuses on how achieving a 40% increase in recycled water supply over the baseline condition would benefit the region. The strategy accomplishes this goal by using an additional 17,000 AFY of locally generated recycled water. As mentioned in Section 3, these additional recycled water supplies will be available as growth occurs in the service area. In addition, this strategy secures 10,500 AFY of external recycle water supply from neighboring jurisdictions by

Figure 4-7: Unmet Demands of Portfolio 1 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy A Portfolio 1
Lower Quartile (25%)	23,300	7,500
Median (50%)	28,800	11,200
Upper Quartile (75%)	33,600	14,400
Outlier (90%)	47,000	23,600
Highest Outlier (100%)	56,300	32,300

Figure 4-8: Stored Groundwater Balance of Portfolio 1

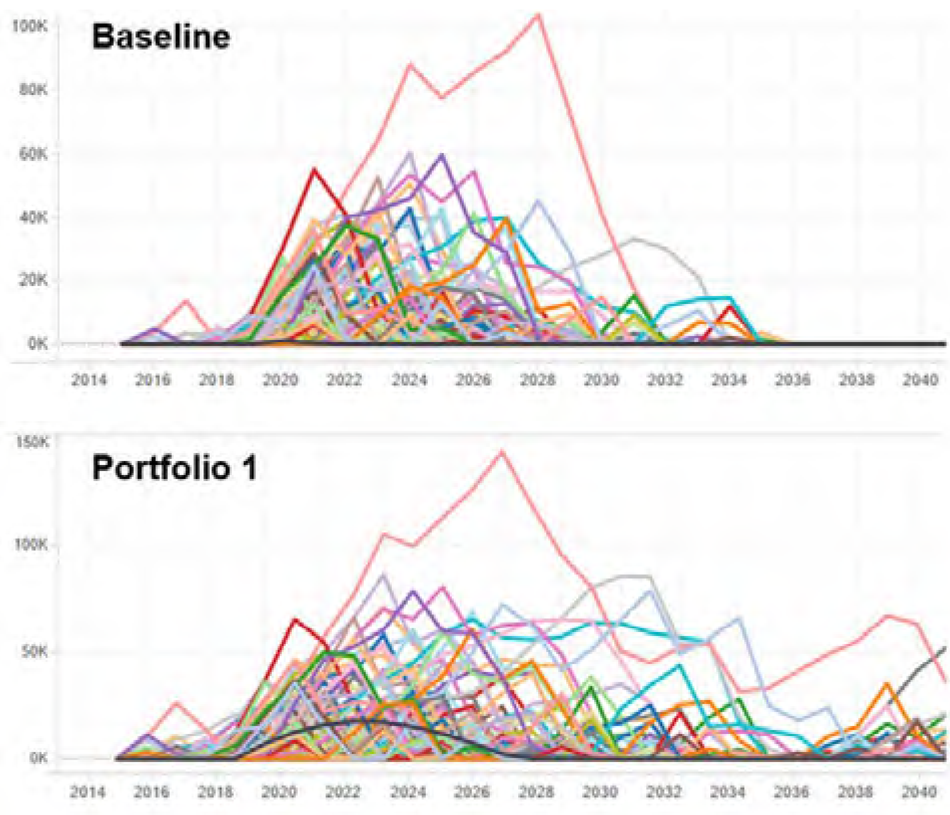


Table 4-2: Supply Totals for Portfolio 2 & 3

Supply Type	Baseline	Portfolio 2	Portfolio 3
Chino Groundwater	91,300	-	-
Stormwater	6,400	-	-
Recycled Water		-	-
Locally Developed[(1)]	64,700	17,000	17,000
External Supplies		10,500	10,500
Chino Desalter	17,700	-	-
Local Surface	22,100	-	-
Non-Chino Groundwater	11,600	-	-
Imported Water		-	-
MWD	69,750	-	7,850
Other		-	4,900
WUE [(2)]	1,000	5,000	5,000
add'l supplies subtotal		*32,500*	*45,250*
Total Water Supply	**283,550**	**316,050**	**328,800**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

2040. Strategy B also includes 5,000 AFY of additional device based conservation savings.

Two water supply portfolios were developed for Strategy B. The first, Portfolio 2, models the additional water supplies as described above. The second, Portfolio 3 includes all of Portfolio 2 supplies plus additional imported water as shown in Table 4-2. Imported water supplies include MWD Tier 1 and/or wet year purchases of supplemental water for groundwater replenishment. A complete list of projects in Portfolios 2 and 3 can be found in Appendix 6.

Figure 4-10 shows unmet demands for Portfolio 2 in comparison to the baseline model run. Potential shortfalls for Portfolio 2 begin to appear around 2024, which is two years later than baseline conditions. In the majority of model runs, Portfolio 2 reduces unmet demands by 2040 from to 27,900 AFY to 9,000 AF.

Stored groundwater balances for Portfolio 2 are illustrated in Figure 4-10. Groundwater balances begin to accumulate by 2018 with the majority of the model runs building around 25,000 AFY or less of stored water. By 2040 the quantity of stored water is depleted in approximately 90% of the climate runs.

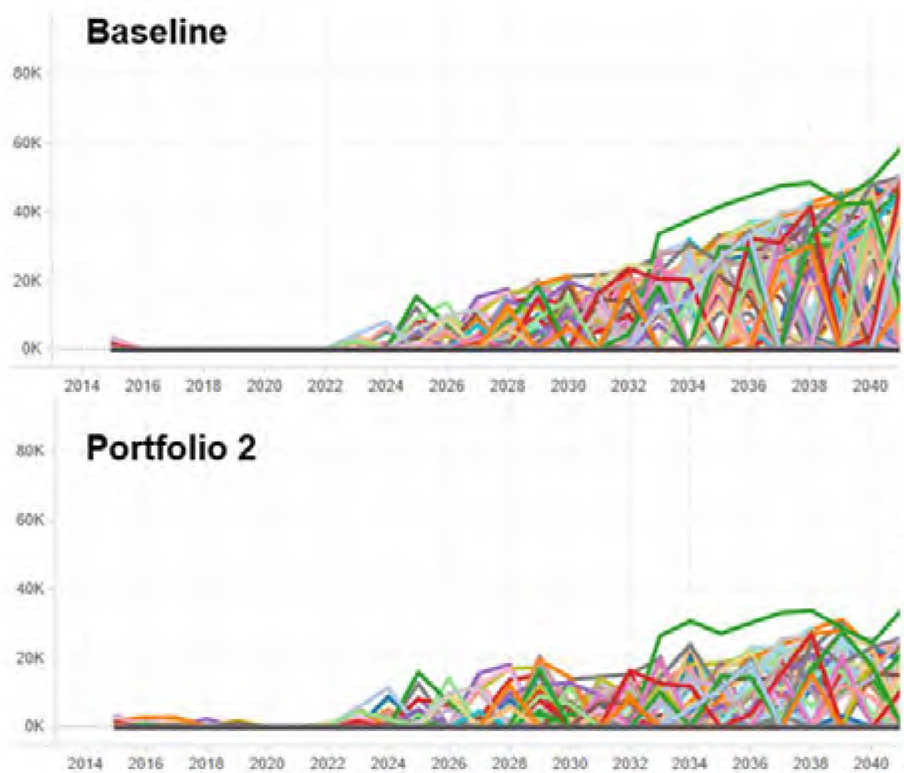
Unmet demands for Portfolio 3 in comparison to the baseline model run are shown in Figure 4-11. Potential shortfalls for Portfolio 3 begin to appear after 2035, 13 years after the baseline condition. In the majority of model runs, Portfolio 3 reduces unmet demands in 2040 from 27,900 AFY to 9,000 AF.

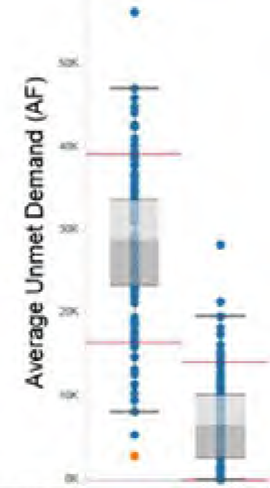
Stored water balances for Portfolio 3 are illustrated in Figure 4-12. Portfolio 3 behaves in a similar fashion to Portfolio 2, however there is a much greater probability of accumulating stored water. Approximately 70% of the runs in Portfolio 3 have water in storage by 2040. The range of stored water falls between 0 AFY and 280,000 AF.

In summary, Portfolios 2 and 3 under 75% of the climate scenarios:

- Provide 90% supply reliability under majority of climate conditions.
- Show a 5% improvement over baseline conditions by utilizing existing stored groundwater on an annual basis
- Water supply shortfalls are delayed by two years as compared to baseline conditions.
- Extend the ability to produce water stored water, with the majority of climate runs having the ability to build and maintain stored supplies through 2040

Figure 4-9: Unmet Demands of Portfolio 2 Compared to Baseline





% of Model Runs in Range	Baseline	Strategy [illegible] Portfolio 2
Lower Quartile (25%)	23,300	2,500
Median (50%)	28,800	6,600
Upper Quartile (75%)	33,600	10,000
Outlier (90%)	47,000	19,600
Highest Outlier (100%)	56,300	28,200

Figure 4-10: Stored Groundwater Balance of Portfolio 2

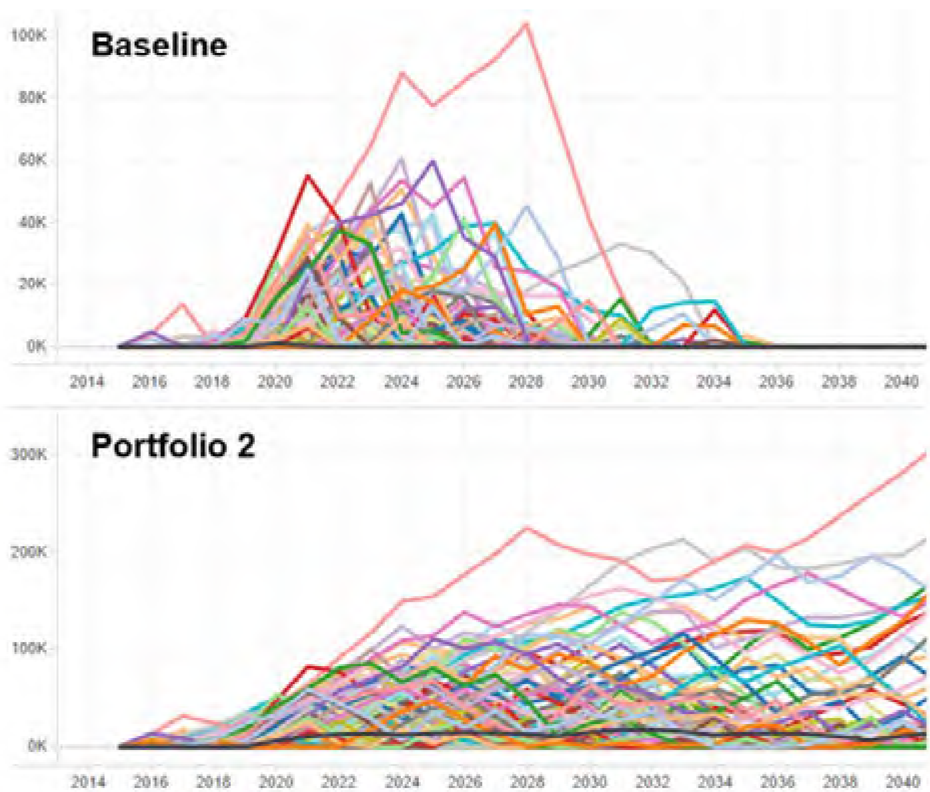
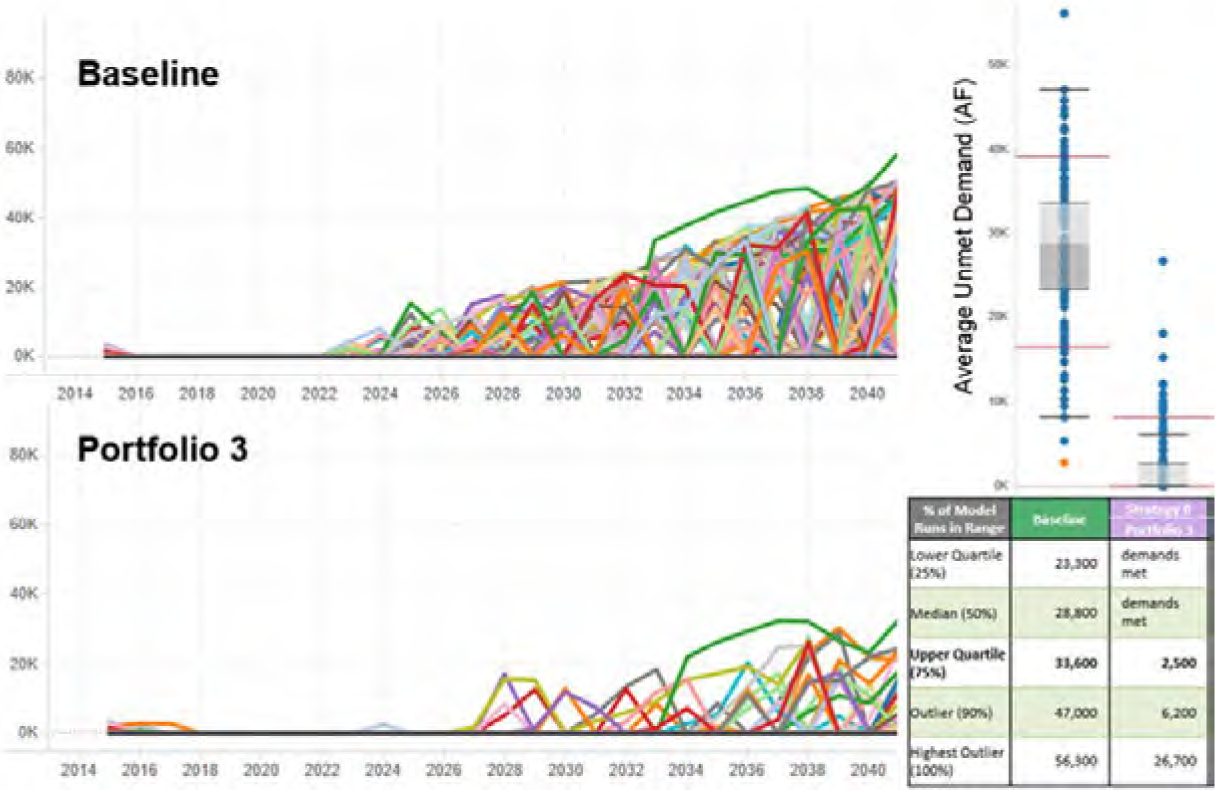
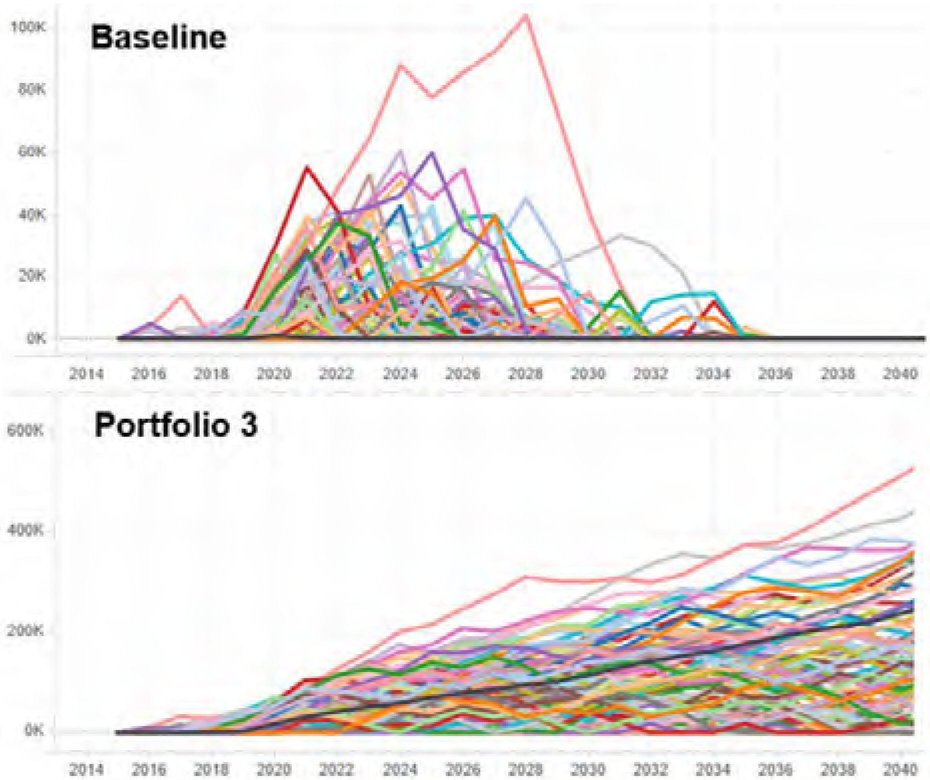


Figure 4-11: Unmet Demands of Portfolio 3 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy 0 Portfolio 3
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	33,600	2,500
Outlier (90%)	47,000	6,200
Highest Outlier (100%)	56,300	26,700

Figure 4-12: Stored Groundwater Balance of Portfolio 3



Strategy C – Recycled Water & Water Efficiency/ Conservation Program Expansions (Portfolios 4 & 5)

Under Strategy C, the IRP Technical Work Group evaluated how increased recycled water and water efficiency/conservation programming could benefit the region. With the focus on outdoor irrigation efficiency, there is a signification amount of water savings that could be achieved in both existing and future developments when compared with baseline conditions.

Strategy C assumes that a minimum of four agencies within IEUA's service area are implementing budget-based rates and increasing device-based conservation programming by 2020. This strategy also increases recycled water supply by utilizing an additional 17,000 AFY of locally generated recycled water, securing 10,500 AFY of an external recycle water supply by 2040, and implementing recycled water use efficiency programs to extend supplies.

Two water supply portfolios were developed for Strategy C. The first, Portfolio 4, models the additional water supplies as described above. The second, Portfolio 5, includes all of Portfolio 4 supplies plus the addition of two additional agencies adopting budget-based rates by 2020 and the addition of supplemental imported water as shown in Table 4-3. Imported water supplies include MWD Tier 1 and/or wet year purchases of supplemental water for groundwater replenishment. A complete list of projects in the portfolios can be found in Appendix 6.

Unmet demands for Portfolio 4 are shown in comparison to the baseline conditions in Figure 4-13. Portfolio 4 meets projected demands through 2040 100% of the time.

Stored water balances are illustrated in Figure 4-14 As illustrated, groundwater balances begin to accumulate in Portfolio 4 by 2022 with the majority of model runs continuing to build stored water through 2040. By 2040, 105 of the 106 model runs accumulated a minimum of 200,000 AFY of stored water.

Unmet demands for Portfolio 5 are shown in comparison to the baseline model run in Figure 4-15. Portfolio 5 meets projected demands through 2040 100% of the time.

Table 4-3: Supply Totals for Portfolio 4 & 5

Supply Type	Baseline	Portfolio 4	Portfolio 5
Chino Groundwater	91,300	-	-
Stormwater	6,400	-	-
Recycled Water		-	-
Locally Developed[1]	64,700	17,000	17,000
External Supplies		10,500	10,500
Chino Desalter	17,700	-	-
Local Surface	22,100	-	-
Non-Chino Groundwater	11,600	-	-
Imported Water		-	-
MWD	69,750	667	667
Other		-	4,900
WUE [2]	1,000	36,700	55,050
add'l supplies subtotal		*64,867*	*88,117*
Total Water Supply	**283,550**	**348,417**	**371,667**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

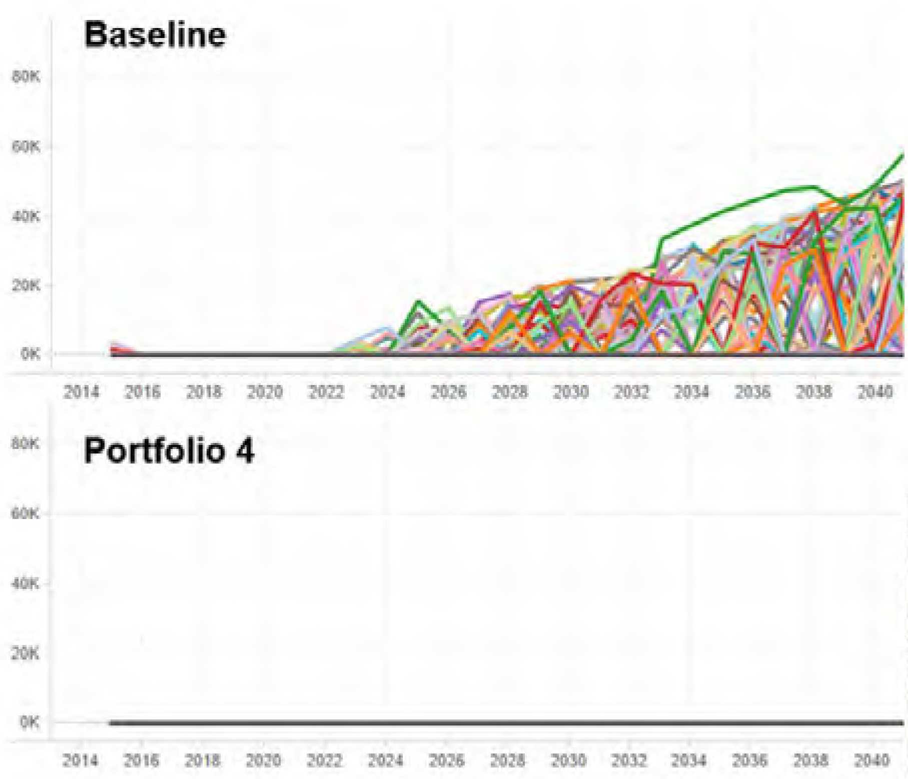
(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

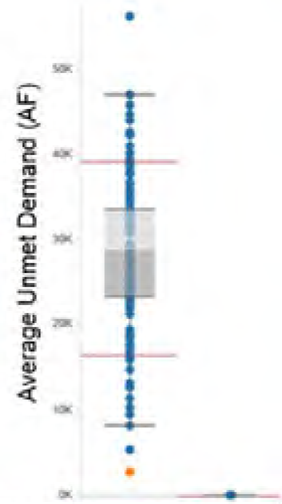
Stored water balances for Portfolio 5 are illustrated in Figure 4-16. As illustrated, groundwater balances begin to accumulate in Portfolio 3B by 2020 with majority of model runs continuing to build stored water through 2040. By 2040, 105 of the 106 model runs accumulated a minimum of 500,000 AFY of stored water.

In summary, Portfolios 4 and 5 perform under 75% of the climate scenarios:

- Have no unmet demands across all climate scenarios due to reduced need for water
- Build water in storage consistently across climate scenarios, which could create an opportunity to sell surplus water
- Portfolio 4 has the potential for stored groundwater to build to over 200,000 AFY by 2040
- Portfolio 5 has the potential for stored groundwater to build to over 500,000 AFY by 2040

Figure 4-13: Unmet Demands of Portfolio 4 Compared to Baseline





% of Model Runs in Range	Baseline	Strategy C Portfolio 4
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	33,600	demands met
Outlier (90%)	47,000	demands met
Highest Outlier (100%)	56,300	demands met

Figure 4-14: Stored Groundwater Balance of Portfolio 4

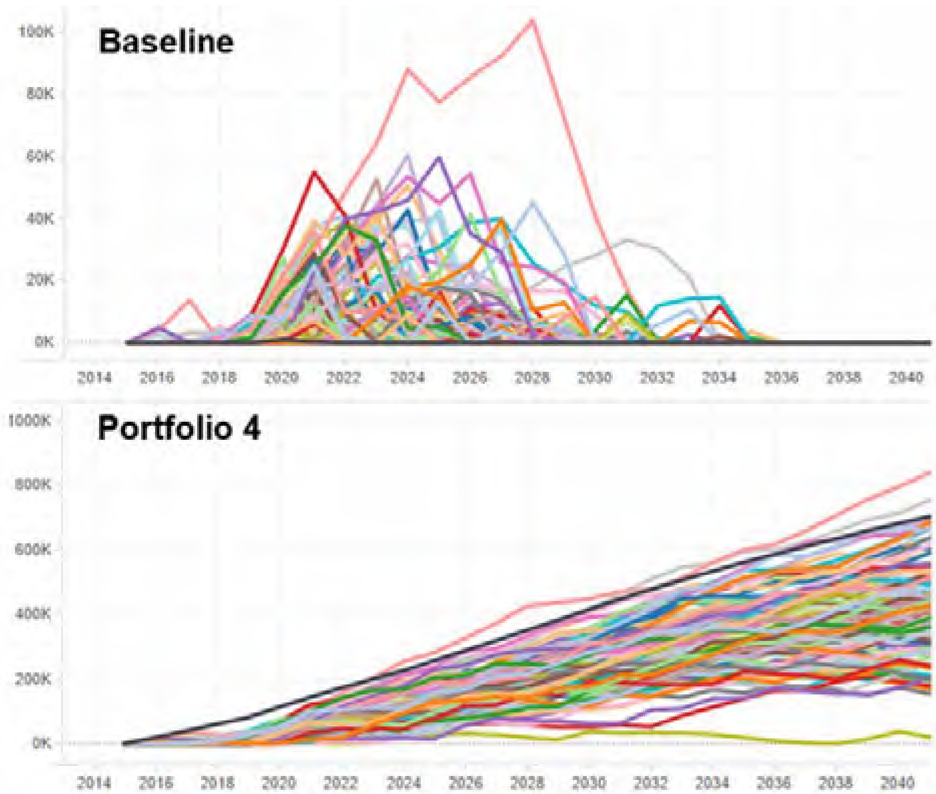
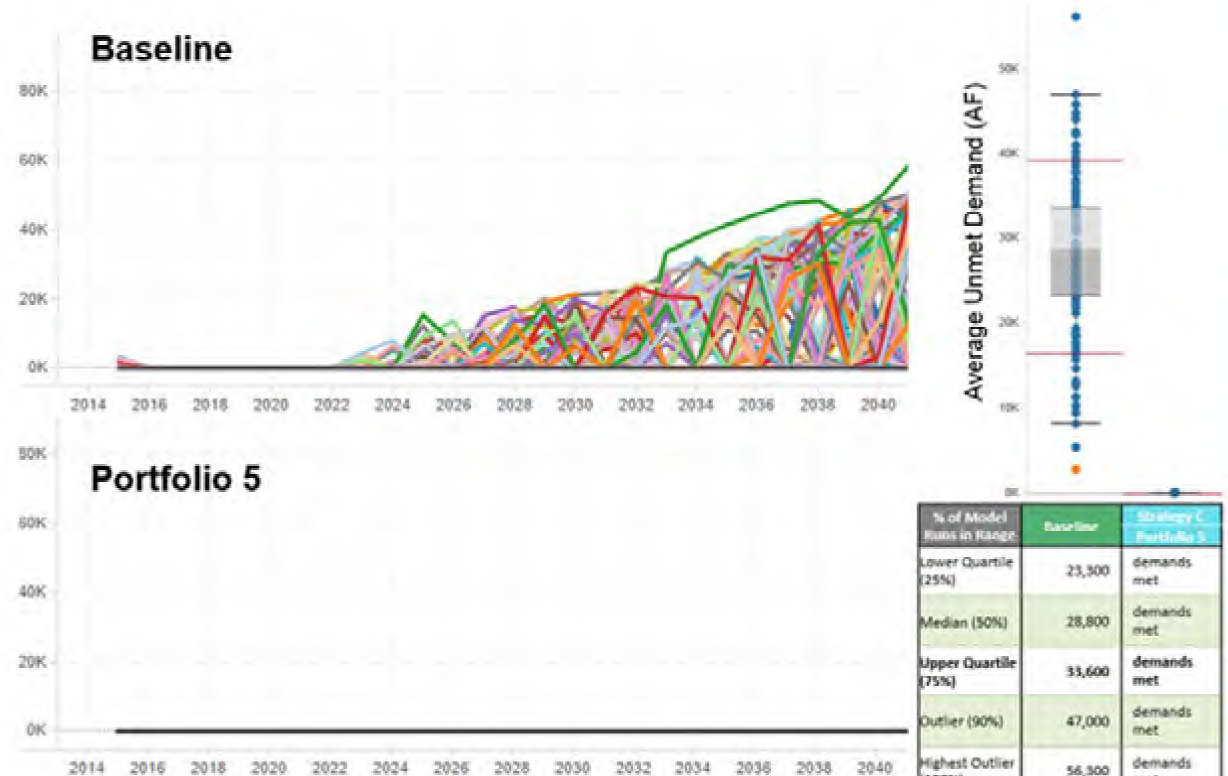


Figure 4-15: Unmet Demands of Portfolio 5 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy C Portfolio 5
Lower Quartile (25%)	23,500	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	33,600	demands met
Outlier (90%)	47,000	demands met
Highest Outlier (100%)	56,300	demands met

Figure 4-16: Stored Groundwater Balance of Portfolio 5

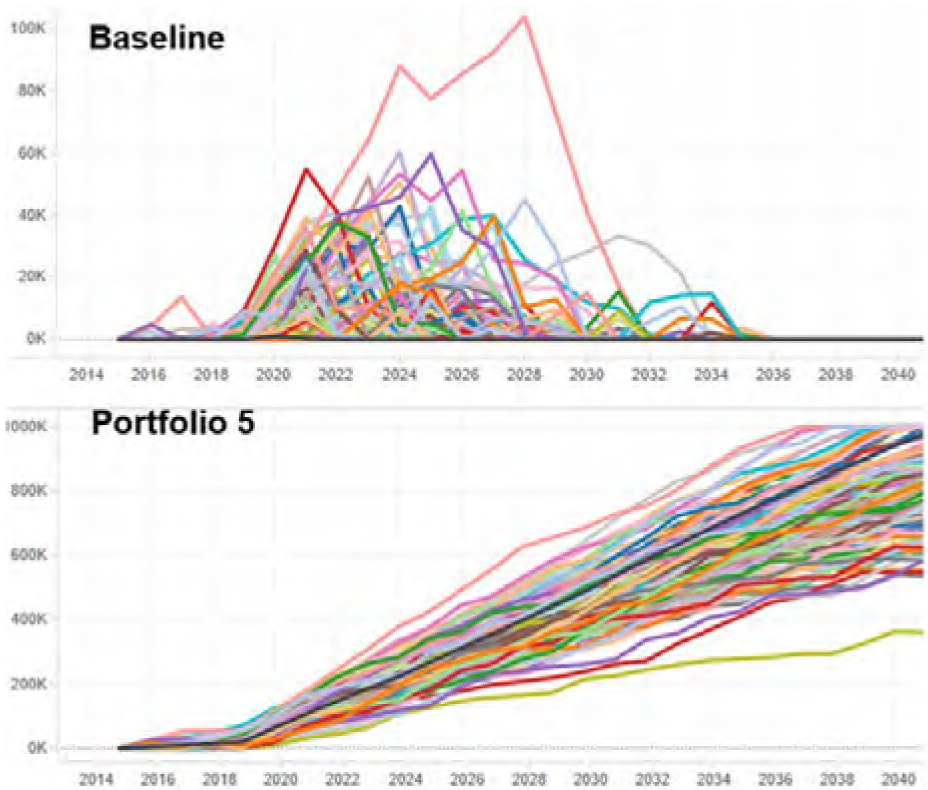


Table 4-4: Supply Totals for Portfolio 6

Supply Type	Baseline	Portfolio 6
Chino Groundwater	91,300	8,400
Stormwater	6,400	-
Recycled Water		-
Locally Developed(1)	64,700	20,800
External Supplies		9,000
Chino Desalter	17,700	-
Local Surface	22,100	-
Non-Chino Groundwater	11,600	2,500
Imported Water		-
MWD	69,750	667
Other		6,400
WUE (2)	1,000	13,500
add'l supplies subtotal		*61,267*
Total Water Supply	**283,550**	**344,817**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

Strategy D– Increase Groundwater Recharge Supplies

Under Strategy D, the IRP Technical Work Group focused on developing water supply interties with neighboring agencies in the watershed. Intermediate levels of water use efficiency/conservation are implemented in the form of two agencies adopting budget-based rates by 2020. In addition, all potential locally produced recycled water would be utilized in this strategy. One water supply portfolio, Portfolio 6, was developed for Strategy 6, with water supplies shown in Table 4-4. A complete list of projects in Portfolio 6 can be found in Appendix 6.

Unmet demands for Portfolio 6 in comparison to the baseline conditions are shown in Figure 4-17. Portfolio 6 meets projected demands through 2040 95% of the time.

Stored water balances are shown in Figure 4-18. As illustrated, groundwater balances begin to accumulate in Portfolio 6 by 2020. Due to variability in wet year supplemental supplies, stored water balances become highly variable and it is unclear whether stored water continues to build or draw down through 2040.

In summary, 75% of the time Portfolio 6:

- Eliminates unmet demand through 2040 due to reduced outdoor water demands from increased water use efficiency/conservation programming
- Has the potential to build stored groundwater through 2040, but the amount varies with climate conditions
- Takes advantage of climate resistant supplies by maximizing recycled water and water use efficiency

Strategy E – Maximize Imported Water Supplies with Moderate Conservation

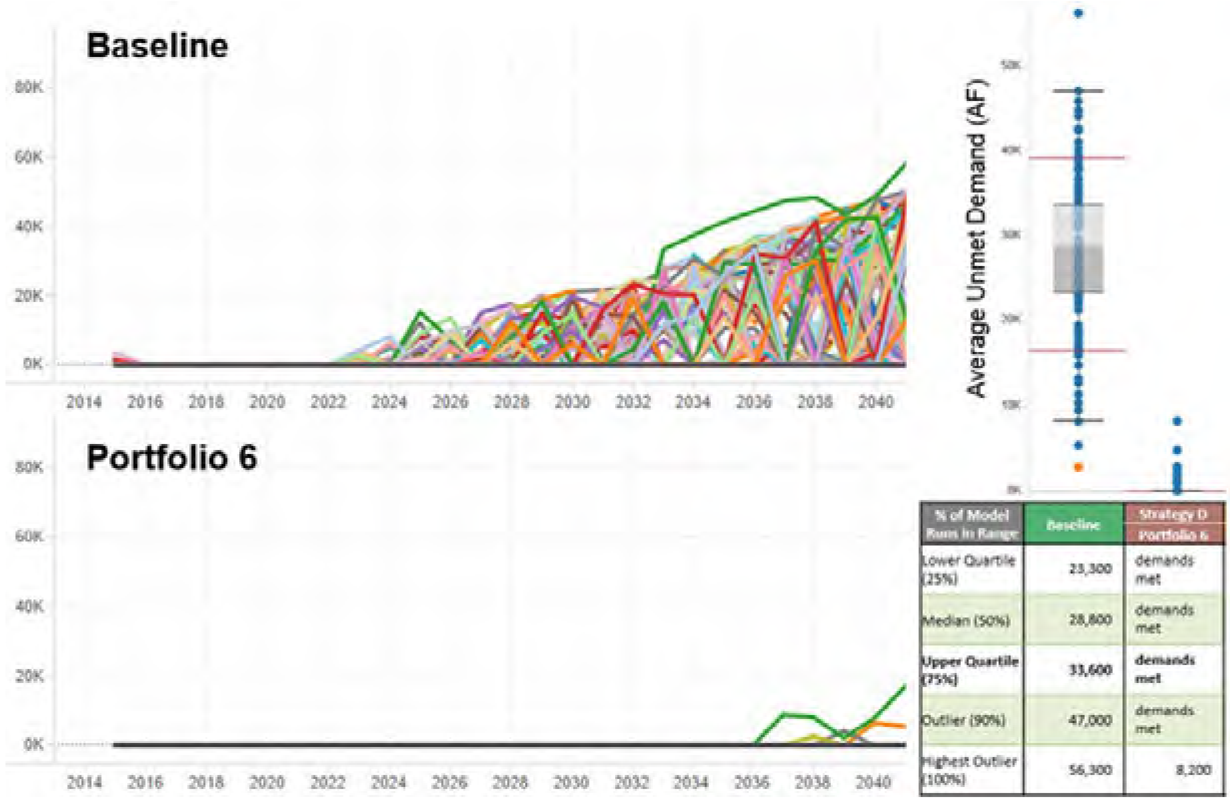
Under Strategy E, the IRP Technical Work Group evaluated how maximizing the purchase of imported water could alleviate pressure on and extend the availability of local water resources. This strategy allows for the purchase of up to 93,300 AFY of imported water to meet urban demand or to be used for groundwater replenishment. In addition, the strategy includes an intermediate level of water use efficiency/conservation in the form of two agencies adopting budget-based rates by 2020.

Two water supply portfolios were developed for Strategy E. The first, Portfolio 7, models the additional water supplies as described above. The second, Portfolio 8, includes all of the supplies of Portfolio 7 plus the addition of maximizing all locally produced recycled water as shown in Table 4-5. A complete list of projects in Portfolios 7 and 8 can be found in Appendix 6.

Unmet demands for Portfolio 7 in comparison to the baseline conditions are shown in Figure 4-19. Portfolio 7 meets projected demands through 2040 across 25% of the model runs.

Stored water balances are illustrated in Figure 4-20. As shown, groundwater balances begin to accumulate in Portfolio 7 by 2020 with the majority of model runs continuing to build stored water through 2040. Due to variability in wet year supplemental supplies, stored water balances become highly variable and unclear

Figure 4-17: Unmet Demands of Portfolio 6 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy D Portfolio 6
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	33,600	demands met
Outlier (90%)	47,000	demands met
Highest Outlier (100%)	56,300	8,200

Figure 4-18: Stored Groundwater Balance of Portfolio 6

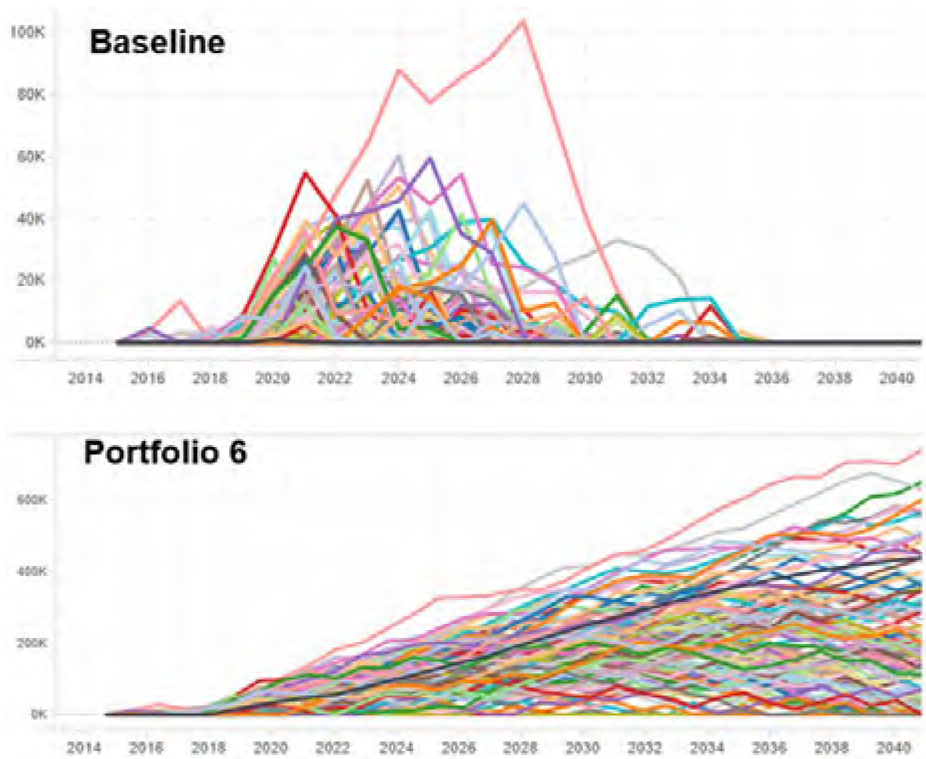
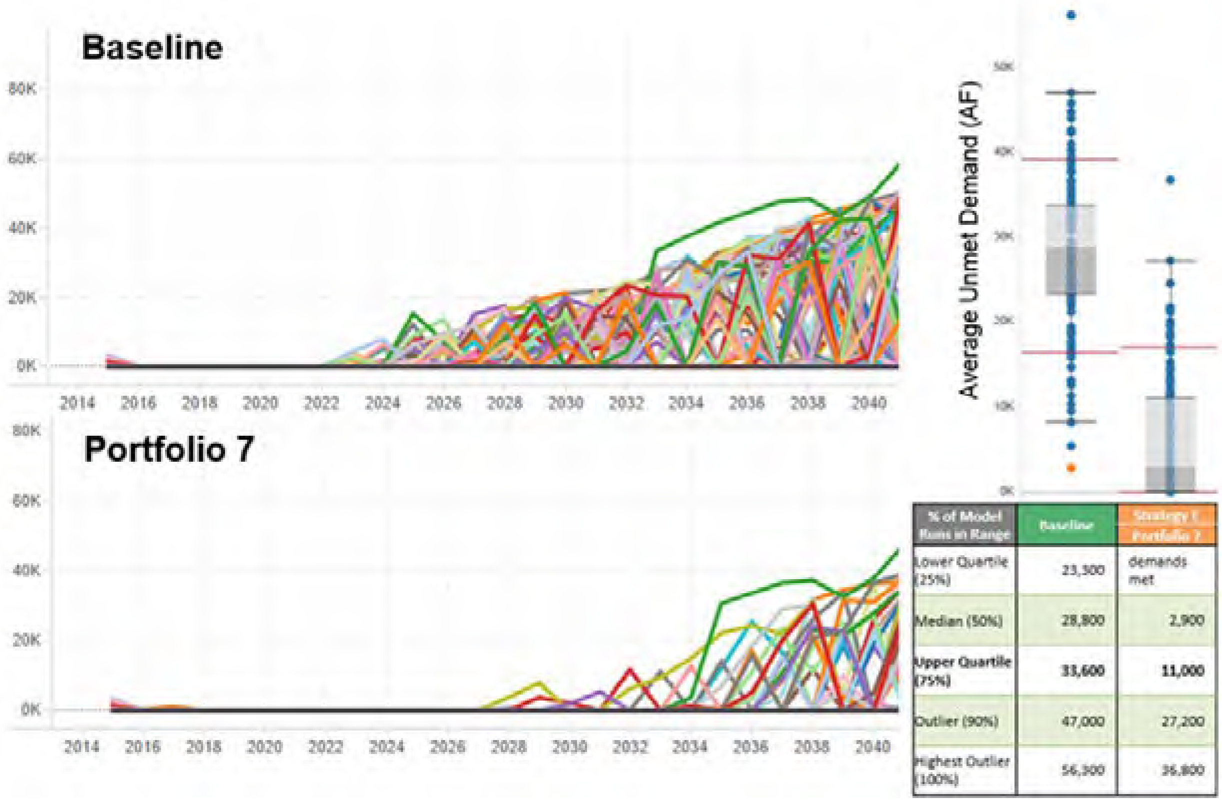
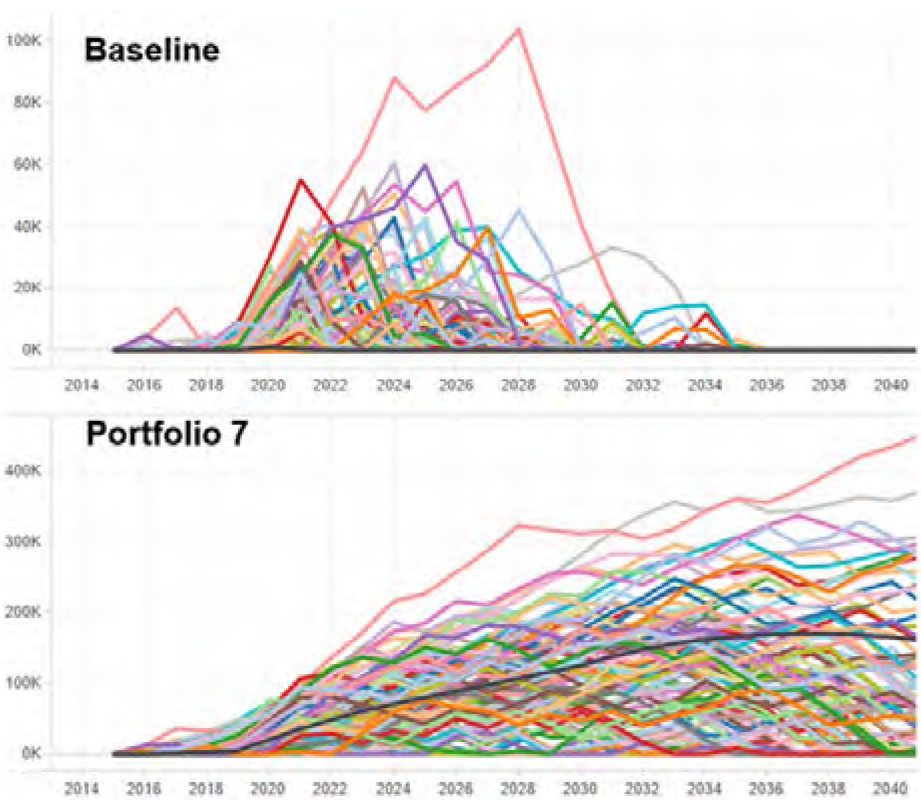


Figure 4-19: Unmet Demands of Portfolio 7 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy [illegible] Portfolio 7
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	2,900
Upper Quartile (75%)	33,600	11,000
Outlier (90%)	47,000	27,200
Highest Outlier (100%)	56,300	36,800

Figure 4-20: Stored Groundwater Balance of Portfolio 7



whether stored water continues to build or drawn down through 2040.

Unmet demands for Portfolio 8 in comparison to the baseline model run are shown in Figure 4-21. Portfolio 8 meets projected demands through 2040 100% of the time.

Stored water balances are illustrated in Figure 4-22. As shown, groundwater balances begin to accumulate in Portfolio 8 by 2020 with majority of model runs continuing to build stored water through 2040. Due to variability in wet year supplemental supplies, stored water balances become highly variable and unclear whether stored water continues to build or drawn down through 2040.

In summary, Portfolio 7 and 8:

- Portfolio 7 has a supply shortfall of up to 11,000 AFY under 75% of the climate scenarios
- Portfolio 8 meets demand under 100% of the climate scenarios, this increase in performance is due to the addition of recycled water.
- Both portfolios have the potential to build stored groundwater through 2040, but the amount in storage varies by climate conditions
- After 2030, Portfolio 8 builds stored groundwater under majority of climate scenarios due to the addition of recycled water.

Table 4-5: Supply Totals for Portfolio 7 & 8

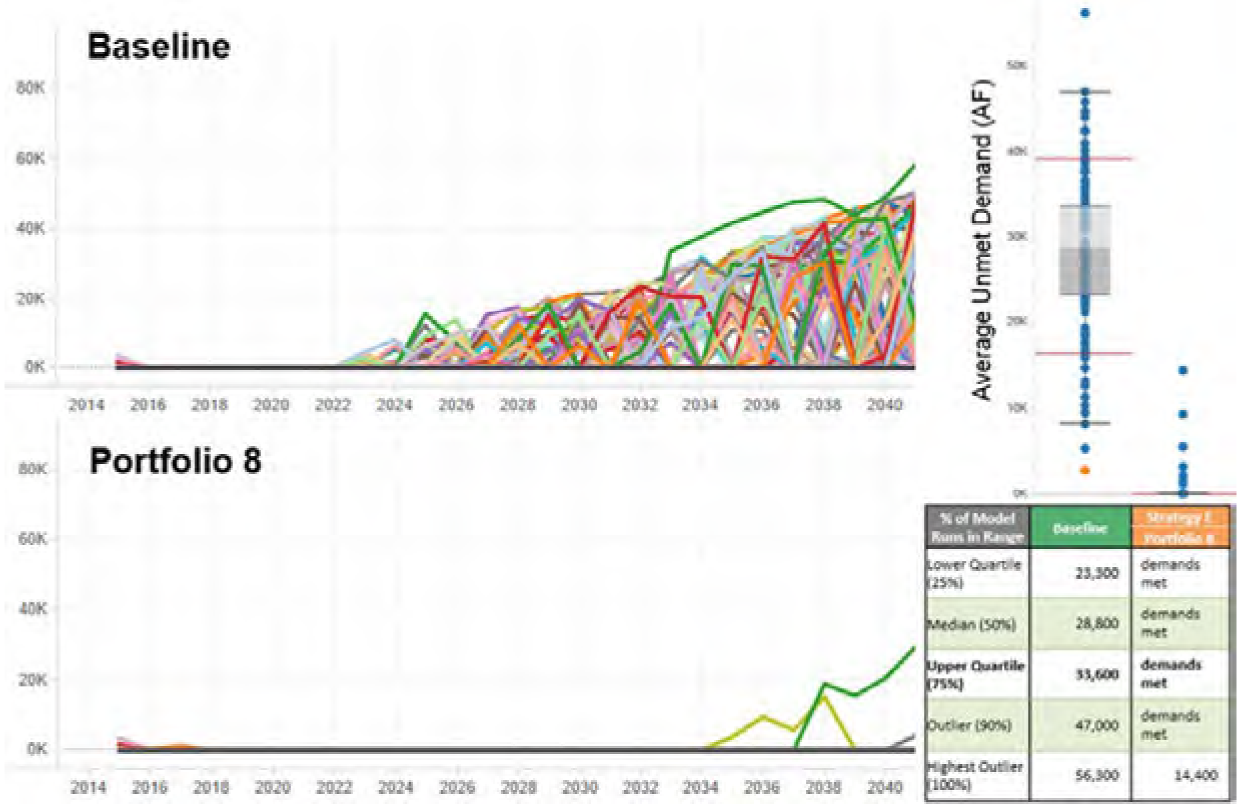
Supply Type	Baseline	Portfolio 7	Portfolio 8
Chino Groundwater	91,300	-	-
Stormwater	6,400	-	-
Recycled Water		-	-
Locally Developed[1]	64,700	-	20,800
External Supplies		-	7,000
Chino Desalter	17,700	-	-
Local Surface	22,100	-	-
Non-Chino Groundwater	11,600	-	-
Imported Water		-	-
MWD	69,750	23,550	23,550
Other		1,000	1,000
WUE [2]	1,000	18,500	18,500
add'l supplies subtotal		*43,050*	*70,850*
Total Water Supply	**283,550**	**326,600**	**354,400**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

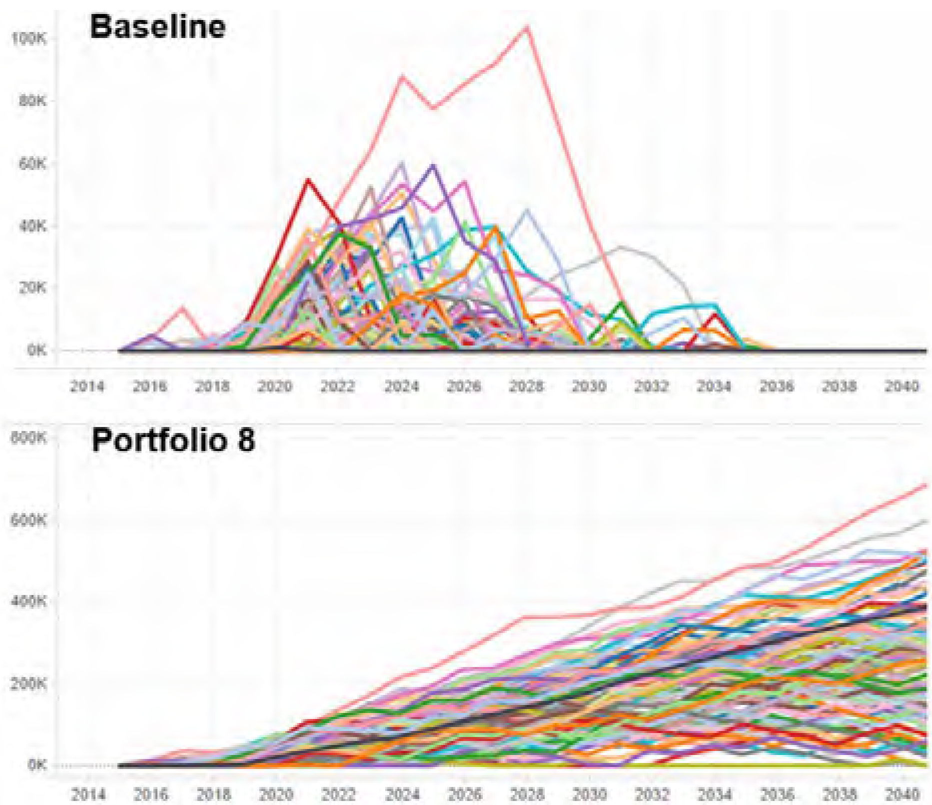
(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

Figure 4-19: Unmet Demands of Portfolio 7 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy E Portfolio 8
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	33,600	demands met
Outlier (90%)	47,000	demands met
Highest Outlier (100%)	56,300	14,400

Figure 4-20: Stored Groundwater Balance of Portfolio 7



Low water-use California native plants in a garden setting


OPEN

5. Conclusions & Next Steps

Core Findings of the 2015 IRP

Lessons Learned from the Climate Simulations

Final IRP Recommendations and Next Steps

Strawberry fields near a new development in Ontario.

Conclusions & Next Steps

With the adoption of the Chino Basin OBMP in 2000, the region embarked on a new era of water management. Over the past 15 years, more than $500 million was invested in the development of local water supplies. This resulted in the expansion of the regional recycled water program as well as in the development of significant groundwater capture, treatment, and storage programs.

As a result, when the record-breaking drought of 2012 began, the region was prepared. The region has had sufficient water supplies available to meet water needs during the drought of the last 4 years without constraining new development or economic growth. These local water resource programs form the foundation for the region's future water resiliency.

Climate change is now creating uncertain conditions and new water management challenges for the region's future. The purpose of the 2015 IRP is to evaluate the resiliency of the region's water resources under climate change and to identify the best strategies for ensuring that the region's future water needs through 2040 can be sustainably met. With the information from the IRP, the region has a roadmap to guide the next 25 years of regional investments in water supply development and management programs.

CORE FINDINGS

The region adopted goals for the 2015 IRP. In looking to the future, the region wanted a water development and management plan that would accomplish the following:

Resilience — Regional water management flexibility to adapt to climate change, economic growth, and any changes that limit, reduce, or make water supplies unavailable.

Water Efficiency — Meet or exceed rules and regulations for reasonable water use.

Sustainability — Provide environmental benefits, including energy efficiency, reduced green house gas emissions, and water quality improvements to meet the needs of the present without compromising the ability of future generations to meet their own needs.

Cost Effectiveness — Supply regional water in a cost-effective manner and maximize outside funding.

To achieve these goals, the IRP evaluated projected water needs and available water supplies through 2040. Future climate change scenarios were then used to "stress-test" an array of water development actions that were organized into "portfolios".

These results form the basis for the IRP's final recommendations. The core findings are:

1. The region's past investments in local water supplies and the diversification of the available water resources have positioned the region well to deal with the future impacts of climate change. If no further actions were taken beyond the currently planned investments in regional supplies and water use efficiency, the region would be able to meet 80-

90% of its projected water needs by 2040 .

2. Portfolios that combined water supply and water efficiency actions yielded the most adaptive strategies for the region. Many portfolios were able to reduce the region's risk of not having sufficient water supplies to meet future needs. Several portfolios were able to dramatically increase the amount of water stored in the Chino Basin. The portfolios that performed the best under the climate change scenarios were:

   - 2B – Maximize recycled water (includes bringing in external recycled water supplies), implement modest water use efficiency, and access supplemental imported water
   - 3A – Maximize recycled water (includes bringing in external recycled water supplies) and implement moderate water use efficiency
   - 3B – Maximize recycled water (includes bringing in external recycled water supplies) and implement high water use efficiency
   - 4 – Maximize supplemental water supplies and recycled water (includes bringing in external recycled water supplies)
   - 5B – Maximize the purchase of MWD water supplies, use of recycled water (includes bringing in external recycled water), and implementation of modest water use efficiency

LESSONS LEARNED FROM THE CLIMATE SIMULATIONS

Value of Water Use Efficiency — The climate scenarios reveal that the addition of very modest levels of water use efficiency (such as 10% reduction in water use) improved the performance of all portfolios and yielded significant benefits the region. The regional benefit is demonstrated through Portfolio 3B in which the actions of two Agencies achieving the State's existing water use efficiency standards results in the region's capacity to increase supplies in groundwater storage while meeting water needs through 2040.

Value of Recycled Water — The climate scenarios confirmed that recycled water is the region's most climate resilient water supply because the amount of available water to the region is not impacted by dry years. The regional benefit of maximizing recycled water is demonstrated through the comparison of Strategy B and C in which the use of recycled water enables the region to increase supplies in groundwater storage, especially in combination with increased water use efficiency.

Value of Supplemental Water — The climate scenarios highlight the importance of securing supplemental water – surface, imported, and external recycled water supplies – when it is available to build a stronger supply buffer for dry years or when State Water Project availability is limited. The regional benefit of opportunistically securing these external water supplies is demonstrated through the comparison of Portfolios 4, 5, and 6 which enables the region to increase supplies in groundwater storage, especially in combination with increased water use efficiency.

Value of Increasing Groundwater Storage — The climate scenarios affirmed the importance of adequate groundwater reserves in addressing future climate uncertainties or catastrophic events, such as a major facility or pipeline break or a loss in supplies. A broader regional benefit is the role that these reserves can play when managed as a regional water bank to enhance water supply reliability within the Santa Ana Watershed and across Southern California. Portfolios 4, 5, 6 and 8 highlight the value to the region of the increased flexibility and resiliency resulting from increased groundwater storage.

RECOMMENDATIONS & NEXT STEPS

Plans to protect air and water, wilderness and wildlife are in fact plans to protect man.

-Stewart Udall

The region adopted the following core recommendations for the 2015 IRP:

- **Continue investment in recycled water** projects to maximize the beneficial reuse.
- **Acquire low TDS supplemental water to enhance groundwater quality** to sustain production and reduce salinity.
- **Implement water use efficiency measures** to reduce current urban demand by at least 10% to enhance water supply resiliency.
- **Strategically maximize the purchase of supplemental water** for recharge or in-lieu when available.
- **Include external supplies**, consisting of exchanges, storage, and water transfers, **strategically in combination with conservation** to augment groundwater recharge, recycled water, **and build storage reserves**. External supplies include surface, imported, and non-potable water.
- **Continue to maximize stormwater recharge projects**, including rainwater capture and infiltration.

These recommendations will be evaluated through a Programmatic Environmental Impact Report in mid-2016. As funding opportunities become available, specific project cost and environmental assessments will be conducted as needed, particularly in relation to the regional benefit of the proposed actions. Phase 2 of the IRP will address additional detailed project level analysis including project scopes, costs, prioritization, and implementation schedule.

Table 5-1: Summary of How Phase 1 Recommendations Meet the IRP Goals

Water Use Efficiency	
Water Efficiency	This would help meet rules and regulations for reasonable water use now and in the future.
Sustainability	Savings realized through the implementation of the program extends the groundwater production for future generations.
Resilience	When combined with other programs, such as recycled water, creates storage to accommodate for abnormal and catastrophic events.

Recycled Water	
Water Efficiency	This would help meet rules and regulations for reasonable water use now and in the future, especially meeting current state mandates.
Sustainability	As a climate resistant supply, the beneficial use of recycled water when combined with Water Use Efficiency builds reserves within the Chino Basin.
Resilience	When combined with other programs, such as Water Use Efficiency, creates storage to accommodate for abnormal and catastrophic events.

Supplemental Water	
Water Efficiency	This would help meet rules and regulations for reasonable water use now and in the future, especially meeting current state mandates.
Sustainability	This would help meet rules and regulations for reasona-ble water use now and in the future, especially meeting current state mandates.
Resilience	as a climate resistant supply, the beneficial use of recycled water when combined with Water Use Efficiency builds reserves within the Chino Basin.

Groundwater Storage	
Sustainability	Storage reserves reduce dependence on climate variable supplies and are not impacted by climate once the supplies are in storage. As a climate resistant supply, the reserves can be used responsibly by future generations without depleting the Chino Basin.
Resilience	When combined with other programs, such as Water Use Efficiency, Recycled Water and Supplemental Water, creates storage to accommodate for abnormal and catastrophic events.

Appendices

1. A&N Technical Services Demand Forecast

2. Draft RAND Memo: "Evaluating Options for Improving the Climate Resilience of the Inland Empire Utilities Agency in Southern California"

3. A&N Technical Services Indoor/Outdoor Demands

4. A&N Technical Services Demand Influencing Factors

5. Full IRP Technical Committee Identified Project List

6. Project Lists for Water Resource Strategy Portfolios 1-8

California native plant, *Heteromeles arbutifolia*, displays crimson berries during the winter in the Chino Creek Wetlands and Educational Park.

Appendix 1:

A&N Technical Services Demand Forecast

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

IEUA Long Term Demand Forecast Model User Guide

A & N Technical Services, Inc.

May 20, 2015

Table of Contents

Abbreviations List

AWE – Alliance for Water Efficiency
CDR – Center for Demographic Research
CII – Commercial-Industrial-Institutional
CVWD – Cucamonga Valley Water District
FIRE – Financial Activity & Real Estate
FWC – Fontana Water Company
GIS – Geographic Information Systems
IEUA – Inland Empire Utilities Agency
IRP – Integrated Resource Plane
MVWD – Monte Vista Water District
MWD – Metropolitan Water District of Southern California
NAICS – North American Industry Classification Systems
RMC – Raines Melton and Carella
RTP - Regional Transportation Plan
SCAG – Southern California Association of Governments
SCS – Sustainable Communities Strategy
SIC – Standard Industrial Classification
TAZ – Traffic Analysis Zone

Introduction

This user guide documents the structure and use of the IEUA Long Term Demand Forecast Model.

Objectives

The model was constructed with the following objectives:

- Forecast demand and demand variability to 2040 in support of the IRP development process.
- Forecast demand as consumption, which we define as all of the consumption within IEUA service area boundaries.
- Base the demand forecast on the latest demographic forecast.
- Utilize a demand forecast method consistent with the MWD demand forecast methods.
- Utilize a conservation forecast method consistent with the AWE Tracking Tool that IEUA currently uses for conservation planning.
- Provide a way to assess the variability of future water demand forecasts to a wide range of scenarios that are built with a range of best-available data sources to accurately depict the effect of future uncertainties.

Approach

The approach in model development can be characterized as:

1. Acquiring the latest demographic forecast data from the SCAG 2012 RTP for all of the area within IEUA, for its retail water service areas, for its cities, and for its waste water tributary areas. (Enacted by the Center for Demographic Research.)
2. Inputting the demographic forecast into the demand forecast econometric equations to create a base forecast.
3. Calibrating the base forecast to normal demand (weather-normalized, employment-normalized). A separate statistical model of historical IEUA monthly water demand was estimated to develop empirical relationships between weather variation, the business cycle, and IEUA demand variability.
4. Inputting the quantified active and passive conservation forecast from the latest version of the AWE Tracking Tool that IEUA uses for conservation planning.

Discussion

Econometric Equations. MWD has cooperated with IEUA in the development of the demand forecast methods. Appendix A provides a review of the analytic structure of their long term water demand models.

Demand as Consumption. The base forecast has been calibrated to normalize demand –that is demand conditional on normal weather and normal economic activity. Note the caveat that some pumpers who are not accounted for by retailers may not be included.

Demographics 2035 to 2040. The SCAG 2012 RTP demographics only go out to the year 2035. We utilize a trend method similar to MWD for the years 2035 to 2040.

Section A: Index

The sections of this document correspond to the worksheets in the Long Term Demand Forecast Model. The following table provides the view of the first worksheet "Index". Clicking on any hyperlink will navigate to that section of the spreadsheet.

Inland Empire Utilities Agency

A MUNICIPAL WATER DISTRICT

IEUA Long Term Demand Forecast Model

Index of Worksheets	
Sheet Name	**Description**
Index	Index of worksheets for navigation
ControlPanel	Make scenario choices and see results.
Chart_Data	Arrays of data for charts
Model_Base	Base Case Scenario
Model_Scenario1	Scenario 1
Model_Scenario2	Scenario 2
Model_Scenario3	Scenario 3
WBBRS_Implementation	Inputs for water budget
WUE_Inputs	Inputs for water use efficiency plans

Section B: Control Panel

The *Control Panel* worksheet contains the "Scenario Manager" that allows the user to explore up to three different scenarios that use different combinations of future demand drivers. Demand drivers can include both short term drivers—such as one year weather swings--and long term drivers of future water demand such as population or employment growth. Water Use Efficiency drivers are broken out separately and include Water Budget Based Rate Structures and more traditional WUE/conservation programs. For more information on statistical analysis of Short Term IEUA Demand refer to Appendix E.

Each demand driver is discussed in sequence.

	Scenario Manager
Item	
	Scenario Name
Short Term Drivers	Drought Persistence
	Economic Cycle
	Short-Term Weather
Long Term Drivers	Sustainable Communities Housing
	Dwelling Units per Land Area
	Median Household Income Growth
	Long Term Climate Change
WUE Drivers	Water Budget Based Rate Structure (WBBRS)
	WUE Level

Short Term Drivers – 5 Years – 2015 to 2020

- **Drought Persistence** defines how much of recent demand reductions will persist into the future
    - amount of recent reduction that is permanent
        - 0 percent implies that everything will return to the baseline forecast
        - 4.6% percent implies that the 4.6% recent reduction is a permanent lifestyle change

The unexpressed bugbear is what is the "recent reduction"? It is reasonable to assume that one would want to know how much of a raw change in consumption is due to recession or weather. Fortunately IEUA has an empirical basis for such a determination in the short term IEUA demand model that is the source of the 4.6% recent reduction in demand (not attributable to recessionary effects.)

- **Economic Cycle** –The user can specify how much recession or boom could bump demand in a single year using the estimated annual standard deviation of business cycle effects from the short term IEUA demand model.
    - Recession year – demand minus 1 standard deviation from the IEUA short run water demand forecasting model
    - Baseline year—normal business cycle, no change
    - Growth year – demand plus 1 standard deviation from the IEUA short run water demand forecasting model

- **Short Term Weather –** Single wet, single dry, three consecutive dry years (required by UWMP). The effect of weather variation is defined using the estimated annual standard deviation of weather effects from the short term IEUA demand model.
    - Single wet year – demand minus 1 standard deviation from the IEUA short run water demand forecasting model
    - Single dry year – demand plus 1 standard deviation from the IEUA short run water demand forecasting model
    - Multiple dry year – demand plus 1.6 standard deviations from the IEUA short run water demand forecasting model

Long Term Drivers—2021 - 2050

- **Sustainable Communities Housing –** Derived scenarios explored in the SCAG Sustainable Communities Strategy, 2012 Regional Transportation Plan (p.114).
    - Baseline—future residential growth resembles the past, of which approximately 40% was high density multiple family.
    - More Sustainable—future residential growth resembles is approximately 71% high density multiple family.
    - Max Sustainable—future residential growth resembles is approximately 71% high density multiple family.

- **Dwelling Units per Land Area –**This driver allows another method of exploring effects of potential future densification.
    - Low Growth—future dwelling units per land area becomes less dense (minus one percent per year)
    - Baseline—future residential growth resembles past dwelling units per land area.
    - High Growth—future dwelling units per land area becomes more dense (plus one percent per year)
    - Very High Growth—future dwelling units per land area becomes more dense (plus two percent per year)

- **Median Household Income Growth –**3 alternative assumptions: low, baseline (2012 RTP), and high
    - Low Growth—median household income grows lower (minus one percent per year)
    - Baseline— median household income grows lower at predicted rate
    - High Growth— median household income grows faster than the baseline (plus one percent per year)

- **Long Term Climate Change –** Long term climate change is modeled by using recent GCC model predictions of potential increases in temperature with the short term IEUA demand model estimated temperature elasticity to depict this effect. (http://scenarios.globalchange.gov/report/regional-climate-trends-and-scenarios-us-national-climate-assessment-part-5-climate-southwest)
    - No Change— no long term climate change
    - P50 Median Expected Climate Change— 3.2% by 2040
    - P80 Median Expected Climate Change— 4.3% by 2040

WUE Drivers

- **Water Budget Based Rate Structure (WBBRS)** are depicted with alterative assumptions of how many agencies will adopt and roll out WBBRS over the next 5 years. These will be modeled as separate activities within the AWE Water Conservation Tracking Tool.
  - Low_Rollout_1 Agency—This results in approximately 10% of Single Family and Irrigation customers being affected within 5 years.
  - Mid_Rollout_2 Agencies--This results in approximately 30% of Single Family and Irrigation customers being affected.
  - High_Rollout_All Agencies-- This results in all Single Family and Irrigation customers being affected.

Note that the Baseline IEUA Demand Model allows a "pure price" effect—how customers would respond to an increase in the real average price of water

- **WUE Level –** the level of WUE Programs being implemented derives from separate account in the AWE Water Conservation Tracking Tool

  - Programmatic (Device-driven) WUE Programs -- Tiers 1, 2, 3 developed as part of the WUE Business Plan.

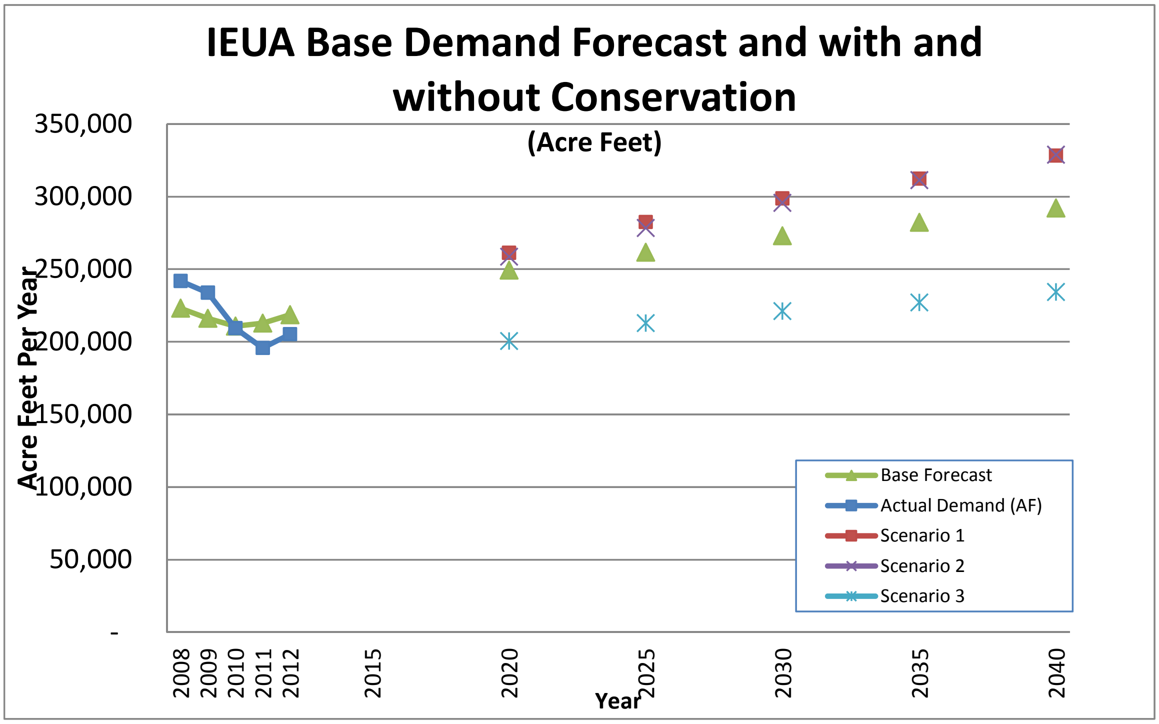
The Control Panel Worksheet contains drop down boxes to select values of demand drivers. A Collection of assumptions on demand drivers constitutes a demand forecasting scenario. Three scenarios are allowed. By allowing the user to define and control sources of forecast uncertainty in this control panel, one can more quickly develop a feel for which sources of uncertainty matter more than others using the visual feedback of dynamically changing plots of future water demand forecasts.

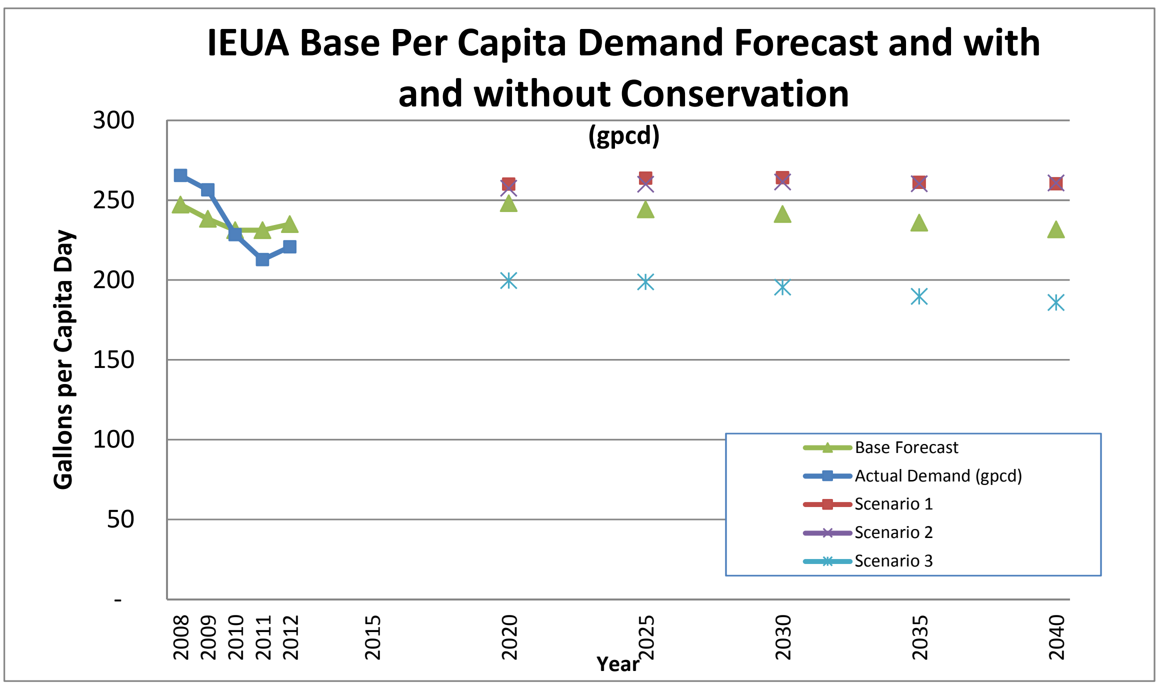
Each green box contains drop down boxes to choose values for each demand driver.

Scenario Manager Use drop down box to enter values. Do not copy and paste unless you paste values only.

Item		Scenario 1:	Scenario 2:	Scenario 3:
	Scenario Name	High	Intermediate	Low
Short Term	Drought Persistence	Drought_4.6%Permanent	Baseline	Drought_4.6%Permanent
Drivers	Economic Cycle	Growth Year	Baseline	Recession Year
	Short-Term Weather	Multi-Yr Dry	1-Yr Dry	1-Yr Wet
Long Term	Sustainable Communities Housing	Baseline (40% MF)	More Sustainable (71% MF)	Max Sustainable (96% MF)
Long Term	Dwelling Units per Land Area	Baseline	Baseline	Baseline
Drivers	Median Household Income Growth	Baseline	High Growth	Low Growth
	Long Term Climate Change	Change 4.3%_P80	Change 3.2%_P50	No Change
WUE	Water Budget Based Rate Structure (WBBRS)	None	Low_Rollout_10pctSF/Irr	High_Rollout_100All
Drivers	WUE Level	Level 3	Level 2	Level 3

The results can be readily observed in the forecast chart below the control panel.





Section C: Chart Data

This worksheet collects and arranges data needed to create charts on the Control Panel worksheet.

Section D: Model Base

The Model_Base worksheet contains the following:

- Base Model Parameters
  - Single Family
  - Multi-Family
  - Revised Non-Residential Models
  - Price effect
- Base Model Input - Region Dependent
- Base Model Output - Demand Forecast with Price-effect
- Demand Forecast Model

Base Model Parameters

The Base Model Parameters table contains the econometric parameter estimates that drive the base model forecast. The Base Model Parameters are revised only for major updates and revisions to the model. For everyday policy scenario runs, the Base Model Parameters are left alone, generally, except for possible sensitivity testing. The lag variables refer to statistical effect at different periods of time. For example, Lag 1 indicates the effect that weather in one year has on the subsequent year. The Base Model Parameters table starts in Row 5 of the Model_Base worksheet, and the values are reproduced in Appendix D:

Single Family Model. The single family model was estimated as a function of the following:

1. Weather variables that include the amount of rain, rainy days, and temperature— all of which also included lag variables of one period. Rain and temperature included additional lag 2 variables in the model.
2. Socioeconomic variables include marginal price, income, density (housing units per acre), and people (persons per household).
3. Conservation variables include one that indicates mandatory conservation, and another that indicates voluntary conservation.
4. Drought indicates drought during the period.
5. Month variables are used to estimate the effect of month on seasonal demand.

MODEL PARAMETERS								
Single Family Model								
	WEATHER	LAG 0	LAG 1	LAG 2				
	Rain	-0.0482	-0.0589	-0.0192				
	Rainy Days	-0.0088	-0.0047					
	Temperature	0.4647	0.3482	0.2942				
	SOCIOECONOMIC							
	Marginal Price	-0.1947						
	Income	0.2722		MONTH				
	Density	-0.6154		January	0.0233		July	0.5785
	People	0.5485		February			August	0.5603
				March	0.0659		September	0.4775
	CONSERVATION			April	0.2166		October	0.3361
	Voluntary	-0.0258		May	0.3799		November	0.1993
	Mandatory	-0.1033		June	0.5128		December	0.1056
	DROUGHT							
		-0.0503						

Multi-Family Model:

1. Weather variables include the amount of rain and temperature. Rain includes a variable with no lag, and also variables with 1 and 2 lag periods. Temperature includes one variable with 1 lag period.
2. Socioeconomic variables included are the same set as for the single family model.
3. Conservation variables include one that indicates mandatory conservation, and another that indicates voluntary conservation.
4. Month variables included are the same set as for the single family model.

Multi-Family Model						
WEATHER	LAG 0	LAG 1	LAG 2	LAG 3		
Rain	-0.0343	-0.0205	-0.0069			
Temperature		0.1375				
SOCIOECONOMIC						
Marginal Price	-0.1626		**MONTH**			
Income	0.3102		January	0.037	July	0.2255
Density	-0.5262		February		August	0.2353
People	0.4496		March	0.0009	September	0.1997
			April	0.0715	October	0.1414
CONSERVATION			May	0.1405	November	0.1037
Voluntary	-0.0452		June	0.1951	December	0.0858
Mandatory	-0.1162					

Revised Non-Residential Model:

1. Weather variables include the amount of rain and cooling degree days, both with no lag, one period lag, and two periods lag.
2. Socioeconomic variables include one for the marginal price of water.
3. Conservation variables include one that indicates mandatory conservation, and another that indicates voluntary conservation.
4. Month variables included are the same set as for the single family model.
5. Employment variables included are Manufacture and Services as it is consistent with current MWD implementation. The model has the structure to accept, in addition, variables for Construction, Transportation, Wholesale, Retail, Finance, and Government employment.

Revised Non-Residential Model							
	WEATHER	LAG 0	LAG 1	LAG 2			
	Rain	-0.05817	-0.04906	-0.01905			
	Cooling degree Days	0.01037	0.01171	0.01200			
	SOCIOECONOMIC			**MONTH**			
	Marginal Price	-0.158920		January	0.0005	July	0.4163
				February		August	0.4308
	CONSERVATION			March	0.0425	September	0.3713
	Voluntary	-0.06655		April	0.1613	October	0.2561
	Mandatory	-0.13011		May	0.2980	November	0.1438
				June	0.3623	December	0.0658
EMPLOYMENT COEFFICIENTS							
Construction	Manufacture	Transportation	Wholesale	Retail	Finance	Services	Government
0.0000	**0.80297**	0.0000	0.0000	0.0000	0.0000	**0.55242**	0.0000

Price Effect

The price effect parameters reduce the effect of price on demand to account for increasing levels of conservation over time. Customers may have fewer opportunities to conserve if they already have conservation devices and behaviors.

The Constant Price parameter (Cell J79) toggles on and off the use of constant 1990 prices. When prices are constant, there are no price impacts on demand. This parameter could be used for sensitivity testing.

Price Effect						
The price effect is reduced to	**Year**	**Price Effect**		**Year**	**Price Effect**	
account for the effects of price	2008	56%		2025	33%	
captured in the End-Use module.	2009	54%		2030	33%	
	2010	52%		2035	33%	
The original MWD model had one	2011	50%		2040	33%	
price effect across the forecast.	2012	48%		2045	33%	
This updated model allows for the	2015	42%		2050	33%	
effect to be reduced in phases, as	2020	33%				
End-Use conservation increases.						
Constant Price (effects of 1990 price across all years) Toggle: 1 = use current rate, 0 use 1990 rates						1

Base Model Input

The Base Model Input tables start in Row 82 of the Model_Base worksheet. These tables contain the demographic input data and the equations to create the demand forecast. The Base Forecast is the forecast under the assumption of no new conservation savings.

Demographic Inputs

The latest demographic forecast for IEUA was acquired from the SCAG 2012 RTP data base. The Center for Demographic Research (CDR) at California State University, Fullerton utilized geographic information system (GIS) methods to extract data only for the area within IEUA service area boundaries. Detailed analysis of boundaries was conducted to assure that households, population, and employment were properly allocated. Appendix B contains detailed description of the GIS methods used to generate the demographic data set. Appendix D contains demographic input tables. The complete set of demographic inputs is as follows:

1. Population (Total Population, SCAG 2012 RTP data from CDR)
2. Occupied Housing Units (Households, SCAG 2012 RTP data from CDR)
3. Household size (Persons per Household, MWD)
4. Housing Density (Units per Acre, MWD)
5. Median Household Income (MWD)
6. Urban Employment by Sector (SCAG 2012 RTP data from CDR)
7. Marginal Water Price (MWD)

Demographics 2035 to 2040. The SCAG 2012 RTP demographics only go out to the year 2035. We utilize a trend method similar to MWD for the years 2035 to 2040, by applying the compounded average growth rate from 2008 to 2035.

The MWD employment categories are by grouped SIC codes and the SCAG 2012 RTP are grouped by NAICS codes. The following cross walk—developed by consulting SIC and NAICS definitions—was used to group SCAG NAICS into MWD SIC categories.

MWD (SIC)	SCAG (NAICS)
Construction	CONST
Manufacturing	MANU, AG
Utilities	TRANS, .5*INFO
Trade	WHOLE
Retail Trade	RET
Real Estate	FIRE
Service	PROF, EDU, ARTENT, OTHER, .5*INFO
Government	PUBADM

Source: Demographics_Compare_1.xlsx

Employment Productivity Factors by Year

1. Construction (MWD)
2. Manufacturing (MWD)
3. Transportation & Utility's Comm (MWD)
4. Wholesale Trade (MWD)
5. Retail Trade (MWD)
6. Finance, Insurance, and Real Estate (MWD)
7. Service (MWD)
8. Government (MWD)

Drought Restrictions

The table of drought restrictions contains the set of indicator variables that can be used to create forecast scenarios with conditions of drought and conservation restrictions.

1. Residential (Voluntary/Mandatory)
    a. Single Family
    b. Multi-Family
2. Employment (Voluntary/Mandatory)
3. Hot & Dry

Model Intercept and Calibration Inputs

The table labeled Model Intercept and Calibration Inputs contains the parameters to adjust the demand forecast to calibrate to the best estimate of normal weather demand. The table contains adjustments for the single family, multi family, and non-residential sectors. In addition the table below labeled Percentage Other can be used to adjust the other demand sector.

Model Intercept and Calibration Inputs

Model Intercept Adjustments

	Adjusted	Model Interc
Single-Family	5.10	4.83
Multi-Family	5.31	5.66
Non-Residential	0.86	0.94
		medi
Model Calibration	0.96	
SF Site Adjustment	0.5065	
MF Site Adjustment	-0.1143	
NR Site Adjustment	-0.0441	

All of the values in the table are sourced from MWD with the exception of Model Calibration. Since we are calibrating for one agency, we set the Model Calibration parameter by minimizing the difference between the modeled demand and normal demand.

Normal demand was estimated by methods described in the technical memo "Statistical Analysis of Short Term IEUA Demand: Empirical Estimates of Demand Trends." This memo documents the weather-normalization and employment-normalization of time series data provided by IEUA. Water demand was approximated as the sum of delivered supplies. The advantage of using this data source is that the modeling effort was based on consistent system-wide monthly data. And in addition, the monthly water production could be adjusted for changes in storage. Although these models may be described as "demand" models, the data on which the models are estimates would be better described as "supply" measures. To the extent that storage issues are accounted for, the difference between these two constructs should be made small.

We have also provided a second calibration that isolates differences between IEUA and MWD methods. The second calibration option takes actual demand history provided by MWD and then applies the weather and employment effects from our statistical analysis to yield normal demand based on MWD data. The model provides a toggle to switch between the two calibration methods for comparison purposes (Cell G161).

Minimize Delta to 2012 Normalized Demand by Adjusting Model Calibration in Cell E138

Source of Actual Demand	Normal Effects Estimation	2012 Demand	Delta	Model Calibration	Toggle 1=IEUA
IEUA	A&N	218,614	(0)	0.956	1
MWD	A&N	243,922	25,308	0.983	

To run the calibration, run a Goal Seek in Excel that sets delta in Cell E161 (or E162) to zero by changing Cell E138. (In Excel, click on Data, What If, and then Goal Seek). This method calibrates the model to normal demand in the most recent year from the statistical analysis (2012).

Adjusted Normal Weather by Month

These values are from MWD and are calculated from tables labeled Actual Climate Data, which contain Median Rainfall, Median Rain Days, Normal Temperature, and Normal Cooling Degree Days.

Base Model Output

The Base Model Output table (Row 171) is the base forecast that includes the price effect, but it does not include new conservation savings. The following is an example of the Base Model Output table for single family multi-family and total acre feet demand (Non-Residential and Other are not shown separately, but they are included in Total demand).

ACRE-FEET									
	Municipal and Industrial Water Demand - Base Forecast with Price Effect (Acre-Feet)								
				by Sector					
		TOTAL		Single-Family			Multi-Family		
YEAR	Annual	Summer	Winter	Annual	Summer	Winter	Annual	Summer	Winter
2008	223,185	147,008	76,177	103,644	69,914	33,730	25,879	15,963	9,916
2009	216,118	142,398	73,720	103,031	69,501	33,531	25,815	15,924	9,891
2010	210,826	138,957	71,869	103,262	69,656	33,606	25,979	16,025	9,954
2011	212,918	140,330	72,588	103,706	69,956	33,750	25,967	16,018	9,949
2012	218,614	144,088	74,526	106,581	71,895	34,686	26,645	16,436	10,209
2015	232,443	153,406	79,037	113,054	76,315	36,740	27,994	17,268	10,726
2020	249,390	164,505	84,885	120,523	81,356	39,167	31,667	19,533	12,133
2025	263,113	173,501	89,613	126,358	85,295	41,063	34,301	21,158	13,143

Demand Forecast Model

The Demand Forecast Model tables (starting in Row 225) contain the demand forecast equations for each forecast period.

Conservation Inputs

The Conservation Inputs tables (starting in Row 696) contain output from the AWE Tracking Tool that IEUA uses to plan conservation activities.

- Plumbing Code Savings by sector
- Historically Achieved (Retrospective) Active Savings by sector for peak and off-peak sectors

The demand forecast calls for Summer and Winter demand, so we apply the peak and off-peak conservation estimates from the AWE Tracking tool to Summer and Winter respectively.

The demand forecast also calls for the following sectors: Single Family, Multi Family, Non Residential, and Other. The AWE Tracking Tool has Commercial, Industrial, and Institutional separately categorized as well as an Irrigation category. We summed these into the Non-Residential sector on the Conservation_Inputs Worksheet.

Note that refined adjustments to the conservation forecast are possible in the AWE Tracking Tool that accompanies the demand forecast model. For example, past and future conservation activities can be added or updated. Past active conservation is entered on the Model_Base worksheet. The Base

Scenario on the Model_Base worksheet assumes there is not additional future active conservation. Scenarios 1 – 3 each have different plans for future active conservation that are linked to the active conservation input worksheets on Model_Scenario1, Model_Scenario2, and Model_Scenario3 respectively.

Note also that the Conservation_Inputs Worksheet takes the results from the AWE Tracking Tool and calculates the future addition to active and passive conservation beyond what is embedded in 2012. That is the latest year of the statistical normalization analysis based on actual demand (which by definition embodies all past active and passive conservation to date). The calculations for the future additions to active conservation accounts for the fact that active conservation has a defined savings life. Unless the conservation activity is replicated in the AWE Tracking Tool, the conservation effect will expire and result in an increment rather than a decrement to future demand. As a default conditions, the model assumes that future active conservation will be maintained at the same level as the present active savings level. This is a place holder until IEUA has developed the next phase of their conservation planning.

Conservation Forecast

The Conservation Forecast tables (Row 832) contains a forecast that is constructed by starting with the Base Forecast and subtracting out the added passive and active conservation forecast moving forward.

Note that since we have calibrated to a current estimate of normal demand, we subtract out only added future conservation above and beyond what is already embedded in the current estimates. The advantage of this approach is that it allows us to anchor the demand forecast to the best estimate of current measured demand data.

Cities Forecast

The Cities Forecast (Row 937) was created by disaggregating the IEUA forecast using the following method:

- Single Family was disaggregated by the share of single family housing units in the city
- Multi Family was disaggregated by the share of multi-family housing units in the city
- Non Residential was disaggregated by the share of employment in the city
- Other was disaggregated by the share of population in the city

When comparing a disaggregate forecast of base demand at a City level to recent realized water demand, analysts will need to recognize that realized demand does not reflect, in general, normal weather and normal business cycle conditions. When comparing alternative forecasts, analysts should begin by comparing the demand driver measures of population, housing stock, and employment.

Retail Service Areas Forecast

The Retail Service Areas Forecast (Row 1219) was created by disaggregating the IEUA forecast using the following method:

- Single Family was disaggregated by the share of single family housing units in the retail water service area

- Multi Family was disaggregated by the share of multi-family housing units in the retail water service area
- Non Residential was disaggregated by the share of employment in the retail water service area
- Other was disaggregated by the share of population in the retail water service area

When comparing a disaggregate forecast of base demand at a Retail Service Area level to recent realized water demand, analysts will need to recognize that realized demand does not reflect, in general, normal weather and normal business cycle conditions. When comparing alternative forecasts, analysts should begin by comparing the demand driver measures of population, housing stock, and employment.

Indoor/Outdoor Forecast

The Indoor/Outdoor Forecast tables break down total forecasted demand into indoor and outdoor components (Row 1560).

Please refer to Appendix C for documentation on the estimate of Indoor/Outdoor end uses in the IEUA service area.

Two methods were examined to estimate outdoor use across customer classes (See Appendix C). The minimum month method is common practice, yet it ignores outdoor use in climates where there is winter irrigation. The seasonal variation method applies the seasonal variation from dedicated irrigation meters to mixed meter customer classes. This method definitively establishes that the assumption of zero winter irrigation is untenable. The recommended seasonal variation method estimates that 62 percent of total water demand in the IEUA service area is outdoor water use. The model can provide additional estimates of how indoor and outdoor end uses are divided seasonally:

Summer (April to Oct.)		Winter (Nov. to March)	
Indoor	Outdoor	Indoor	Outdoor
33%	67%	49%	51%

Note that this split occurs in the model after the Base and Conservation Forecasts, and thus proportions of indoor and outdoor added active conservation savings will not be reflected. However, for the indoor outdoor analysis of passive conservation savings we performed to assist wastewater design team, we disaggregated passive conservation coming out of the AWE Tracking Tool into indoor and outdoor components. In addition, we disaggregated passive conservation into components derived from new construction and components derived from existing sites.

Section E: Model Scenarios (1-3)

There are three Model_Scenario worksheets that contain each of three scenarios controlled by the Control Panel. Each of these worksheets is based structurally on the Base_Model worksheet with differences in either data sources or assumptions that comprise the defined scenarios.

Section F: WBBRS Implementation

The WBBRS_Implementation worksheet contains the calculations and assumptions that underlie the alternative water budget based rate structures and their estimated water savings.

Section G: WUE Inputs

The WUE_Inputs worksheet contains the planned active conservation savings from the alternative water use efficiency scenarios.

Appendix A: Review of MWD Demand Model

Current econometric model specification

Metropolitan currently uses a customized version of the IWR-MAIN (Municipal and Industrial) sometimes referred to as MWD-MAIN. This demand model features a separate model for different customer sectors—Single Family Residential, Multifamily Residential, and Commercial, Industrial, and Institutional (CII). Table 1 depicts these key relationships in the MWD demand model. In the residential sector, the forecasts of water demand per dwelling unit are ultimately combined with the forecasts of dwelling units from the regional planning agencies to yield an estimate of total sector water demand. Similarly, in the nonresidential sector, water use per employee is combined with forecasts of employment to yield an estimate of total nonresidential water demand.

Table 1 MWD Demand Model Variables

Demand Sector	Projected Demographic	Dependent Variable	Explanatory Variables
Single Family Residential	Number of Single Family Households	Water use per household	Climate Household Size Income Price and Conservation Housing Density Service Area Location
Multifamily Residential	Number of Multifamily Households	Water use per household	Climate Household Size Income Price and Conservation Housing Density Service Area Location
Commercial, Industrial, Institutional (CII)	Total Urban Employment	Water use per employee	Climate Price and Conservation Industrial / Service Employment Share
System Loss / Unmetered Use			Percentage of total use

Each statistical model will be analytically described.

Specification of Single Family Residential Model

The systematic form of the single family residential model is:

Equation 1

$$\ln \frac{Use_{i,t}}{Unit_{i,t}} = \mu_i + \beta_M \cdot Month_t + \beta_W \cdot Weather_{i,t} + \beta_S \cdot SocioEconomic_{i,t} + \beta_D \cdot Drought_t$$

where $\frac{Use_{i,t}}{Unit_{i,t}}$ is the interpolated quantity of single family water use per occupied single family residence of retail agency *i* within month *t*,
the parameter μ_i represents a fixed intercept parameter for each agency *i*,
$Month_t$ is an indicator variable for the month,
$Weather_t$ is weather component,
$SocioEconomic_t$ is a set of socioeconomic measures, and
Drought, are indicator variables for the presence of drought response.

Taking a closer look at each component, the dependent variable is interpolated to reflect the fact that it is a measure taken from billed consumption data. (This type of "sales" data is required for the customer class specific models of MWDMAIN.) The interpolation was performed as follows:

$$\hat{U}se_t = 0.5 \cdot Use_t + 0.5 \cdot Use_{t-1}; monthly\_data$$
$$or$$
$$\hat{U}se_t = 0.25 \cdot Use_t + 0.5 \cdot Use_{t-1} + 0.25 \cdot Use_{t-2}; bimonthly\_data$$

The monthly seasonal component includes 11 binary indicator variables, one for each month:

$$Month_t = Jan + Mar + Apr + May + Jun + Jul + Aug + Sep + Oct + Nov + Dec$$

Since 12 monthly indicator variables are perfectly correlated with the intercept, one must be excluded. Identical predictions are generated no matter which month is excluded; only the interpretation of the monthly coefficients changes.

The weather component is comprised of weather measures (monthly rainfall, rainy days in the month, and air temperature) that are transformed logarithmically with their monthly average subtracted away. Contemporaneous values (rain in the same month as use) as well as lagged values are included.

$$Weather_{i,t} \equiv dlR_{i,t} + dlR_{i,t-1} + dlR_{i,t-2} + lRDays_{i,t} + lRDays_{i,t-1} + dlT_{i,t} + dlT_{i,t-1} + dlT_{i,t-2}$$
$$dlR_{i,t} \equiv \ln(Rain_{i,t} + 1) - \overline{\ln(Rain_{i,t} + 1)}$$
$$lRDays_{i,t} \equiv \ln(number\_of\_rainy\_days\_in\_month + 1)$$
$$dlT_{i,t} \equiv \ln(Temp_{i,t}) - \overline{\ln(Temp_{i,t})}$$

The socioeconomic component for single family residential includes measures of water price, the number of occupied housing units per acre in 1990, the number of persons per household in 1990, and median household income in 1990.

$$Socioeconomic_{i,t} = \ln(real\_marginal\_price_{i,t}) + \ln(\frac{Units_{i,1990}}{Acres_{i,1990}}) + \ln(\frac{Persons_{i,1990}}{Units_{i,1990}}) + \ln(\frac{\overline{Income_{i,1990}}}{Unit_{i,1990}})$$

Because the estimation period included periods of drought, the model controlled for customer response to agency requested curtailments by using additional, agency-specific, binary indicators for voluntary or mandatory curtailments. An additional indicator for the severe drought period 1990-1992 was also included.

$$
\begin{aligned}
Drought_t = {} & IndicatorforVoluntaryConservation_{i,t} + \\
& IndicatorforMandatoryConservation_{i,t} + \\
& IndicatorforDroughtPeriod(1990-1992)
\end{aligned}
$$

The single family residential model was weighted by single family use/deliveries and estimated using ordinary least squares.

Multifamily Residential

The systematic form of the multifamily residential model is:

Equation 2

$$\ln \frac{Use_{i,t}}{Unit_{i,t}} = \mu_i + \beta_M \cdot Month_t + \beta_W \cdot Weather_{i,t} + \beta_S \cdot SocioEconomic_{i,t} + \beta_D \cdot Drought_t$$

where $\frac{Use_{i,t}}{Unit_{i,t}}$ is the interpolated quantity of water use per occupied multifamily residence of retail agency *i* within month *t*, as in the single family model.

The parameter μ_i represents a fixed intercept parameter for each agency *i*,
$Month_t$ is an indicator variable for eleven months,
$Weather_t$ is a somewhat simpler weather component,
$SocioEconomic_t$ is a set of socioeconomic measures, and
$Drought_t$ are indicator variables for the presence of drought response.

The components of the multifamily residential model are somewhat simpler.

$$
\begin{aligned}
& Weather_{i,t} \equiv dlR_{i,t} + dlR_{i,t-1} + dlR_{i,t-2} + dlT_{i,t-1} \\
& dlR_{i,t} \equiv \ln(Rain_{i,t} + 1) - \overline{\ln(Rain_{i,t} + 1)} \\
& dlT_{i,t} \equiv \ln(Temp_{i,t}) - \overline{\ln(Temp_{i,t})} \\
& Drought_t = IndicatorforVoluntaryConservation_{i,t} + \\
& \qquad IndicatorforMandatoryConservation_{i,t}
\end{aligned}
$$

The multifamily residential model was weighted by multifamily use/deliveries and estimated using ordinary least squares.

Nonresidential—CII

For the nonresidential sector, the dependent variable is specified in terms of use per employee.

$$\ln \frac{Use_{i,t}}{Employee_{i,t}} = \mu_i + \beta_M \cdot Month_t + \beta_W \cdot Weather_{i,t} + \beta_S \cdot SocioEconomic_{i,t} + \beta_D \cdot Drought_t$$

In the documentation provided, the *Socioeconomic* component is formed by measures of eight major types of employment (the eight two digit SIC classifications of employment), that are adjusted for changes in productivity. A simpler form of this model is currently being used to generate nonresidential projections; the working form of the nonresidential equation uses (unadjusted) measures of employment for the two largest employment groupings.

The nonresidential model was weighted by nonresidential use/deliveries and estimated using ordinary least squares.

Evaluation of current econometric model specification and estimation

Any water demand model can be described as deriving from a separation of the explanatory variable into systematic and nonsystematic portions: $Y=f(X) + \varepsilon$.

Dependent Variable: Y

This type of "smoothing" will reduce variation in the original measure and can attenuate the effect of explanatory variables that vary monthly (e.g., weather measures). This said, the use of estimated monthly data represents an improvement over the annual or semi-annual measures used in previous MAIN modeling exercises.

Functional Form of Model: f(X)

The only agency-specific parameter is the intercept. This implies that all slope parameters are restricted to be the same for each agency. Though this may not appear to be a very plausible assumption on the face of it, it does reflect some of the difficult choices between available data and the number of parameters that the modeler attempts to estimate. For example, the current model specification imposes the restriction that the seasonal shape is identical for each agency *i*. Thus, in the single family model, each agency will have January use that is 2 percent above its intercept. Further, the weather effect is identical for each agency. It is implausible that inland agencies would have the same response to weather variation that primarily coastal agencies would have.

The weather effect also imposes the restriction that the percentage response to changes in temperature or rainfall are identical throughout the year. It is implausible that rainfall in June would have the same response as rainfall in January. The specification of the climate effects constitutes an area of potential further refinement.

Estimation Method of Model: $\hat{f}$ and ε

It is well known that fixed effect models, such as those used in estimating equations for MWD-MAIN cannot directly yield slope estimates for explanatory variables that only vary cross-sectionally. Thus, the elasticity's attached to variables that do not vary with time—housing density, persons per household, and median household income—are the result of the weighting procedure and a very small amount of cross-sectionally varying agency data from 1990. The signs of the estimated coefficients are correct but I cannot attest to their validity. However, the magnitude and signs of the estimated parameters are within reasonable ranges, based on my professional experience with demand models in the literature and in use nationally. The model would be improved by the use of modern panel data estimators.

Summary

The current MWD-MAIN models represent an improvement over previous models. The evolutionary path of the MWD-MAIN has several promising alternatives for further improvement.

This review was based on documents, interviews, and data provided by Metropolitan. These included:

Development of Water Use Models for the Interim #5 Forecast: Memorandum Report, January 1995, Jack C. Kiefer, Jerzy W. Kocik, Eva M. Opitz, and Benedykt Dziegielewski of PMCL, A report for the Metropolitan Water District of Southern California.

Development of Water Use Models for the Interim #5 Forecast, ADDENDUM REPORT: MWDMOD Implementation and Calibration, May 1995, Jack C. Kiefer, Jerzy W. Kocik, Eva M. Opitz, and Benedykt Dziegielewski of PMCL, A report for the Metropolitan Water District of Southern California.

Development and Verification of Sectorial Water Demand Forecasting Models for the Metropolitan Water District of Southern California, Draft Report, Feb. 1997, Jack C. Kiefer, Jerzy W. Kocik of PMCL, A report for the Metropolitan Water District of Southern California.

Appendix B: Demographic Data Development

Summary Methodology for Socioeconomic Data Disaggregation to IEUA

In fall 2013, the Center for Demographic Research (CDR) at California State University, Fullerton was contracted to disaggregate regional socioeconomic data for a water demand model for the Inland Empire Utilities Agency (IEUA). The specific objectives of this project were to develop estimates and projections of the following variables for 2008 and 2010 through 2035 for the cities, Retail Water Service Agencies, and Wastewater Tributaries within IEUA:

1. Total Population
2. Resident/Household Population
3. Group Quarters Population
4. Households (Occupied Housing Units)
5. Single-Family Households
6. Multi-Family Households
7. Employment (Jobs) by sector:
    a. Agriculture & Mining
    b. Construction
    c. Manufacturing
    d. Wholesale
    e. Retail
    f. Transportation, Warehousing, & Utility
    g. Information
    h. Financial Activity & Real Estate (FIRE)
    i. Professional & Business Services
    j. Education & Health Services
    k. Leisure & Hospitality
    l. Other Services
    m. Public Administration

The projections database used is the Southern California Association of Governments (SCAG) 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (2012 RTP/SCS), which was allocated to the Traffic Analysis Zones (TAZ).

These were developed by first overlaying the city, water agency, and tributary boundaries on the TAZ boundaries using GIS software. Prior to overlaying the geographies, corrections and adjustments were made to the boundaries to minimize errors and differences.
First, a union of TAZ data to each of the three primary geographies (cities, Retail Service Water Agencies, and Wastewater Tributaries) was done using GIS software. TAZs wholly contained within a primary geography were assigned to that geography.
If a TAZ was split by a primary geography, the TAZ data was redistributed between two or more split polygons using a combination of GIS and Microsoft Excel. To distribute population and housing data, an area allocation method was used and then supplemented with a review of the 2010 aerial photo from ESRI. This was done by counting rooftops of single family detached homes. For multi-family housing,

Google Maps were used to find the property information, and then properties were contacted to obtain the number of housing units in the development.

Population was allocated based on the share of housing units in the split compared to the total number for the original TAZ data. For employment, employer point data from D&B was used which contained the address and number of employees by NAICS code. Each 2-digit NAICS code was assigned to one of the SCAG 13 employment sector categories. These were then subtotaled by the split TAZ geographies, and then controlled by sector to the original TAZ totals.

Summary Methodology for Socioeconomic Data Disaggregation to IEUA 2 of 2
Future growth after 2010 was allocated based on aerial review of open land by TAZ where splits occurred. After all population, housing, and employment data were allocated, the data were joined to each primary geography boundary file using GIS software. Each boundary file (shapefile) was quality-checked to verify the split TAZs correctly followed the source data for each geography type. Finally, the split TAZ data were dissolved on each of the primary geographies for cartographic representation. The outcomes were GIS shapefiles with spatially accurate, allocated population, housing, and employment data for three primary geographies: cities, Retail Water Service Agencies, and Wastewater Tributaries.

1. Total Population- Refers to all persons; sum of resident/household population and group quarters population.
2. Resident/Household Population- Resident population refers to the segment of the population that resides in non-institutionalized quarters, such as single and multiple family units, mobile homes, oats, recreational vehicles, and other miscellaneous types of residences. The resident population is synonymous with household population as defined by the California State Department of Finance.
3. Group Quarters Population- Group Quarters Population refers to the population residing in non-institutionalized group quarters, such as college dormitories, military barracks, convalescent hospitals, and shelters.
4. Total Households (Occupied Housing Units) - Occupied Total Dwelling Units and Households are synonymous. Households were calculated by summing Occupied Single-Family Households and Multi-Family Households.
5. Single-Family Households- Occupied single-family detached housing units.
6. Multi-Family Households- All other occupied housing units (includes single-family attached, multi-family, duplex, triplex, fourplex, mobile homes.
7. Employment: Total number of jobs, includes full time and part time jobs by sector
    a. Agriculture & Mining
    b. Construction
    c. Manufacturing
    d. Wholesale
    e. Retail
    f. Transportation, Warehousing, & Utility
    g. Information
    h. Financial Activity & Real Estate (FIRE)
    i. Professional & Business Services
    j. Education & Health Services
    k. Leisure & Hospitality
    l. Other Services
    m. Public Administration

Boundary Details Documentation

The IEUA official shape file was available for all IEUA-wide demographics.

To get the city boundaries, CDR utilized the RTP city files which are more accurate than the Census Tiger files.

To get the retail service area boundaries, CDR utilized the city files, and then overlaid the non-city water companies (MVWD, FWC, and CVWD).

Then special corrections were made for the following:

- West Valley Water District (northeastern IEUA area)
- Golden State Water Company (border of Upland and MVWD)
- Power Plant (Reliant Energy Etiwanda)
- IEUA facilities (adjacent to power plant)
- Yellowstone Circle (Chino Hills for water and Chino for wastewater)

To get the wastewater tributaries, RMC developed a boundary file in cooperation with IEUA.

Appendix C: Indoor/Outdoor End Uses

Introduction

This Appendix documents the estimation of indoor and outdoor water end uses for water demand in the IEUA service area. This estimation of indoor/outdoor end uses is conducted by customer class—single family residential, multi-family residential, and commercial-industrial-institutional (CII). Indoor end uses are of particular interest to planners tasked with designing wastewater systems and recycled water systems because it helps them establish capacity requirements. Both indoor and outdoor use is of great interest to planners tasked with designing Water Use Efficiency (conservation) programs. Although much has already been accomplished with indoor conservation, there is some level of remaining potential for water savings. WUE planners have particular interest in outdoor use because it is generally assumed to be a large share of total use with large remaining potential for savings.

Two methods were used to estimate outdoor use across customer classes. The first method is the minimum month method that has been historically used in the water industry—this method assumes that the minimum month of water demand is 100 percent indoor end uses. Though we believe that this is a counterfactual assumption in the IEUA service area (it assumes exactly zero outdoor irrigation in the winter) we provide estimates using the minimum month method to serve as a point of comparison. The second method develops an estimate of winter irrigation from dedicated irrigation meters and applies this nonzero assumption instead. Termed a “seasonal variation” method, it applies the seasonal variation from dedicated irrigation meters to mixed meter customer classes.

The seasonal variation method estimates outdoor end uses to compose 62 percent of overall water demand in the IEUA service area. (Presuming all water demand in the minimum month to be all indoor end use would estimate outdoor end uses to be 46 percent of total demand.) We recommend using the seasonal variation method because we know the minimum month method systematically underestimates outdoor water use in climates where there is winter irrigation such as IEUA.

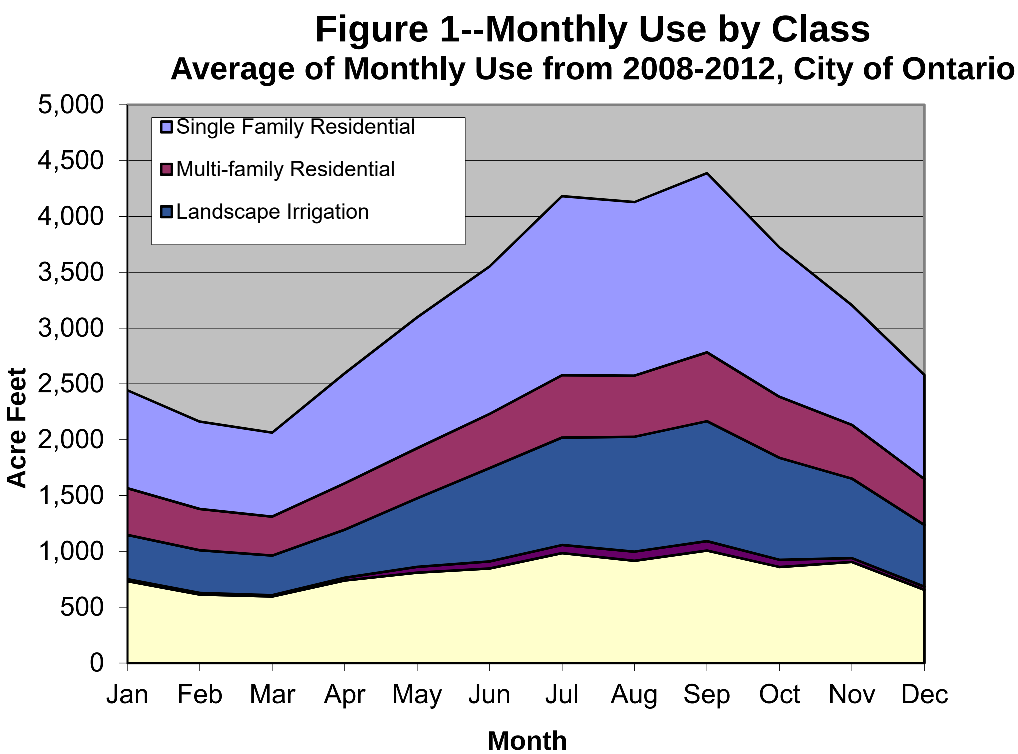
Data

The data used are from the California Department of Water Resources, Public Water System Statistics filings for the City of Ontario for the years 1993 to 2012. These data are billing system summaries at the monthly level. Several other retailers provided monthly use summaries; however, these were generated with bimonthly billing cycles. Since different retailers can apportion bimonthly billing into calendar using different methods, we stick to the monthly data generated with monthly billing.

Table 1 shows the average use from 2008 to 2012 summed by customer class. Figure 1 shows the sum of water use by month. The strong seasonal pattern reflects irrigation needs during the characteristic hot and dry summers.

Table 1 – Average Use, 2008 to 2012, City of Ontario

Class	Use (AF)	Percent
Single Family Residential	13,993	36.7%
Multi-family Residential	5,647	14.8%
Commercial/Industrial/Institutional	9,666	25.4%
Landscape Irrigation	8,259	21.7%
Other	549	1.4%
Total	38,114	100.0%



Methods

Outdoor end uses are directly measured by dedicated irrigation meters. Many other types of water meters--single family, multi family, commercial, industrial, and institutional--can be measuring both indoor and outdoor end uses. If not measured or observed directly, planners are forced to rely on inference or judgment. For IEUA, we have conducted two methods to infer outdoor use for all sectors.

Minimum Month Method

The most common method employed to infer outdoor use is to assume the winter use is all indoors. (This assumption may be closer to the truth in wetter or colder climates.) For example, if we calculate winter minimum use times 12 months we have inferred total indoor use for the year. Total use for the year minus indoor use then equals outdoor use.

In Table 2 below, we find that outdoor use calculated with the “minimum winter use is indoor use” method is 46%. The method underestimates outdoor use because there is likely to be at least some winter irrigation in dry climates. Variations on this method include daily accounting and various ways

to define winter minimum. Note the results of this method will vary considerably from year to year; the reader is cautioned when using results from one year for planning
Purposes and we used for this analysis the monthly average over the five most recent years for which data were available (2008 to 2012).

Table 2 – Percent Outdoor Use

Class	Total	Minimum Month Method	Seasonal Variation Method
Single Family Residential	13,993	36%	58%
Multi-family Residential	5,647	26%	43%
Commercial/Industrial/Institutional	9,666	26%	42%
Landscape Irrigation	8,259	100%	100%
Other	549	75%	100%
Total	38,114	46%	62%

Seasonal Variation Method

The second method to infer outdoor use consists of employing the pattern of seasonal variation with dedicated irrigation meters and applying it to other sectors with mixed meters. The reasoning is that with dedicated irrigation meters we can measure winter irrigation. Thus, we can observe the relative water use in winter and summer irrigation seasons and calculate a parameter from variables that are observable in other sectors. For example, by calculating the ratio of winter minimum to the seasonal range we have a function of variables observable for sectors other than dedicated irrigation meters. This method will result in a higher estimate of outdoor water use than using minimum month. The method relies on the assumption that the seasonal variation of outdoor use is the same for sites with dedicated meters as for sites with mixed meters.
Due to the variability of landscape water use from year to year, we expect the calculated parameter to vary considerably from year to year. For this reason, we calculated the parameter (ratio of winter minimum to seasonal range) for each year for which we could collect data (1993 to 2012) and took the average. We applied this long term average to the monthly average of the most recent five years of consumption data (2008 to 2012) because of the changing distribution of water use by customer class as more dedicated irrigation meters are employed.

Figure 2 shows the use from irrigation-only meters, with winter irrigation illustrated in blue and the seasonal range in red for one example year (2011).

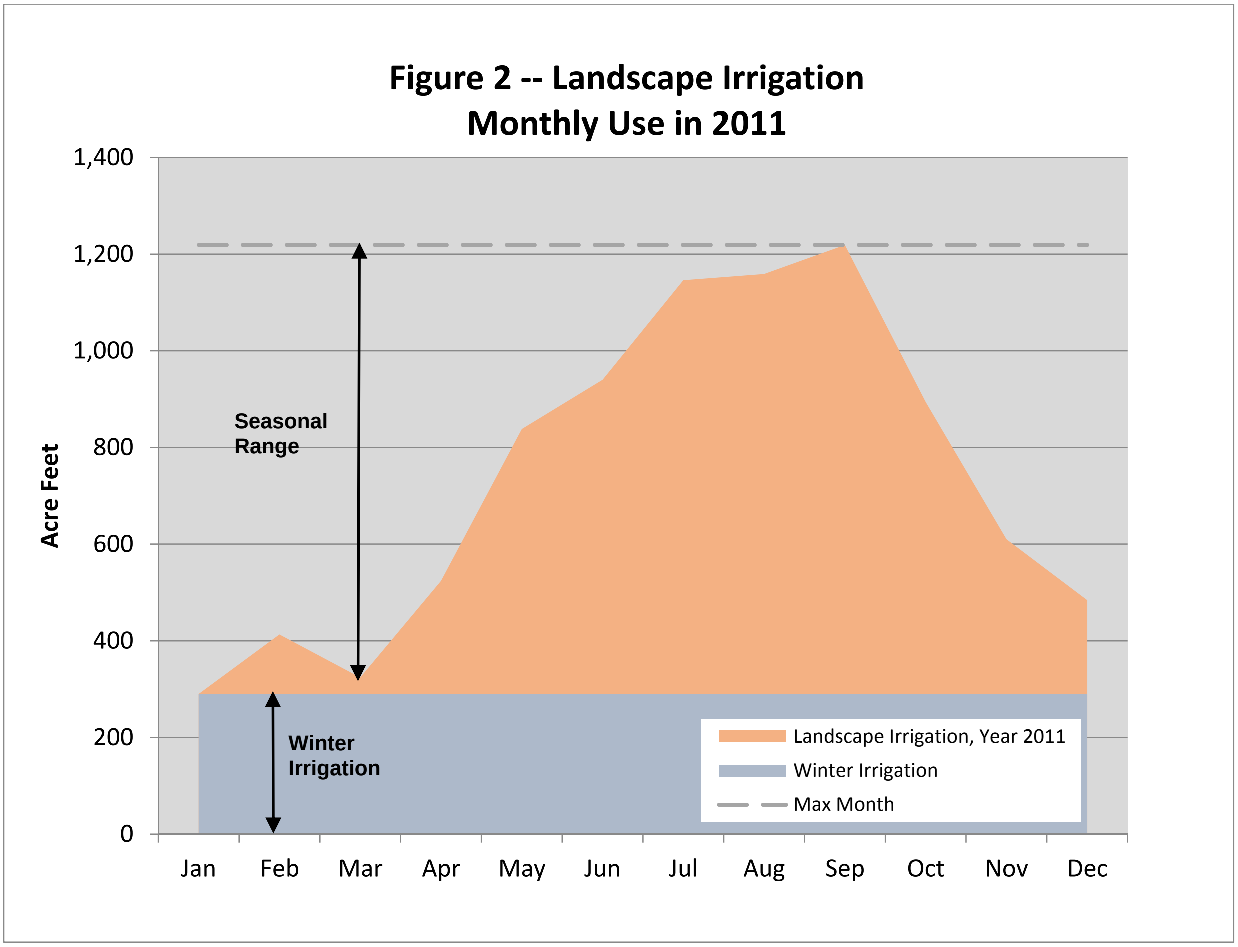
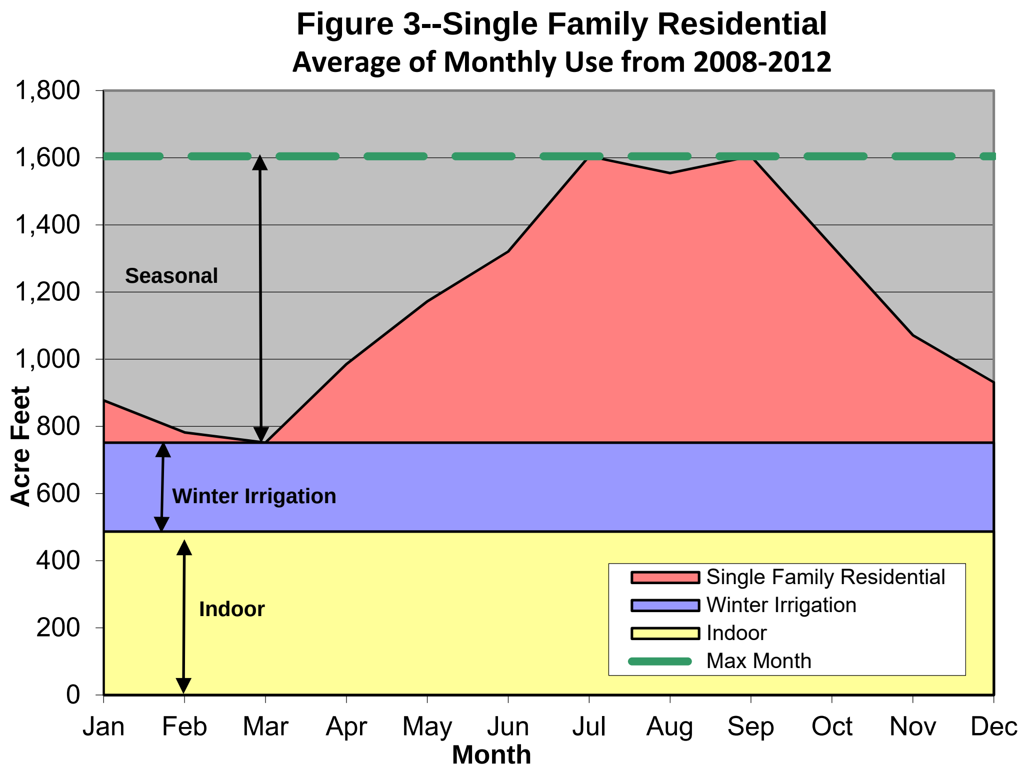


Figure 2 shows winter irrigation is 31% of seasonal range between summer and winter for dedicated irrigation accounts for the year 2011. We repeated this calculation for each year for which were able to collect data (1993 to 2012) and averaged the values to get the result we apply to customer sectors with mixed meters (31%).

Seasonal range and winter minimum are observable for non-irrigation classes. If we assume that winter irrigation is also 31% of seasonal range for the non-irrigation customer categories, we can infer their winter irrigation, and thus indoor and outdoor use.



For example, Figure 3 shows winter irrigation calculated as 31% of seasonal range for the single family residential sector. Total outdoor use (red+blue in this graph) is, thus, 58% of total use for the year (red+blue+yellow). In contrast, using the minimum month for the single family sector results in 36% outdoor use (red area only).

Recommendations

The minimum month method systematically underestimates outdoor use and overestimates indoor use. As such we do not recommend using it for planning water resource investments in the IEUA service area. Since it is a commonly used method, it may have comparison value. We can improve the reliability of the results by using a longer time series of data to see how the percent outdoor varies from year to year with changes in weather; however, the systematic estimation bias remains.

We recommend the seasonal variation method over the minimum month in this analysis for IEUA because the seasonal variation method does not contain the same source of systematic bias. We have reliable empirical measures using monthly-billed data from one of the larger retail water service areas.

Appendix D: Data Inputs

The following table is from the Parameters_Inputs Worksheet and it summarizes the econometrically estimated parameters that drive the demand equations. Section A defines these parameters in detail. These tables show the socioeconomic inputs from the Base_Forecast Worksheet as described in Section B:

MODEL PARAMETERS

Single Family Model

	WEATHER	LAG 0	LAG 1	LAG 2			
	Rain	-0.0482	-0.0589	-0.0192			
	Rainy Days	-0.0088	-0.0047				
	Temperature	0.4647	0.3482	0.2942			
	SOCIOECONOMIC						
	Marginal Price	-0.1947					
	Income	0.2722		**MONTH**			
	Density	-0.6154		January	0.0233	July	0.5785
	People	0.5485		February		August	0.5603
				March	0.0659	September	0.4775
	CONSERVATION			April	0.2166	October	0.3361
	Voluntary	-0.0258		May	0.3799	November	0.1993
	Mandatory	-0.1033		June	0.5128	December	0.1056
	DROUGHT						
		-0.0503					

Multi-Family Model

	WEATHER	LAG 0	LAG 1	LAG 2	LAG 3		
	Rain	-0.0343	-0.0205	-0.0069			
	Temperature		0.1375				
	SOCIOECONOMIC						
	Marginal Price	-0.1626		**MONTH**			
	Income	0.3102		January	0.037	July	0.2255
	Density	-0.5262		February		August	0.2353
	People	0.4496		March	0.0009	September	0.1997
				April	0.0715	October	0.1414
	CONSERVATION			May	0.1405	November	0.1037
	Voluntary	-0.0452		June	0.1951	December	0.0858
	Mandatory	-0.1162					

Revised Non-Residential Model

	WEATHER	LAG 0	LAG 1	LAG 2			
	Rain	-0.05817	-0.04906	-0.01905			
	Cooling degree Days	0.01037	0.01171	0.01200			
	SOCIOECONOMIC			**MONTH**			
	Marginal Price	-0.158920		January	0.0005	July	0.4163
				February		August	0.4308
	CONSERVATION			March	0.0425	September	0.3713
	Voluntary	-0.06655		April	0.1613	October	0.2561
	Mandatory	-0.13011		May	0.2980	November	0.1438
				June	0.3623	December	0.0658
EMPLOYMENT COEFFICIENTS							
Construction	Manufacture	Transportation	Wholesale	Retail	Finance	Services	Government
0.0000	**0.80297**	0.0000	0.0000	0.0000	0.0000	**0.55242**	0.0000

Price Effect

The price effect is reduced to	**Year**	**Price Effect**		**Year**	**Price Effect**
account for the effects of price	2008	56%		2025	33%
captured in the End-Use module.	2009	54%		2030	33%
	2010	52%		2035	33%
The original MWD model had one	2011	50%		2040	33%
price effect accross the forecast.	2012	48%		2045	33%
This updated model allows for the	2015	42%		2050	33%
effect to be reduced in phases, as	2020	33%			
End-Use conservation increases.					

YEAR	Population: TOTAL Population	Population: Household Population	Occupied Housing Units: TOTAL	Occupied Housing Units by Sector: Single-Family	Occupied Housing Units by Sector: Multi-Family	Household Size (persons / household): AVERAGE	Household Size by Sector: Single-Family	Household Size by Sector: Multi-Family	Housing Density (units / acre by Sector: Single-Family	Housing Density by Sector: Multi-Family	Median Household Income (1990 dollars)
2008	805,506	787,995	230,915	158,948	71,967	3.42	3.60	2.89	3.20	10.90	38.18
2009	809,590	792,072	232,091	159,548	72,542	3.41	3.59	2.87	3.20	10.90	37.38
2010	813,695	796,170	233,272	160,150	73,122	3.42	3.60	2.88	3.20	10.90	37.06
2011	822,018	804,344	235,913	162,158	73,754	3.43	3.61	2.90	3.20	10.90	35.82
2012	830,425	812,603	238,583	164,192	74,391	3.45	3.62	2.91	3.20	10.90	37.72
2015	856,168	837,890	246,777	170,447	76,337	3.40	3.58	2.87	3.20	10.90	41.70
2020	896,533	877,494	262,894	178,394	84,500	3.34	3.52	2.80	3.20	10.90	46.30
2025	955,569	935,762	279,209	187,488	91,721	3.35	3.54	2.82	3.20	10.90	46.05
2030	1,009,349	988,771	295,545	197,642	97,903	3.35	3.55	2.82	3.20	10.90	45.81
2035	1,067,946	1,046,605	311,860	207,794	104,066	3.36	3.56	2.83	3.20	10.90	45.59
2040	1,125,203	1,103,084	329,707	218,366	111,422	3.33	3.54	2.81	3.20	10.90	45.43
2045	1,185,530	1,162,611	348,575	229,475	119,298	3.33	3.53	2.81	3.20	10.90	45.23
2050	1,249,091	1,225,350	368,522	241,150	127,731	3.32	3.53	2.80	3.20	10.90	45.03

YEAR	Urban Employment by Sector (Major SIC Code): TOTAL	by Sector: Construction	Manufacturing	Transportation and Public Utilities	Wholesale Trade	Retail Trade	Finance, Insurance, and Real Estate	Service	Government
2008	330,533	21,107	42,701	39,443	24,545	46,478	13,138	137,549	5,572
2009	315,381	17,722	38,572	38,242	22,820	44,094	12,236	132,535	8,168
2010	300,924	14,880	34,843	37,077	21,217	41,833	11,396	127,704	11,974
2011	310,237	16,141	35,615	38,214	21,663	42,684	11,653	132,151	11,984
2012	319,838	17,510	36,404	39,385	22,118	43,552	11,915	136,754	11,993
2015	350,461	22,351	38,878	43,121	23,542	46,265	12,738	151,545	12,022
2020	375,653	29,099	41,667	45,467	25,409	53,494	13,213	159,272	8,032
2025	422,424	33,652	42,577	50,597	27,167	57,670	14,636	184,170	11,956
2030	462,518	37,906	43,051	54,733	28,720	62,530	16,165	206,525	12,888
2035	488,928	41,547	42,659	57,937	29,258	65,765	17,118	222,942	11,702
2040	525,693	47,098	42,651	62,213	30,225	70,131	17,978	243,799	13,426
2045	565,222	53,391	42,643	66,804	31,225	74,787	18,881	266,607	15,403
2050	607,724	60,525	42,636	71,734	32,257	79,752	19,829	291,549	17,672

Appendix E: Statistical Analysis of Short Term IEUA Demand: Empirical Estimates of Demand Trends

Introduction

For purposes of quantifying trends in IEUA Demand, one must estimate how water demand responds to predictable variations. There are numerous forces that drive demand growth in the long-term. These include changes in land use patterns and household size, growth in personal income and employment, and price and conservation. Weather conditions tend to make water demand go up or down in any given year.

For use in the Integrated Resource Plan and for calibrating long term water demand forecasts, the IEUA needs depiction of the predictable forces that cause demand to vary in the short-term so as to clarify remaining long term trends. This memorandum describes an empirical model developed to predict daily demand fluctuations. By nature, these models cannot replace long-term predictive models of water demand. However, by providing a better understanding of short-term demand variations, these models can clarify the direction of long term trends. The explanatory variables in this short-term model include:

- Deterministic functions of calendar time, including
  - The seasonal shape of demand
- Weather conditions
  - measures of maximum daily temperature, contemporaneous and time of year
  - measures of rainfall, contemporaneous and time of year
- Measures to control for long-term growth in demand
  - Trend
  - Employment growth different than trend
  - Customer response to voluntary curtailment in 2013 and 2014

The model documented here is used to create high resolution depictions of how variations in weather and the business cycle affect water demand over a wide range of conditions. These model-estimated weather and employment effects can then be used to (1) normalize observed demand and (2) serve as the basis for defining near term variability of demand and any planning dependent upon the trajectory of long term demand.

Data and Methods

Data

Water demand in the IEUA service area is approximated in this analysis as the sum of delivered supplies. This modeling effort used consistent system-wide monthly data—that is monthly water production adjusted for changes in storage. The reader is urged to keep in mind that though these models maybe described as “demand” models, the data on which these models are estimated would be better described as “supply” measures. To the extent that storage issues can be accounted for, the difference between these two constructs should be made small. Nonetheless, the issue remains.

The second major issue with using production data is the level and magnitude of noise in the data. The data generating mechanism for recording production can change over time as flow meters age or are replaced. Constructing a consistent time series requires matching two different—and possibly inconsistent—time-series. The records of flow can also embed non-ignorable meter miss-measurement.

To keep data inconsistencies from corrupting statistical estimates of model parameters, this modeling effort employed a sophisticated range of outlier-detection methods and models.

Specification

A Model of Per Capita Water Demand

The model for IEUA per capita water demand seeks to separate several important driving forces. In the short run, changes in weather can make demand increase or decrease in a given year. In the long run, increased population can drive demand higher. Strong regional economic growth can increase water demand through additional commercial or industrial water use. In addition, a rising economic tide can broadly increase personal income levels and economic activity can encourage or discourage additional population growth. Changes in water rates will change the relative attractiveness of water conservation.

These models are estimated at an aggregate level and, as such, should be interpreted as a condensation of many types of relationships — meteorological, physical, behavioral, managerial, legal, and chronological. Nonetheless, these models depict key short-run and long-run relationships and should serve as a solid point of departure for improved quantification of these linkages.

Systematic Effects

This section specifies a water demand function that has several unique features. First, it models seasonal and climatic effects as continuous (as opposed to discrete monthly, semi-annual, or annual) function of time. Thus, the seasonal component in the water demand model can be specified on a continuous basis, then aggregated to a level comparable to measured water use (e.g. monthly). Second, the climatic component is specified in "difference" form as a similar continuous function of time. The climate measures are thereby made independent of the seasonal component. Third, the model permits interactions of the seasonal component and the climatic component. Thus, the season-specific response of water use can be specific to the season of the year.

The general form of the model is:

Equation 2

$$PerCapitaWaterUse_t[GPCD] = \frac{Use_t}{Pop_t} = f(S_t + C_t + T_t)$$

where ***Use*** is the volumetric quantity of retail water use within time *t*, $\boldsymbol{S_t}$ is a seasonal component, $\boldsymbol{C_t}$ is a climatic component, and $\boldsymbol{T_t}$ is the trend component of GPCD Demand. The function *f* is the functional form of the connection between per capita water use and its explanatory components. Each of these components is described below.

Seasonal Component: A monthly seasonal component could be formed using monthly dummy variables to represent a seasonal step function. Equivalently, one may form a combination of sine and cosine terms in a Fourier series to define the seasonal component as a continuous function of time.[1] The following harmonics are defined for a given day *T*, ignoring the slight complication of leap years:

[1] The use of a harmonic representation for a seasonal component in a regression context dates back to *Hannan* [1960]. *Jorgenson* [1964] extended these results to include least squares estimation of both trend and seasonal components.

Equation 3

$$S_t \equiv \sum_{1}^{6}\left[\beta_{i,j}\cdot\sin\left(\frac{2\pi\cdot jT}{365}\right)+\beta_{i,j}\cdot\cos\left(\frac{2\pi\cdot jT}{365}\right)\right]=Z\cdot\beta_S$$

where T = (1,...365) and j represents the frequency of each harmonic. Because the lower frequencies tend to explain most of the seasonal fluctuation, the higher frequencies can often be omitted with little predictive loss.

The percentage effect of the seasonal component on normal demand is given by:

Equation 3

$$S_t\% = \left[\frac{\exp(\widehat{Y}_t - T_t) - \exp(\widehat{Y}_t - T_t - S_t)}{\exp(\widehat{Y}_t - T_t - S_t)}\right]$$

where $\widehat{Y}$ is the predicted demand.

Climatic Component: The model incorporates two types of climate measures into the climatic component–rainfall and maximum daily air temperature.[2] The measures of temperature and rainfall are then logarithmically transformed to yield:

Equation 4

$$R_t \equiv \ln\left[1+\sum_{t=T}^{T_d} Rain_t\right], T_t \equiv \ln\left[\sum_{t=T}^{T_d}\frac{T_t}{d}\right]$$

Though this model extends to monthly measures while for daily measures, d takes on the value of one. Because weather exhibits strong seasonal patterns, climatic measures are strongly correlated with the seasonal measures. In addition, the occurrence of rainfall can reduce expected temperature. To obtain valid estimates of a constant seasonal effect, the seasonal component is removed from the climatic measures by construction.

Specifically, climatic measures are constructed as a departure from their "normal" or expected value at a given time of the year. The expected value for rainfall during the year, for example, is derived from regression against the seasonal harmonics. The expected value of the climatic measures ($\hat{\boldsymbol{C}}=\boldsymbol{Z}\cdot\beta_C$) is subtracted from the original climatic measures:

Equation 5

$$C_t \equiv (R_t - \widehat{R}_t)\cdot\beta_R + (E_t - \widehat{E}_t)\cdot\beta_T$$

The climatic measures in this deviation-from-mean form are thereby separated from the constant seasonal effect.[3] Thus, the seasonal component of the model captures all constant seasonal effects, as it

[2] Specifically it uses the daily temperature and the total daily precipitation at the Ontario NOAA station summarized to a monthly level.

[3] The logarithmic transformation of the original climate variable implies that the seasonal mean climate effect is a geometric mean. Because the model is estimated on the logarithmic scale the departure-from-mean climatic effects would be more accurately termed departure-from-median. See *Goldberger* [1968].

should, even if these constant effects are due to normal climatic conditions. The remaining climate measures capture the effect of climate departing from its normal pattern.

The model can also specify a richer texture in the temporal effect of climate than the usual fixed contemporaneous effect. Seasonally-varying climatic effects can be created by interacting the climatic measures with the harmonic terms. In addition, the measures can be constructed to detect lagged effects of climate, such as the effect of rainfall a month ago on today's water demand.

The percentage effect of the climate on normal demand is given by:

Equation 6

$$C_t\% = \left[\frac{\exp(\hat{Y}_t - T_t) - \exp(\hat{Y}_t - T_t - C_t)}{\exp(\hat{Y}_t - T_t - C_t)}\right]$$

where $\hat{Y}$ is the predicted demand.

Trend Component : For the IEUA Demand model, a deterministic annual trend term was used as the primary determinant of trends in per capita water demand in the long term.

Equation 7

$$\mathbf{T}_t \equiv AnnualTrend_t \cdot \beta_T + (\ln EmpDetrended) \cdot \beta_E$$

Thus the annual long term trend in IEUA Demand from 2002-2012 on is captured by β_T while the effects of the business cycle are captured by the departure of employment from its long term trend.

Stochastic Effects

To complete the model, we must account for the fact that not every data point will lie on the plane defined by Equation **(1)**. This fundamental characteristic of all systematic models can impose large inferential costs if ignored. Misspecification of this “error component” can lead to inefficient estimation of the coefficients defining the systematic forces, incorrect estimates of coefficient standard errors, and an invalid basis for inference about forecast uncertainty. The specification of the error component involves defining what departures from pure randomness are allowed. What is the functional form of model error? Just as the model of systematic forces can be thought of as an estimate of a function for the “mean” or expected value, so too can a model be developed to explain departures from the mean—i.e., a “variance function” If the vertical distance from any observation to the plane defined by **(1)** is the quantity $\boldsymbol{\varepsilon}$, then the error component is added to Equation **(1)**:

Equation 8

$$\ln \frac{Use}{Pop} = \mathbf{f}\left(\mathbf{S}_t, \mathbf{C}_t, \mathbf{T}_t\right) + \varepsilon$$

In an Ordinary Least Squares (OLS) Regression, the error term is assumed to be distributed normally with a constant variance.

$$\varepsilon \sim N\left(\mu_\varepsilon, \sigma_\varepsilon\right)$$

In the estimated retail demand model below, the variance is allowed to be nonconstant and separately modeled as an empirical variance (or link) function.

$$\sigma_{\varepsilon} = g(\mathbf{S}_t, \mathbf{C}_t, \mathbf{T}_t)$$

A variance function was estimated using the methods of Carroll and Ruppert as a two stage weighted least squares regression[4]. Briefly described, the first stage uses an OLS regression of the mean function (Equation 7) to derive a consistent estimate of the estimated error. The absolute value of the estimated error is used to estimate the variance function. The inverse of the predicted variance is used to weight the regression of the mean function in the second stage.

Estimated Per Capita Demand Model for IEUA

Table C1 presents the estimation results for the model of mean monthly per capita demand in IEUA. The independent variables 1 to 8—made up of the sines and cosines of the Fourier series described in Equation 2—are used to depict the seasonal shape of daily retail water demand (that is, $Z \cdot \widehat{\beta}_S$); this is the shape of demand in a normal weather year. This seasonal shape is important in that it represents the point of departure for the estimated climate effects (expressed as departure from what is expected in an average month).

The estimated weather effect is specified in "departure-from-normal" form. Variable 9 is the departure of monthly precipitation from the average precipitation for that month in the season. (Average seasonal precipitation is derived from a regression of monthly precipitation on the seasonal harmonics—exactly equal to monthly precipitation averaged over all years in the record.) Temperature is treated in an analogous fashion (Variables 11). The contemporaneous weather effect is interacted with the harmonics (Variables 10, 12, and 13) to produce a seasonal shape to both the rainfall and the temperature elasticities. Thus, departures of temperature from normal produce the largest percentage effect in the spring. Similarly, departures from normal rainfall produce a larger effect upon daily demand in the summer than in the winter. The lagged effect of temperature can also be detected further in time than rainfall—a detectable effect one month long.

The departure of employment growth from trend (13) and the annual trend term (variable 14) and comprise the long term determinants of demand.[5] Indicators ("dummy") variables for the years 2013 and 2014 were used to detect any customer response to the drought-induced calls for voluntary demand curtailment. (These measure the annual change in demand that was surprising: not explainable due to weather variation, recession, or ongoing trends in demand.) The constant term (17) describes the intercept for this equation.

[4] See Carroll, R. J. and Ruppert, D. (1988). *Transformation and Weighting in Regression*. Chapman and Hall, London.

[5] A variation of the model was used to test for a detectable trend in the seasonal shape of demand by including an interaction of the trend term and the annual harmonic.

Table 1-- Estimated IEUA Per Capita Demand Model (Mean Function)

Estimated IEUA Demand Model (Mean Function) Ln IEUA Per Capita Use (Gl. Per Capita Per Day)		
Independent Variable	**Coefficient**	**Std. Error**
1. First Sine harmonic, 12 month (annual) frequency	-0.10278	0.00714
2. First Cosine harmonic, 12 month (annual) frequency	-0.37889	0.00642
3. Second Sine harmonic, 6 month (biannual) frequency	-0.00489	0.00688
4. Second Cosine harmonic, 6 month (biannual) frequency	-0.00438	0.00723
5. Third Sine harmonic, 4/12 frequency	-0.00510	0.00849
6. Third Cosine, 4/12 frequency	0.02987	0.00699
7. Fourth Sine harmonic, 3 month (quarterly) frequency	0.01300	0.00857
8. Fourth Cosine, 3 month (quarterly) frequency	0.02357	0.00820
9. Contemporaneous Rainfall Deviation [(ln (Rain+1)) – Monthly mean]	-0.13102	0.02219
10. Interaction of contemporaneous rain with annual cosine harmonic	-0.04787	0.02701
11. Contemporaneous deviation from mean ln (temperature) in the month	0.87760	0.12878
12. Interaction of contemporaneous temperature deviation with annual sine harmonic	0.14438	0.16733
13. Deviation of ln(Employment in San Bernardino County) from Trend	0.96640	0.09765
14. Overall Annual Trend 2003-2014	-0.00147	0.00207
15. Indicator for 2013	-0.02098	0.01367
16. Indicator for 2014	-0.04618	0.02613
17. Intercept	5.46346	0.01788
Obs	139	
R^2	0.9760	
Root Mean Squared Error	0.03816	
Time period (Fiscal Years)	2003-2014	

Figures 1 and 2 plot Actual IEUA Per Capita Demand against the model predictions ($\hat{Y}$) and reveals a very tight fit of predictions to actual.

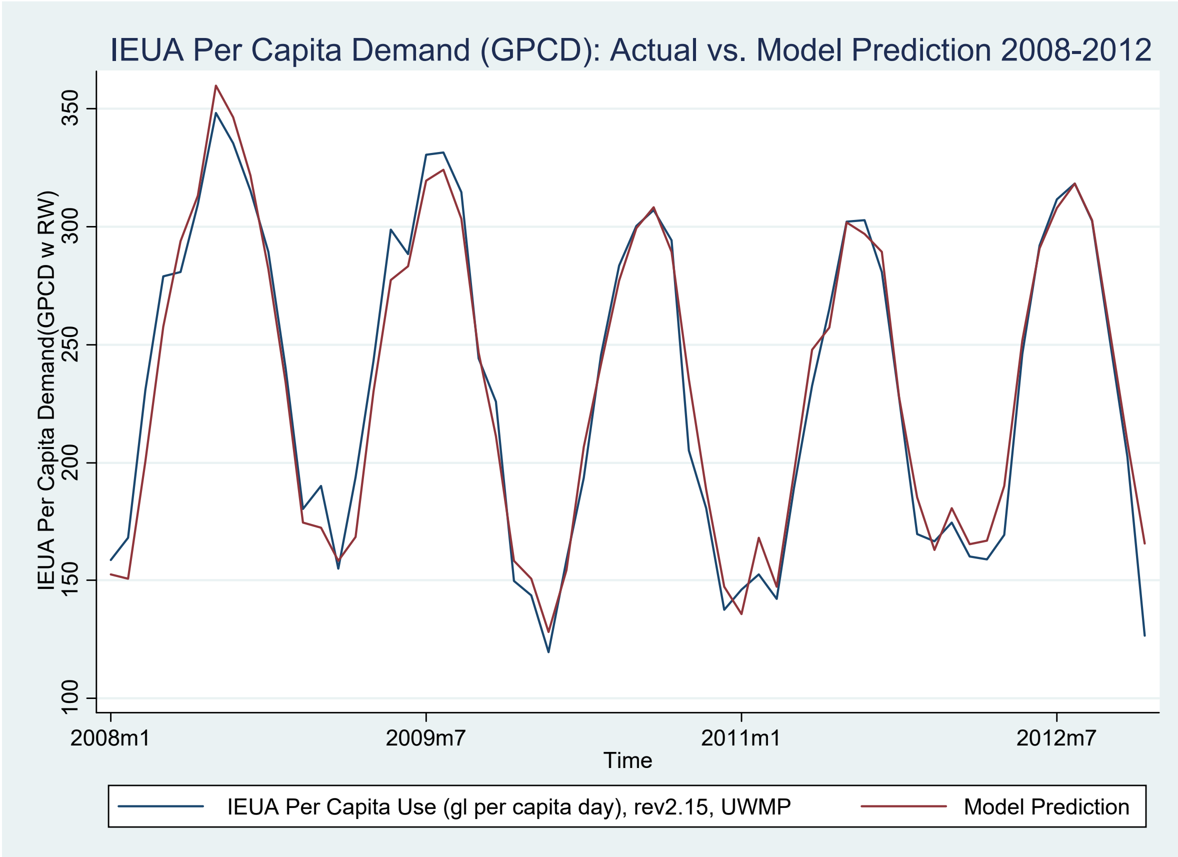


Figure 1-- IEUA Per Capita Demand (GPCD): Actual vs. Model Prediction , FY 2008-2012

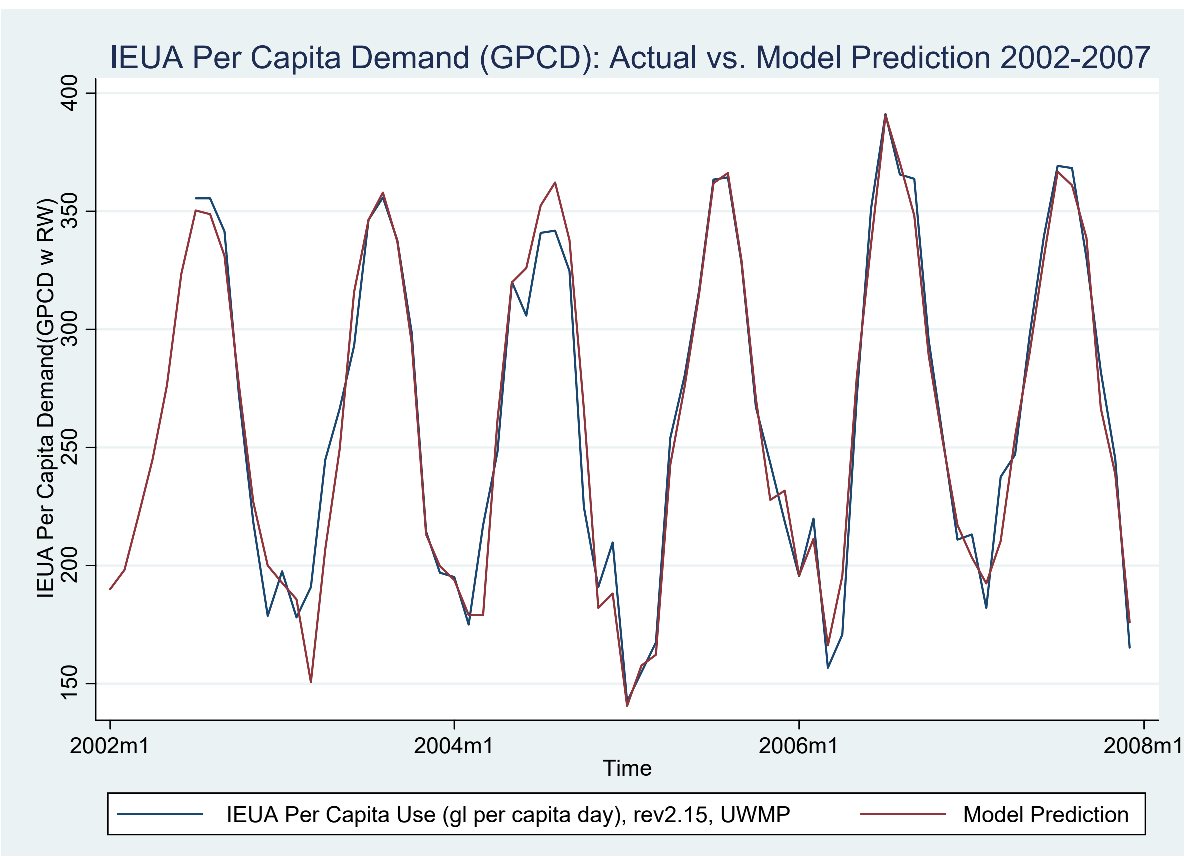


Figure 2-- IEUA Per Capita Demand (GPCD): Actual vs. Model Prediction , FY 2002-2007

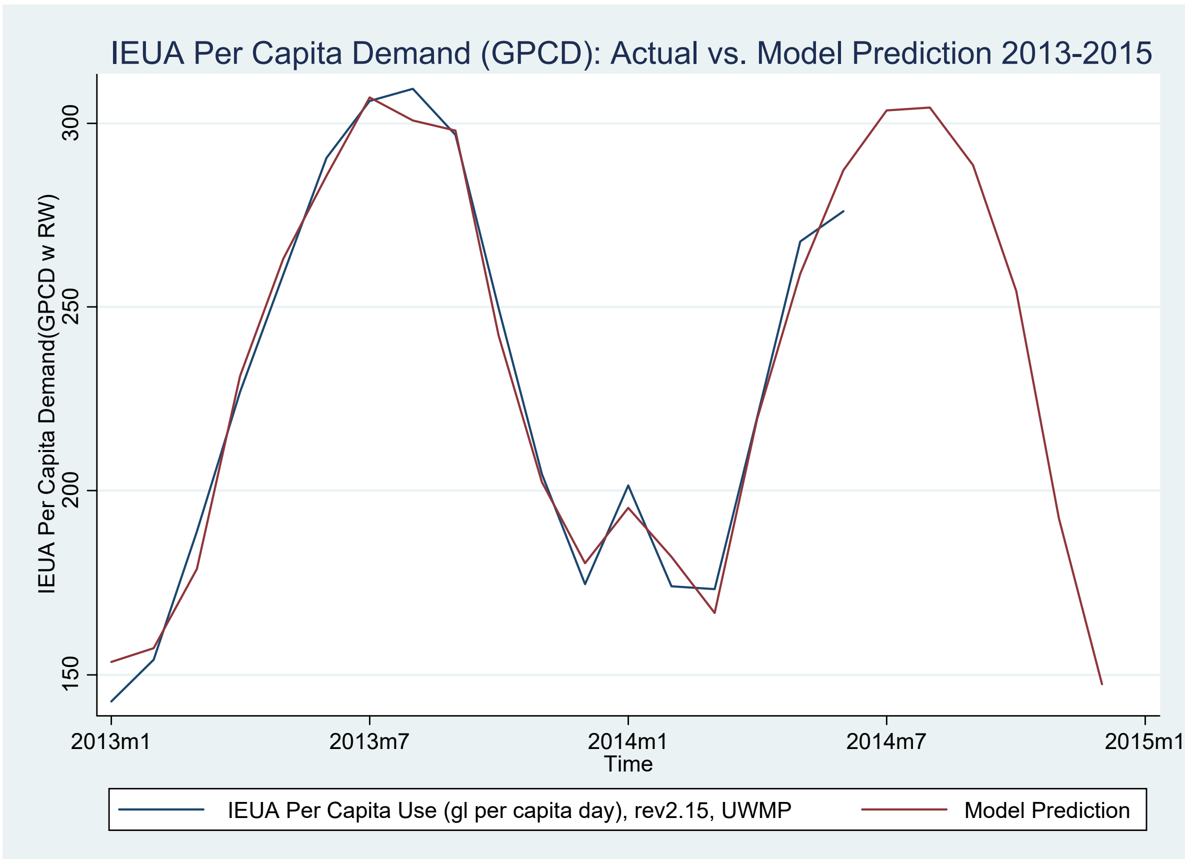


Figure 3-- IEUA Per Capita Demand (GPCD): Actual vs. Model Prediction, 2013-2014

Application to Demand Trends

From the statistically estimated model documented above, one can calculate the effect of weather on per capita water demand as the difference between two predictions: a prediction of demand conditional on actual weather and a prediction of demand “as if” weather were normal[6]. Equation 5 specifies this relationship in percentage terms. Table 2 presents the summation of the estimated effect of weather for each year.

[6] Normal weather is defined as the average values of each weather variable in each month over the period of record 1950-2012.

Table 2-- Effect of Weather on IEUA Per Capita Demand (GPCD)

IEUA Water Demand (GPCD)				
	IEUA Water Demand			
Year	Effect of Weather on Water Demand (Change in GPCD)	Effect of Weather on Water Demand (Percent)	Precipitation (inches)	Max Temperature (F)
2003	-22.85	-0.75%	16.71	77.15
2004	114.88	3.58%	8.66	79.71
2005	-170.88	-5.73%	28.20	76.19
2006	-10.02	-0.32%	12.78	78.15
2007	190.90	5.70%	3.73	79.78
2008	43.61	1.40%	11.75	78.58
2009	111.29	3.70%	9.40	79.50
2010	-15.18	-0.56%	15.34	77.95
2011	-75.60	-2.89%	16.45	76.47
2012	14.05	0.52%	9.12	78.14
2013	142.80	5.05%	5.54	80.35
2014	197.84	6.97%	4.38	81.13
Long Term Average	2003-2014		11.84	78.6
Weather Station	Ontario NOAA			

Finally, these estimated effects of non-normal weather and employment different from trend are next used to estimate what per capita water demand would have been if weather had been normal and if employment had not differed from its historical trend (that is, if the recession had not occurred.) Actual demand with weather and employment effects removed will be referred to as “normalized” per capita water demand. Figure 4 below plots the mean monthly employment for San Bernardino County and reveals the sharp effects of the recent recession.

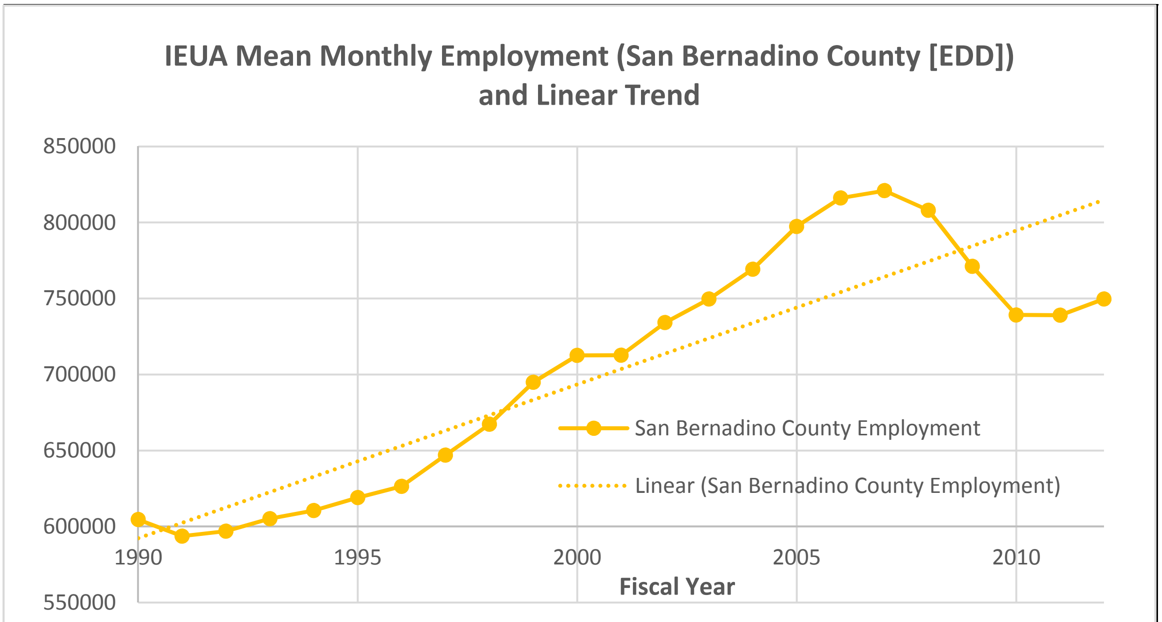


Figure 4-- IEUA Mean Monthly Employment (San Bernardino County [EDD]) and Linear Trend

Table 3 presents the derivation of normalized IEUA per capita water demand. The first column of raw demand data ("Actual Demand") is followed by demand normalized for weather. The estimated percentage effect of weather different from normal ("Effect of Weather on Water Demand (Percent)") explains how weather affected actual demand and is used to estimate the third column of retail demand ("Demand Normalized for Weather (GPCD)"). A similar estimate for the effect of employment different than trend is used to estimate the last column of retail demand ("Demand Normalized for Weather and Employment"). The assumptions implied by this "normalization" include that realized weather is exactly equal to average weather (monthly averages based on the period of record 1950-2012) and that employment continued along its long term trend (as depicted by the straight line in Figure 3).

Note that the variation of the percentage annual effect of weather and employment is summarized at the bottom of the table and is useful for risk analysis. Weather could knock per capita demand 7.3 percent either way in any year (90 percent confidence interval). The effect of the business cycle—as captured by the effect of employment swings—is very pronounced in recent years due to the Great Recession. Single year swings of 5 and a half percent occurred more than once with a very wide confidence interval required to contain 90 percent of expected annual variation due to employment variation (approximately 12.8 percent either way in any year).

The model also detects customer response in 2013 and 2014 to drought-induced calls for customers to voluntarily curtail water demand. These effects, though targeted mostly to residential customers, provide evidence of some customer response that cannot be explained by the other forces in the model—weather variation, variation in employment, and long term trends in water demand.

Table 3-- IEUA Per Capita Use (GPCD): Actual and Normalized

	IEUA Water Demand				
Fiscal Year	Actual Demand (GPCD)	Effect of Weather on Water Demand (Percent)	Demand Normalized for Weather (GPCD)	Effect of Employment on Water Demand (Percent)	Demand Normalized for Weather and Employment (GPCD)
2003	257.77	-0.75%	259.7	4.54%	247.92
2004	267.63	3.58%	258.1	5.64%	243.51
2005	245.78	-5.73%	259.9	7.71%	239.83
2006	262.56	-0.32%	263.4	8.70%	240.47
2007	283.06	5.70%	266.9	8.11%	245.29
2008	265.58	1.40%	261.9	5.52%	247.43
2009	256.55	3.70%	247.1	0.10%	246.82
2010	228.42	-0.56%	229.7	-5.56%	242.47
2011	212.70	-2.89%	218.8	-7.04%	234.25
2012	220.83	0.52%	219.7	-7.08%	235.24
2013	231.40	5.05%	219.7	-6.06%	233.03
2014	237.75	6.97%	221.2	-5.25%	232.80
	Standard Deviation of % Effects	**+/- 3.74%**		**+/- 6.55%**	
	95% Confidence Interval	**+/- 7.3%**		**+/- 12.8%**	
Percentage Annual Trend, FY2003-2007	2.4%			0.7%	-0.3%
Percentage Annual Trend, 2007-2012	-2.7%			-3.8%	-0.8%

Table 4 presents the same results as in Table 3, but in terms of acre feet rather than GPCD. Again, the first column of raw demand data ("Actual Demand") is followed by demand normalized for weather. The estimated percentage effect of weather different from normal ("Effect of Weather on Water Demand (Percent)") explains how weather affected actual demand and is used to estimate the third column of retail demand ("Demand Normalized for Weather (AF)"). A similar estimate for the effect of employment different than trend is used to estimate the last column of retail demand ("Demand Normalized for Weather and Employment").

Taken from "peak to trough," from 2007 to 2012, Table 4 also shows the decline in actual demand was an average of 4.3 percent per year, for a total of 19.6 percent decline over the five-year period. After normalizing for weather and employment, the decline was an average of 0.2 percent per year, or about a one percent decline over the five-year period.

The effect on the trend in per capita demand is easier to discern in Figures 4 and 5. Figure C5 plots actual and normalized demand in terms of GPCD. The near three percent annual decline (2.7 percent) in actual GPCD demand between fiscal years 2007 and 2012 is reduced in magnitude to less than one percent decline (0.8 percent) after normalizing for weather and employment. Figure 5 plots actual and normalized demand in terms of acre feet. The decline in actual demand (in acre feet per year) between fiscal years 2007 and 2012 was 4.3 percent per year on average. After normalizing for weather and employment, there was actually a slight decrease of 0.2 percent.

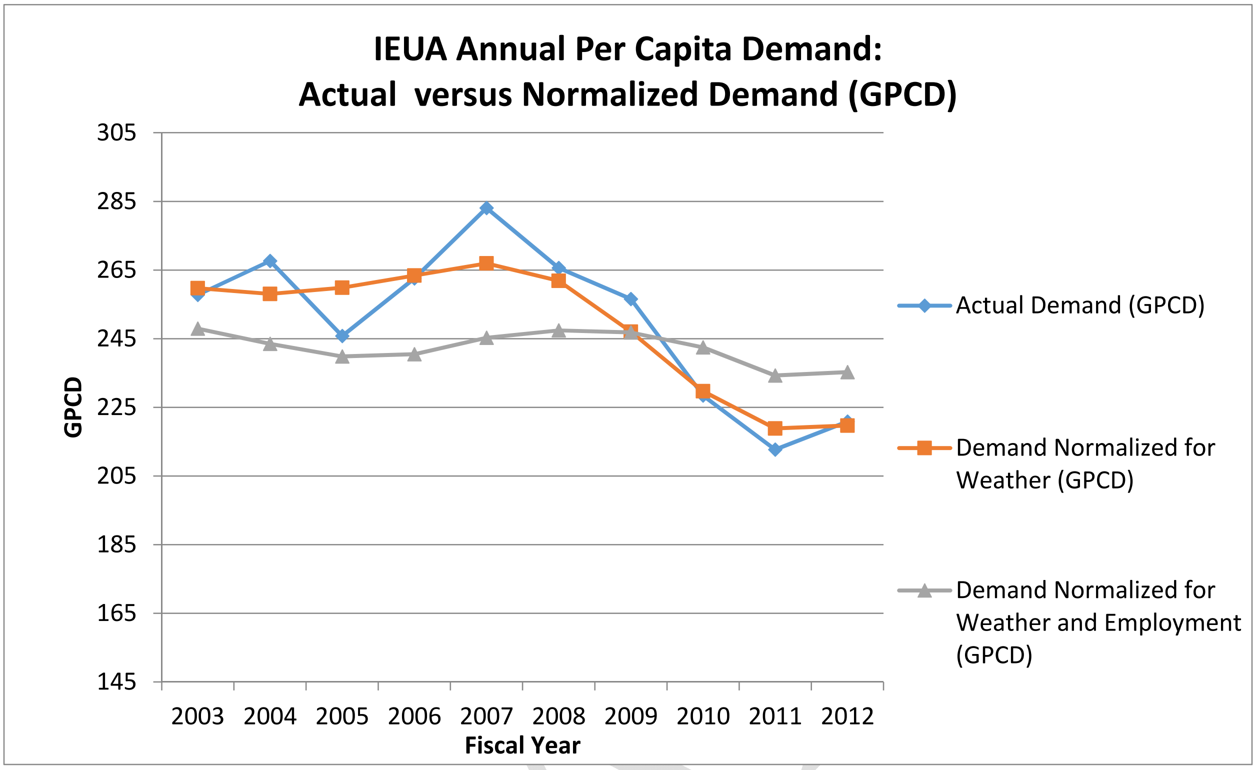


Figure 5-- IEUA Annual Per Capita Demand: Actual versus Normalized Demand (GPCD)

Table 4-- IEUA Use (Acre Feet): Actual and Normalized

	IEUA Water Demand				
Fiscal Year	Actual Demand (AF)	Effect of Weather on Water Demand (Percent)	Demand Normalized for Weather (AF)	Effect of Employment on Water Demand (Percent)	Demand Normalized for Weather and Employment (AF)
2003	215685	-0.75%	217309.4	4.54%	207434.07
2004	230498	3.58%	222247.4	5.64%	209718.74
2005	213262	-5.73%	225476.5	7.71%	208098.51
2006	230911	-0.32%	231640.4	8.70%	211482.21
2007	255280	5.70%	240727.8	8.11%	221216.62
2008	241913	1.40%	238528.0	5.52%	225372.92
2009	233799	3.70%	225147.9	0.10%	224930.13
2010	209290	-0.56%	210457.9	-5.56%	222162.16
2011	195745	-2.89%	201392.7	-7.04%	215570.59
2012	205231	0.52%	204166.6	-7.08%	218614.07
2013	216004	5.05%	205103.5	-6.06%	217527.39
2014	223435	6.97%	207870.6	-5.25%	218784.24
	Standard Deviation of % Effects	**+/- 3.74%**		**+/- 6.55%**	
	95% Confidence Interval	**+/- 7.3%**		**+/- 12.8%**	
Percentage Annual Trend, FY2003-2007	4.3%			2.6%	1.6%
Percentage Annual Trend, 2007-2012	-4.3%			-3.2%	-0.2%

Appendix 2:

RAND Memo "Evaluating Options for Improving Climate Resilience of the Inland Empire Utilities Agency in Southern California"

DRAFT. NOT CLEARED FOR OPEN PUBLICATION. DO NOT CIRCULATE OR QUOTE.

Project Report

Evaluating Options for Improving the Climate Resilience of the Inland Empire Utilities Agency in Southern California

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Elizabeth Hurst and Jason Pivovaroff (Inland Empire Utilities Agency)

March 2016

Preface

The Inland Empire Utilities Agency (IEUA) and RAND worked together in 2003-2005 to demonstrate and evaluate how new approaches to decisionmaking under uncertainty could help a water utility evaluate the potential threats of climate change in their long-term planning. This work was performed outside IEUA's planning process and was documented in several RAND reports and scientific journal articles (Groves, Davis, *et al.*, 2008; Groves, Knopman, *et al.*, 2008; Groves, Lempert, *et al.*, 2008). In 2015, IEUA asked RAND to help it re-evaluate its water management system under a range of future conditions reflecting climate change and other drivers for its Integrated Resources Plan (IRP). This report documents the tools developed and analysis performed during 2015 for this effort. Questions or comments about this report should be sent to the project leaders, David Groves (groves@rand.org) and Abbie Tingstad (tingstad@rand.org).

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Abbreviations

BCSD	Bias-Corrected Statistically Downscaled
CMIP	Coupled Model Intercomparison Project
FWOA	Future Without Action
GCM	General Circulation Model
GHCND	Global Historical Climatology Network Database
IEUA	Inland Empire Utilities Agency
IRP	Integrated Resources Plan
MWD	Metropolitan Water District of Southern California
NOAA	National Oceanographic and Atmospheric Administration
PDT	Portfolio Development Tool
RDM	Robust Decision Making
SAR	Santa Ana River
SEI	Stockholm Environment Institute
UWMP	Urban Water Management Plan
WCRP	World Climate Research Programme
WEAP	Water Evaluation and Planning System
WEI	Wildermuth Environmental Inc.

Introduction

Water managers continue to face challenges related to climate non-stationarity (Milly *et al.*, 2008) in their long-term planning. Even when water supplies appear sufficient to meet present and short-term demand, uncertain future changes in temperature and precipitation make decisions about investments to ensure longer-term supply sufficiency difficult. In Southern California, the recent drought has refocused attention on water resources in this semi-arid, populous area. Although this drought appears to be consistent with long-term patterns of climate variability, its effects may be exacerbated by ongoing climate change, which is anticipated to have a strong effect on the region, including on its water supplies (e.g., with respect to the length and magnitude of droughts, timing of precipitation, and temperature-driven demand) (Diffenbaugh *et al.*, 2015; Mao *et al.*, 2015; Shukla *et al.*, 2015)

Adaptive management plans are designed to evolve over time in response to new information regarding future conditions. This type of flexible approach is becoming increasingly favored in the water management community as a mechanism for planning under uncertainty. Integrative approaches, which help facilitate adaptive plans, focus on combining a variety of management options, rather than a single type of solution.

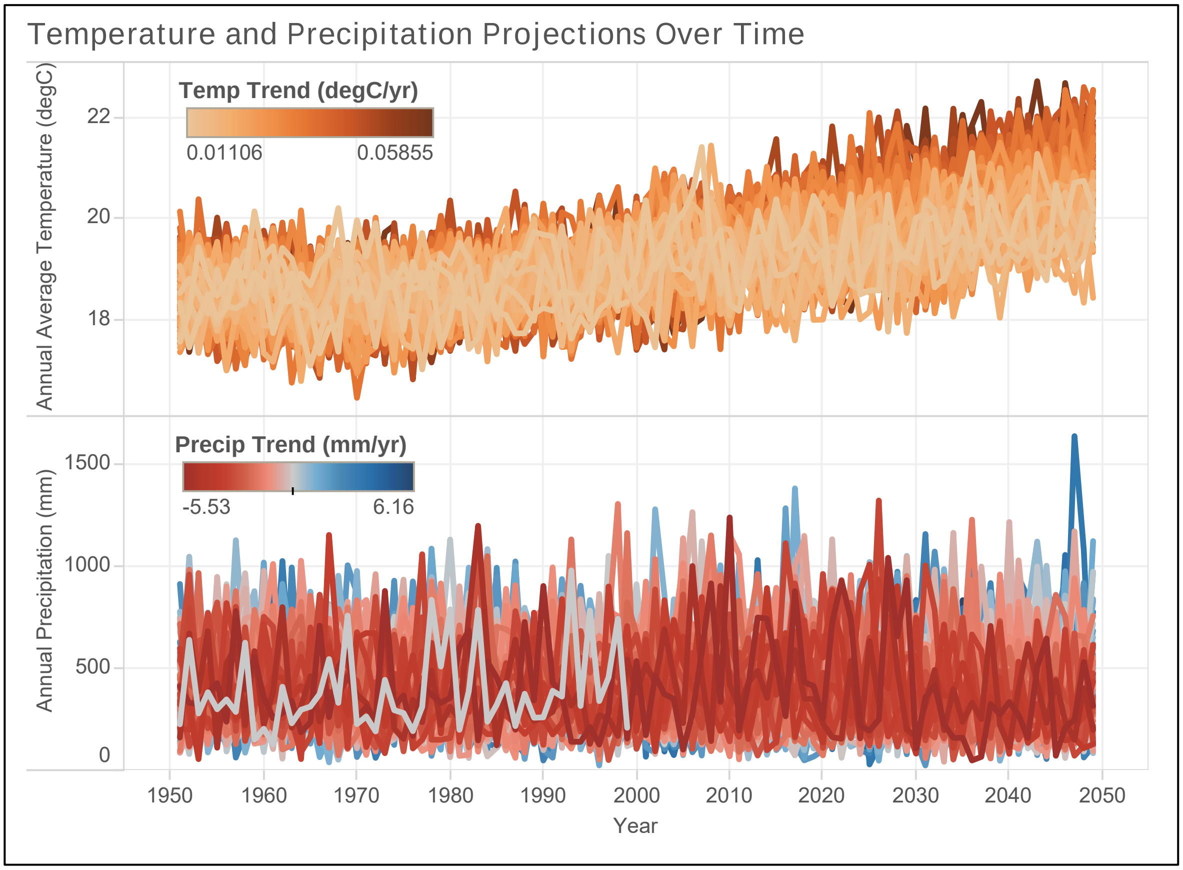
The Inland Empire Utilities Agency (IEUA), a water management agency in Southern California, recently partnered with the RAND Corporation, a multi-disciplinary, non-partisan research organization and educational institution headquartered in Santa Monica, California, to evaluate how adaptive, integrative water management options could improve IEUA's abilities to meet customer needs under a wide range of futures. This analysis was used to support the development of its Integrated Resources Plan (IRP). The purpose of the IRP is to evaluate the resiliency of water resources in the IEUA's service area over the next twenty-five years and to evaluate alternative management options for ensuring water deliveries to urban users. The IRP results will be used to recommend regional strategies and identify preferred water supply projects that, in turn, will help the IEUA and its member agencies to apply for grants and loans to implement new projects. RAND supported IEUA's IRP by developing a tool for constructing and visualizing different portfolios for water management investments and actions, and enabling an analysis of *status quo* and potential future water management activity success in meeting future urban water demand under different demand and climate change-impacted water supply conditions. This follows RAND's previous work supporting the IEUA's 2005 Urban Water Management Plan (UWMP) (Groves, Knopman, *et al.*, 2008; Groves, Lempert, *et al.*, 2008).

Current water demands in the IEUA service area are serviced by groundwater from the Chino Basin in addition to local surface supplies, recycled water, and imported water from Northern California via Metropolitan Water District of Southern California (MWD). In addition, IEUA implements water efficiency projects, such as low-flow toilet rebate programs. Depending on different estimates of future infrastructure water efficiency, this “baseline” supply (current and planned supplies from groundwater and other sources plus savings from water efficiency projects) is likely sufficient, or very nearly so, for meeting future demand assuming climatic conditions remain similar to those experienced in recent history. However, IEUA wanted to explore how shifts in stationarity assumptions through climate change, along with possible changes in demand, could impact its future water supplies and demands, and what water management projects could help meet future demand under uncertain future temperature and precipitation conditions.

A suite of global climate models suggests that temperatures over the IEUA service area will rise over the coming decades and that annual precipitation will continue to be highly variable, with no consensus on trends towards wetter or drier conditions. Figure 1 displays the annual average temperature and total precipitation estimates from 1950 to 2050 for the IEUA service area based on 106 downscaled projections of climate from a range of general circulation models (GCMs).[1] The temperature increases seen beginning around the 1980s and the uncertainty associated with local precipitation underscores the importance of carrying out an analysis of IEUA water management options to ensure that future demand can be met under a variety of different hydrologic circumstances against the backdrop of rising temperatures.

[1] Note that GCMs are not expected to simulate the precise interannual fluctuations of the historical period, because stochastic forces and sequences of events that are unresolvable by numerical models drive such historical variability. Instead, GCMs are validated based on their ability to characterize the statistical characteristics of historical climate, such as maximum and minimum temperatures or precipitation.

Figure 1: Estimates of historical and future annual average temperature and total precipitation for the IEUA service area



To support this analysis we developed (1) a simple mass balance water management model to estimate future supplies and demand across different future and (2) a decision support tool to help IEUA planners and stakeholders to compare attributes of different management options and develop portfolios for evaluation. We then performed a three-step analysis:

1. Evaluated the performance of the IEUA system under a wide range of futures to evaluate its vulnerability to climate and future demand
2. Constructed portfolios of water management projects that could help increase water management supplies in the future
3. Tested and compared how each proposed water management portfolio enhances the IEUA's ability to deliver urban water supplies in the future

In the next section we describe the methods and models used in each step. Due to the limited scope of this effort, we did not attempt to evaluate the cost-effectiveness or finer details (e.g., implementation potential at specific locations) of the different water management projects. We also did not conduct statistical analysis to determine the specific climatic conditions most conducive to different portfolio success or failure in meeting urban water demand, nor did we consider uncertainties related to budget and/or other factors that could impact our results.

Methods

The overarching methodological framework for this project is Robust Decision Making (RDM) (Groves and Lempert, 2007; Lempert *et al.*, 2003). RDM is an approach that seeks to determine what plans reduce risk over a range of assumptions, thereby facilitating deliberation among stakeholders that may have differing values and expectations about the future (Lempert, 2013). It is a methodological process, involving iterative steps including stakeholder interactions, modeling, and statistical analysis, that facilitates interactions and aims to shape decision-maker discussions around which factors lead to plan success or failure and the identification of robust solutions – those that perform well under a range of futures—rather than a single “best” solution (Hallegatte *et al.*, 2012; Lempert *et al.*, 2006). The RDM approach runs models on tens to thousands of different sets of assumptions to describe how plans perform in a range of plausible futures. Analysts then use visualization and statistical analysis of the resulting large database of model runs to help decision-makers distinguish future conditions in which their plans will perform well from those in which they will perform poorly (Bryant and Lempert, 2010). RDM has been used in a range of contexts, to include water management, flood risk assessment, and sea level rise planning (Groves *et al.*, 2013, 2014; Herman *et al.*, 2015; Tingstad *et al.*, 2013).

Many RDM analyses are conceptually organized using a framework called “XLRM”, where key uncertainties (X), policy levers or strategies (L), relationships or models (R), and metrics or outcome measures (M) are summarized in a quad chart. The principal considerations around which this project is organized are summarized in XLRM format below.

Table 1: Summary of uncertainties, projects, models, and outcome measures considered

Uncertainties (X)	Projects (L)
Climate conditions Demand	75 different projects in categories • Chino Basin projects (13) • Imported Water Direct, Imported Water Recharge (14) • Imported Water Recharge (3) • Imported Water Recharge / Recycled Water (4) • Local Surface (2) • Other Groundwater (1) • Recycled Water (16) • Stormwater (6) • Stormwater, Recharge, Imported Water Recharge, Recycled Water (4) • Water Use Efficiency (10) • Chino Basin Groundwater, Recycled Water, Imported Water (2)
Models (R)	**Performance Metrics (M)**
WEAP IEUA IEUA Portfolio Development Tool	Demand Sources of supply to meet demand Unmet demand

Water Management Mass Balance Model

RAND developed a water management model developed for the IEUA service area using a simulation platform called the Water Evaluation and Planning system (WEAP) (Yates *et al.*, 2005). The purpose of this model was to help address Step One of our analysis by creating a simulation model that could evaluate the performance of the IEUA system under a wide range of futures. In brief, WEAP enables integration of physical hydrologic processes with management of water demands and supplies using a link-and-node representation of a water management system, as constructed by a user. The WEAP model was used primarily to evaluate projected annual urban demands, sources of supply, and unmet demands.

RAND previously developed a WEAP model for the IEUA service area (Groves, Lempert, *et al.*, 2008) based on information available during the 2003-2005 time period. For the present study, RAND developed a new WEAP model based primarily on IEUA's latest spreadsheet-based information about current water supplies and demands, and annual projections of them through 2050. See Appendix 2 for more detail.

Absent available detailed analyses of how climate change could affect each element of IEUA's water supply portfolio, RAND worked with the best available data to develop some coarse approximations of how different supplies and demand would change under different assumptions and projections of climate conditions. These analyses were developed as a first step towards a more comprehensive assessment of IEUA resilience to climate change, and were vetted by IEUA water managers. For the purposes of this initial work, these coarse approximations provided sufficient insights into the potential impacts of climatic changes on supply and demand to facilitate deliberation over the usefulness of different types of water management projects.

Several "simple models" were developed to estimate the impacts of climatic changes on the following elements of the IEUA system (see Appendix 2 for details):

- *Local surface supplies, storm water, and replenishment supplies*: two regression models of historical annual local surface supplies and annual climate were used to estimate future local surface supplies based on projections of temperature and precipitation. These models were applied to estimate local surface supplies, available storm water supplies, and non-MWD replenishment supplies.
- *Groundwater safe yield*: Projections of future safe yield under different trends in climate conditions were developed by Wildermuth Environmental Inc. (WEI) and provided to IEUA and the study team. The current long-term sustainable yield of the groundwater basin was then modified for each climate projection based long-term precipitation trend perturbation factors derived from the WEI analysis.
- *Imported supplies via Metropolitan Water District*: A simple linear model of supply availability over time from Northern California via MWD was used to modify IEUA's contractually available supply from MWD. Two different climate response rates were

evaluated that effectively assumed a 17% and 34% reduction in imported available water by 2040.

- *Water demand*: Demand climate adjustment factors were developed using IEUA calculations of the sensitivity of demand to climate using MWD-MAIN. These factors were used together with the climate scenarios (annual average temperature and precipitation) to adjust the demand annually.

By imbedding these models into the WEAP model, we estimated future local surface water production, groundwater sustainable yield and replenishment, outdoor urban demand, and possible adjustments to water imports under changing climate. This WEAP model was used to both test baseline supply resiliency to climate change as well as determine expected benefits from new water management projects.

Portfolio Development Tool

With inputs from the IEUA and its member agencies, RAND created a Portfolio Development Tool (PDT) using the visualization software platform Tableau. The purpose of this activity was to support Step Two of our analysis by creating a user-friendly interface through which the IEUA and its member agencies could explore a variety of water management projects and develop portfolios that included one or more projects. The PDT enables users to review individual project attributes—both quantitative (i.e., how much water they produce) and qualitative (e.g., whether they contribute to different IEUA regional goals)—and determine how combinations of these projects together would increase future supplies, moderate demand, and meet qualitative, regional goals. IEUA and RAND used the PDT to support a series of meetings between the IEUA and member agencies and a workshop co-run with member agency representatives to create different adaptive, integrative options for increasing future water supplies. The final list of portfolios selected by the IEUA using the PDT is represented in the table below (Table 2), and the IEUA IRP includes more detailed description and rationale for these portfolios.

Table 2: Management portfolios developed using the Portfolio Development Tool

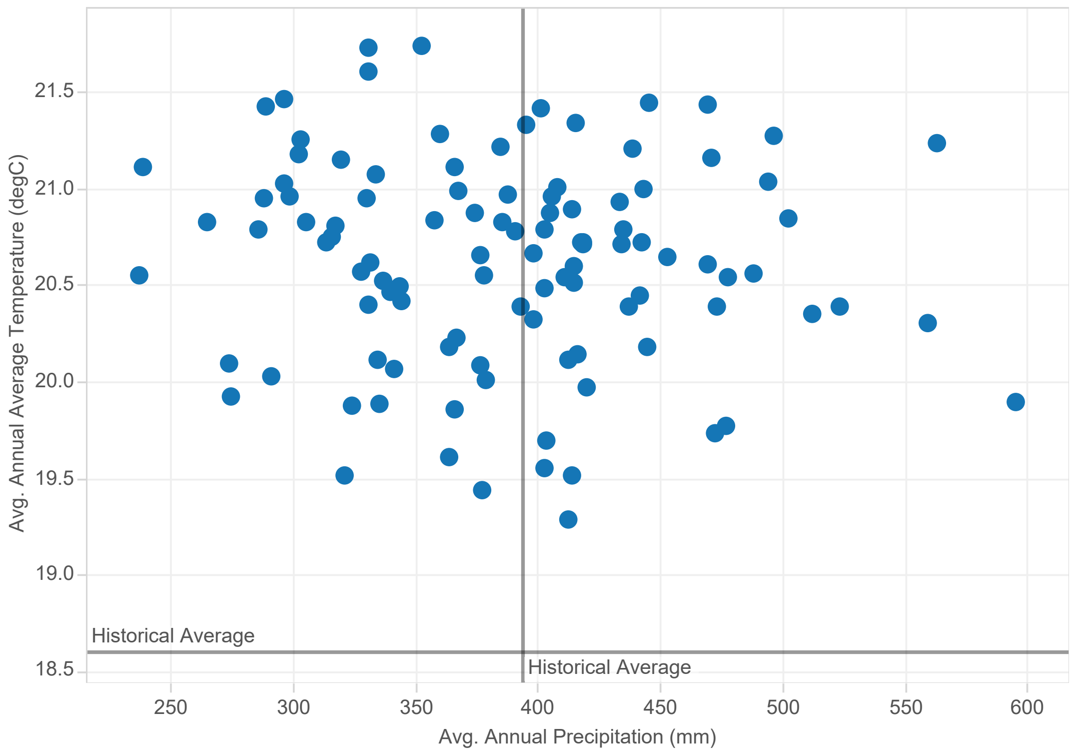
Portfolio Name	Portfolio Description
Portfolio #1	Maximize the Use of Prior Stored Groundwater
Portfolio #2A	Maximize Recycled Water (Including External Supplies) and Local Supply Projects and Implement Minimal Water Efficiency
Portfolio #2B	Portfolio 2A Plus Secure Supplemental Imported Water from MWD and Non-MWD Sources
Portfolio #3A	Maximize Recycled Water (Including External Supplies) and Implement Moderate Water Efficiency
Portfolio #3B	Portfolio 3A Plus Implement High Water Efficiency

Portfolio #4	Maximize Supplemental Water Supplies and Recycled Water Supplies
Portfolio #5A	Maximize the Purchase of Imported Water from MWD and Implement Minimal-Moderate Level of Water Efficiency
Portfolio #5B	Portfolio 5A Plus Maximize Recycled Water

Climate and Demand Futures

The WEAP model was then used to “stress test” the resiliency of the IEUA service area’s baseline water supplies, and baseline supplies plus the different future water management project portfolios, under different conditions of climate change and demand. This is Step Three of our analysis. The study considered the 106 projections of future climate displayed in Figure 1. These were downloaded from an archive of downscaled global climate model simulations, described in Appendix 2. These 106 projections of future climate were integral to our ability to stress test the IEUA water management system in its ability to meet future demand. Each projection represents a plausible climate future in our analysis. Although we cannot know with certainty what type of climatic change the future holds, having a diverse set of projections enables development of management alternatives that could be robust in adapting to a range of different conditions. Figure 2 plots the average annual temperature and precipitation from 2040-2049 for this set of climate projections.

Figure 2: Average annual temperature and precipitation over the Inland Empire Utilities Agency service area from 106 climate projections (2040-2049)



All the climate projections show higher average annual temperatures from 2040 – 2049 than the historical average (1951-1999). This is consistent with observed and projected changes around the world (IPCC, 2014). About half of the climate projections show higher precipitation and half show lower precipitation. Specifically, annual average precipitation varies between 237 mm/year to 595 mm/year, or between 60% and 151% of the historical record. This uncertainty in precipitation trends reflects the difficulty in modeling the complex atmospheric and oceanic processes that govern precipitation patterns in the Southwest United States and the stochasticity of these processes (Peterson *et al.*, 2013). Although these projections do not indicate whether the climate will get drier or wetter in the coming decades in the IEUA service area, they do provide a useful test bed of plausible climate conditions for which to stress test water management plans. Dry conditions can challenge the ability of the system to meet user demand whereas wet conditions can render additional supply investments unnecessary expenditures.

Scientists have confidence that the projections in Figure 2 are suggestive of future climate conditions that are impacted by higher greenhouse gas concentrations in the atmosphere. One reason is that these climate models, when evaluated for historical periods of time (e.g. 1950-2000), estimate past variability that is similar to the observed historical values. To illustrate this, Figure 3 shows the historical, observed annual average temperature and annual total precipitation from 1951 – 1999 for the IEUA service area (blue line on the left), along side the maximum and minimum projected annual average temperature from the 106 climate scenarios for the same time period (box charts on the right). The models, when "backcasting" the same historical time period, estimate a range of maximum and minimum temperatures that are inclusive of the historical observed maximum and minimum temperature. Figure 4 shows the same comparison for annual total precipitation. Once again, the future and historical maxima and minima appear to have some overlap.

Figure 3: Observed historical annual temperature record for the IEUA service area from 1951 – 1999 (left) compared to the distribution of predicted maximum and minimum temperatures across the 106 climate scenarios for the same historical time period (right)

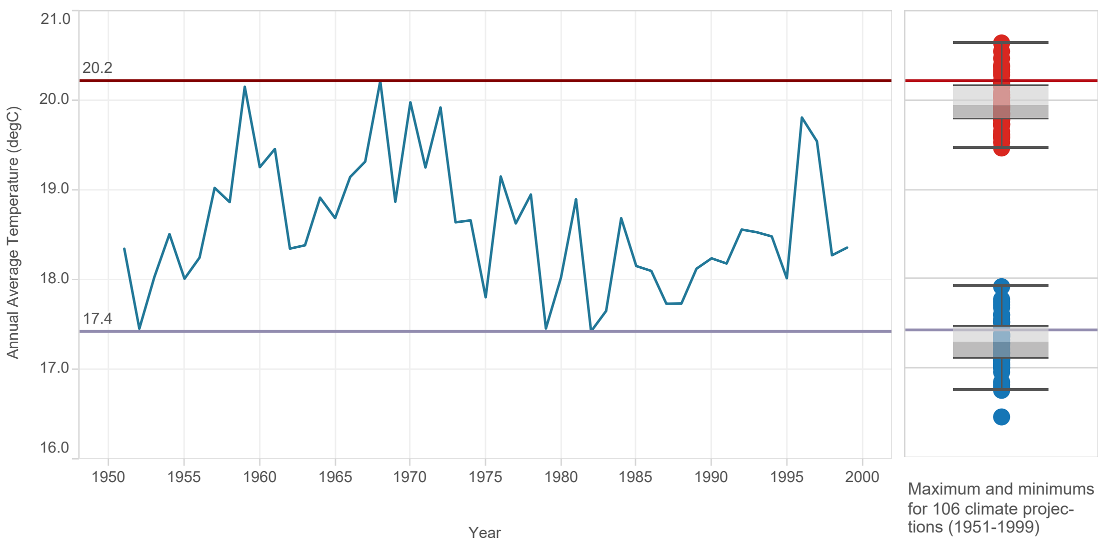
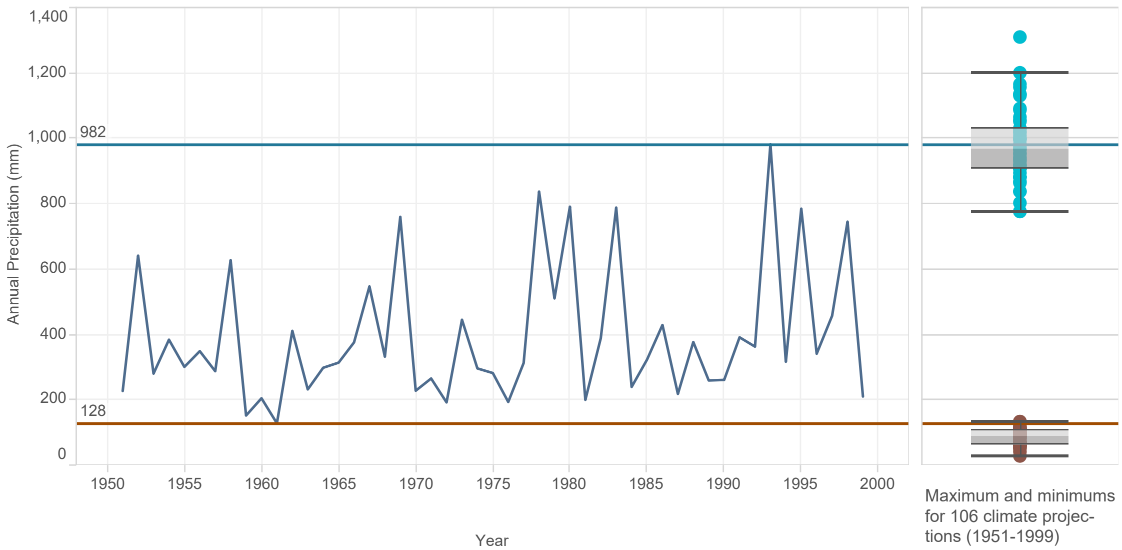
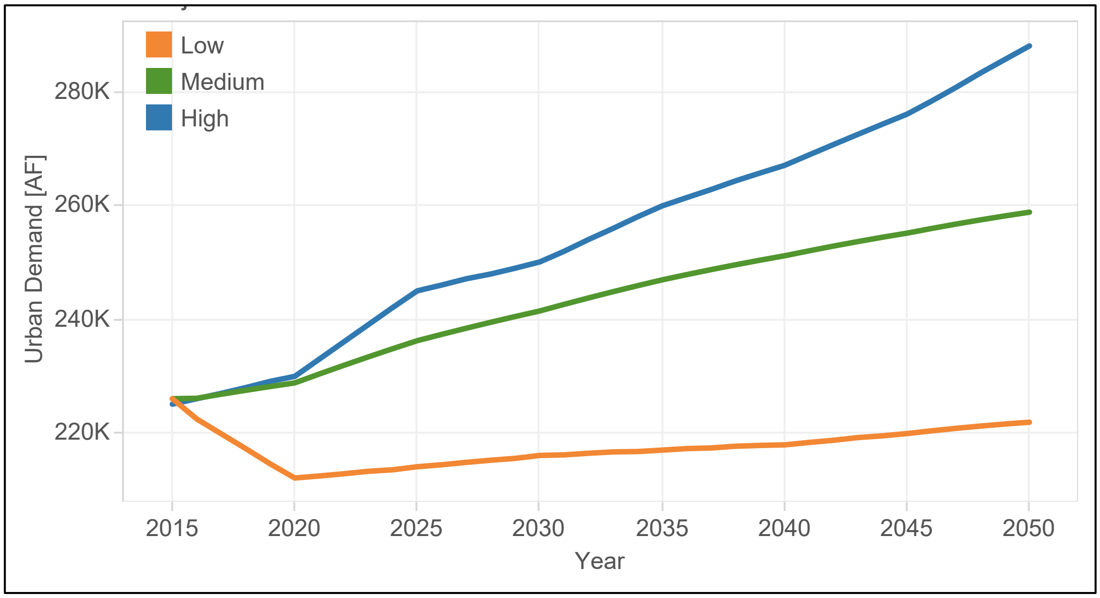


Figure 4: Observed historical annual total precipitation record for the IEUA service area from 1951 – 1999 (left) compared to the distribution of predicted maximum and minimum precipitation across the 106 climate scenarios for the same historical time period (right)



In addition to future climate, this work also examined impact of future demand. IEUA supplied two projections of future demand—a low and high demand estimate. A middle projection was then estimated within the water management model by specifying indoor and outdoor water use rates that were between those used for the high and low demand estimate. Figure 5 shows these three demand scenarios under conditions of no climate change. It also shows unmet demand under historical climate conditions.

Figure 5: IEUA demand scenarios under no climate change



Simulating future conditions

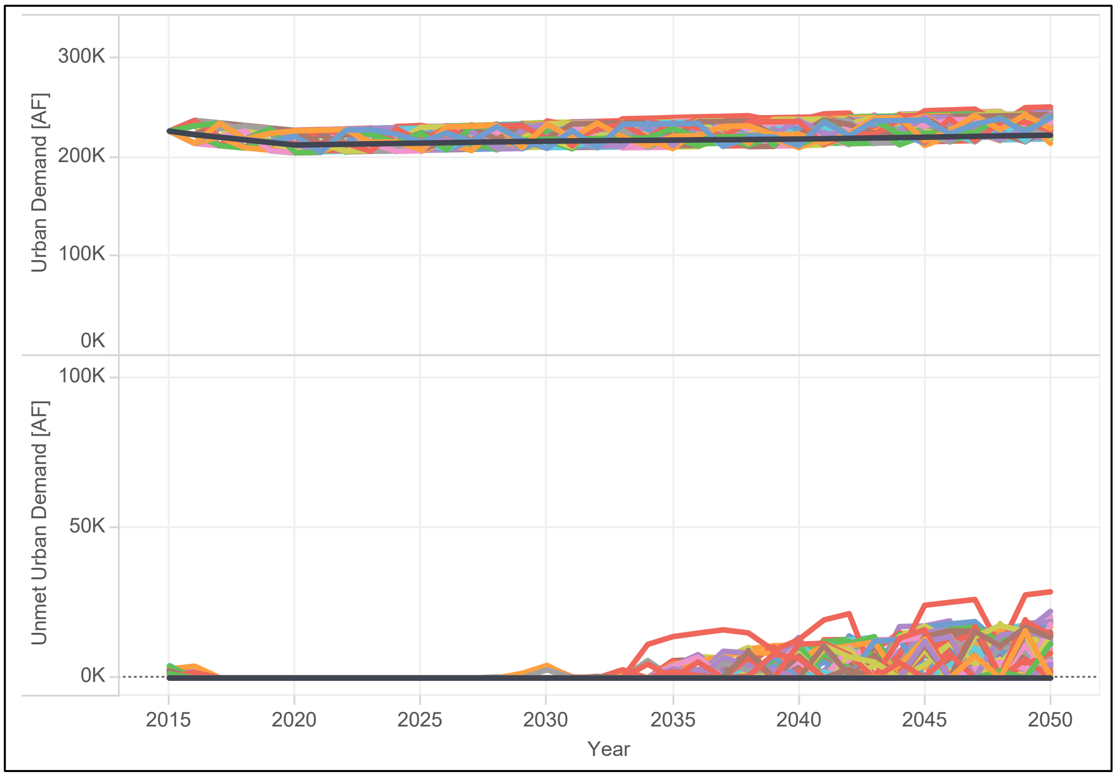
The study team used the WEAP IEUA model to stress test the IEUA's baseline supplies and proposed supply augmentation portfolios, and evaluated urban demand, supplies, and unmet demand from 2015 to 2050 for each of the 106 climate change projections as well as a projection that repeated historical climate conditions. Impacts of these 107 climate futures on IEUA's baseline supplies and proposed portfolios to augment supplies were examined in the context of the three future demand scenarios, as well as assumptions about the strength of climate change on imports, and the sensitivity of local supplies to temperature. In sum, IEUA's baseline supplies and each augmentation portfolio were tested against 1,284 futures (107 climate projections x 3 demand scenarios x 2 regressions to estimate climate impacts on local supplies x 2 levels of climate impact on water imports). The necessary computing capacity was obtained via Amazon Web Service, which enabled the WEAP model to be run hundreds of times simultaneously.

Results

IEUA baseline supplies may be insufficient to meet future demand

We found that, under the low demand scenario, supplies were sufficient under historical climate and mostly sufficient through mid-century with climate change (Figure 6). After 2035, some shortages begin to appear. The figure below shows results that assume the strongest effect of climate on imports, and that temperature changes affect local supplies. See Appendix 2 for more detail.

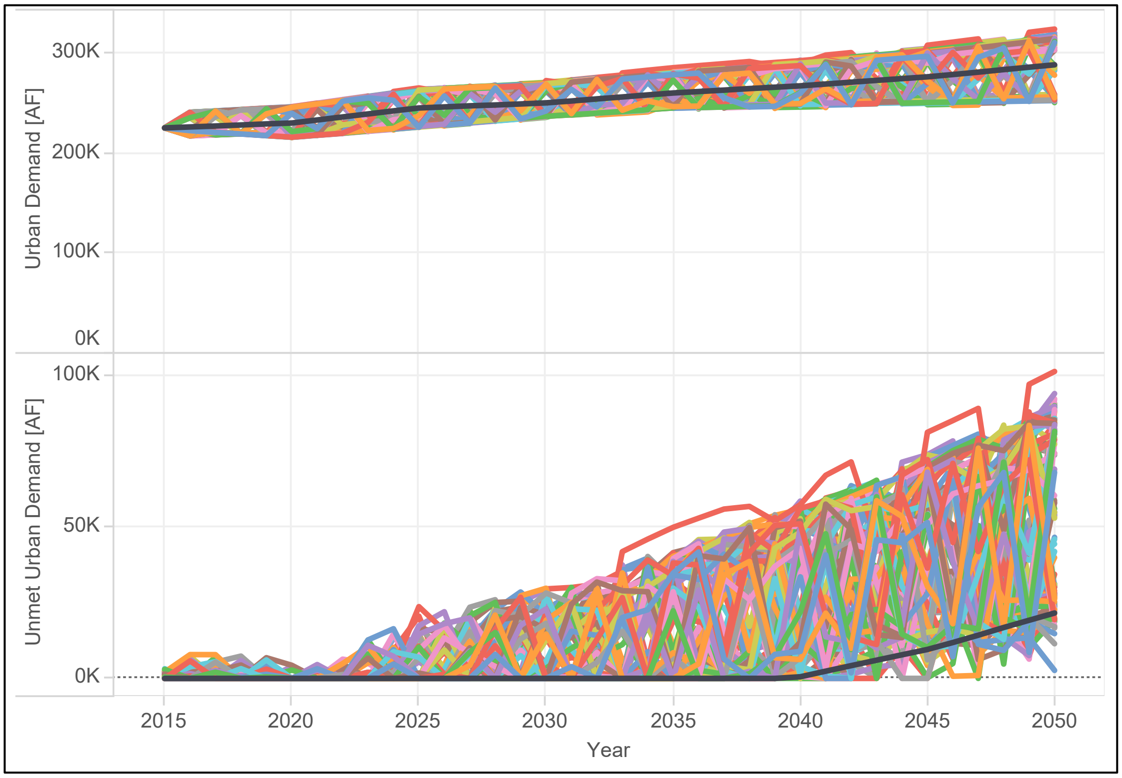
Figure 6: Unmet demand for IEUA service area by climate change scenario over time (low demand scenario)



Note: Colored lines correspond to the individual 106 climate scenarios. The black lines correspond to the historical climate scenario.

However, supplies do not appear sufficient to meet demand in the medium (not shown) and high demand scenarios as early as 2016, with the level of unmet demand ramping up significantly after 2020. Under the high demand scenario, unmet demand is nonzero even under historical climate conditions (Figure 7).

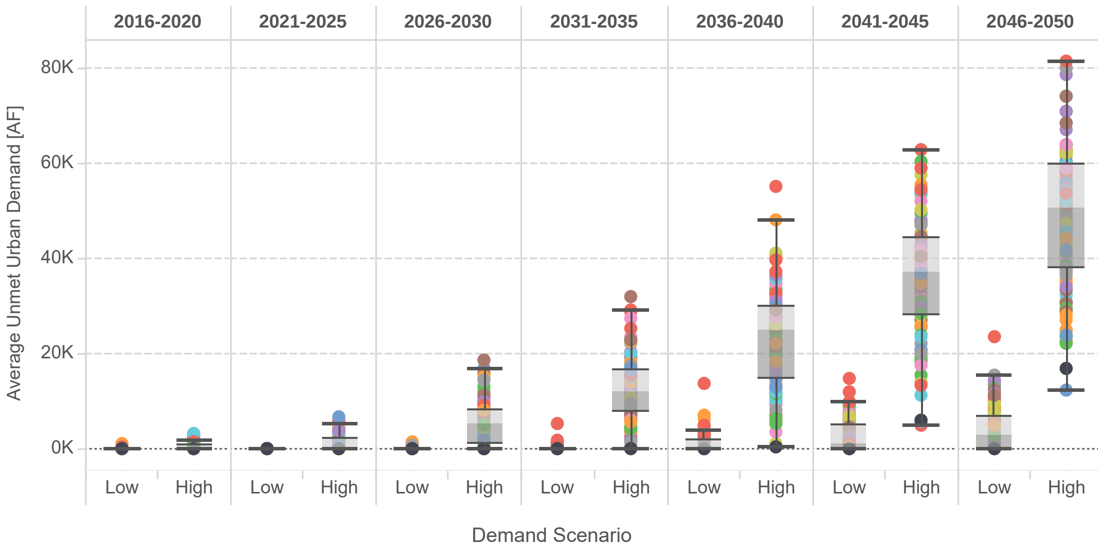
Figure 7: Unmet demand for IEUA service area by climate change scenario over time (high demand scenario)



Note: Colored lines correspond to the individual 106 climate scenarios. The black lines correspond to the historical climate scenario.

Figure 8 summarizes the results shown above by 5-year period. For the 2036-2040 period, which essentially reflects the end of IEUA's IRP timeframe, there is virtually no unmet demand for half of the 106 climate projections under the low demand scenario. In contrast, under the high demand scenario, the median result for unmet demand is about 25 TAF/year, and there is unmet demand in most of the future climates considered. Note that the IEUA IRP reports the 75th percentile unmet demand results as a characterization of the majority of plausible futures. The 75th percentile results are seen in the figure as the top of the shaded boxes.

Figure 8: Summaries of unmet demand across climate scenarios by demand scenario and 5-year period

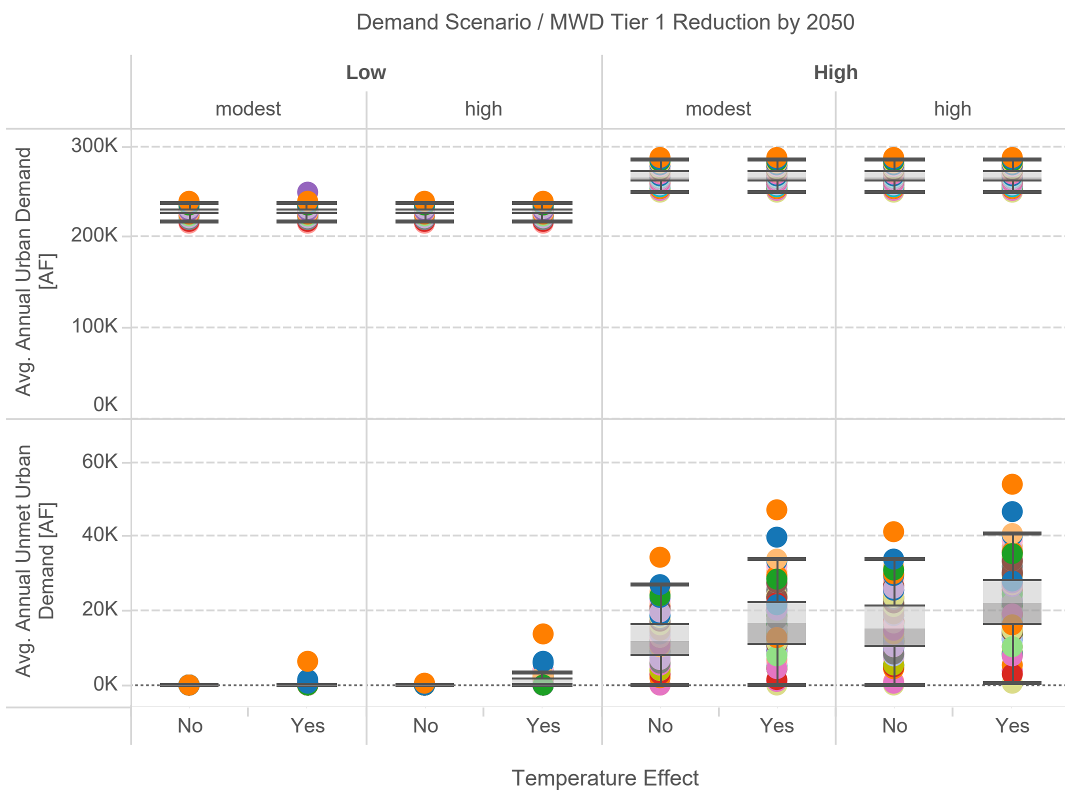


Note: Colored dots correspond to the individual 106 climate scenarios. The black dots correspond to the historical climate scenario. The boxes show the 25th, median, and 75th quartile results, with the vertical stems indicates 1.5 times the 25th-75th quartile range.

RAND also investigated how the results vary with different assumptions about how much MWD supplies might decline over time in response to climate change, and whether or not local supplies, stormwater, and non-MWD replenishment supplies will fluctuate due to temperature in addition to precipitation (see Appendix 2 for more detail). Figure 9 compares the range of unmet demands for the 2036-2040 period under different assumptions about temperature effects on local supplies and climate change on MWD supplies. For the low demand scenario, the assumptions appear to have little effect on the unmet demand results across the climate scenarios. For the high demand scenario, however, there are some modest changes. The effect of going from modest to high climate impact on MWD supplies is about equal to the effect of including the temperature impacts on local, stormwater, and replenishment water supplies. For both types of uncertainties, however, the effects on the results are modest, and are much smaller in scale than differences in results between demand scenarios.

For the IRP, IEUA selected the assumptions that (1) climate change would have a high impact on MWD supplies and that (2) there would be temperature effects on local, stormwater, and replenishment supplies in order to be able to plan for more stressing future situations. These assumptions were made to ensure that IEUA has sufficient resources and necessary infrastructure under a wide range of plausible futures.

Figure 9: Average urban demand and unmet demand (2036-2040) across climate scenarios (boxes), demand scenarios (Low, Wide), climate effects on MWD supplies (modest, high), and temperature effects on local, stormwater, and replenishment supplies (No, Yes)



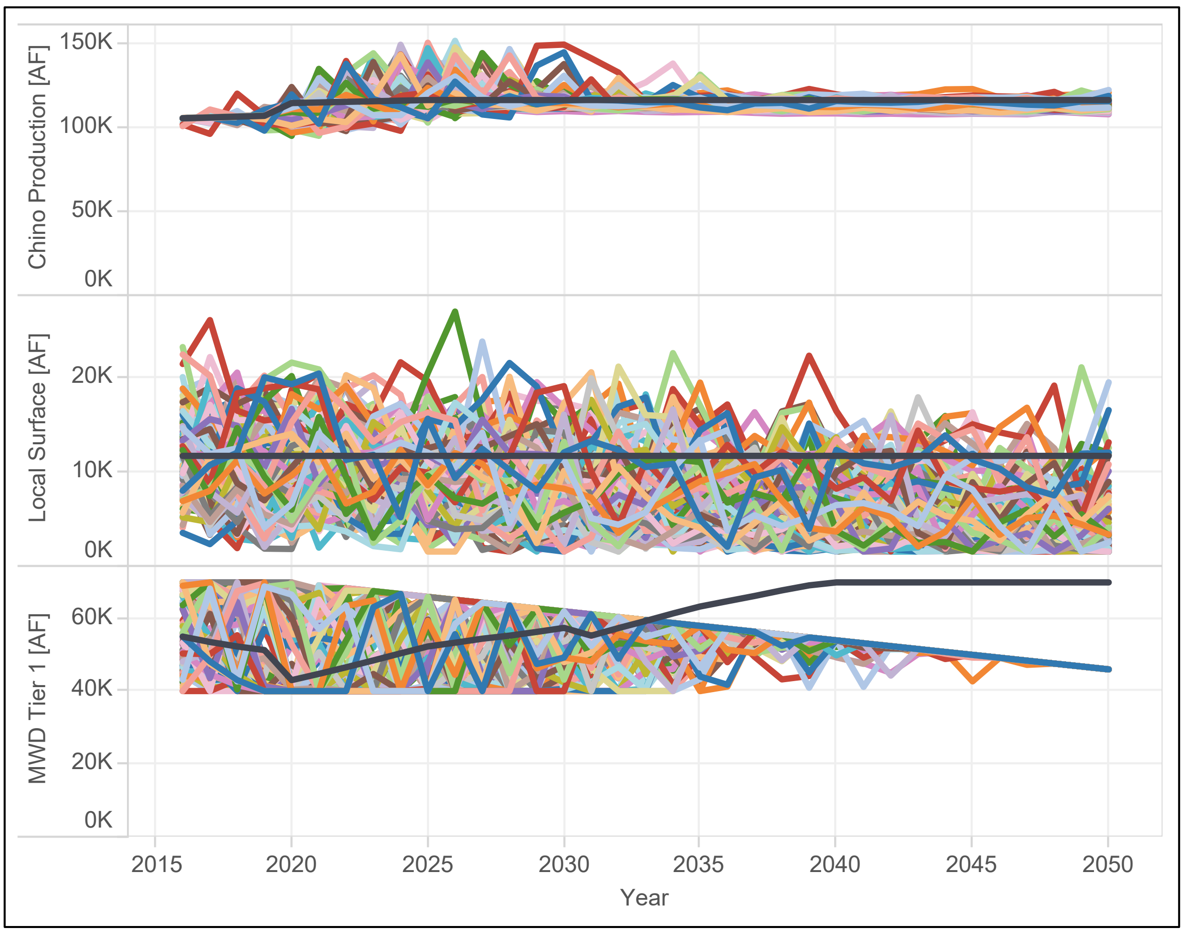
Note: Colored dots correspond to the individual 106 climate scenarios. The black dots correspond to the historical climate scenario. The boxes show the 25th, median, and 75th quartile results, with the vertical stems indicates 1.5 times the 25th-75th quartile range.

Figure 10 shows the major climate-dependent supplies used to meet demand over time for the 107 climate scenarios. The top panel shows these results for Chino Basin groundwater. The figure shows that during the next 15 years, when supplies generally exceed demand, there is a range of groundwater supply use, depending on the demand and availability of cheaper local surface supplies. The increased use during some years reflects deferred use of these supplies during wet years. Around 2030, increasing demand, coupled with declining surface supplies, groundwater supply becomes more stable at the maximum amount available. The slight range of use across the climate scenarios in the out years reflects the different climate effects on safe yield—which is small.

Local supply, some types of which are relatively low-cost (notably excluding recycled and desalted water), fluctuates due to its availability. Figure 10 shows significant variability as well as a tendency for declining amounts of supply, as compared to the typical IEUA assumption of stable supplies based on historical yields (the solid black line). These results reflect the projected warming conditions for all climate scenarios and variability in projected precipitation.

Lastly, the bottom panel of Figure 10 shows use of MWD Tier 1 water over time across the 107 climate scenarios. Future use under assumptions of historical climate declines initially as other supplies are developed. After 2020, however, IEUA increasingly relies on the assumed available MWD Tier 1 supply to meet growing demands. By 2040, all cheaper supplies are completely utilized and MWD Tier 1 supply is used at its maximum level. Note that 2040 is the year in which shortages are also shown to begin (see Figure 7). There is significant interannual variability in the use of MWD Tier 1 supplies across the futures, in response to variable demands and other supplies. In many years, Tier 1 use reaches the maximum available amount. Per the assumptions about climate's impact on available MWD supplies, the maximum amount available begins to decline in 2020. In those years and scenarios in which the MWD Tier 1 use is at this declining maximum level, there is also unmet demand as seen in Figure 7.

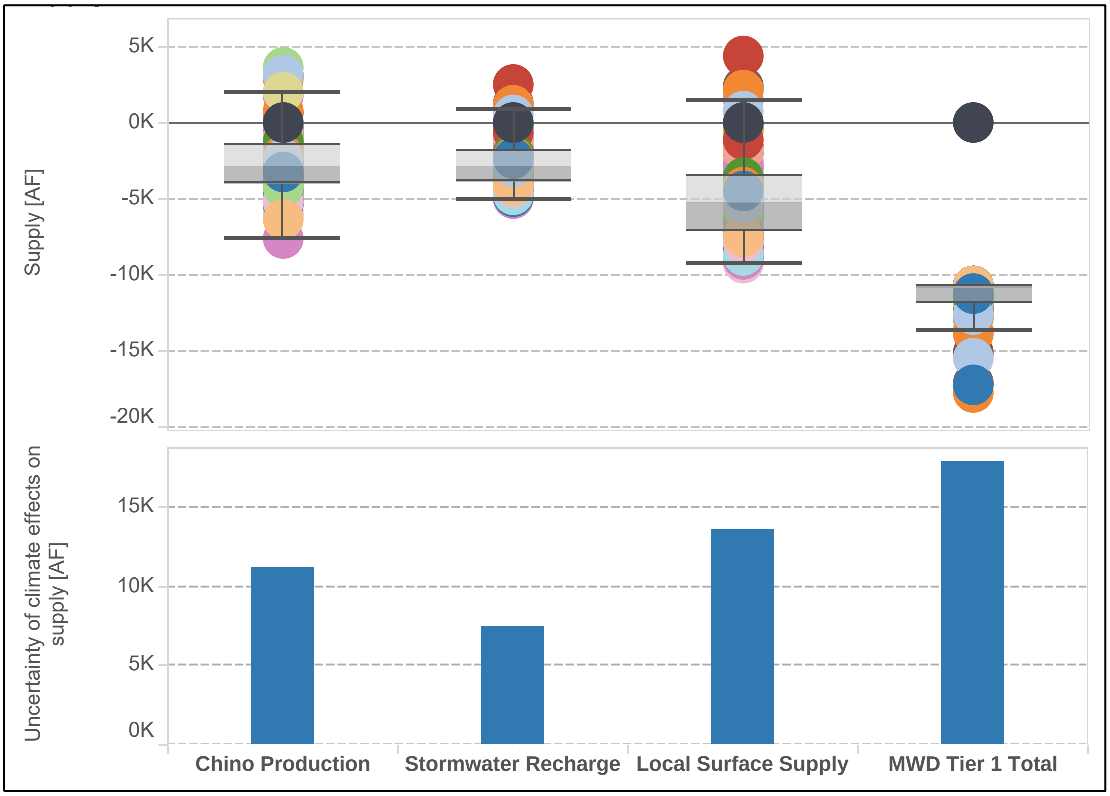
Figure 10: Baseline supply ability to meet IEUA service area in the high demand scenario by climate projection



While there is uncertainty over how climate change might affect IEUA's supplies, the climate scenarios used, combined with assumptions made in this analysis, show a tendency for supply reductions. The top panel of Figure 11 shows that for most scenarios, supplies are lower than they would be under historical climate conditions. The largest potential impact on supply is on MWD imported supply—with all climate scenarios showing a decline in accordance with the assumption that MWD supplies could experience a gradual decline in response to climate change. The second most impacted supply is on local surface supply, with a median decline of about 5 TAF/year. The overall effect on groundwater production is small, consistent with the assumptions about climate's effect on safe yield.

The bottom panel of Figure 11 shows the range in use of future supplies across the climate scenarios. For the resources that are utilized fully due to their lower cost, such as Chino groundwater and local surface supplies, the variability reflects the range of climate impacts on these supplies. For these, the larger range of uncertainty is seen in the local supplies. The range in uses of MWD Tier 1, however, reflects the range of availability of the less expensive supplies—not any assumptions of climate effects on MWD supplies. As described above, the only climate effect on MWD Tier 1 availability is specified through a steady decline in supply availability.

Figure 11: Impacts of climate on IEUA supplies across climate futures (colored dots) (2036-2040) (top) and uncertainty in the magnitude of climate impacts uncertainty (bottom)



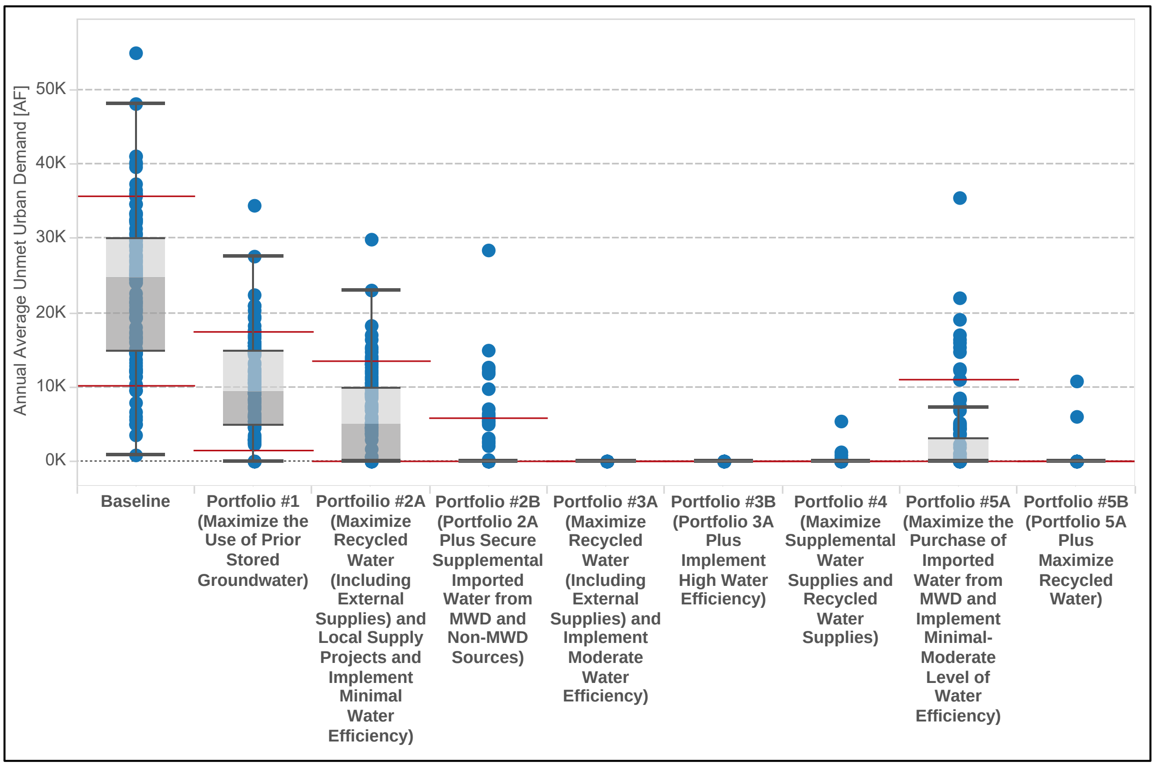
Note: Colored dots correspond to the individual 106 climate scenarios. The black dots correspond to the historical climate scenario. The boxes show the 25th, median, and 75th quartile results, with the vertical stems indicates 1.5 times the 25th-75th quartile range. The blue bars indicate the range of supply outcomes across the climate scenarios (excluding the historical simulation shown by the black dot).

Management strategies that focus on efficiency and maximizing use of recycled and imported water help close future gaps between supply and demand

Through interactions with member agencies and other stakeholders, the IEUA developed the seven portfolios discussed above in Table 2, consisting of different water management actions aimed at closing the future gap between supply and demand, and meeting other qualitative regional goals.

Using the WEAP model and the same climate projections used to "stress test" the IEUA baseline water supplies, we evaluated how well each of the seven strategies would meet demand in the future. Figure 12 summarizes the performance of the baseline strategy and the seven portfolios in terms on unmet demand from 2036-2040. All portfolios lead to an improvement in unmet demand over the baseline supply. Portfolio 1, which uses previously stored groundwater, reduces unmet demand by more than half for the median climate scenario. Portfolio #2A, which increases use of recycled water and external supplies as well as implements additional efficiency, eliminates unmet demand for more than 25% of scenarios and reduces the median unmet demand to below 10 TAF. Portfolio #2B improves upon portfolio #2A by adding additional imports—all but eliminating unmet demand. Portfolio #5A combines moderate efficiency with increased imports to eliminate unmet demand in more than half of the scenarios. Lastly, four portfolios—#3A, #3B, #4, and #5B—eliminate unmet demand in at least 90% of the scenarios. The first two do so by significantly increasing efficiency—effectively ensuring that demand follow the low growth demand trajectory. The other two (#3B and #5B) improve performance by maximizing recycled water use while also increasing imported water supplies.

Figure 12: Average unmet demand (2036-2040) across climates projections for high demand projection and different IEUA portfolios



Conclusion

This is one of a growing number of water planning examples that highlights the benefits of examining the impacts of different climate change futures on meeting consumer demand. Here, assumptions about demand growth and climate future both had substantial impacts on ability to meet demand, and level of climate change impact on imported water as well as temperature impacts on local supplies also had some effect, especially in the most stressing demand future. Using these results, RAND and IEUA were able to identify types of management strategies focused on efficiency and maximizing available supplies that helped close the modeled future gaps between supply and demand. This work also demonstrates the value of visualization tools and water management simulations that can help facilitate discussion of alternatives for managing water resources in a very uncertain future.

For IEUA, participating in this process was not academic. As reported by IEUA management, it was a “game changer”. This is because the analytic process described herein enabled understanding of how powerful water use efficiency and local supplies are in reducing the risk of future supply shortfalls in IEUA’s service area, and also provided reassurance that their region is prepared for a future with uncertain shifts in climate. By engaging in this process, IEUA has not only identified how and when changes in temperature and precipitation could impact its water supplies, but also how demand influences the delicate balance between supply and demand. Both the timing of surges in unmet demand and the types of management actions that could help mitigate anticipated gaps in supply are helping to inform the construction of the IRP in a way that encourages adaptation and the use of integrative plans. Future work could investigate more specifically which assumptions related to future climate, demand, and supply lead to the greatest challenges in unmet demand, which could further help IEUA refine management practices and future plans.

Appendix 1 – Portfolio Development Tool

This appendix describes the IEUA Portfolio Development Tool (PDT) developed by RAND (Figure 13), with input from IEUA on its function, design, and input data. The PDT is a decision support tool designed to help IEUA and its member agencies assemble different portfolios of water management options that could help ensure the IEUA meets future water demands. IEUA used the PDT to develop a set of portfolios that were then evaluated across different climate and demand scenarios using a water management model described in Appendix 2. Although the information within and specific design of the PDT are specific to IEUA's needs, the visualization platform and methodological process could be used in the context of any water agency with similar needs for long-range planning under uncertain future conditions.

Figure 13: Title screen for the Portfolio Development Tool

The PDT was developed using Tableau—a business analytics and visualization software package. All the data used to develop the PDT were provided to RAND by IEUA, and the PDT was deployed via the Internet for IEUA and stakeholders. In the series of figures below, we walk through each of the PDT's visualizations. Once again, the design and data shown here are specific to IEUA, but this type of tool could be configured to support decision-making within numerous types of organizations.

Overview of the Portfolio Development Tool

The PDT’s main function is to help the user develop a portfolio of management options that meets specified near-term and long-term water supply and demand targets. To do this, the user first specifies the projects that he or she wishes to consider. Next, the user specifies the near-term and long-term targets. The PDT then identifies the projects that would best achieve the targets from the set of eligible projects using a cost effectiveness criterion. In this context cost effectiveness is expressed in terms of levelized cost—or average cost per unit of new supply or demand reduction. Lastly, the PDT summarizes the included projects, their overall attributes, their cumulative yields, and their cumulative costs.

Portfolio Development Tool Visualizations

Figure 14 shows one visualization used to concisely display qualitative information about the attributes of different water management projects. Here, each row pertains to a different project, organized by type, with each column indicating one of 16 qualitative attributes related to IEUA’s future goals (e.g., increasing water levels in critical groundwater management zones, increasing stormwater capture and associated groundwater recharge). Filled circles indicate that projects help meet certain goals, half circles indicate that a projects have no impact on goals, and open circles indicate that projects detract from efforts to meet goals. This visualization provided a reference for IEUA and member agencies used this tab to contrast how well different types of and individual projects helped meet goals.

Figure 14: Summary of how a sample of IEUA potential projects would help meet qualitative goals

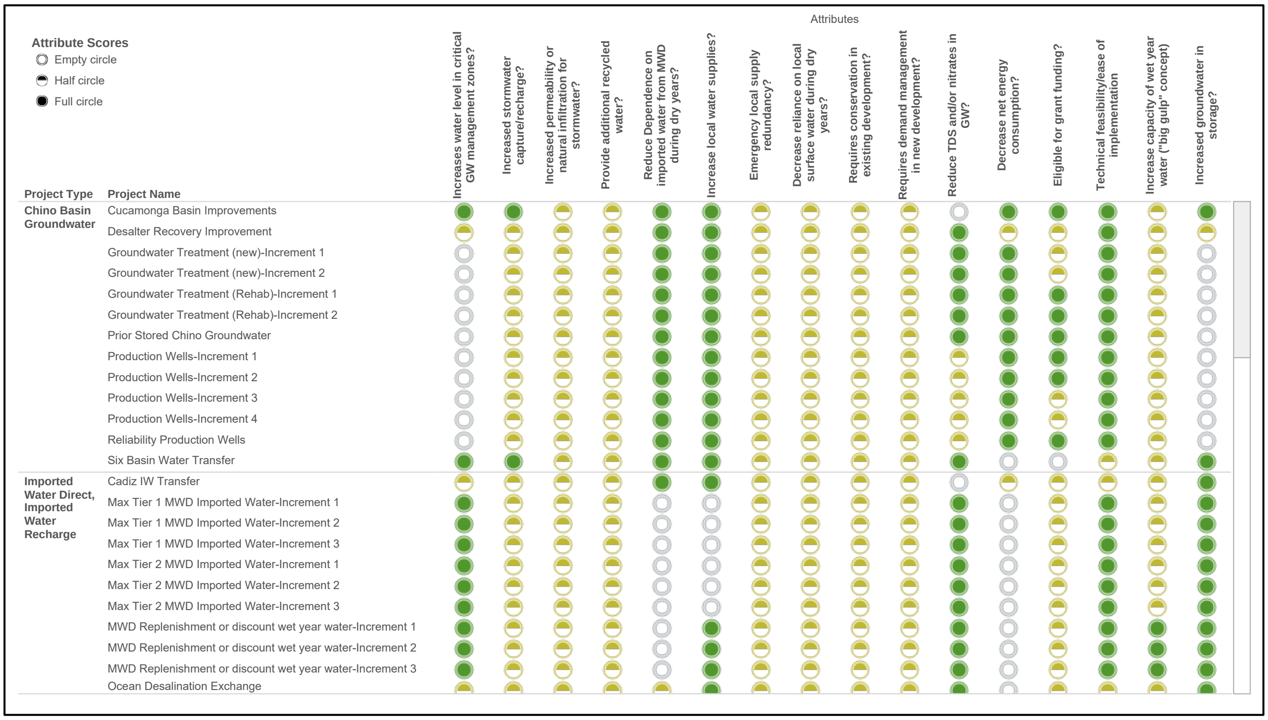
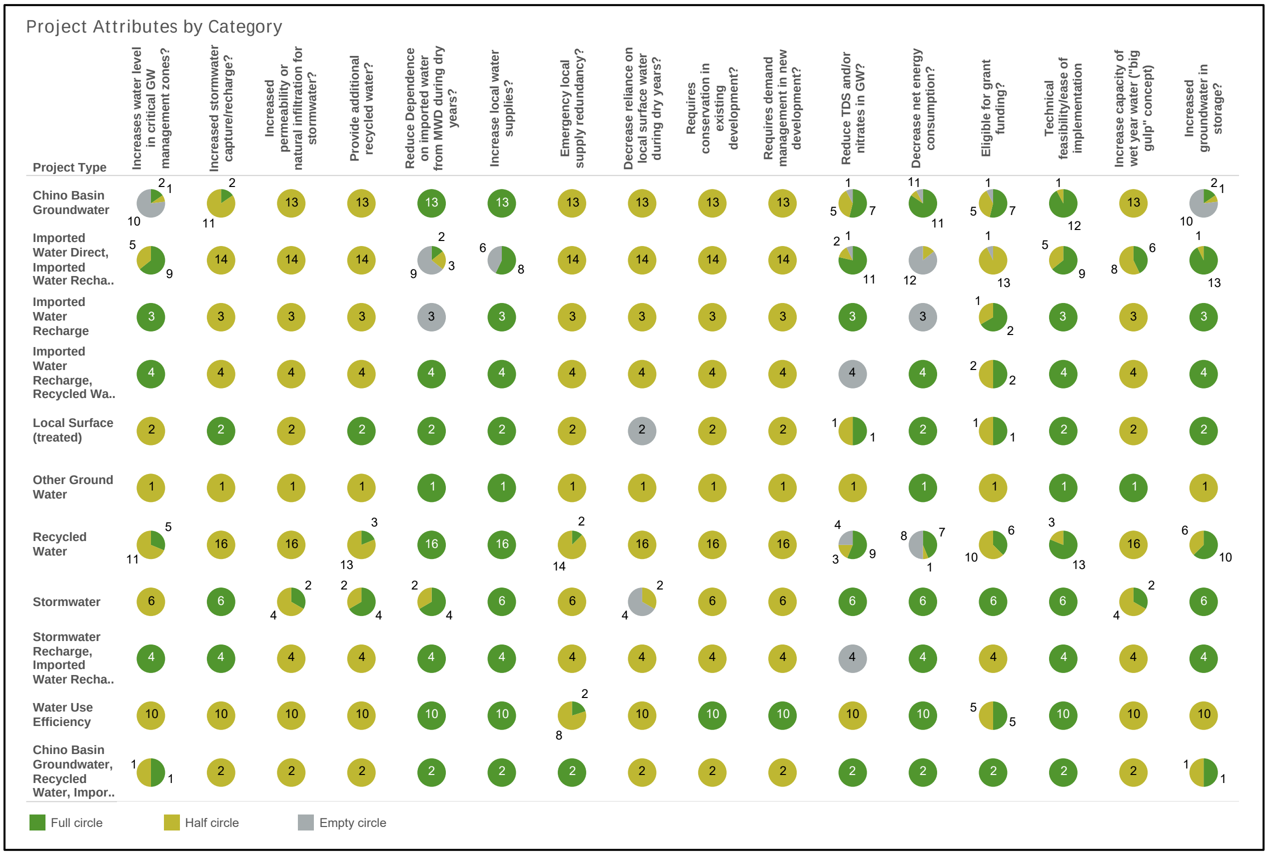


Figure 15 displays the same IEUA qualitative goals as in the previous screenshot (above), but summarizes their values within the different project categories. This shows, for example, how many projects within the more general category of "Chino Basin Groundwater" add to, detract from, or have neutral effects on different goals. This assists decision makers in identifying which categories have the most projects that might contribute to the achievement of particular goals.

Figure 15: Summary of how well projects in different categories meet various IEUA qualitative goals

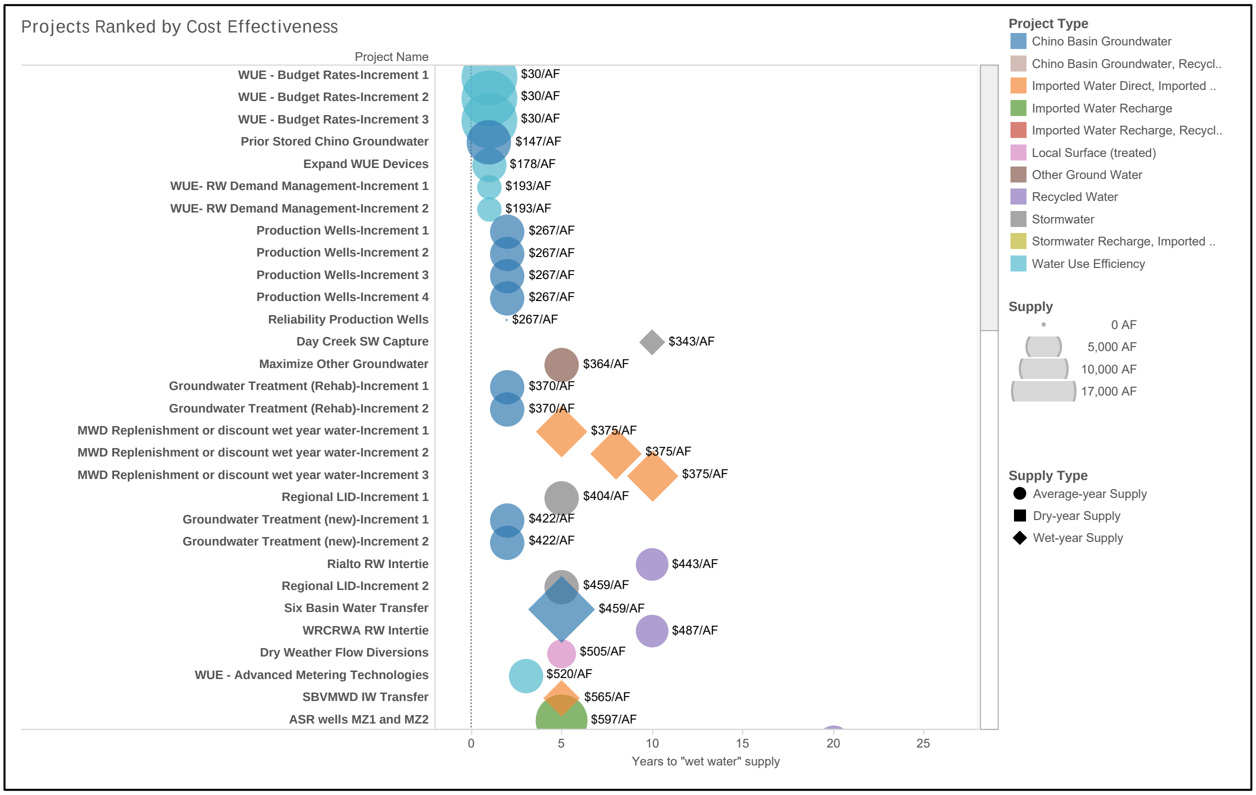


IEUA has considerable supplies to meet current and future needs already. These are highlighted in the top panel of Figure 16, and include groundwater, recycled water, imported water, conservation measures, and other sources. The color bars indicate when these sources come online, and most are already available. (Note that those that come online in the future are already planned for implementation and are thus not considered in the portfolio options directly.) IEUA and member agencies requested this view of the baseline supplies because it serves as a useful perspective upon which to layer projects to bring additional future supplies. Below the baseline supply panel are the different potential projects, sorted by general categories, and with information about cost and amount of supply each is estimated to provide. Note that not all projects are visible in this screen shot.

Figure 16: Summary of baseline supplies, estimated new project supply amounts, and new project costs

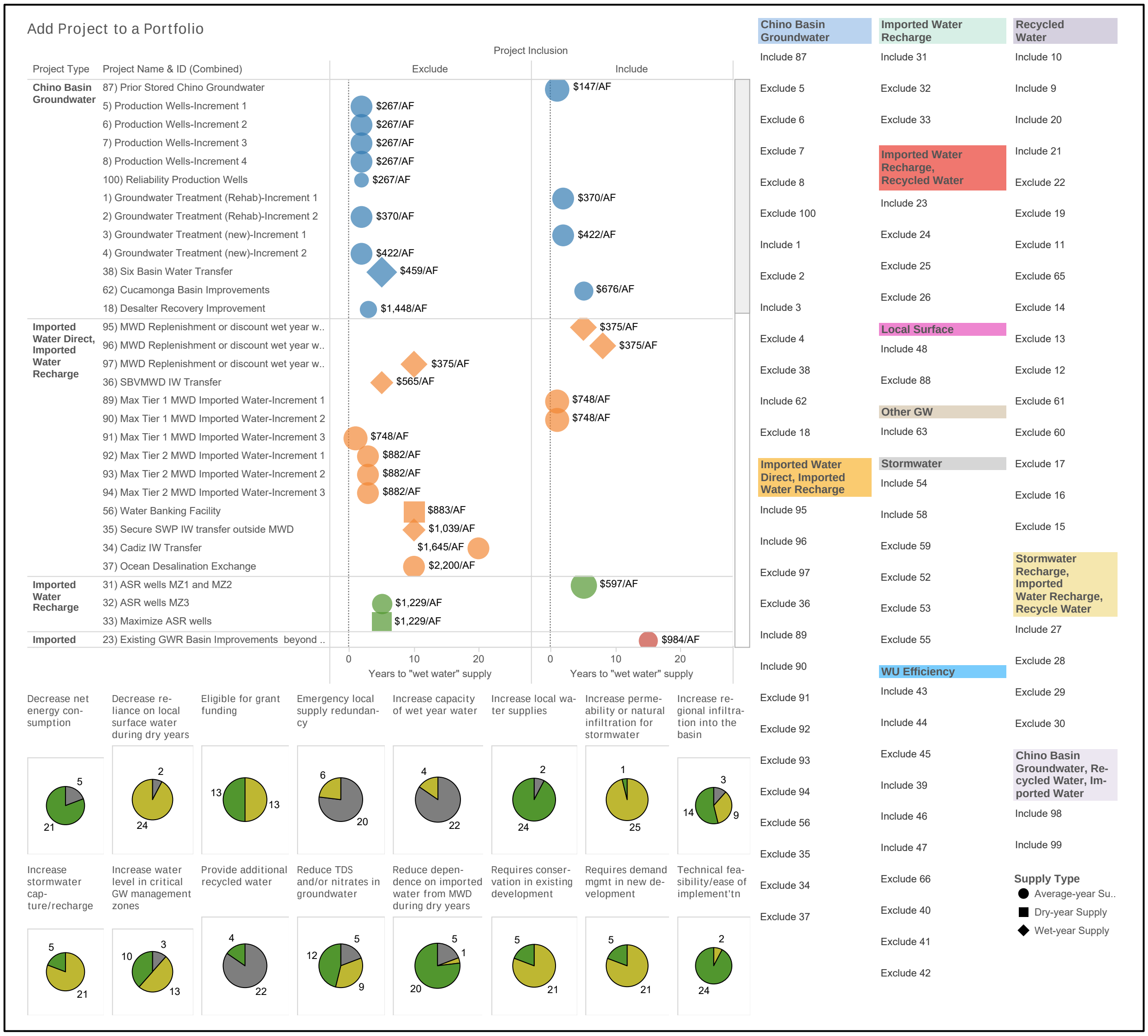
Figure 17 displays all the projects, sorted by preliminary estimates of per unit water cost (these have yet to be finalized). Symbol coloring indicates its category, size indicates its estimated volume; horizontal position indicates the number of years until which the project produces enough water to add to the supply IEUA distributes to stakeholders; the text label indicates its cost; and its symbol indicates whether the water is available during any given year or only under particularly wet or dry conditions. This view was useful for stakeholders to compare projects, and general categories of projects, by supply amount, timing, and cost.

Figure 17: Project cost per acre-foot, with information on project type, supply amount, supply type, and number of years to "wet water" supply



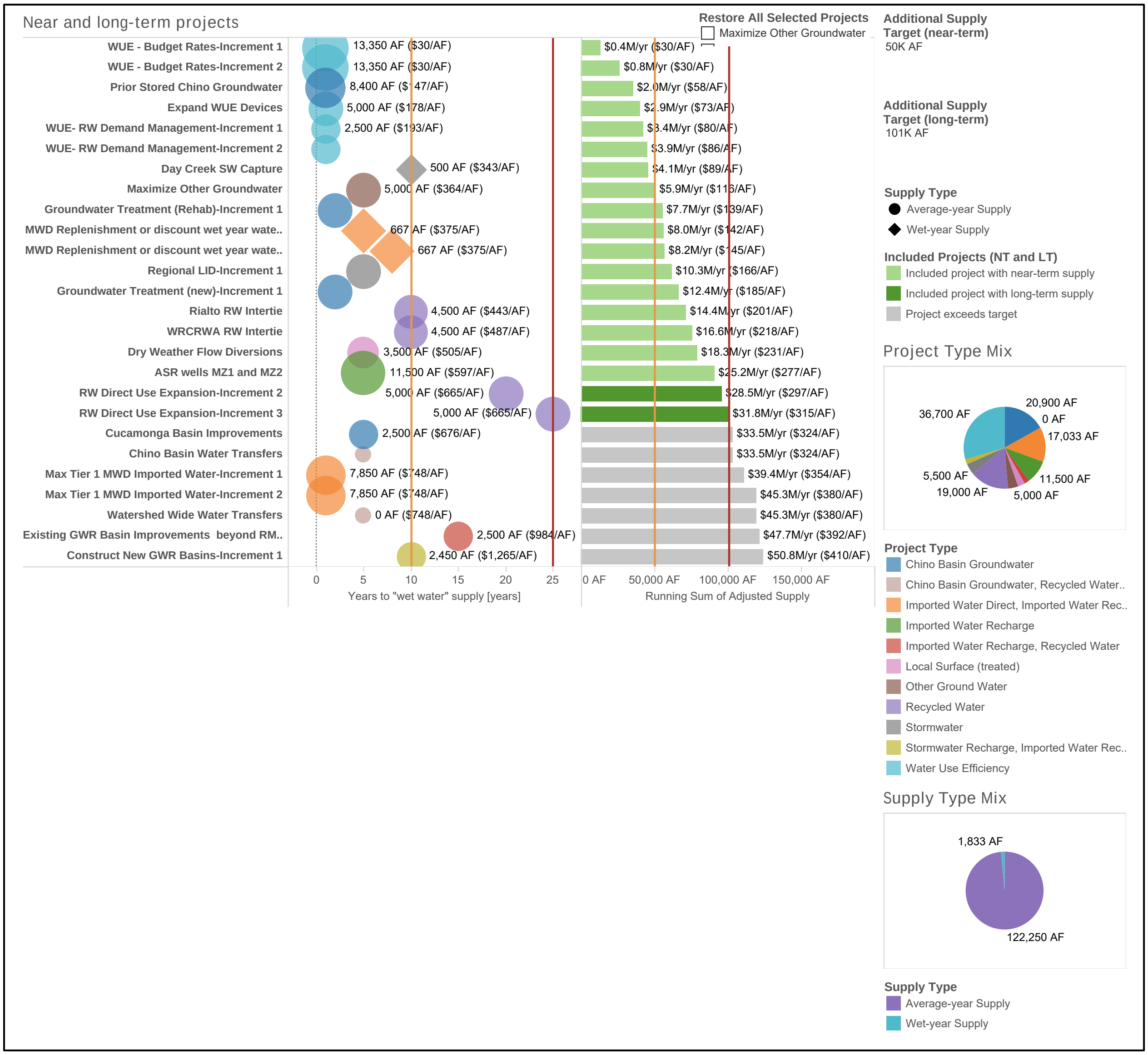
The next figures show how IEUA and member agencies were able to use the tool to create different potential portfolios of water management options. Figure 18 shows a tab in which the user is able to select individual projects to be considered in a portfolio. The user can exclude or include a project with a single click of the toggles on the right side of the screen shot. Projects' inclusion, category, cost, and years to wet water supply are tracked in real time on the left side of the screen. Aggregate summaries of the project attribute measures are shown as pie charts at the bottom of the screen. In this figure, a subset of projects is selected for inclusion, and only some projects are shown in the figure. In the tool, the user is able to scroll to see projects from all project categories.

Figure 18: Portfolio building tab enabling user to include and exclude specific projects in real time and visually track different project categories, costs, and years to "wet water" supply



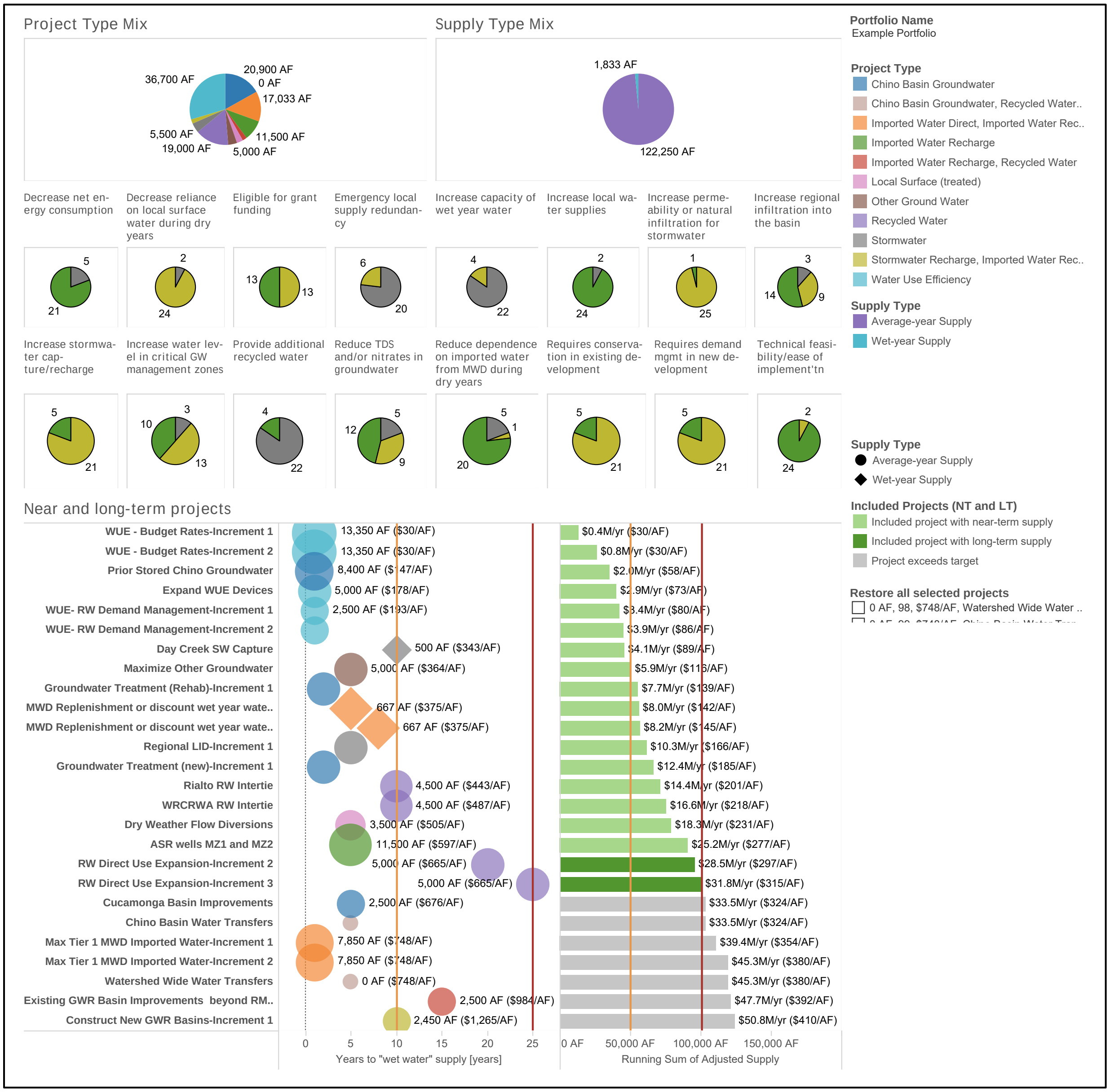
The next visualization (Figure 19) takes the options included in the previous screens and sorts them by cost effectiveness and availability to meet user-specified near-term (year 10) and long-term (year 25) targets. In this example, the near-term target is set to 50 TAF, whereas the long-term target is set to 101 TAF. On the left, projects are shown ordered by cost effectiveness. The bar chart to the right shows the cumulative new supply or demand reduction. Projects that meet the near-term or long-term targets are shaded green, indicating that they are included in the final portfolio. The project shaded dark green are only available to meet long-term demand. On the right, a pie chart summarizes the mixture of projects used to meet the supply targets and the type of projects with respect to availability (all year, wet year, or dry year).

Figure 19: Example portfolio with information on projects included therein, and how well projects meet supply goals



Lastly, Figure 20 provides another summary of the defined portfolio. This includes a summary of the supply and project category information in Figure 19, but also displays summaries of the project attributes—suggesting how well a particular portfolio meets different IEUA qualitative goals. IEUA and member agencies were able to use this display as a final summary chart for each portfolio they explored.

Figure 20: Example project portfolio summary, including how well projects meet IEUA qualitative goals



Appendix 2 – Water Management Model And Assumptions

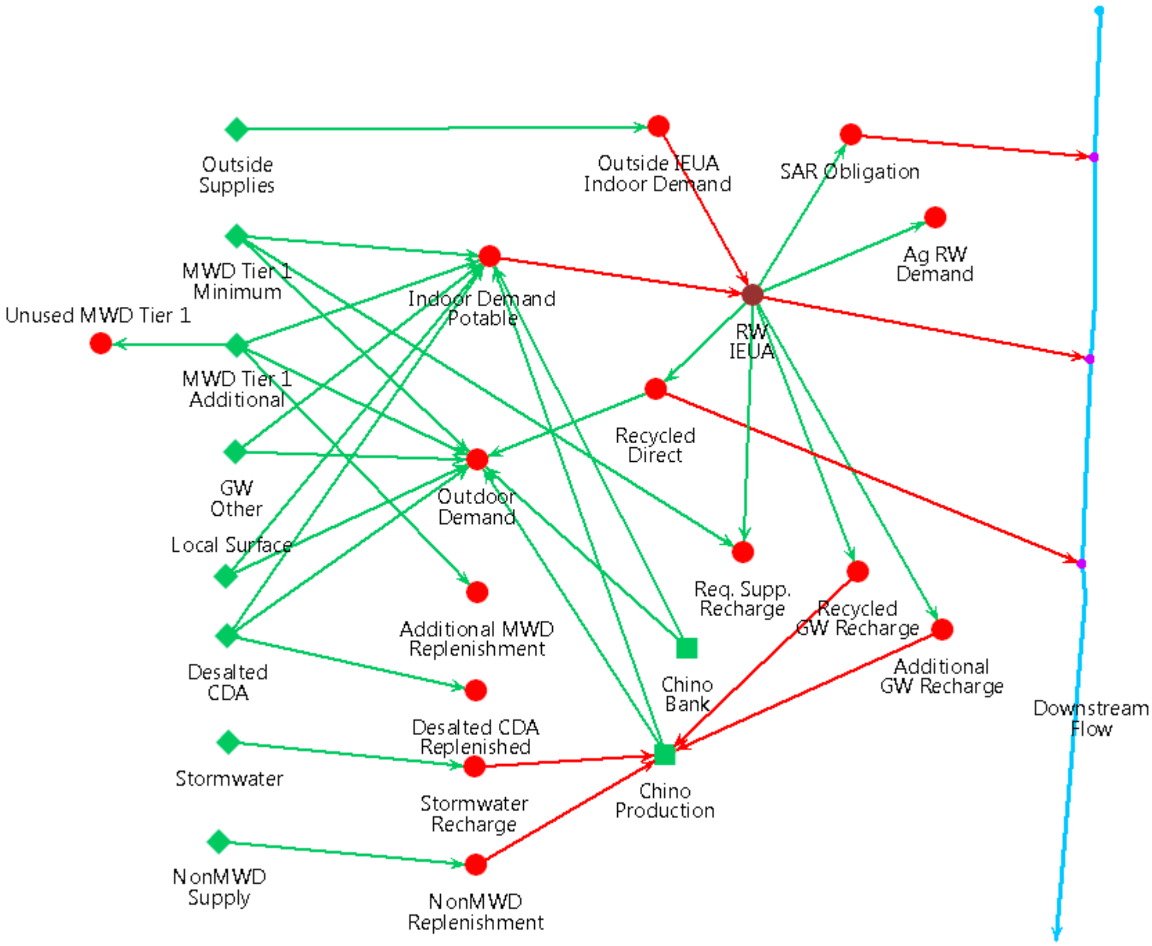
Model Overview

The study team built a model of the IEUA water management system, based on tabular monthly and annual information on historical and projected IEUA water supplies and demands provided by IEUA. The model includes simple relationships and data on estimated future climate conditions to evaluate water supply and demand balance conditions under alternative futures. Lastly, the model evaluates how different water management portfolios, developed using the Portfolio Development Tool (see Appendix 1), would improve performance over these futures.

The model is built in the Water Evaluation And Planning (WEAP) system, developed by the Stockholm Environment Institute (SEI) (Yates *et al.*, 2005). The WEAP IEUA water management model represents the IEUA system through a set of arcs and nodes. Nodes represent locations of water inflows, storage (surface or groundwater), outflows, or demand. Arcs represent conveyance, either natural or constructed, between different nodes.

The IEUA WEAP model calculates how water demand would be met by various supplies based on a system of supply preferences and priorities for each demand node. The model schematic shows the connectivity of water flows among the nodes via the arcs within the model (Figure 21). The schematic is not intended to represent the specific locations of IEUA system elements, but rather show their connectivity. Table 3 lists and describes the demand and supply nodes shown in the model schematic. More details on select demands and supplies are provided in the sections below.

Figure 21: Schematic of the WEAP model of the Inland Empire Utilities Agency service area



Note: RW = recycled water; Ag = agricultural; SAR = Santa Ana River; MWD = Metropolitan Water District of Southern California; CDA = Chino Desalter Authority; GW = Groundwater.

Table 3: IEUA WEAP model supply and demands

Node Name	Description
Demand	
Indoor Demand Potable	Indoor demand for potable (non recycled) water
Outdoor Demand	Outdoor demand for potable and recycled water
Recycled Direct	Total recycled water demand for outdoor use; met demand passes through to Outdoor Demand node or downstream flow if unneeded
Recycled GW Recharge	Demand for groundwater replenishment water; passes to Chino Production node
Additional GW Recharge	Demand for additional groundwater replenishment as specified by water management strategies; passes to Chino Production node
Outside IEUA Indoor Demand	Demand for water outside IEUA that is provided to IEUA for recycling via RW IEUA node

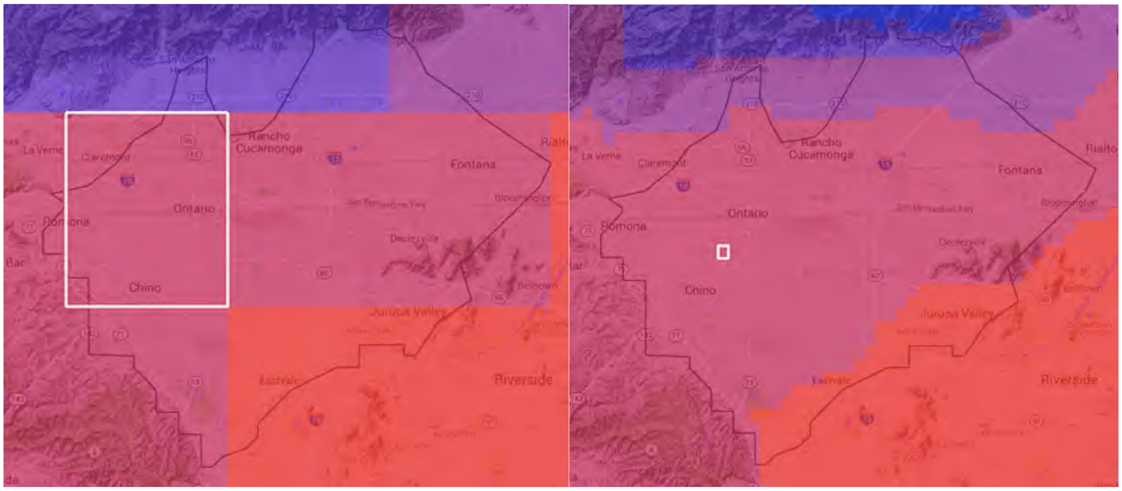
SAR Obligation	Santa Ana River flow obligation; met by recycled water
Ag RW Demand	Agricultural water demand in IEUA service area met with recycled water
Supplies	
MWD Tier 1 Minimum	Specified annual minimum Tier 1 MWD imports (about 40 TAF)
MWD Tier 1 Additional	Additional annual Tier 1 MWD imports, constrained by contract with MWD
Local Surface	Water supplies obtained from watersheds within the IEUA boundary
Desalted CDA	Desalted brackish groundwater from the Chino Desalter Authority facilities
Chino Production	Groundwater from the Chino Basins
GW Other	Groundwater from sources outside the Chino Basin
Stormwater	Additional runoff from storms captured and treated for use
NonMWD Supply	External sources of water used for groundwater replenishment

Climate Scenarios

The study uses downscaled climate data from general circulation models as the basis for a wide range of plausible future climate conditions. Historical and projected climate data from the World Climate Research Programme's (WCRP's) Coupled Model Intercomparison Project phase 3 (CMIP3) multi-model dataset were downloaded from the Downscaled CMIP3 and CMIP5 Climate and Hydrology Projections archive (Maurer *et al.*, 2007).[2] Climate data retrieved from this archive included bias-corrected statistically downscaled (BCSD) global climate model (GMD) monthly mean temperature and total precipitation observations and projections for 36 CMIP3 simulations and 70 CMIP5 model runs for years 1950-2050 (Brekke *et al.*, 2013). Note, however, that observed BCSD data were available only for years 1950-1999. These gridded climate data represented the gridded area bounded by latitudes 34.0N and 34.125N and longitudes 117.625W and 117.5W, roughly centered at Ontario International Airport (Figure 22).

[2] Data is available online at: http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/.

Figure 22: Geographic scale of climate sources for CMIP-3 data (left) and CMIP-5 date (right)



Select Demands

Indoor Potable

Indoor potable demand is calculated as the population within the IEUA service area times an annual water use rate. IEUA, assisted by A&N Technical Services, specified the high and low demand scenario by varying annual water use rates. The middle demand scenario is user definable by setting the indoor and water use rates for 2050. Indoor potable demand does not vary by climate.

Table 4: Indoor potable demand parameters for historical data and scenario projections

Model Parameter	2010 (data)	2014 (data)	2020 (projection)	2050 (projection)
Population (people)	813,695	847,587	896,533	1,249,091 (all)
Water Use rates (gal/person/year)	26,061	23,981	24,090 (high) 22,959 (low)	24,017 (high) 17,082 (low)
Water Use/Demand (taf/year)	65.1	62.4	66.3 (high) 63.2 (low)	92.1 (high) 65.5 (low)

Outdoor

Outdoor demand is calculated as the population within the IEUA service area times an annual water use rate. IEUA, assisted by A&N Technical Services, specified the high and low demand scenario by varying annual water use rates. The middle demand scenario is user definable by setting the nominal outdoor and water use rates for 2050.

IEUA performed a series of sensitivity analyses of urban outdoor demand and weather conditions. By 2040, IEUA estimated that one dry year would increase demand by 5.6%. Similarly, a one wet year would decrease outdoor demand by 5.6%. A longer period of dry weather (3-years) would increase demand by 8.9%. Separately IEUA estimated the long-term effect of warming on outdoor demand. They found that for each degree temperature increase (in Celsius), outdoor demand would increase by 3%. Together these factors were applied to the climate scenarios to estimate how outdoor demand could change due to weather in the future.

Outdoor demand varies by three outdoor water demand factors that are applied depending up the projected precipitation difference from historical (or perturbation), as shown in Table 5. The outdoor water demand factors were derived from IEUA analysis.

Table 5: Climate effect factors on outdoor water demand

Precipitation Condition	Perturbation Threshold	Outdoor Water Demand Factor
Very dry	-5 cm/year	-0.089
Dry	0 cm/year	-0.056
Wet	+ 25 cm/year	+0.56

Agricultural recycled water demand

Agricultural recycled water demand is specified based on IEUA projections and does not vary by climate. This demand declines from about 10,000 AF in 2015 to 2,000 AF by 2025 and then remains constant through 2050. This is due to the transition of agricultural land to urban use.

SAR Obligations

IEUA's Santa Ana River (SAR) obligations are specified to be 17,000 AF/year per IEUA agreement.

Select Supplies

Local Surface supplies

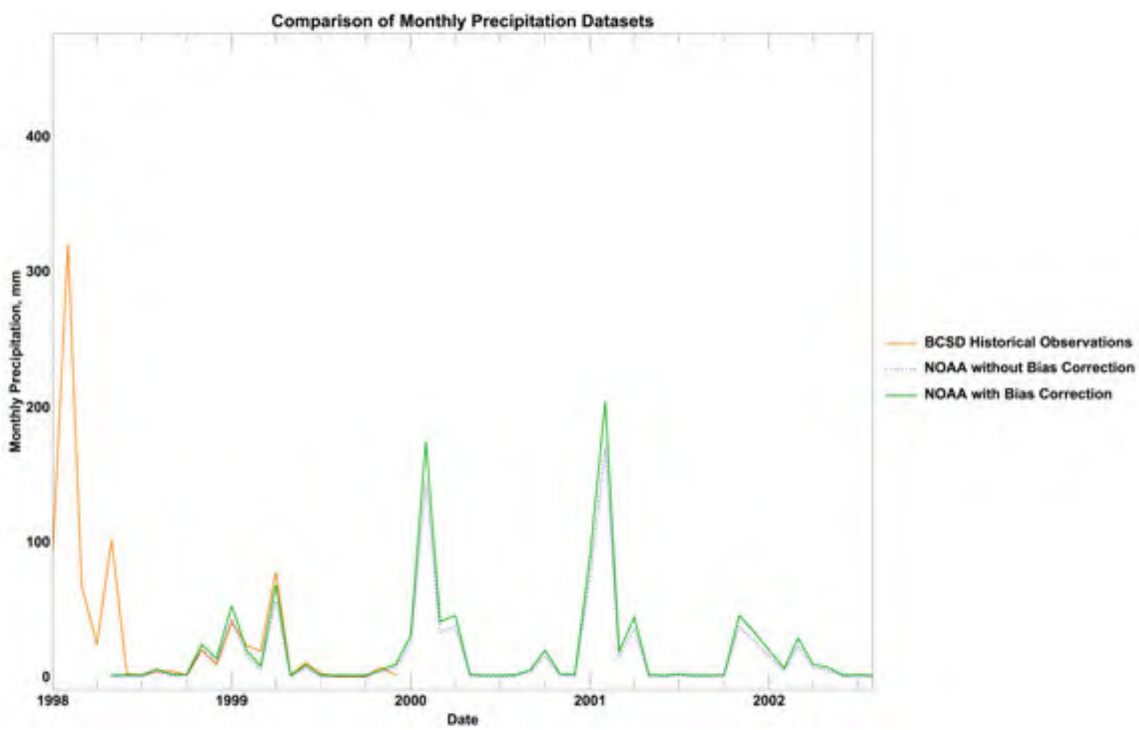
Total monthly local surface supplies within the IEUA management boundary for water years (July through June) 2010 through 2015 were provided by IEUA member agencies and represent the amount of water that is diverted, not total stream flow. To estimate these total local surface water supplies under different climate scenarios, relationships between climate variables and surface supply were derived using historical data. These relationships were then used to estimate future supplies under each climate scenario included in the analysis. Several different regression models were evaluated, and two models were found to reasonably represent the relationship between historical climate and historical supplies. One included both temperature and precipitation variables and the other only precipitation.

At the time of the analysis, the gridded BCSD historical climate observations were available only between 1950 and 1999. Therefore, to compare climate observations to the surface supply results for 2010 to 2015 an additional proxy data set for the 2010 to 2015 period was developed. Specifically, we used weather station observation at Ontario International Airport[3] (coordinates 34.05N, 117.61667W) contained in the Global Historical Climatology Network Database (GHCND) (Menne *et al.*, 2012), maintained by the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center. The Ontario International Airport observation station reports monthly total precipitation and mean temperature observations from 1998 to present day.

We compared the monthly mean NOAA observed data to the monthly mean BCSD observed data for the overlapping period of May 1998 to June 2015. As expected we found very strong relationships for both monthly temperature and precipitation, although the NOAA observations were generally slightly drier than the BCSD data. We calculated a correction factor that we subsequently applied to the NOAA observed data to generate bias corrected datasets. Figure 23 shows a comparison of BCSD observed precipitation, NOAA observed monthly precipitation, and NOAA bias-corrected precipitation. This figure shows the strong relationship between the NOAA and BCSD datasets during the overlapping period of 1998 to 2000 and the very slight adjustment that was made to the NOAA data for months from 2000 and later.

[3] This station has Station ID GHCND:USW00003102 with latitude/longitude coordinates 34.05N, 117.61667W.

Figure 23: Comparison of BCSD, NOAA, and NOAA bias corrected monthly precipitation data on overlapping dates



NOAA bias corrected temperature and precipitation data, which were available until June 2015, were used to assess linear regressions relating monthly mean temperature and mean precipitation to total observed IEUA surface supplies. Additionally, given that a significant component of surface supply is due to melting snow pack, the potential of a delayed precipitation signal was evaluated. Four regressions were considered to estimate stream flow: (1) precipitation alone, (2) temperature alone, (3) precipitation and temperature, and (4) precipitation and a 12-month moving average of temperature. These regressions were analyzed with various lag times—applied to both temperature and precipitation—ranging from 0 to 6 months to search for a significant signal; a lag time of three months was found to have the lowest p-value among for all regressions and appeared to best reflect observed stream flow patterns. Note that the minimum p-value found with a lag time of 0 months was ≈ 0.429, while the p-values of the three best-fitting regression models at a lag time of three months were < 0.005. Shown below in Figure 24 is a comparison of each of the four regressions considered—each mapped over the NOAA bias corrected precipitation and/or temperature data—against observed surface flows. Figure 25 shows the same models aggregated to annual totals.

Figure 24: The four regression models versus observed flows

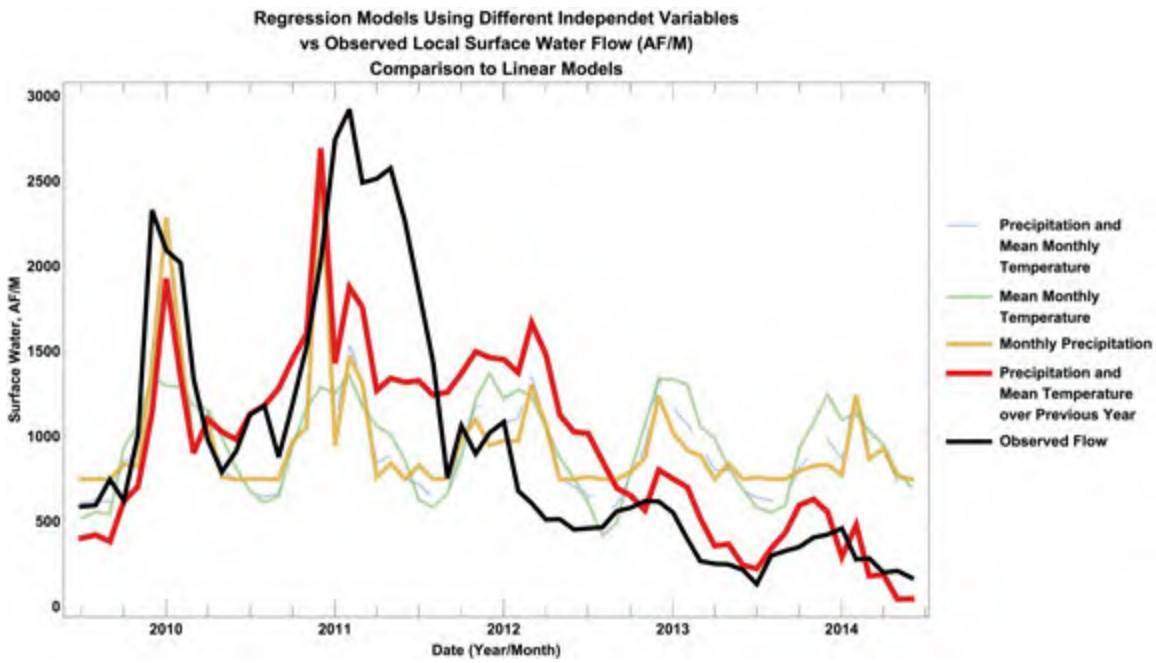
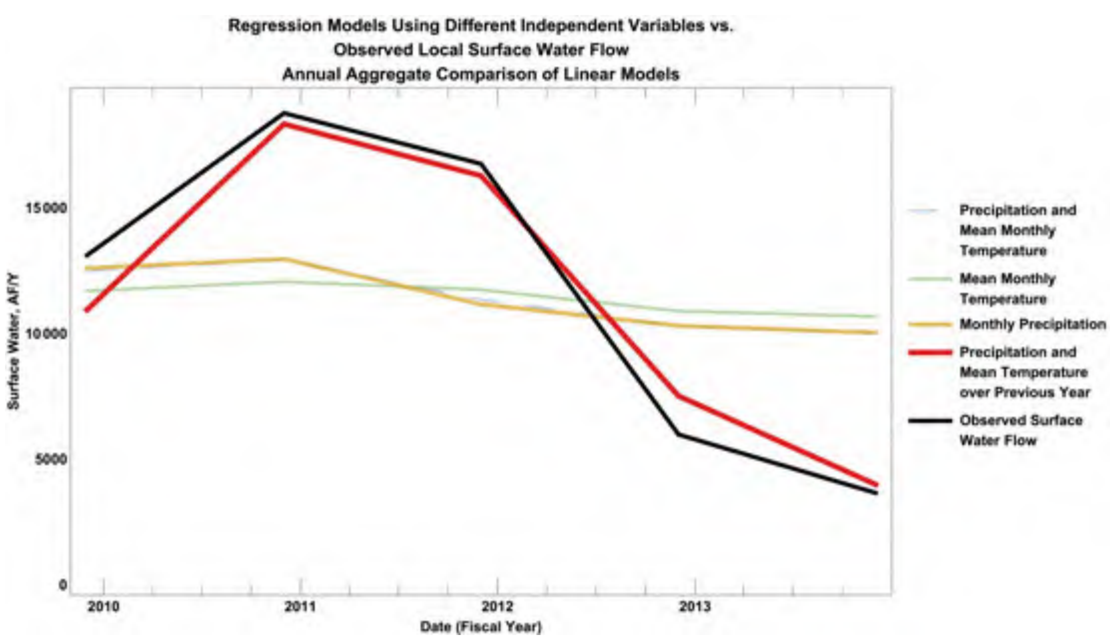


Figure 25: Four regression models averaged annually



The regression model using precipitation and the mean temperature of the previous year (a moving average of twelve months) appears to generally follow the downward trend, while the precipitation only model, while accounting for much of the same variance, does not reflect the monthly downward trend in flow shown in Figure 24.

Estimated flows using both the precipitation and mean annual temperature under all 343 climate scenarios included, in addition to the mean estimated flow across all climate model outcomes, are shown in Figure 26. These same estimates generated using the precipitation only model are shown below in Figure 27.

Figure 26: Annual projected IEUA surface supplies using the Precipitation and Temperature regression model

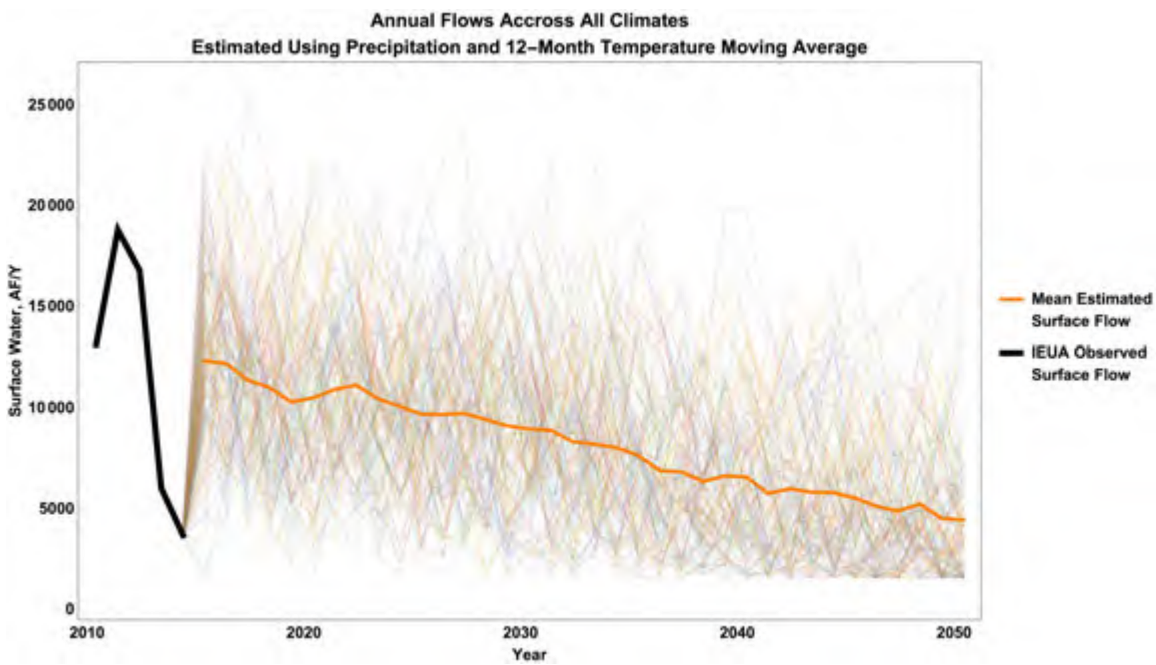
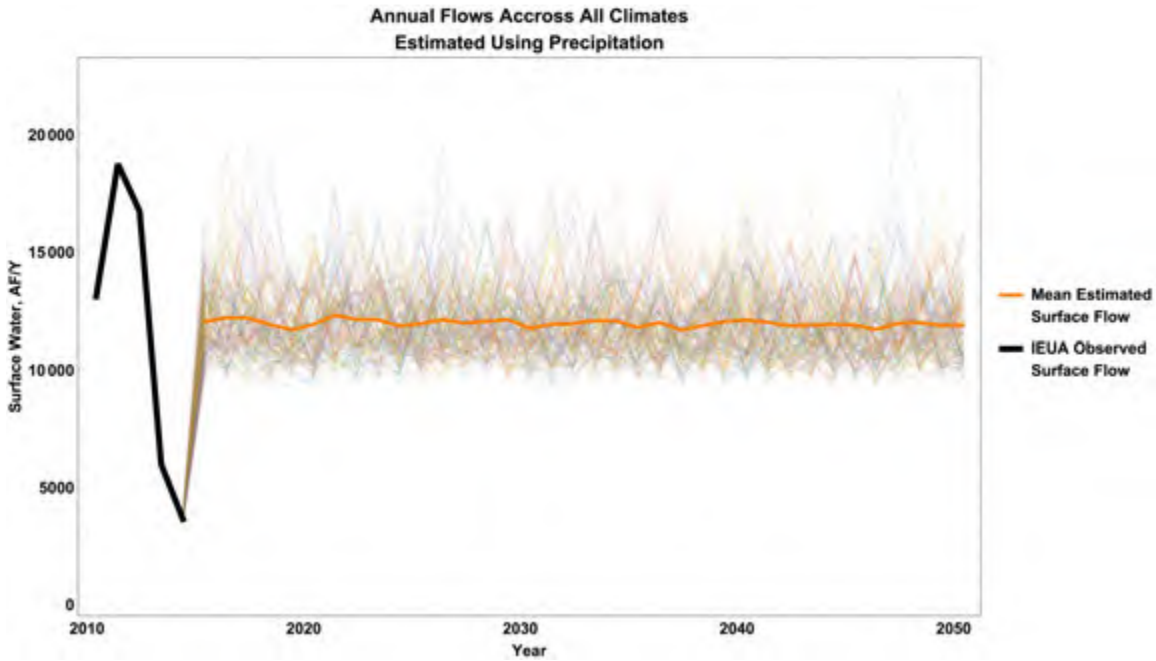


Figure 27: Annual projected IEUA surface supplies using the Precipitation regression model



Stormwater

Stormwater used for Chino Basin groundwater replenishment is projected to increase from effectively 0 to 6,400 AF by 2020. The historical stormwater recharge has been included in the Chino basin groundwater supply. Any “new” stormwater supply could be from projects constructued under the 2013 Recharge Master Plan Update prepared by the Chino Basin Water Master. In absence of more detailed information on how future stormwater would vary with respect to precipitation, we apply the same regression formula develop for surface water supply to the baseline supply as well as any additional supply specified as part of a water management strategy.

Imports via Metropolitan Water District

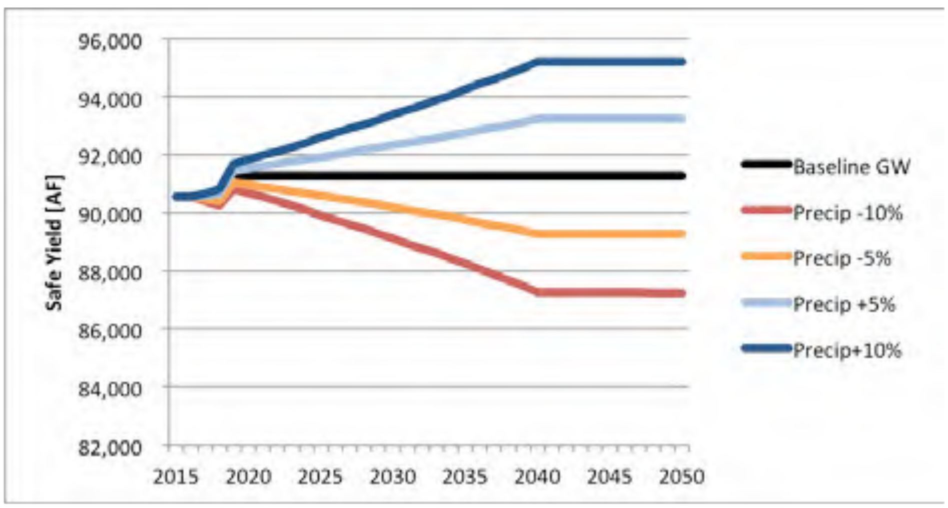
IEUA purchases water from MWD. Tier 1 water is generally used to meet urban indoor and outdoor demands. Per contract with MWD, IEUA must purchase at least 39,835 AF/year. Additional Tier 1 water, up to a total of 93,283 AF/year, is also typically made available to IEUA and is purchased when needed for direct use or groundwater replenishment. The baseline assumption for available additional Tier 1 water is 26,600 AF/year, for a total of just under 67,000 AF/year.

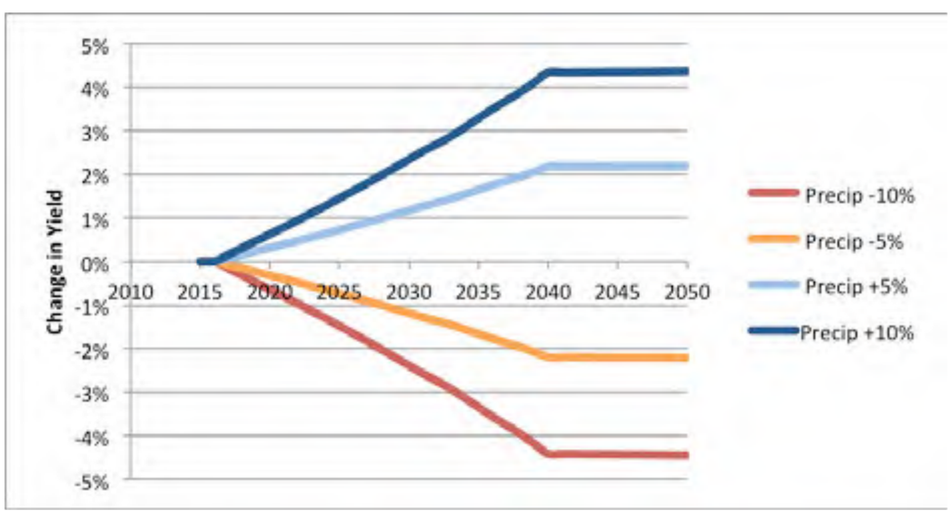
For this study we evaluate two possible levels of climate effect on additional Tier 1 water. In both cases, the total amount available declines beginning in 2021 through 2050. In one scenario, we assume additional Tier 1 water declines by 40%. In the other scenario, we assume declines of 80%. Note that these two level of water declines imply a total reduction in MWD Tier 1 water from 62,600 AF in the without climate change condition to 51,960 (for the 40% decline in additional supplies) and to 41,320 (for the 80% decline in additional supplies).

Chino Groundwater Basin

IEUA's share of Chino Basin's sustainable groundwater yield is set through actions of the Chino Basin Water Master. Under current basin conditions, the amount of groundwater available to the appropriators within the IEUA service area is 91,266 AF. An analysis by Wildermuth Environmental Inc. determined the sensitivity of IEUA's allowable production as a function of long-term precipitation trends (Figure 28). These data show that across the four scenarios evaluated, the safe yield would decline 0.44% for each 1% decline in long-term precipitation.

Figure 28: Safe yield over time for the baseline and four trends in precipitation (top); change in safe yield (as compared to 2015 across four trends in precipitation (bottom)





We then modified the Chino Basin safe yield by the product of the long-term precipitation trend and the empirically derived scaling factor. For example, groundwater safe yield would be reduced 4.4% by 2040 for a climate scenario that exhibits a long-term precipitation trend of -10%.

Key Simulation Results

The WEAP IEUA model simulates annual water supply and demand from 2010 to 2015. For this analysis, the key outputs reviewed included:

- Urban indoor and outdoor demand
- Supplies used to meet urban demand
- Unmet urban demand
- Recycled water inflows and outflows
- Chino Basin inflows and outflows

This section shows results for these outputs from the WEAP IEUA model for a single simulation—high demand scenario and historical climate.

Figure 29 shows annual indoor potable demand and outdoor demand—both potable and recycled. Note that indoor demand gradually increases each year, whereas outdoor demand varies year-to-year. The outdoor demand variation is due to the historical climate used in this simulation.

Figure 29: Urban indoor and outdoor demand for high demand scenario and historical climate

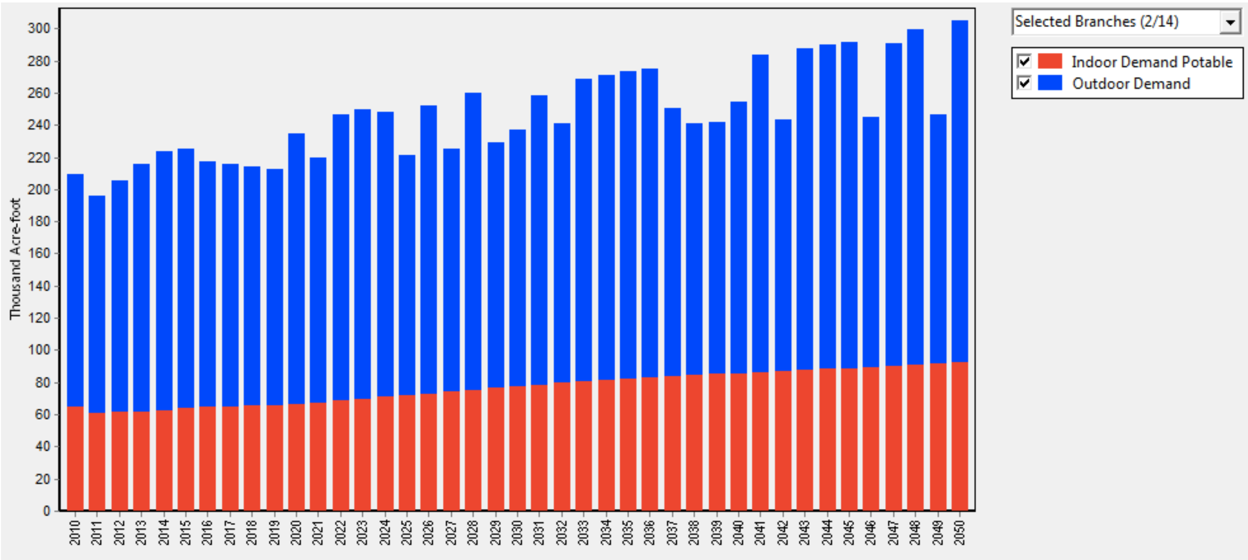


Figure 30 shows the mixture of supplies used to meet the demands in Figure 29. The largest source is Chino groundwater supplies. MWD Tier 1 supplies (minimum and additional) provide significant water. Lastly, recycled water provides about 20 percent of the supply.

Figure 30: Supplies used to meet demand for high demand scenario and historical climate

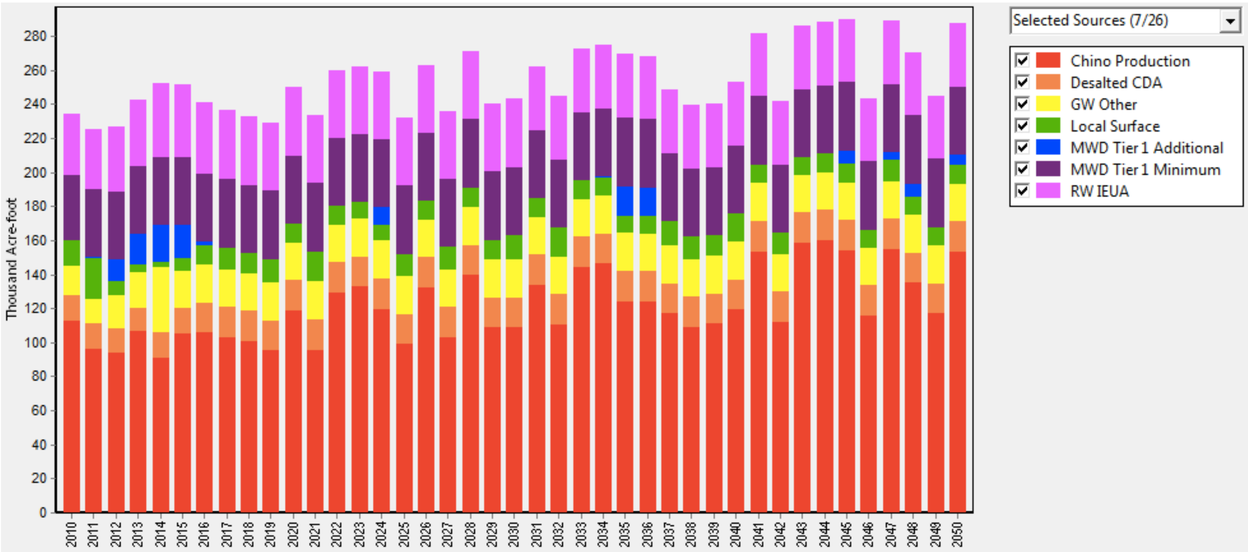


Figure 31 focuses on the recycled water portion of the IEUA system. The top bars show the inflows—return flow from IEUA indoor demand and some small amount of wastewater from outside the IEUA service area. The bottom bars show the destinations for the recycled water supply including: outdoor urban use (Recycled Direct), agricultural use (Ag RW Demand), the Santa Ana River (SAR Obligation and Downstream Flow), recharge to the Chino Basin (Req. Supp. Recharge and Recycled GW Recharge, Additional GW Recharge). Note that Downstream Flow represents more available recycled water than is needed to meet demand for recycled water. In simulations with low urban demand, there is no excess recycled water and instead shortages.

Figure 31: Sources of recycled water (top) and uses of recycled water (bottom) for high demand scenario and historical climate

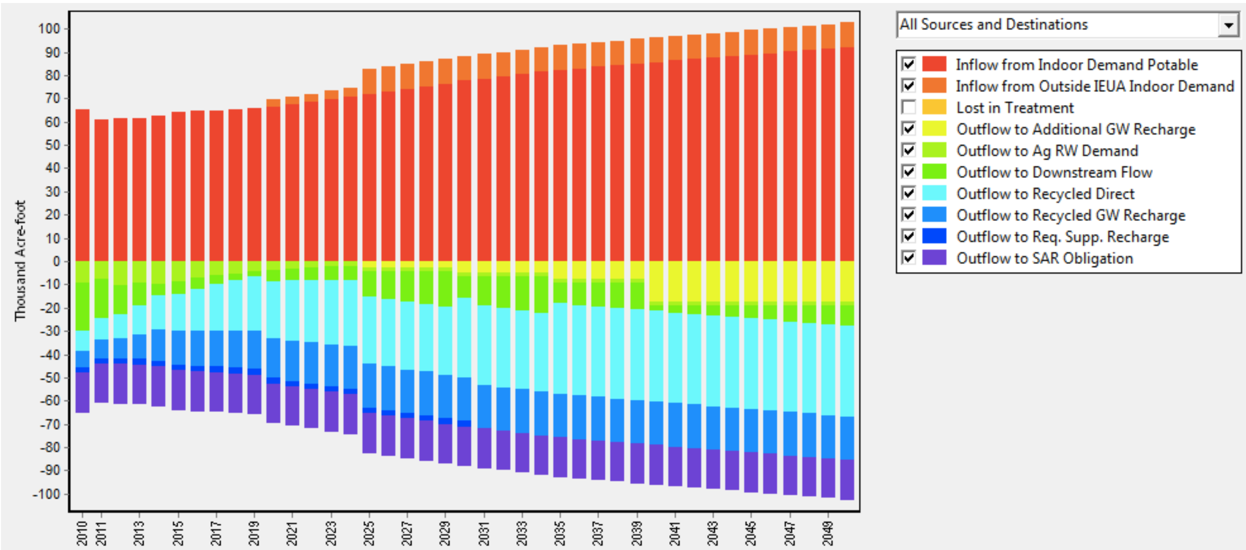
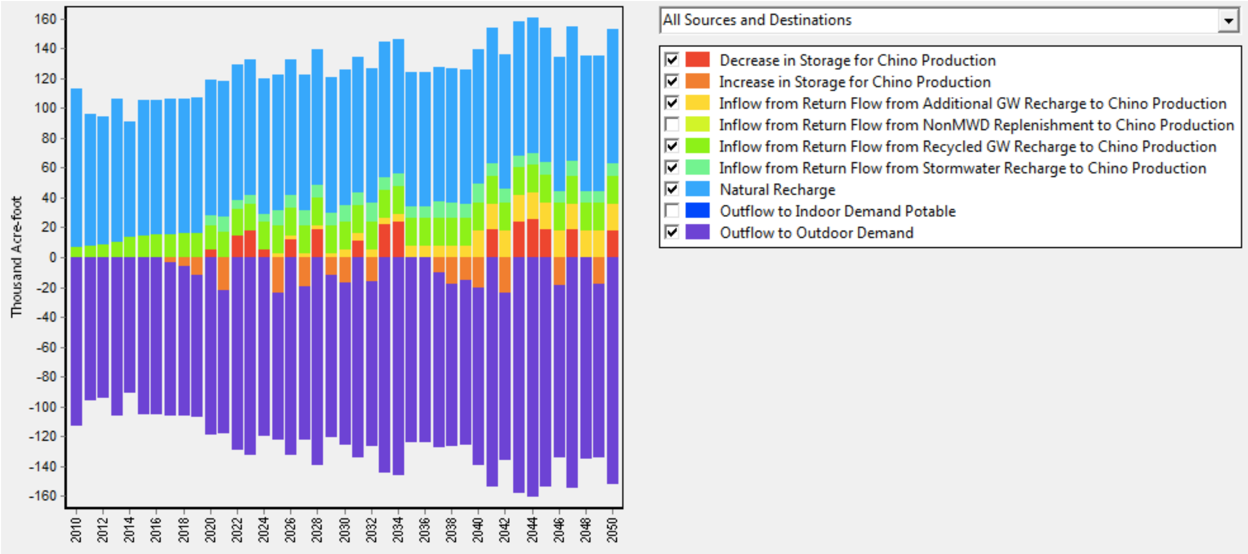


Figure 32 shows the inflows and outflows to the Chino Groundwater Basin. Natural Recharge is the largest source, but one can see how the different replenishment sources increase the inflows over time. The primary use of groundwater is to meet outdoor demands.[4] There is some modest increase and decrease in storage over the years.

[4] In reality, potable water for indoor and outdoor use are served using common water mains. The partitioning of supplies to indoor and outdoor potable use in the model reflects the priority structure used to ensure that shortages, if any, are experienced by outdoor uses first.

Figure 32: Inflows (top) and outflows (bottom) to the Chino Basin for high demand scenario and historical climate



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Appendix 3:

A&N Technical Services “Indoor and Outdoor Demands”

A & N Technical Services, Inc.

Memorandum

To: Jason Pivovaroff, IEUA

From: **David Pekelney and Thomas Chesnutt**

Date: January 24, 2014

Re: **Inferring Indoor and Outdoor Water End Uses in the IEUA Service Area**

Introduction

This memo documents the estimation of indoor and outdoor water end uses for water demand in the IEUA service area. This estimation of indoor/outdoor end uses is conducted by customer class—single family residential, multi-family residential, and commercial-industrial-institutional (CII). Indoor end uses are of particular interest to planners tasked with designing wastewater systems and recycled water systems because it helps them establish capacity requirements. Both indoor and outdoor use is of great interest to planners tasked with designing Water Use Efficiency (conservation) programs. Although much has already been accomplished with indoor conservation, there is some level of remaining potential for water savings. WUE planners have particular interest in outdoor use because it is generally assumed to be a large share of total use with large remaining potential for savings.

Two methods were used to estimate outdoor use across customer classes. The first method is the minimum month method that has been historically used in the water industry—this method assumes that the minimum month of water demand is 100 percent indoor end uses. Though we believe that this is a counterfactual assumption in the IEUA service area (it assumes exactly zero outdoor irrigation in the winter) we provide estimates using the minimum month method to serve as a point of comparison. The second method develops an estimate of winter irrigation from dedicated irrigation meters and applies this nonzero assumption instead. Termed a "seasonal variation" method, it applies the seasonal variation from dedicated irrigation meters to mixed meter customer classes.

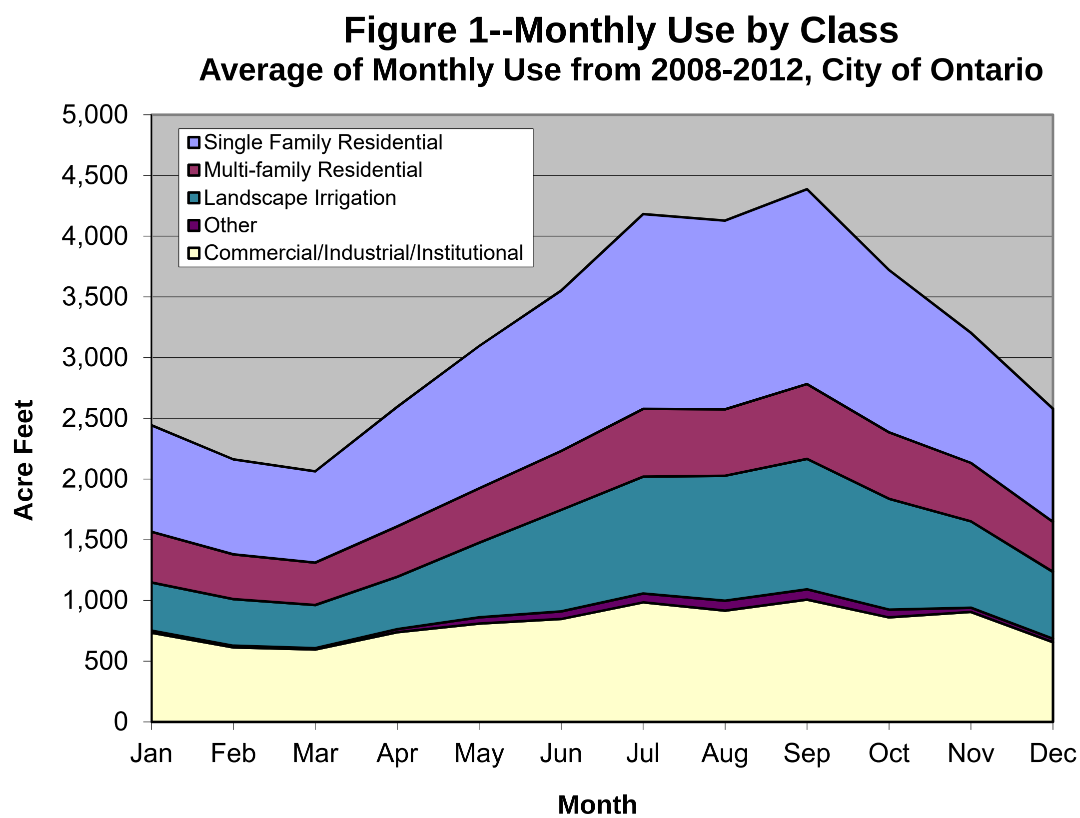
Data

The data used are from the California Department of Water Resources, Public Water System Statistics filings for the City of Ontario for the years 1993 to 2012. These data are billing system summaries at the monthly level. Several other retailers provided monthly use summaries; however, these were generated with bimonthly billing cycles. Since different retailers can apportion bimonthly billing into calendar months using different methods, it is more consistent to stick to the monthly data generated with monthly billing. Although CVWD, Upland, and MVWD provided monthly data (based on bimonthly billing), we used the City of Ontario data for this analysis because it was the only retailer to provide monthly use data generated by monthly billing.

Table 1 shows the average use from 2008 to 2012 summed by customer class. Figure 1 shows the sum of water use by month. The strong seasonal pattern reflects irrigation needs during the characteristic hot and dry summers.

Table 1 – Average Use, 2008 to 2012, City of Ontario

Class	Use (AF)	Percent
Single Family Residential	13,993	36.7%
Multi-family Residential	5,647	14.8%
Commercial/Industrial/Institutional	9,666	25.4%
Landscape Irrigation	8,259	21.7%
Other	549	1.4%
Total	38,114	100.0%



Methods

Outdoor end uses are directly measured by dedicated irrigation meters. Many other types of water meters--single family, multi family, commercial, industrial, and institutional--can be measuring both indoor and outdoor end uses. If not measured or observed directly, planners are forced to rely on inference or judgment. For IEUA, we have conducted two methods to infer outdoor use for all sectors.

Minimum Month Method

The most common method employed to infer outdoor use is to assume the winter use is all indoors. (This assumption may be closer to the truth in wetter or colder climates.) For example, if we calculate winter minimum use times 12 months we have inferred total indoor use for the year. Total use for the year minus indoor use then equals outdoor use.

In Table 2 below, we find that outdoor use calculated with the "minimum winter use is indoor use" method is 46%. The method underestimates outdoor use because there is likely to be at least some winter irrigation in dry climates. Variations on this method include daily accounting and various ways to define winter minimum. Note the results of this method will vary considerably from year to year; the reader is cautioned when using results from one year for planning purposes and we used for this analysis the monthly average over the five most recent years for which data were available (2008 to 2012).

Table 2 – Percent Outdoor Use

Class	Total	Minimum Month Method	Seasonal Variation Method
Single Family Residential	13,993	36%	58%
Multi-family Residential	5,647	26%	43%
Commercial/Industrial/Institutional	9,666	26%	42%
Landscape Irrigation	8,259	100%	100%
Other	549	75%	100%
Total	38,114	46%	62%

Seasonal Variation Method

The second method to infer outdoor use consists of employing the pattern of seasonal variation with dedicated irrigation meters and applying it to other sectors with mixed meters. The reasoning is that with dedicated irrigation meters we can measure winter irrigation. Thus, we can observe the relative water use in winter and summer irrigation seasons and calculate a parameter from variables that are observable in other sectors. For example, by calculating the ratio of winter minimum to the seasonal range we have a function of variables observable for sectors other than dedicated irrigation meters. This method will result in a higher estimate of outdoor water use than using minimum month. The method relies on the assumption that the seasonal variation of outdoor use is the same for sites with dedicated meters as for sites with mixed meters.

Due to the variability of landscape water use from year to year, we expect the calculated parameter to vary considerably from year to year. For this reason, we calculated the parameter (ratio of winter minimum to seasonal range) for each year for which we could collect data (1993 to 2012) and took the average. We applied this long term average to the monthly average of the most recent five years of consumption data (2008 to 2012) because of the changing distribution of water use by customer class as more dedicated irrigation meters are employed.

Figure 2 shows the use from irrigation-only meters, with winter irrigation illustrated in blue and the seasonal range in red for one example year (2011).

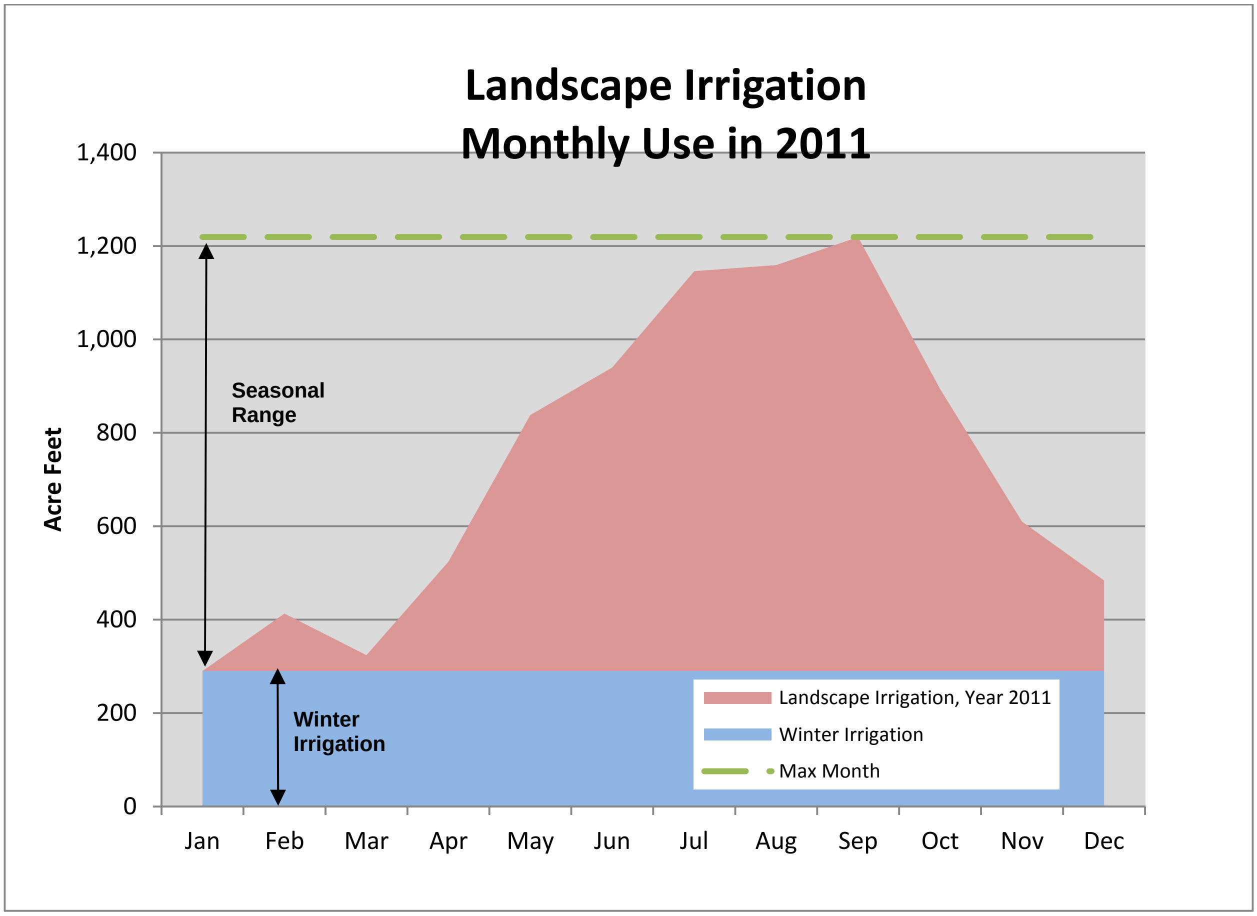
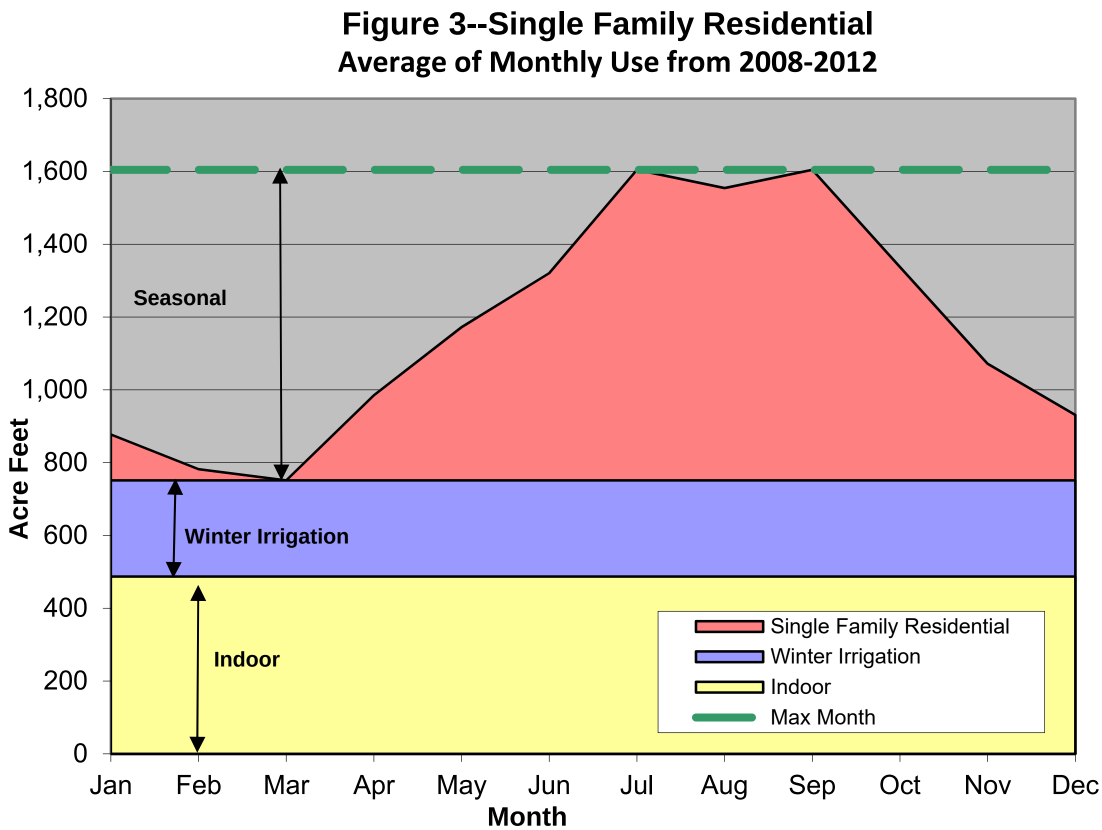


Figure 2 shows winter irrigation is 31% of seasonal range between summer and winter for dedicated irrigation accounts for the year 2011. We repeated this calculation for each year for which were able to collect data (1993 to 2012) and averaged the values to get the result we apply to customer sectors with mixed meters (31%).

Seasonal range and winter minimum are observable for non-irrigation classes. If we assume that winter irrigation is also 31% of seasonal range for the non-irrigation customer categories, we can infer their winter irrigation, and thus indoor and outdoor use.



For example, Figure 3 shows winter irrigation calculated as 31% of seasonal range for the single family residential sector. Total outdoor use (red+blue in this graph) is, thus, 58% of total use for the year (red+blue+yellow). In contrast, using the minimum month for the single family sector results in 36% outdoor use (red area only).

Conclusions and Recommendations

The seasonal variation method estimates outdoor end uses to compose 62 percent of M&I water demand (across all customer sectors) in the IEUA service area. We recommend using the seasonal variation method because we know the minimum month method systematically underestimates outdoor water use in climates where there is winter irrigation such as IEUA.

Although the minimum month method systematically underestimates outdoor use and overestimates indoor use--and we do not recommend using it for planning water resource investments--it is a commonly used method that is simple to implement and, thus, it may have value as a comparison benchmark.

This analysis used empirical measures using monthly-billed data from one of the larger retail water service areas. We can improve the reliability of the results by expanding the data set to include other IEUA service areas that utilize monthly billing.

As stated in the Introduction, estimation of indoor/outdoor split is of particular interest because it aids with designing wastewater system and recycled water systems to establish capacity requirements. Indoor use is directly related to wastewater flows; however, that does not mean they should be directly compared. Indoor use and wastewater flows are not commensurate without accounting for the following:

- The water volume used in the indoor/outdoor estimate derives from customer consumption measures. If a comparison to production measures is desired, one must account for factors that explain the differences between production and consumption measures: system loss, unaccounted for water, meter accuracy, and unmetered water. Additionally, if applying the estimate of indoor water use to total production, agricultural use needs to be separately accounted for because the estimates of indoor water use were constructed with M&I consumption data only.
- Some indoor use does not go down the drain because of cooking, consumption, cleaning, indoor plants, and other uses. These indoor water uses do not translate into wastewater flows.
- Parts of the unincorporated areas of IEUA are not hooked up to the sewer system—they still use septic systems—and their indoor use also does not translate to sewer flow.
- Any loss or gain in volume between the customer and the wastewater treatment plant would also need to be accounted for. For example, infiltration and inflows, wastewater system loss, and evaporation are potential effects on wastewater volume.
- It is easy to observe that water consumption data is inherently more variable than wastewater inflow measures due to outdoor use and weather variability. The estimate of indoor water use as a proportion of total M&I use in the City of Ontario is 38% over the years 1992-2012. If this proportion is calculated using the most recent five years from 2008 to 2012, the proportion of indoor water use is only 36%. This proportion should clearly not be thought of as a constant over time.

In sum, although most of indoor water use does indeed flow to the treatment plant, the estimates of wastewater flow and the indoor water use are not directly comparable without accounting for the above factors.

Appendix 4:

A&N Technical Services “Demand Influencing Factors”

Baseline Demand Influences

Table 1 summarizes the demand influences that were incorporated into the corresponding baseline demand forecast. The following sections define each level of influence, or adjustment that was applied to the normalized demand forecast.

Table 1: Baseline demand influences incorporated within each demand forecast

	Baseline Demand Influences					
	Economic Cycle	**Household Income**	**Housing Density**	**Weather**	**Climate Change**	**Customer Response**
Upper Forecast	Baseline	Baseline	City General Plan	Multiple Dry	High	Permanent
Lower Forecast	Baseline	Baseline	SCAG	Dry	Baseline	Permanent
Planning Forecast	NA	NA	DWR	NA	NA	NA

Notes: NA = Not Applicable

Economic Cycle

Ability to specify how strong and weak market conditions impact demand. The effect from market conditions was defined from historical demand data through the normalizing process.

- **Weak –** implies weak market conditions and demand is reduced by 6.55%.
- **Baseline –** implies that demand will not change and market conditions will remain normal/average.
- **Strong –** implies strong market conditions and demand will increase by 6.55%

Median Household Income

Ability to incorporate potential changes in demand related to household income. The following alternatives were based on the following assumptions.

- **Low** – median household income growth is below the baseline rate and reduces over time at minus 1% percent per year. Implies that demand will potentially be reduced.
- **Baseline—** median household income trends at the predicted rate per the 2012 SCAG RTP/SCS. Implies that demand will not change and will remain normal/average.
- **High** – median household income growth increases faster than the baseline rate and increases at plus 1% percent per year. Implies that demand will potentially be increased.

Housing Density

Ability to adjust the water use factor applied to each occupied housing unit based upon the expected density of future development. The density values below are aggregated regional values for the Agency's service area. In general, higher housing densification tends to have lower water use per unit caused by reduced landscape areas and more stringent water use efficiency standards.

- **City General Plan –** incorporates housing density reflective of the 2014 City General Plans.
    - Single family residential density range 1.2 – 4.2 units per acre
    - Multi-family residential density range 9.7 – 17.3 units per acre
- **Baseline –** implies that future residential development resembles past/traditional dwelling units per land area.
- **SCAG** - incorporates housing density reflective of the 2012 S.California Association of Governments Regional Transportation Plan/Sustainable Communities Strategy (2012 SCAG RTP/SCS).
    - Single family residential density range 2.3 – 5.4 units per acre
    - Multi-family residential density range 8.4 – 17.0 units per acre
- **DWR –** does not incorporate housing density, assumed a modified version of the current DWR State Model Water Efficient Landscape Ordinance. Assumed the following efficiency standards:
    - 70% relative evapotranspiration (Eto) for existing landscapes
    - 60% relative Eto for new landscapes
    - Indoor water use for future development of 55 gallons per capita day (GPCD) in 2015 to 35 GPCD by 2040.
    - Number of occupied housing units per SCAG RTP/SCS
    - Assumed 62% of total demand for residential use

Weather

Ability to specify how weather conditions impact demand from below and above average/normal conditions. The effect of weather variation was defined from historical demand data through the normalizing process.

- **Wet –** implies that demand will be decreased by 3.74% due to below normal temperature and increased wet periods.
- **Baseline** - implies that demand will not change and weather will remain normal/average conditions.
- **Dry –** implies that demand will increase by 3.74% due to above normal temperature and reduced wet periods.
- **Multiple Dry –** implies that demand will increase by 5.98% due to extended periods of above normal temperature and reduced wet periods.

Climate Change

Long term climate change is modeled by using recent Global Climate Change model predictions of potential increases in temperature and corresponding impact to demands. The Regional Climate Trends and Scenarios from the Southwest U.S. were referenced from the National Oceanic and Atmospheric Administration (NOAA) Technical Report NESDIS 142-5. (http://scenarios.globalchange.gov/report/regional-climate-trends-and-scenarios-us-nationalclimate-assessment-part-5-climate-southwest)

- **Baseline** - implies that demand will not change and climate will remain at normal/average conditions.
- **Median** (50^{th} percentile) – implies that expected temperature will increase by 2.7 degree Fahrenheit due to climate change. This would increase demands by 3.2% by 2040.
- **High** (80^{th} percentile) – implies that expected temperature will increase by 3.6 degree Fahrenheit due to climate change. This would increase demands by 4.3% by 2040.

Customer Response and Water Use Behavior

Defines how much of recent demand reductions will persist into the future that is permanent. The effect from recent customer response and water use behavior was defined from historical demand data through the normalizing process.

- **Baseline** – implies that demand will not change and everything will return to the normal, or bounce back to normal/average conditions.
- **Permanent** – implies that the 4.6% recent reduction is a permanent lifestyle change and continues to 2040.

Baseline Demand Comparison: Normalized vs. Adjusted

Figure A presents the Upper, Lower and Planning Forecasts under Baseline assumptions, therefore all demand influences are assumed to be normal or under average conditions, except for housing density. Housing density remained as indicated in Table 1. Figure B presents the same demand forecasts with the demand influences indicated in Table 1. As shown, there is a slight difference in the forecast envelope when you compare Figure A to B. The common attribute between the two Figures is housing density; therefore as shown, the other demand influences did not have as much impact to the demand forecasts as housing density did. To note, each demand influence adjusts the normalized water use factors that are applied regional growth projections for number of households and employees per sector.

Figure A: Baseline demand forecasts under normal or average conditions.

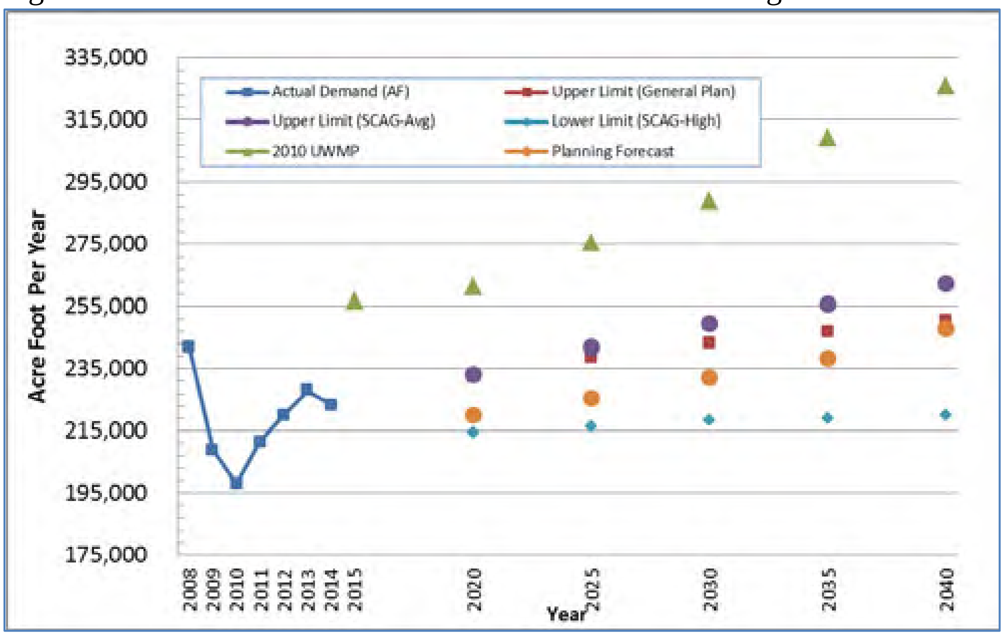
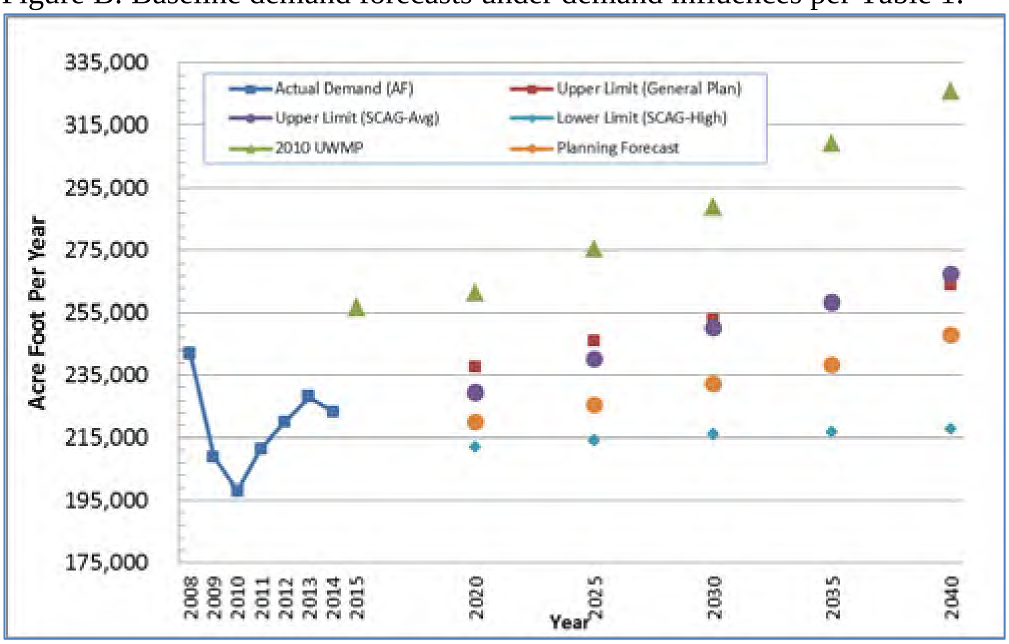


Figure B: Baseline demand forecasts under demand influences per Table 1.



Appendix 5:

Full IRP Technical Committee Identified Project List

ID	Project Name	Description	AF yield	Years to "wet water" yield	Increased groundwater in storage?	Increases water level in critical GW management zones?	Increased stormwater capture/recharge?	Increased permeability or natural infiltration for	Provide additional recycled water?	Reduce Dependence on imported water from MWD during dry	Increase local water supplies?	Emergency local supply redundancy?	Decrease reliance on local surface water during dry years?	Requires conservation in existing development?	Requires demand management in new development?	Reduce TDS and/or nitrates in GW?	Decrease net energy consumption?	Increase capacity of wet year water ("big	Eligible for grant funding?	Technical feasibility/ease of
1	Groundwater Treatment (Rehab)-Increment 1	This project category will rehabilitate an existing groundwater production wells decommissioned due to water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	2	2
2	Groundwater Treatment (Rehab)-Increment 2	This project category will rehabilitate an existing groundwater production wells decommissioned due to water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 + 2 will provide up to 10,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	2	2
3	Groundwater Treatment (new)-Increment 1	This project category will construct a new groundwater production well and treatment facility to address water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	1	2
4	Groundwater Treatment (new)-Increment 2	This project category will construct a new groundwater production well and treatment facility to address water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 + 2 will provide up to 10,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	1	2
5	Production Wells-Increment 1	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	2	2
6	Production Wells-Increment 2	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1+2 will provide up to 10,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	2	2
7	Production Wells-Increment 3	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1-3 will provide up to 15,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	1	2
8	Production Wells-Increment 4	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1-4 will provide up to 20,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	1	2
9	WRCRWA RW Intertie	The Western Riverside County Regional Wastewater Authority (WRCRWA) Plant intertie would allow for the delivery of recycled water from the WRCRWA Plant to be used in the IEUA southern service area. This would also allow additional recycled water to be delivered into the northern service area groundwater recharge basins by reducing the demand from the RP-1 930 pressure zone pump station. Intertie would occur within the 800/930 Pressure Zones.	4,500	10	2	1	1	1	2	2	2	2	1	1	1	1	2	1	1	1
10	Rialto RW Intertie	The Rialto intertie project would allow for delivery of recycled water from the Rialto WWTP to be used in the IEUA service area. The intertie could occur near the RP-3 groundwater recharge basins. This concept could involve the Inland Valley Pipeline, LLC (IVP) to convey water between Rialto WWTP and IEUA's recycled water distribution system. Supply could be used for direct, GWR or other reuse strategy.	4,500	10	2	2	1	1	2	2	2	2	1	1	1	1	2	1	1	1
11	Pomona RW Exchange/Transfer	The City of Pomona does not currently use all of the treated effluent from the Pomona WRP. One concept would involve partnering to develop and expand their recycled water facilities in exchange for an agreed amount of their Chino Basin groundwater right. Could include other supply transfer agreement such as reclaimable waste and/or groundwater.	2,500	10	2	2	1	1	1	2	2	1	1	1	1	1	2	1	1	1
12	RP-1 RW Injection-Increment 1	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increment 1 facility would be sized for 2,500 AFY.	2,500	9	2	1	1	1	1	2	2	1	1	1	1	2	0	1	2	2

13	RP-1 RW Injection-Increment 2	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increment 1+2 facility would be sized for 5,000 AFY.	2,500	9	2	1	1	1	1	2	2	1	1	1	1	2	0	1	1	2
14	RP-1 RW Injection-Increment 3	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increment 1-3 facility would be sized for 7,500 AFY.	2,500	9	2	1	1	1	1	2	2	1	1	1	1	2	0	1	1	2
15	Satellite RW Injection-Increment 1	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing and volume to be produced will be determined as part of the portfolio development process. Increment 1 facility, or facilities would have a capacity of 2,500 AFY.	2,500	5	2	2	1	1	1	2	2	1	1	1	1	2	0	1	2	2
16	Satellite RW Injection-Increment 2	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing and volume to be produced will be determined as part of the portfolio development process. Increment 1+2 facility, or facilities would have a capacity of 5,000 AFY.	2,500	5	2	2	1	1	1	2	2	1	1	1	1	2	0	1	1	2
17	Satellite RW Injection-Increment 3	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing and volume to be produced will be determined as part of the portfolio development process. Increment 1-3 facility, or facilities would have a capacity of 7,500 AFY.	2,500	5	2	2	1	1	1	2	2	1	1	1	1	2	0	1	1	2
18	Desalter Recovery Improvement	The existing Chino Basin I Desalter (CD-1) recovers approximately 75 percent of water. Improvements could be done to increase recovery to approximately 90 percent. This water would be conveyed through the existing potable water system.	1,500	3	1	1	1	1	1	2	2	1	1	1	1	2	1	1	1	2
19	RW Direct Use Expansion-Increment 1	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1 facilities would increase direct use beyond baseline supply by 5,000 AFY.	5,000	15	1	1	1	1	1	2	2	1	1	1	1	0	2	1	2	2
20	RW Direct Use Expansion-Increment 2	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1+2 facilities would increase direct use beyond baseline supply by 10,000 AFY.	5,000	20	1	1	1	1	1	2	2	1	1	1	1	0	2	1	1	2
21	RW Direct Use Expansion-Increment 3	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1-3 facilities would increase direct use beyond baseline supply by 15,000 AFY.	5,000	25	1	1	1	1	1	2	2	1	1	1	1	0	2	1	1	2
22	RW Direct Use Expansion-Increment 4	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1-4 facilities would increase direct use beyond baseline supply by 20,000 AFY.	5,000	25	1	1	1	1	1	2	2	1	1	1	1	0	2	1	1	2
23	Existing GWR Basin Improvements beyond RMPU-Increment 1	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1 facilities would increase recharge at existing basins within the Chino Basin by an additional 2,500 AFY.	2,500	15	2	2	1	1	1	2	2	1	1	1	1	0	2	1	2	2
24	Existing GWR Basin Improvements beyond RMPU-Increment 2	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1+2 facilities would increase recharge at existing basins within the Chino Basin by an additional 5,000 AFY.	2,500	20	2	2	1	1	1	2	2	1	1	1	1	0	2	1	2	2
25	Existing GWR Basin Improvements beyond RMPU-Increment 3	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1-3 facilities would increase recharge at existing basins within the Chino Basin by an additional 10,000 AFY.	5,000	25	2	2	1	1	1	2	2	1	1	1	1	0	2	1	1	2

26	Existing GWR Basin Improvements beyond RMPU-Increment 4	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1-4 facilities would increase recharge at existing basins within the Chino Basin by an additional 15,000 AFY.	5,000	25	2	2	1	1	1	2	2	1	1	1	1	0	2	1	1	2
27	Construct New GWR Basins-Increment 1	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1 would provide up to an additional 2,450 AFY of recharge capacity, which is approximately one new basin at 350 AF per month for 7 months of operation.	2,450	10	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
28	Construct New GWR Basins-Increment 2	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1+2 would provide up to an additional 4,900 AFY of recharge capacity, which is approximately 2 new basins at 350 AF per month for 7 months of operation.	2,450	15	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
29	Construct New GWR Basins-Increment 3	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1-3 would provide up to an additional 7,350 AFY of recharge capacity, which is approximately 3 new basins at 350 AF per month for 7 months of operation.	2,450	20	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
30	Construct New GWR Basins-Increment 4	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1-4 would provide up to an additional 9,800 AFY of recharge capacity, which is approximately 4 new basins at 350 AF per month for 7 months of operation.	2,450	20	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
31	ASR wells MZ1 and MZ2	Construct aquifer storage and recovery (ASR) wells to increase improted water groundwater recharge within management zone 1 and 2. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.1 and 3 for CVWD and the City of Ontario.	11,500	5	2	2	1	1	1	0	2	1	1	1	1	2	0	1	2	2
32	ASR wells MZ3	Construct aquifer storage and recovery (ASR) wells to increase imported water groundwater recharge within management zone 3. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.2 for JCSD.	3,500	5	2	2	1	1	1	0	2	1	1	1	1	2	0	1	2	2
33	Maximize ASR wells	Construct other aquifer storage and recovery (ASR) wells to increase imported water groundwater recharge by 3,500 AFY within the Chino Basin during wet and dry years. Assume benefit 40% of the time (2 in 5 years). Storage to be dependent on supplemental water availability in wet years	3,500	5	2	2	1	1	1	0	2	1	1	1	1	2	0	1	1	2
34	Cadiz IW Transfer	The Cadiz project would allow for the import of unused groundwater from the remote Fenner Valley near Cadiz, California. For the purposes of the IRP, a 5,000 AFY increment of water is assumed. The Cadiz supply would be transferred and taken as SWP water into the Chino Basin.	5,000	20	2	1	1	1	1	2	2	1	1	1	1	0	1	1	1	1
35	Secure SWP IW transfer outside MWD	Imported water supply is solely from MWD via the SWP and is limited by the Agency's purchase order. Other permanent, temporary or seasonally available imported water supplies could be purchased and wheeled into the Chino Basin. The volume of water available varies depending on the source of water and timing. Supplies could be purchased from various Irrigation Districts or secured via Ag Transfer. Assume benefit 1 in 10 years	5,000	10	2	1	1	1	1	1	2	1	1	1	1	1	0	2	1	1
36	SBVMWD IW Transfer	As a SWP contractor, San Bernardino Valley MWD (SBVMWD) has a Table A allocation. This option would involve constructing an intertie between SBVMWD's imported water system. The supply would be temporary or seasonally available and could be purchased and wheeled into the Chino Basin. Assume benefit 1 in 5 years.	5,000	5	2	1	1	1	1	1	2	1	1	1	1	2	0	2	1	1
37	Ocean Desalination Exchange	This project category would involve a partnership with another water agency pursuing ocean water desalination; through in-lieu exchange, the Chino basin would obtain an agreed amount of imported water. For the purposes of the IRP, a volume of 5,000 AFY was chosen. Opportunity to invest in upcoming ocean desalination plants includes Huntington Beach, Carlsbad and West Basin.	5,000	10	2	1	1	1	1	1	2	1	1	1	1	2	0	1	1	1
38	Six Basin Water Transfer	This project would explore the idea of developing a water transfer agreement with Six Basins. One concept is to purchase imported water for recharge into Six Basins and get in return equal volume of groundwater underflow plus agreed amount of stormwater. For example, could purchase 10,000 AF of IW for exchange of 10,000 AF of groundwater plus 7,000 AF of stormwater. Assume benefit 1 in 5 years.	17,000	5	2	2	2	1	1	2	2	1	1	1	1	2	0	1	0	1
39	Expand WUE Devices	Implement additional targeted device related savings to reduce demand beyond current annual water use efficiency savings. Provide incentives and pilot programs to roll out extremely high efficient indoor fixtures and toilets. To be verified with WUEBP.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
40	WUE - Turf Removal-Increment 1	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Increment 1 would provide up to 5,000 AFY of savings.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
41	WUE - Turf Removal-Increment 2	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Increment 1+2 would provide up to 10,000 AFY of savings.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
42	WUE - Turf Removal-Increment 3	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Increment 1-3 would provide up to 15,000 AFY of savings.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
43	WUE - Budget Rates-Increment 1	Implement water budget based rates for 2 member agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Increment 1 would provide up to 13,350 AFY of savings.	13,350	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	2	2

44	WUE - Budget Rates-Increment 2	Implement water budget based rates for 2 member agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Increment 1 would provide up to 26,700 AFY of savings.	13,350	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	2	2
45	WUE - Budget Rates-Increment 3	Implement water budget based rates for 2 member agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Increment 1 would provide up to 40,050 AFY of savings.	13,350	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	2	2
46	WUE- RW Demand Management-Increment 1	Implement demand management devices and programs for direct recycled water customers. Does not generate additional supply, aids in managing the supply during peak demand. Increment 1 would provide 2,500 AFY of demand management, this supply could be used for increasing direct use demands, groundwater recharge or other reuse strategy.	2,500	1	1	1	1	1	1	2	2	2	1	2	2	1	2	1	2	2
47	WUE- RW Demand Management-Increment 2	Implement demand management devices and programs for direct recycled water customers. Does not generate additional supply, aids in managing the supply during peak demand. Increment 1+2 would provide 5,000 AFY of demand management, this supply could be used for increasing direct use demands, groundwater recharge or other reuse strategy.	2,500	1	1	1	1	1	1	2	2	2	1	2	2	1	2	1	2	2
48	Dry Weather Flow Diversions	Capture and treat urban dry weather flow from Chino, Cucamonga and San Sevaine Creek into the Regional Plants. For the purposes of the IRP, a volume of 3,500 AFY was assumed as total available dry weather flow.	3,500	5	2	1	2	1	2	2	2	1	0	1	1	1	2	1	1	2
52	San Antonio Creek SW Capture	Modify existing basins along San Antonio Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years	1,000	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
53	Cucamonga Creek SW Capture	Modify existing basins along Cucamonga Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years.	2,500	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
54	Day Creek SW Capture	Modify existing basins along Day Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years.	2,500	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
55	San Sevaine Creek SW Capture	Modify existing basins along San Sevaine Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years.	2,500	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
56	Water Banking Facility	This project category would invest into the Semitropic Groundwater Storage Bank in Kern County or similar program. The Chino Basin could bank additional purchases of wet year water when these supplies are available and Chino Basin facilities are capacity limited.	5,000	10	1	1	1	1	1	2	2	1	1	1	1	1	1	2	0	1
58	Regional LID-Increment 1	Construct or modify urban development to better manage and infiltrate rainfall at the source. Projects could include bioswales and or pervious concrete installation in parking lots, street drainages. Increment 1 facilities could provide up to 5,000 AFY of recharge.	5,000	5	2	1	2	2	1	1	2	1	1	1	1	2	2	2	2	2
59	Regional LID-Increment 2	Construct or modify urban development to better manage and infiltrate rainfall at the source. Projects could include bioswales and or pervious concrete installation in parking lots, street drainages. Increment 1+2 facilities could provide up to 10,000 AFY of recharge.	5,000	5	2	1	2	2	1	1	2	1	1	1	1	2	2	2	2	2
60	Direct Potable Reuse-Increment 1	This project would construct an advanced water filtration and treatment (e.g. process treatment that combines micro or ultrafiltration) facility at a Regional Plant. The treatment process would allow the recycled water to be introduced into the potable water system. Increment 1 facility would have a capacity of 5,000 AFY.	5,000	10	1	1	1	1	1	2	2	1	1	1	1	2	0	1	2	2
61	Direct Potable Reuse-Increment 2	This project would construct an advanced water filtration and treatment (e.g. process treatment that combines micro or ultrafiltration) facility at a Regional Plant. The treatment process would allow the recycled water to be introduced into the potable water system. Increment 1+2 facility would have a capacity of 10,000 AFY.	5,000	10	1	1	1	1	1	2	2	1	1	1	1	2	0	1	2	2
62	Cucamonga Basin Improvements	This project category will identify projects that would result in additional groundwater production benefits coming into the IEUA service area from the Cucamonga Basin. Includes recharge facilities, treatment and production facilities to maximize supply coming into the Chino Basin.	2,500	5	2	2	2	1	1	2	2	1	1	1	1	0	2	1	2	2
63	Maximize Other Groundwater	This project category will identify local member agency projects that would result in additional groundwater production benefits coming into the IEUA service area outside of the Chino Basin.	5,000	5	1	1	1	1	1	2	2	1	1	1	1	1	2	2	1	2
65	RP-1 NRWS Treatment	The north Non Reclaimable Wastewater System (NRWS) discharges approx.. 3.5 MGD of brine to Los Angeles County annually. The project would construct a treatment facility to allow the Region to reuse this supply into the recycled water system. Requires plant expansion and partial reverse osmosis for blending.	3,920	9	2	1	1	1	2	2	2	1	1	1	1	2	1	1	2	2
66	WUE - Advanced Metering Technologies	Install advanced metering infrastructure (AMI) between retail meters and a utility provider. Will provide real-time data about consumption and allow customers to make informed choices about usage.	5,000	$ 3	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
87	Prior Stored Chino Groundwater	This category will allow supply to be taken from groundwater stored in the Chino Basin, pre 2014. It is estimated that approximately 400,000 AF of stored groundwater is available, of which 280,000 AF is made available for IEUA member agencies. This supply category will be managed on a case by case basis as selected into the Regional supply portfolios. The supply will be limited, but can be used annually or intermittent as needed.	8,400	1	0	0	1	1	1	2	2	1	1	1	1	2	2	1	2	2
88	Maximize Local Surface Water	This category of projects will construct facilities needed to capture additional local surface water. Projects to be defined by IEUA's member agencies. For example, increase surface flows off Lytle Creek in wet years. Assume benefit 3 in 5 years	1,000	1	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2

89	Max Tier 1 MWD Imported Water-Increment 1	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1 would allow for the purchase of an additional 7,850 AFY. Can be purchased annually or intermittently.	7,850	1	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
90	Max Tier 1 MWD Imported Water-Increment 2	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1+2 would allow for the purchase of an additional 15,700 AFY. Can be purchased annually or intermittent.	7,850	1	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
91	Max Tier 1 MWD Imported Water-Increment 3	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1-3 would allow for the purchase of an additional 23,550 AFY. Can be purchased annually or intermittent.	7,850	1	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
92	Max Tier 2 MWD Imported Water-Increment 1	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1 would allow for the purchase of an additional 5,000 AFY. Can be purchased annually or intermittent.	5,000	3	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
93	Max Tier 2 MWD Imported Water-Increment 2	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1+2 would allow for the purchase of an additional 10,000 AFY. Can be purchased annually or intermittent.	5,000	3	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
94	Max Tier 2 MWD Imported Water-Increment 3	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1-3 would allow for the purchase of an additional 15,000 AFY. Can be purchased annually or intermittently.	5,000	3	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
95	MWD Replenishment or discount wet year water-Increment 1	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Increment 1 would allow for the purchase of an additional 10,000 AFY. Can be purchased annually or intermittently. Assume benefit after 2 consecutive wet years (assume 1 in 15 years)	10,000	5	2	2	1	1	1	0	2	1	1	1	1	2	0	2	1	2
96	MWD Replenishment or discount wet year water-Increment 2	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Increment 1+2 would allow for the purchase of an additional 20,000 AFY. Can be purchased annually or intermittently. Assume benefit after 2 consecutive wet years (assume 1 in 15 years)	10,000	8	2	2	1	1	1	0	2	1	1	1	1	2	0	2	1	2
97	MWD Replenishment or discount wet year water-Increment 3	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Increment 1-3 would allow for the purchase of an additional 30,000 AFY. Can be purchased annually or intermittently. Assume benefit after 2 consecutive wet years (assume 1 in 15 years)	10,000	10	2	2	1	1	1	0	2	1	1	1	1	2	0	2	1	2
98	Watershed Wide Water Transfers	This category of projects will construct or arrange other water transfers external to the Chino Basin. For example, dry weather flow exchange of recycled water to Orange County Water District for an equivalent amount of purchased imported water. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability and/or quality. To occur annually or intermittent. Resiliency and flexibility benefit only	-	5	1	1	1	1	1	2	2	2	1	1	1	2	2	1	2	2
99	Chino Basin Water Transfers	This category of projects will construct or arrange other water transfers within the Chino Basin. Projects to also include inter-agency interties for increased reliability. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability. To occur annually or intermittent.	-	5	2	2	1	1	1	2	2	2	1	1	1	2	2	1	2	2
100	Reliability Production Wells	This project category will construct new production wells needed to replace lost production or under performing facilities. These projects will maintain current annual groundwater production deliveries and are intended to increase operational flexibility and reliability. Increment 1 varies in capacity and will be determined on a case by case basis as selected into each of the regional supply portfolios.	-	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	2	2

Appendix 6:

Project Lists for Water Resource Strategy Portfolios 1-8

Project List for Strategy A Portfolio 1

Strategy A		
Project ID #	Portfolio 1	Project Name
1	x	Groundwater Treatment (Rehab)-Increment 1
2	x	Groundwater Treatment (Rehab)-Increment 2
5	x	Production Wells-Increment 1
6	x	Production Wells-Increment 2
23	x	Existing GWR Basin Improvements beyond RMPU-Increment 1
24	x	Existing GWR Basin Improvements beyond RMPU-Increment 2
25	x	Existing GWR Basin Improvements beyond RMPU-Increment 3
26	x	Existing GWR Basin Improvements beyond RMPU-Increment 4
46	x	WUE- RW Demand Management-Increment 1
47	x	WUE- RW Demand Management-Increment 2
87	x	Prior Stored Chino Groundwater
88	x	Maximize Local Surface Water

Project List for Strategy B Portfolios 2 & 3

Strategy B			
Project ID #	Portfolio 2	Portfolio 3	Project Name
1	x	x	Groundwater Treatment (Rehab)-Increment 1
5	x	x	Production Wells-Increment 1
9	x	x	WRCRWA RW Intertie
11	x	x	Pomona RW Exchange/Transfer
12	x	x	RP-1 RW Injection-Increment 1
19	x	x	RW Direct Use Expansion-Increment 1
20	x	x	RW Direct Use Expansion-Increment 2
23	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 1
24	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 2
25	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 3
26	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 4
27	x	x	Construct New GWR Basins-Increment 1
35		x	Secure SWP IW transfer outside MWD from Irrigation Districts or Ag Transfers
36		x	SBVMWD IW Transfer
38		x	Six Basin Groundwater Transfer
39	x	x	Expand WUE Devices
48	x	x	Dry Weather Flow Diversions
89		x	Max Tier 1 MWD Imported Water-Increment 1

Project List for Strategy C Portfolios 4 & 5

Strategy C			
Project ID #	Portfolio 4	Portfolio 5	Project Name
12	x	x	RP-1 RW Injection-Increment 1
13	x	x	RP-1 RW Injection-Increment 2
14	x	x	RP-1 RW Injection-Increment 3
21	x	x	RW Direct Use Expansion-Increment 3
23	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 1
24	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 2
25	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 3
33	x	x	Maximize ASR wells
35		x	Secure SWP IW transfer outside MWD
36		x	SBVMWD IW Transfer
38		x	Six Basin Water Transfer
39	x	x	Expand WUE Devices
40		x	WUE - Turf Removal-Increment 1
43	x	x	WUE - Budget Rates-Increment 1
44	x	x	WUE - Budget Rates-Increment 2
45		x	WUE - Budget Rates-Increment 3
46	x	x	WUE- RW Demand Management-Increment 1
47	x	x	WUE- RW Demand Management-Increment 2
66	x	x	WUE - Advanced Metering Technologies
88	x	x	Maximize Local Surface Water
95	x	x	MWD Replenishment or discount wet year water-Increment 1
96		x	MWD Replenishment or discount wet year water-Increment 2

Project List for Strategy D Portfolio 6

Strategy D		
Project ID #	Portfolio 6	Project Name
9	x	WRCRWA Intertie
10	x	Rialto Intertie
36	x	SBVMWD IW Transfer
38	x	Six Basin Groundwater Transfer
43	x	WUE - Budget Rates- Increment 1 (2 agencies, 15% savings per agency)
56	x	Water Banking Facility - Increment 1
62	x	Cucamonga Basin Upgrades
87	x	Prior Stored Chino Groundwater
95	x	MWD Replenishment or discount wet year water-Increment 1

Project List for Strategy E Portfolios 7 & 8

Strategy E			
Project ID #	Portfolio 7	Portfolio 8	Project Name
9		x	WRCRWA Intertie
11		x	Pomona RW Exchange/Transfer
12		x	RP-1 advanced treatment RW Injection - Increment 1
19		x	Recycled Water Direct Use System Expansion - Increment 1
20		x	Recycled Water Direct Use System Expansion- 5,000 AF increment 2
23		x	Existing GWR Basin Improvements beyond RMPU - Increment 1
24		x	Existing GWR Basin Improvements beyond RMPU- 2,500 AF increment 2
25		x	Existing GWR Basin Improvements beyond RMPU- 5,000 AF increment 3
26		x	Existing GWR Basin Improvements beyond RMPU- 5,000 AF increment 4
27		x	Purchase Land to Construct New GWR Basins - Increment 1
36	x	x	SBVMWD IW Transfer
43	x	x	WUE - Budget Rates- Increment 1 (2 agencies, 15% savings per agency)
66	x	x	Advanced Metering Technologies
89	x	x	Max Tier 1 MWD Imported Water-Increment 1
90	x	x	Max Tier 1 MWD Imported Water-Increment 2
91	x	x	Max Tier 1 MWD Imported Water-Increment 3

Baseline Supply Forecast to 2040

Acre-Foot per Year (AFY)

FY End	Total Regional Supply	Total Urban Supply	Total Potable Supply	Imported-MWD	GW-Chino	GW-Other	Local Surface	Total RW-Direct	RW-Direct Ag	StormWater	RW-Direct	RW-GWR	Desalted-CDA	Other	RW-SAR Obligation	Supp. Recharge
09-10	226,290.0	209,290.0	201,004.1	38,243.9	105,594.8	17,286.6	13,109.9	17,312.8	9,026.9	-	8,285.9	7,208.0	14,623.6	12,145.4	17,000.0	
11	212,744.8	195,744.8	186,762.4	42,730.2	88,366.5	14,459.1	18,761.3	16,655.9	7,673.5	-	8,982.4	8,028.0	14,440.8	8,004.6	17,000.0	
12	222,230.9	205,230.9	194,886.1	52,876.1	85,345.8	19,507.2	16,744.3	20,605.5	10,260.8	-	10,344.8	8,634.0	13,961.0	6,451.8	17,000.0	
13	233,004.3	216,004.3	203,379.7	59,013.0	95,955.5	21,145.4	5,980.2	21,840.0	9,215.4	-	12,624.6	10,479.0	13,671.4	7,614.2	17,000.0	
14	240,435.2	223,435.2	208,836.9	67,055.4	77,429.9	38,092.2	3,658.3	24,657.2	10,058.9	-	14,598.3	13,593.0	14,735.4	7,865.8	17,000.0	
15	**251,837.3**	**234,837.3**		**65,000.0**	**90,538.5**	**22,098.1**	**11,650.8**	**24,600.0**	**8,550.0**	-	**16,050.0**	**14,500.0**	**15,000.0**		**17,000.0**	
16	261,910.8	244,910.8		69,752.0	90,538.5	22,098.1	11,650.8	25,426.0	7,267.5	-	18,158.5	14,980.0	17,733.0	-	17,000.0	
17	264,306.9	247,306.9		69,752.0	90,538.5	22,098.1	11,650.8	26,252.0	6,177.4	-	20,074.6	15,460.0	17,733.0	-	17,000.0	
18	266,539.6	249,539.6		69,752.0	90,538.5	22,098.1	11,650.8	27,078.0	5,250.8	-	21,827.2	15,940.0	17,733.0	-	17,000.0	
19	268,633.2	251,633.2		69,752.0	90,538.5	22,098.1	11,650.8	27,904.0	4,463.2	-	23,440.8	16,420.0	17,733.0	-	17,000.0	
20	**277,736.2**	**260,736.2**		**69,752.0**	**91,266.0**	**22,098.1**	**11,650.8**	**28,730.0**	**3,793.7**	**6,400**	**24,936.3**	**16,900.0**	**17,733.0**	-	**17,000.0**	
21	279,047.2	262,047.2		69,752.0	91,266.0	22,098.1	11,650.8	29,112.0	3,224.6	6,400	25,887.4	17,260.0	17,733.0	-	17,000.0	
22	280,272.9	263,272.9		69,752.0	91,266.0	22,098.1	11,650.8	29,494.0	2,740.9	6,400	26,753.1	17,620.0	17,733.0	-	17,000.0	
23	281,426.1	264,426.1		69,752.0	91,266.0	22,098.1	11,650.8	29,876.0	2,329.8	6,400	27,546.2	17,980.0	17,733.0	-	17,000.0	
24	282,517.5	265,517.5		69,752.0	91,266.0	22,098.1	11,650.8	30,258.0	1,980.3	6,400	28,277.7	18,340.0	17,733.0	-	17,000.0	
25	**283,556.6**	**266,556.6**		**69,752.0**	**91,266.0**	**22,098.1**	**11,650.8**	**30,640.0**	**1,683.3**	**6,400**	**28,956.7**	**18,700.0**	**17,733.0**	-	**17,000.0**	
26	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
27	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
28	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
29	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
30	**283,556.6**	**266,556.6**		**69,752.0**	**91,266.0**	**22,098.1**	**11,650.8**	**30,640.0**	**1,683.3**	**6,400**	**28,956.7**	**18,700.0**	**17,733.0**	-	**17,000.0**	
31	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
32	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
33	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
34	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
35	**283,556.6**	**266,556.6**		**69,752.0**	**91,266.0**	**22,098.1**	**11,650.8**	**30,640.0**	**1,683.3**	**6,400**	**28,956.7**	**18,700.0**	**17,733.0**	-	**17,000.0**	-
36	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
37	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
38	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
39	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
40	**283,556.6**	**266,556.6**		**69,752.0**	**91,266.0**	**22,098.1**	**11,650.8**	**30,640.0**	**1,683.3**	**6,400**	**28,956.7**	**18,700.0**	**17,733.0**	-	**17,000.0**	-

Chino Basin Groundwater - Baseline Supply Calculation

Chino Groundwater baseline Supply Calculation Sheet

GW Pumping - Available to Appropriators	Year 2040	
Developed Yield	135,000	
SARUNY	-	50% of CDA Production
Operating Safe Yield	135,000	OSY = DY - SARUNY
Ag	5,000	at 2040
Non-Ag	3,000	at 2040
Operating Safe Yield Available to Appropriators	127,000	AFY
IEUA Member Share of OSY Available to Appropriators (%)	71.9%	See below
IEUA Member Share of OSY Available to Appropriators	91,266	AFY
IEUA Member Share of SARUNY Credit (%)	57%	Based upon FY2012-13 productions
IEUA Member Share of SARUNY Credit	-	AFY
Total IEUA Member Share of GW available to Appropriators	91,266	Included SY + SARUNY credit

APPROPRIATIVE RIGHTS
(AS OF JUNE 30, 2011)

Party	Appropriative Right (Acre-Feet)	Share of Initial Operating Safe Yield (Acre-Feet)	Share of Operating Safe Yield (Percent)
City of Chino [A]	5,794.25	4,033.857	7.356
City of Chino Hills [B]	3,032.86	2,111.422	3.851
City of Norco	289.50	201.545	0.368
City of Ontario	16,337.40	11,373.816	20.742
City of Pomona	16,110.50	11,215.852	20.454
City of Upland	4,097.20	2,852.401	5.202
Cucamonga Valley Water District [C]	5,199.00	3,619.454	6.601
Jurupa Community Services District [D]	2,960.60	2,061.118	3.759
Monte Vista Water District [E]	6,929.15	4,823.954	8.797
West Valley Water District [F]	925.50	644.317	1.175
Fontana Union Water Company [G]	9,181.12	6,391.736	11.657
Fontana Water Company [H]	1.44	1.000	0.002
Los Serranos County Club [I]	-	-	-
Marygold Mutual Water Company	941.30	655.317	1.195
Monte Vista Irrigation Company	972.10	676.759	1.234
Niagara Bottling, LLC [J]	-	-	-
Nicholson Trust [K]	5.75	4.000	0.007
San Antonio Water Company	2,164.50	1,506.888	2.748
Santa Ana River Water Company	1,869.30	1,301.374	2.373
Golden State Water Company [L]	591.05	411.476	0.750
West End Consolidated Water Company	1,361.30	947.714	1.728
San Bernardino County (Shooting Park) [M]	-	-	-
Arrowhead Mountain Springs Water Company [N]	-	-	-
City of Fontana [O]	-	-	-
Total	78,763.82	54,834.000	100.000

[A] In 1990, Chino received a portion of San Bernardino County Water Works #8 (WW#8) OSY (363.790 AF) as a result of a permanent transfer.

[B] City of Chino Hills incorporated in 1991 and assumed the responsibility for providing the public services formerly provided by WW#8. WW#8 acquired a portion of the rights of Park and Pomona Valley Water Companies in 1982.

[C] CCWD acquired the rights to Etiwanda Water Company (upon dissolution) in 1996. CCWD changed its name to CVWD in 2004.

[D] JCSD acquired the rights of Mira Loma Water Company in 1979 (779.340 AF OSY), Feldspar Gardens in 1986 (47.543AF OSY) and Mutual Water Company of Glen Avon Heights in 1997 (467.374 AF OSY).

[E] MVCWD changed its name to MVWD in 1980. In 1990, MVWD received 675.616 AF of WW#8 OSY as a result of a permanent transfer.

[F] WSBCWD changed its name to WVWD in 2003.

[G] In FY 01-02, 5.000 AF OSY was reassigned: 1.000 AF to FWC and 4.000 AF to the Nicholson Trust.

[H] FWC intervened in 1985 and was assigned 1.000 AF OSY as a result of a permanent transfer of water rights from FUWC.

[I] Los Serranos intervened into the Appropriative Pool in 1990 with 0.000 AF OSY, and it was later determined that they are not within the Basin.

[J] Niagara Bottling intervened in FY 02-03 with 0.000 AF OSY.

[K] Nicholson Trust intervened in FY 01-02 and was assigned 4.000 AF OSY as a result of a permanent transfer of water rights from FUWC.

[L] GSWC permanently transferred 623.500 AF OSY to Park Water Company in 1980. Park Water Co was acquired by WW#8 which was subsequently acquired by the City of Chino Hills. SCWC changed its name to GSWC in 2005.

[M] San Bernardino County Prado Tiro (now known as Prado Shooting Park) was involuntarily reassigned to the Appropriative Pool from the Agricultural Pool in 1986.

[N] Arrowhead intervened in 1992 with 0.000 AF OSY.

[O] City of Fontana intervened in 1998 with 0.000 AF OSY.

Inland Empire Utilities Agency

6075 Kimball Avenue

Chino, CA 91708

Phone: (909) 993-1600

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Appendix D:

2015 Integrated Water Resources Plan: Mitigation Actions

IEUA Drought Contingency Plan

Appendix 5:

Full IRP Technical Committee Identified Project List

ID	Project Name	Description	AF yield	Years to "wet water" yield	Increased groundwater in storage?	Increases water level in critical GW management zones?	Increased stormwater capture/recharge?	Increased permeability or natural infiltration for	Provide additional recycled water?	Reduce Dependence on imported water from MWD during dry	Increase local water supplies?	Emergency local supply redundancy?	Decrease reliance on local surface water during dry years?	Requires conservation in existing development?	Requires demand management in new development?	Reduce TDS and/or nitrates in GW?	Decrease net energy consumption?	Increase capacity of wet year water ("big	Eligible for grant funding?	Technical feasibility/ease of
1	Groundwater Treatment (Rehab)-Increment 1	This project category will rehabilitate an existing groundwater production wells decommissioned due to water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	2	2
2	Groundwater Treatment (Rehab)-Increment 2	This project category will rehabilitate an existing groundwater production wells decommissioned due to water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 + 2 will provide up to 10,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	2	2
3	Groundwater Treatment (new)-Increment 1	This project category will construct a new groundwater production well and treatment facility to address water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	1	2
4	Groundwater Treatment (new)-Increment 2	This project category will construct a new groundwater production well and treatment facility to address water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 + 2 will provide up to 10,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	1	2
5	Production Wells-Increment 1	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	2	2
6	Production Wells-Increment 2	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1+2 will provide up to 10,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	2	2
7	Production Wells-Increment 3	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1-3 will provide up to 15,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	1	2
8	Production Wells-Increment 4	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1-4 will provide up to 20,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	1	2
9	WRCRWA RW Intertie	The Western Riverside County Regional Wastewater Authority (WRCRWA) Plant intertie would allow for the delivery of recycled water from the WRCRWA Plant to be used in the IEUA southern service area. This would also allow additional recycled water to be delivered into the northern service area groundwater recharge basins by reducing the demand from the RP-1 930 pressure zone pump station. Intertie would occur within the 800/930 Pressure Zones.	4,500	10	2	1	1	1	2	2	2	2	1	1	1	1	2	1	1	1
10	Rialto RW Intertie	The Rialto intertie project would allow for delivery of recycled water from the Rialto WWTP to be used in the IEUA service area. The intertie could occur near the RP-3 groundwater recharge basins. This concept could involve the Inland Valley Pipeline, LLC (IVP) to convey water between Rialto WWTP and IEUA's recycled water distribution system. Supply could be used for direct, GWR or other reuse strategy.	4,500	10	2	2	1	1	2	2	2	2	1	1	1	1	2	1	1	1
11	Pomona RW Exchange/Transfer	The City of Pomona does not currently use all of the treated effluent from the Pomona WRP. One concept would involve partnering to develop and expand their recycled water facilities in exchange for an agreed amount of their Chino Basin groundwater right. Could include other supply transfer agreement such as reclaimable waste and/or groundwater.	2,500	10	2	2	1	1	1	2	2	1	1	1	1	1	2	1	1	1
12	RP-1 RW Injection-Increment 1	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increment 1 facility would be sized for 2,500 AFY.	2,500	9	2	1	1	1	1	2	2	1	1	1	1	2	0	1	2	2

13	RP-1 RW Injection-Increment 2	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increment 1+2 facility would be sized for 5,000 AFY.	2,500	9	2	1	1	1	1	2	2	1	1	1	1	2	0	1	1	2
14	RP-1 RW Injection-Increment 3	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increment 1-3 facility would be sized for 7,500 AFY.	2,500	9	2	1	1	1	1	2	2	1	1	1	1	2	0	1	1	2
15	Satellite RW Injection-Increment 1	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing and volume to be produced will be determined as part of the portfolio development process. Increment 1 facility, or facilities would have a capacity of 2,500 AFY.	2,500	5	2	2	1	1	1	2	2	1	1	1	1	2	0	1	2	2
16	Satellite RW Injection-Increment 2	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing and volume to be produced will be determined as part of the portfolio development process. Increment 1+2 facility, or facilities would have a capacity of 5,000 AFY.	2,500	5	2	2	1	1	1	2	2	1	1	1	1	2	0	1	1	2
17	Satellite RW Injection-Increment 3	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing and volume to be produced will be determined as part of the portfolio development process. Increment 1-3 facility, or facilities would have a capacity of 7,500 AFY.	2,500	5	2	2	1	1	1	2	2	1	1	1	1	2	0	1	1	2
18	Desalter Recovery Improvement	The existing Chino Basin I Desalter (CD-1) recovers approximately 75 percent of water. Improvements could be done to increase recovery to approximately 90 percent. This water would be conveyed through the existing potable water system.	1,500	3	1	1	1	1	1	2	2	1	1	1	1	2	1	1	1	2
19	RW Direct Use Expansion-Increment 1	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1 facilities would increase direct use beyond baseline supply by 5,000 AFY.	5,000	15	1	1	1	1	1	2	2	1	1	1	1	0	2	1	2	2
20	RW Direct Use Expansion-Increment 2	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1+2 facilities would increase direct use beyond baseline supply by 10,000 AFY.	5,000	20	1	1	1	1	1	2	2	1	1	1	1	0	2	1	1	2
21	RW Direct Use Expansion-Increment 3	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1-3 facilities would increase direct use beyond baseline supply by 15,000 AFY.	5,000	25	1	1	1	1	1	2	2	1	1	1	1	0	2	1	1	2
22	RW Direct Use Expansion-Increment 4	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1-4 facilities would increase direct use beyond baseline supply by 20,000 AFY.	5,000	25	1	1	1	1	1	2	2	1	1	1	1	0	2	1	1	2
23	Existing GWR Basin Improvements beyond RMPU-Increment 1	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1 facilities would increase recharge at existing basins within the Chino Basin by an additional 2,500 AFY.	2,500	15	2	2	1	1	1	2	2	1	1	1	1	0	2	1	2	2
24	Existing GWR Basin Improvements beyond RMPU-Increment 2	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1+2 facilities would increase recharge at existing basins within the Chino Basin by an additional 5,000 AFY.	2,500	20	2	2	1	1	1	2	2	1	1	1	1	0	2	1	2	2
25	Existing GWR Basin Improvements beyond RMPU-Increment 3	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1-3 facilities would increase recharge at existing basins within the Chino Basin by an additional 10,000 AFY.	5,000	25	2	2	1	1	1	2	2	1	1	1	1	0	2	1	1	2

26	Existing GWR Basin Improvements beyond RMPU-Increment 4	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1-4 facilities would increase recharge at existing basins within the Chino Basin by an additional 15,000 AFY.	5,000	25	2	2	1	1	1	2	2	1	1	1	1	0	2	1	1	2
27	Construct New GWR Basins-Increment 1	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1 would provide up to an additional 2,450 AFY of recharge capacity, which is approximately one new basin at 350 AF per month for 7 months of operation.	2,450	10	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
28	Construct New GWR Basins-Increment 2	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1+2 would provide up to an additional 4,900 AFY of recharge capacity, which is approximately 2 new basins at 350 AF per month for 7 months of operation.	2,450	15	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
29	Construct New GWR Basins-Increment 3	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1-3 would provide up to an additional 7,350 AFY of recharge capacity, which is approximately 3 new basins at 350 AF per month for 7 months of operation.	2,450	20	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
30	Construct New GWR Basins-Increment 4	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1-4 would provide up to an additional 9,800 AFY of recharge capacity, which is approximately 4 new basins at 350 AF per month for 7 months of operation.	2,450	20	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
31	ASR wells MZ1 and MZ2	Construct aquifer storage and recovery (ASR) wells to increase improted water groundwater recharge within management zone 1 and 2. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.1 and 3 for CVWD and the City of Ontario.	11,500	5	2	2	1	1	1	0	2	1	1	1	1	2	0	1	2	2
32	ASR wells MZ3	Construct aquifer storage and recovery (ASR) wells to increase imported water groundwater recharge within management zone 3. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.2 for JCSD.	3,500	5	2	2	1	1	1	0	2	1	1	1	1	2	0	1	2	2
33	Maximize ASR wells	Construct other aquifer storage and recovery (ASR) wells to increase imported water groundwater recharge by 3,500 AFY within the Chino Basin during wet and dry years. Assume benefit 40% of the time (2 in 5 years). Storage to be dependent on supplemental water availability in wet years	3,500	5	2	2	1	1	1	0	2	1	1	1	1	2	0	1	1	2
34	Cadiz IW Transfer	The Cadiz project would allow for the import of unused groundwater from the remote Fenner Valley near Cadiz, California. For the purposes of the IRP, a 5,000 AFY increment of water is assumed. The Cadiz supply would be transferred and taken as SWP water into the Chino Basin.	5,000	20	2	1	1	1	1	2	2	1	1	1	1	0	1	1	1	1
35	Secure SWP IW transfer outside MWD	Imported water supply is solely from MWD via the SWP and is limited by the Agency's purchase order. Other permanent, temporary or seasonally available imported water supplies could be purchased and wheeled into the Chino Basin. The volume of water available varies depending on the source of water and timing. Supplies could be purchased from various Irrigation Districts or secured via Ag Transfer. Assume benefit 1 in 10 years	5,000	10	2	1	1	1	1	1	2	1	1	1	1	1	0	2	1	1
36	SBVMWD IW Transfer	As a SWP contractor, San Bernardino Valley MWD (SBVMWD) has a Table A allocation. This option would involve constructing an intertie between SBVMWD's imported water system. The supply would be temporary or seasonally available and could be purchased and wheeled into the Chino Basin. Assume benefit 1 in 5 years.	5,000	5	2	1	1	1	1	1	2	1	1	1	1	2	0	2	1	1
37	Ocean Desalination Exchange	This project category would involve a partnership with another water agency pursuing ocean water desalination; through in-lieu exchange, the Chino basin would obtain an agreed amount of imported water. For the purposes of the IRP, a volume of 5,000 AFY was chosen. Opportunity to invest in upcoming ocean desalination plants includes Huntington Beach, Carlsbad and West Basin.	5,000	10	2	1	1	1	1	1	2	1	1	1	1	2	0	1	1	1
38	Six Basin Water Transfer	This project would explore the idea of developing a water transfer agreement with Six Basins. One concept is to purchase imported water for recharge into Six Basins and get in return equal volume of groundwater underflow plus agreed amount of stormwater. For example, could purchase 10,000 AF of IW for exchange of 10,000 AF of groundwater plus 7,000 AF of stormwater. Assume benefit 1 in 5 years.	17,000	5	2	2	2	1	1	2	2	1	1	1	1	2	0	1	0	1
39	Expand WUE Devices	Implement additional targeted device related savings to reduce demand beyond current annual water use efficiency savings. Provide incentives and pilot programs to roll out extremely high efficient indoor fixtures and toilets. To be verified with WUEBP.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
40	WUE - Turf Removal-Increment 1	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Increment 1 would provide up to 5,000 AFY of savings.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
41	WUE - Turf Removal-Increment 2	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Increment 1+2 would provide up to 10,000 AFY of savings.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
42	WUE - Turf Removal-Increment 3	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Increment 1-3 would provide up to 15,000 AFY of savings.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
43	WUE - Budget Rates-Increment 1	Implement water budget based rates for 2 member agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Increment 1 would provide up to 13,350 AFY of savings.	13,350	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	2	2

44	WUE - Budget Rates-Increment 2	Implement water budget based rates for 2 member agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Increment 1 would provide up to 26,700 AFY of savings.	13,350	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	2	2
45	WUE - Budget Rates-Increment 3	Implement water budget based rates for 2 member agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Increment 1 would provide up to 40,050 AFY of savings.	13,350	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	2	2
46	WUE- RW Demand Management-Increment 1	Implement demand management devices and programs for direct recycled water customers. Does not generate additional supply, aids in managing the supply during peak demand. Increment 1 would provide 2,500 AFY of demand management, this supply could be used for increasing direct use demands, groundwater recharge or other reuse strategy.	2,500	1	1	1	1	1	1	2	2	2	1	2	2	1	2	1	2	2
47	WUE- RW Demand Management-Increment 2	Implement demand management devices and programs for direct recycled water customers. Does not generate additional supply, aids in managing the supply during peak demand. Increment 1+2 would provide 5,000 AFY of demand management, this supply could be used for increasing direct use demands, groundwater recharge or other reuse strategy.	2,500	1	1	1	1	1	1	2	2	2	1	2	2	1	2	1	2	2
48	Dry Weather Flow Diversions	Capture and treat urban dry weather flow from Chino, Cucamonga and San Sevaine Creek into the Regional Plants. For the purposes of the IRP, a volume of 3,500 AFY was assumed as total available dry weather flow.	3,500	5	2	1	2	1	2	2	2	1	0	1	1	1	2	1	1	2
52	San Antonio Creek SW Capture	Modify existing basins along San Antonio Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years	1,000	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
53	Cucamonga Creek SW Capture	Modify existing basins along Cucamonga Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years.	2,500	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
54	Day Creek SW Capture	Modify existing basins along Day Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years.	2,500	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
55	San Sevaine Creek SW Capture	Modify existing basins along San Sevaine Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years.	2,500	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
56	Water Banking Facility	This project category would invest into the Semitropic Groundwater Storage Bank in Kern County or similar program. The Chino Basin could bank additional purchases of wet year water when these supplies are available and Chino Basin facilities are capacity limited.	5,000	10	1	1	1	1	1	2	2	1	1	1	1	1	1	2	0	1
58	Regional LID-Increment 1	Construct or modify urban development to better manage and infiltrate rainfall at the source. Projects could include bioswales and or pervious concrete installation in parking lots, street drainages. Increment 1 facilities could provide up to 5,000 AFY of recharge.	5,000	5	2	1	2	2	1	1	2	1	1	1	1	2	2	2	2	2
59	Regional LID-Increment 2	Construct or modify urban development to better manage and infiltrate rainfall at the source. Projects could include bioswales and or pervious concrete installation in parking lots, street drainages. Increment 1+2 facilities could provide up to 10,000 AFY of recharge.	5,000	5	2	1	2	2	1	1	2	1	1	1	1	2	2	2	2	2
60	Direct Potable Reuse-Increment 1	This project would construct an advanced water filtration and treatment (e.g. process treatment that combines micro or ultrafiltration) facility at a Regional Plant. The treatment process would allow the recycled water to be introduced into the potable water system. Increment 1 facility would have a capacity of 5,000 AFY.	5,000	10	1	1	1	1	1	2	2	1	1	1	1	2	0	1	2	2
61	Direct Potable Reuse-Increment 2	This project would construct an advanced water filtration and treatment (e.g. process treatment that combines micro or ultrafiltration) facility at a Regional Plant. The treatment process would allow the recycled water to be introduced into the potable water system. Increment 1+2 facility would have a capacity of 10,000 AFY.	5,000	10	1	1	1	1	1	2	2	1	1	1	1	2	0	1	2	2
62	Cucamonga Basin Improvements	This project category will identify projects that would result in additional groundwater production benefits coming into the IEUA service area from the Cucamonga Basin. Includes recharge facilities, treatment and production facilities to maximize supply coming into the Chino Basin.	2,500	5	2	2	2	1	1	2	2	1	1	1	1	0	2	1	2	2
63	Maximize Other Groundwater	This project category will identify local member agency projects that would result in additional groundwater production benefits coming into the IEUA service area outside of the Chino Basin.	5,000	5	1	1	1	1	1	2	2	1	1	1	1	1	2	2	1	2
65	RP-1 NRWS Treatment	The north Non Reclaimable Wastewater System (NRWS) discharges approx.. 3.5 MGD of brine to Los Angeles County annually. The project would construct a treatment facility to allow the Region to reuse this supply into the recycled water system. Requires plant expansion and partial reverse osmosis for blending.	3,920	9	2	1	1	1	2	2	2	1	1	1	1	2	1	1	2	2
66	WUE - Advanced Metering Technologies	Install advanced metering infrastructure (AMI) between retail meters and a utility provider. Will provide real-time data about consumption and allow customers to make informed choices about usage.	5,000	$ 3	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
87	Prior Stored Chino Groundwater	This category will allow supply to be taken from groundwater stored in the Chino Basin, pre 2014. It is estimated that approximately 400,000 AF of stored groundwater is available, of which 280,000 AF is made available for IEUA member agencies. This supply category will be managed on a case by case basis as selected into the Regional supply portfolios. The supply will be limited, but can be used annually or intermittent as needed.	8,400	1	0	0	1	1	1	2	2	1	1	1	1	2	2	1	2	2
88	Maximize Local Surface Water	This category of projects will construct facilities needed to capture additional local surface water. Projects to be defined by IEUA's member agencies. For example, increase surface flows off Lytle Creek in wet years. Assume benefit 3 in 5 years	1,000	1	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2

89	Max Tier 1 MWD Imported Water-Increment 1	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1 would allow for the purchase of an additional 7,850 AFY. Can be purchased annually or intermittently.	7,850	1	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
90	Max Tier 1 MWD Imported Water-Increment 2	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1+2 would allow for the purchase of an additional 15,700 AFY. Can be purchased annually or intermittent.	7,850	1	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
91	Max Tier 1 MWD Imported Water-Increment 3	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1-3 would allow for the purchase of an additional 23,550 AFY. Can be purchased annually or intermittent.	7,850	1	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
92	Max Tier 2 MWD Imported Water-Increment 1	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1 would allow for the purchase of an additional 5,000 AFY. Can be purchased annually or intermittent.	5,000	3	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
93	Max Tier 2 MWD Imported Water-Increment 2	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1+2 would allow for the purchase of an additional 10,000 AFY. Can be purchased annually or intermittent.	5,000	3	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
94	Max Tier 2 MWD Imported Water-Increment 3	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1-3 would allow for the purchase of an additional 15,000 AFY. Can be purchased annually or intermittenty.	5,000	3	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
95	MWD Replenishment or discount wet year water-Increment 1	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Increment 1 would allow for the purchase of an additional 10,000 AFY. Can be purchased annually or intermittently. Assume benefit after 2 consecutive wet years (assume 1 in 15 years)	10,000	5	2	2	1	1	1	0	2	1	1	1	1	2	0	2	1	2
96	MWD Replenishment or discount wet year water-Increment 2	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Increment 1+2 would allow for the purchase of an additional 20,000 AFY. Can be purchased annually or intermittently. Assume benefit after 2 consecutive wet years (assume 1 in 15 years)	10,000	8	2	2	1	1	1	0	2	1	1	1	1	2	0	2	1	2
97	MWD Replenishment or discount wet year water-Increment 3	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Increment 1-3 would allow for the purchase of an additional 30,000 AFY. Can be purchased annually or intermittently. Assume benefit after 2 consecutive wet years (assume 1 in 15 years)	10,000	10	2	2	1	1	1	0	2	1	1	1	1	2	0	2	1	2
98	Watershed Wide Water Transfers	This category of projects will construct or arrange other water transfers external to the Chino Basin. For example, dry weather flow exchange of recycled water to Orange County Water District for an equivalent amount of purchased imported water. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability and/or quality. To occur annually or intermittent. Resiliency and flexibility benefit only	-	5	1	1	1	1	1	2	2	2	1	1	1	2	2	1	2	2
99	Chino Basin Water Transfers	This category of projects will construct or arrange other water transfers within the Chino Basin. Projects to also include inter-agency interties for increased reliability. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability. To occur annually or intermittent.	-	5	2	2	1	1	1	2	2	2	1	1	1	2	2	1	2	2
100	Reliability Production Wells	This project category will construct new production wells needed to replace lost production or under performing facilities. These projects will maintain current annual groundwater production deliveries and are intended to increase operational flexibility and reliability. Increment 1 varies in capacity and will be determined on a case by case basis as selected into each of the regional supply portfolios.	-	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	2	2

Appendix E: Response Action Program Cut Sheets

IEUA Drought Contingency Plan

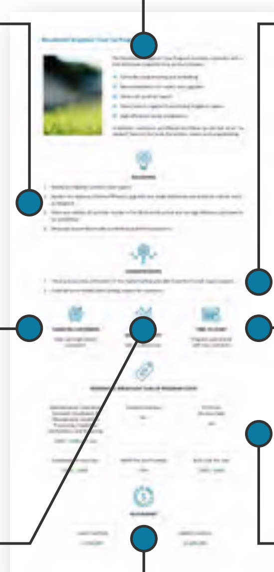
Table of Contents

Guide to the Program Write-Ups

IEUA has selected seven customer programs to be offered during drought conditions. Each program is detailed in an individual write-up contained in this section.

The sections contained in each write-up are explained in the diagram below:

DESCRIPTION
Provides a basic overview of the program, the measures, and delivery mechanisms



REASONING
Overviews the market need being met and reasons for this particular program design

CONSIDERATIONS
Provides awareness of additional program issues or circumstances that may impact the program

TARGETED CUSTOMERS
Identifies the customer groups targeted for program participation

TIME TO START
The anticipated time to develop and start-up operations for the program

POTENTIAL ANNUAL ACTIVITY
The expected number of customer participants or product installations per year

PROGRAM COSTS
Program costs are broken down into six categories: Administration & Operational costs; Product Incentive or rebate; IEUA's cost per Acre-foot (cost/the lifetime water savings); Estimated Cost per Unit (total costs per property); MAAP per unit (potential Member Agency Administered Program funding from MWD), and; IEUA cost per unit (Estimated Cost per Unit – MAAP per unit)

IEUA BUDGET
Identifies the overall annual cost to IEUA for the program at both a low participation and high participation levels

Turf Replacement Program

The Turf Replacement Program encourages customers to remove high water-consuming turf and replace it with alternative solutions such as low water-using, regionally appropriate plants and surfaces that allow for ground water infiltration and elimination of runoff. Qualifying applicants are eligible to receive $3 per square foot of turf removed with a maximum incentive of 5,000 square feet for residential customers and 50,000 square feet for commercial customers. Eligible projects must have:

- Three plants per 100 square feet of area transformed
- No hardscape within the transformed area, except permeable hardscape
- A stormwater retention feature
- Replacement or modification of overhead spray sprinklers

For reference, the historical program activity of square feet removed is listed below.

	Residential	Commercial	Total
FY 14/15	119,130	1,136,334	1,255,464
FY 15/16	1,596,789	3,337,120	4,933,909
FY 16/17	255,091	637,916	893,007

REASONING

1. There are hundreds of thousands of square feet of irrigated turf in the IEUA territory.
1. Replacing turf with regionally appropriate plants aids in transforming the market. In a recent analysis done by Western MWD, for every customer replacing their turf, another customer did so without an incentive.
2. Provides long term savings- Current studies have shown that savings increase after the initial plant stabilization period and persist over 10 years or more.

CONSIDERATIONS

1. Turf replacement has an extremely high cost per acre-foot.
3. The market acceptance is low during non-drought times.
4. There are numerous customer barriers: costs, concerns about the new look, and lack of ability to execute projects.
5. Contractors are not interested in projects smaller than 1,000 sf.

TARGETED CUSTOMERS	POTENTIAL ANNUAL ACTIVITY	TIME TO START
All customers with live turf	500,000 – 5 Million SF	Currently operational

TURF REPLACEMENT PROGRAM COSTS

Administration, Contractor Outreach, Enrollment & Management, Incentive Processing, Inspection Verifications, and Reporting	Product Incentive	IEUA Cost Per Acre-foot
Covered by Metropolitan through regional vendor	**$3 per square foot**	**$769** **($ per sf)**
Estimated Per Unit Cost	MAAP Per Unit Funding	IEUA Cost Per Unit
$3 per sf	**$2.00 (regional rebate)**	**$1 per sf**

IEUA BUDGET

Lower Incentive	Higher Incentive
$500,000	**$5,000,000**

Residential Irrigation Tune Up Program

The Residential Irrigation Tune Program provides customers with a free landscape irrigation tune-up that includes:

- Controller programming and scheduling
- Recommendation for repairs and upgrades
- Valve and sprinkler repairs
- Minor lateral irrigation line and drip irrigation repairs
- High efficiency nozzle installations

In addition, customers are offered one follow-up site visit on an "as needed" basis to fine-tune the system, repairs and programming.

REASONING

1. Nearly all irrigation systems need repairs.
6. Repairs are necessary before efficiency upgrades are made otherwise new products will not work as designed.
7. There are millions of sprinkler nozzles in the IEUA territory that are not high efficiency and need to be retrofitted.
8. Measures are professionally installed by qualified contractors.

CONSIDERATIONS

1. There are very few contractors in the market willing and able to perform small repair projects.
9. Could be some liability with making repairs for customers.

TARGETED CUSTOMERS	POTENTIAL ANNUAL ACTIVITY	TIME TO START
High use single family customers	500 – 2,500 homes	Program operational with one contractor

RESIDENTIAL IRRIGATION TUNE UP PROGRAM COSTS

Administration, Contractor Outreach, Enrollment & Management, Incentive Processing, Inspection Verifications, and Reporting	Product Incentive	IEUA Cost Per Acre-foot
$300 - $400 per site	**NA**	**NA**
Estimated Per Unit Cost	MAAP Per Unit Funding	IEUA Cost Per Unit
$300 - $400	**TBD**	**$300 - $400**

IEUA BUDGET

Lower Incentive	Higher Incentive
$150,000	**$1,000,000**

Smart Irrigation Direct Installation

DESCRIPTION

The Smart Irrigation Direct Installation Program offers the installation of smart irrigation devices, potentially free to the customer. The Program could offer:

- Smart cloud-based controllers
- High efficiency sprinkler nozzles
- Wireless flow sensors

In order to maximize water savings, a qualification consideration could be that customers must have one acre or more of irrigated area or water usage of over 450,000 gallons per year per household. The Program could be designed with a customer co-pay, which would boost cost effectiveness. The inclusion of nozzle installations adds tremendous costs and could be eliminated if the budget does not allow it.

REASONING

1. Top water users and large landscape properties offer maximum water savings due to the expansive volume of acreage of irrigated lawns and gardens. In addition, over one-acre sites provide additional MAAP funding.
2. Single family properties with irrigated area have controllers and spray heads, but most do not have the latest smart irrigation technologies.
3. The smart irrigation package includes proven technologies that will be appealing to customers.
4. Addition of flow sensors will provide the ability to detect abnormal water use and alert property owners via text or email.
5. Measures will be professionally installed by contractors ensuring quality installations and programming.
6. Direct installation contractors typically meet installation goals on schedule due to proactive sales activities.

CONSIDERATIONS

1. High cost to provide direct installations.
2. Sometimes customers do not buy into new measures, specifically programming of the controller and they will override efficiency schedule.
3. Could be some liability with providing product and installation.

TARGETED CUSTOMERS	POTENTIAL ANNUAL ACTIVITY	TIME TO START
Single-family, multi-family, commercial 1 acre or larger	1,000 – 5,000 properties	6 – 8 months

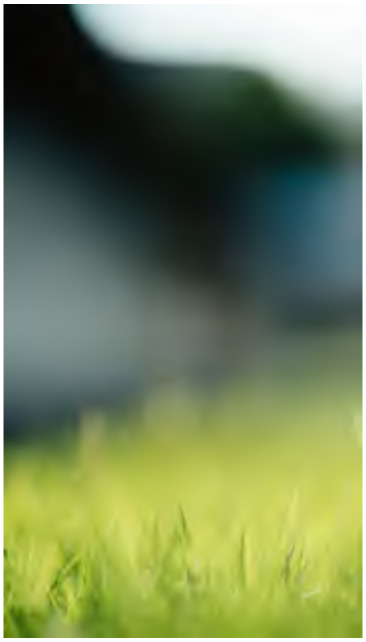
SMART IRRIGATION DIRECT INSTALLATION PROGRAM COSTS

Administration, Contractor Outreach, Enrollment & Management, Incentive Processing, Inspection Verifications, and Reporting **$400**	Product Incentive **Free to customer**	IEUA Cost Per Acre-foot **$327**
Estimated Per Unit Cost **$1,550**	MAAP Per Unit Funding **$600**	IEUA Cost Per Unit **$950**

IEUA BUDGET

Lower Incentive	Higher Incentive
$950,000	**$4,750,000**

School Smart Irrigation Direct Installation



DESCRIPTION

Schools use a tremendous amount of water for irrigation, specifically for watering their lawn areas. These lawns are frequently used for student sports and recreation and therefore not candidates for turf replacement. The School Smart Irrigation Program would offer local schools free installation of smart irrigation devices. Measures to include:

- Pressure regulating spray heads
- High efficiency sprinkler nozzles
- Flow sensors and master valves (if practical)
- Smart cloud-based controllers (if practical)

If cost prohibitive flow sensors, master valves and smart controllers can be eliminated.

REASONING

1. Schools have large areas of functional lawn area, used for sports and recreation.

2. School properties typically have irrigation systems with old malfunctioning equipment. Much of the time the spray heads are broken, clogged, below grade or too high.

3. Most schools have limited budgets and resources to purchase and install irrigation equipment.

4. The program addition of flow sensors and master valves eliminates water waste due to leaks by shutting off the valve. In addition, the flow sensing data provides information on actual water usage.

5. Smart cloud-based controllers can provide and share water use information.

6. Improved irrigation efficiency in schools can significantly reduce their utility costs.

7. The program provides opportunity for schools to demonstrate leadership and educate students on water use efficiency.

CONSIDERATIONS

1. High cost to provide direct installations.
2. School personnel may override programming of the controller.
3. Could be some liability with providing product and installation.

TARGETED CUSTOMERS	POTENTIAL ANNUAL ACTIVITY	TIME TO START
Public schools	Schools	6 – 8 months

SCHOOL SMART IRRIGATION DIRECT INSTALLATION PROGRAM COSTS

Administration, Contractor Outreach, Enrollment & Management, Incentive Processing, Inspection Verifications, and Reporting $	Product Incentive **Free to customer**	IEUA Cost Per Acre-foot $
Estimated Per Unit Cost $	MAAP Per Unit Funding $	IEUA Cost Per Unit $

IEUA BUDGET

Lower Incentive	Higher Incentive
$	$

Qualified Contractor Irrigation Incentive Program

DESCRIPTION

Program will allow customers to receive a comprehensive package of innovative and proven irrigation technologies from qualified contractors, for the following discounted prices:

- Smart controllers $35 - $50 per station
- High efficiency sprinkler nozzles **$6 - $10 per nozzle**
- Flow sensors with master valves **$60 - $100 per sensor**
- Drip irrigation **$0.40 - $0.60**

Eligible contractors would include: QWEL, CLCA and IA certified firms. Customers would be responsible for installation costs.

Targeted properties would include all customer segments (commercial, multi-family and residential) with one acre or more of irrigated area, with a program focus on commercial and HOA common areas.

REASONING

1. Large landscape properties offer maximum water savings due to the expansive acreage of irrigated lawns and gardens.
2. MF, CII and SF properties with irrigated area have irrigation controllers and spray heads, but most do not have the latest water-efficient smart irrigation technologies.
3. The smart irrigation package includes proven technologies that will be of interest to customers and their contractors.
4. Measures will be professionally installed by qualified contractors.

CONSIDERATIONS

1. In order to achieve activity goals, it will be necessary to offer the higher incentive making the program more costly.

2. Enlisting and managing contractors will take expert resources and add significant costs to the program.

TARGETED CUSTOMERS	POTENTIAL ANNUAL ACTIVITY	TIME TO START
All customer segments with one acre or more of irrigated area	250 – 1,000 homes	6 months

QUALIFIED CONTRACTOR IRRIGATION INCENTIVE PROGRAM COSTS

Administration, Contractor Outreach, Enrollment & Management, Incentive Processing, Inspection Verifications, and Reporting **$300 per property**	Product Incentive (24-station controller, 150 nozzles, 46 sf of drip, 25 flow sensor/master valve) **Average of $1,809 per property** **(assumes full MAAP funding)**	IEUA Cost Per Acre-foot **$31 - $450**
Estimated Per Unit Cost **$2,109 - $3,227**	MAAP Per Unit Funding **$1,809**	IEUA Cost Per Unit **$300 - $1,418**

IEUA BUDGET

Lower Incentive	Higher Incentive
$75,000 - $300,000	**$354,500 - $1,418,000**

FreeSprinklerNozzles.com

The FreeSprinklerNozzles.com Program provides participating water agencies with a full-service approach to distribution of high efficiency sprinkler nozzles to their residential and commercial customers while requiring only minimal staffing. Nozzles are provided free to customers. Customer are responsible for installation.

With eight years of successful implementation, program management is looking to overhaul the FreeSprinklerNozzles.com program. The goal is for the new program to be a 100% online fulfilment program.

The new program would include an online application that would utilize aerial imagery to map a customer's landscaped area and irrigation system. The customer would use the tool to measure their irrigated area and note head locations. The system would automatically generate a nozzle inventory which would be sent to the irrigation equipment fulfilment center electronically. The nozzles would then be shipped to the customer.

REASONING

1. Nearly all properties in IEUA's territory with irrigated area have spray heads that can be retrofitted with efficient nozzles – there are literally millions of nozzles in this market available to be upgraded.
2. The product is easy to install and inexpensive.
3. The program offers a turnkey approach requiring minimal resources from IEUA or its member agencies.

CONSIDERATIONS

1. With a small device that many customers store in their garage until needed, a higher percentage of customers may not install the nozzles.

TARGETED CUSTOMERS	POTENTIAL ANNUAL ACTIVITY	TIME TO START
All customers with irrigated area & spray heads	50,000 – 200,000	Expected launch date of December 2019

FREESPRINKLERNOZZLES.COM PROGRAM COSTS

Administration, Contractor Outreach, Enrollment & Management, Incentive Processing, Inspection Verifications, and Reporting **Estimated $2 per nozzle**	Product Incentive **Free to customer**	IEUA Cost Per Acre-foot **$92 - $450**
Estimated Per Unit Cost **$5 - $6**	MAAP Per Unit Funding **$2 - $4**	IEUA Cost Per Unit **$2 - $4**

IEUA BUDGET

Lower Incentive	Higher Incentive
$100,000	**$800,000**

Leak Detection Incentive

DESCRIPTION

Household leaks can result in thousands of gallons of wasted water and potential property damage.

Smart leak detector devices can now monitor use, detect anomalies and alert homeowners of potential leaks. Some devices can even shut off use, mitigating water damage.

The Leak Detection Incentive would offer customers a rebate for purchase of an approved monitoring and leak detection device. There are currently five viable products on the market including Flume, Buoy, Flo, Phyn and Saya. Some devices require tapping into the existing plumbing system and may require a licensed plumber for installation, while others simply attach to the customer's water meter.

The water savings are unknown at the time and cost for product with installation ranges from $200 - $700+. The program could also offer free installation for customers with high use or could be an incentive offered to the manufacturer. The manufacturer would offer an incentive off the purchase price and bill IEUA for those properties.

REASONING

1. Many homes have leaks, currently industry estimates 10%.
2. Most leaks go undetected and customers are not aware for months until they get their bill and many times not even then.
3. Repairing water damage caused by leaks can cost thousands of dollars for a typical homeowner.
4. Providing customers with data on their water use gives them the necessary information and motivation to make efficiency changes.
5. Several water agencies have incentive and installation programs including: Southern Nevada Water Authority, Jurupa Community Services District, Contra Costa Water District, Rainbow Municipal Water District, and San Antonio Water System.

CONSIDERATIONS

1. Savings are unknown.
2. If water agency already has AMI, service is duplicative.
3. Program not applicable to all customers, must target customers with potential leaks and ones that value monitoring data.
4. Customer still has to fix leaks to secure savings.

TARGETED CUSTOMERS Single-family homes, potentially in high pressure areas or with a significant increase in use	**POTENTIAL ANNUAL ACTIVITY** 500 – 1,000 homes	**TIME TO START** 4 months

LEAK DETECTION INCENTIVE PROGRAM COSTS

Administration, Contractor Outreach, Enrollment & Management, Incentive Processing, Inspection Verifications, and Reporting **$25 per home**	Product Incentive **$100 per home**	IEUA Cost Per Acre-foot **TBD**
Estimated Per Unit Cost **$125**	MAAP Per Unit Funding **TBD**	IEUA Cost Per Unit **$125**

IEUA BUDGET

Lower Incentive	Higher Incentive
$62,500	**$125,000**

WEFlex Fund

DESCRIPTION

Recognizing that the future is unknowable, IEUA understands that unforeseen marketing and water savings opportunities may present themselves at some point during a drought cycle. For this reason, the WEFlex Fund was created to allow IEUA to quickly respond and fund a new, creative approach.

The program will offer IEUA's retail agencies funds for locallyadministered activities. The budget will be allocated to each agency based upon the water agencies size (or water sales). An agency could use the funds for local activities such as water waste enforcement and education or recycled water hook up and permit fees. Other programs or services could be funded through WE Flex Fund, if approved by the drought response committee.

An agency will submit a description of the local activity, estimated costs and potential benefits or results. When accepted, IEUA will provide the funds.

REASONING

1. Should an effective new technology, marketing/promotional initiative, or delivery mechanism become available, IUEA does not want an agency to be limited to the pre-selected list of programs.
2. The program allows for retail agencies to choose a program or service that best serves their needs and those of their customers.
3. Typically, approval and funding of new initiatives take significant time to work their way through the management hierarchy. The WE Flex Fund will allow for an expedited process to implement new tactics.

CONSIDERATIONS

1. In order to achieve activity goals, it will be necessary to offer the higher incentive making the program more costly.
2. Enlisting and managing contractors will take expert resources and add significant costs to the program.

TARGETED CUSTOMERS	**POTENTIAL ANNUAL ACTIVITY**	**TIME TO START**
All customer segments	NA	Immediate

WEFLEX PROGRAM COSTS

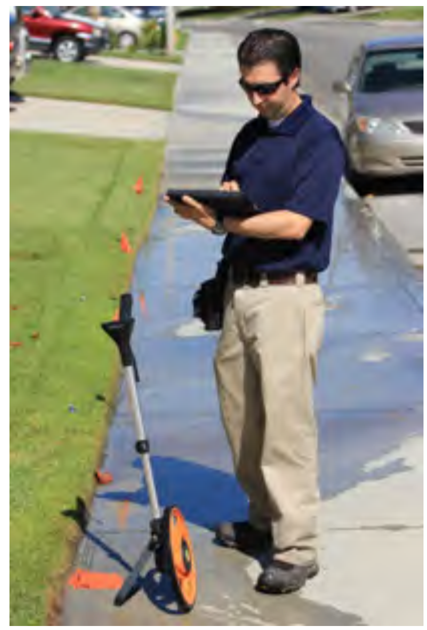
Administration, Contractor Outreach, Enrollment & Management, Incentive Processing, Inspection Verifications, and Reporting **TBD**	Product Incentive (24-station controller, 150 nozzles, 46 sf of drip, 25 flow sensor/master valve) **TBD**	IEUA Cost Per Acre-foot **TBD**
Estimated Per Unit Cost **TBD**	MAAP Per Unit Funding **TBD**	IEUA Cost Per Unit **TBD**

Services Offered

In addition to Programs, three Support Services are offered to provide customers with knowledge and information about water efficient landscaping. These Services are:

1. Landscape Surveys
2. Landscape Workshops
3. Landscape Design Services

Landscape Surveys



Administered by the Chino Basin Water Conservation District (CBWCD), in partnership with IEUA and the member agencies, the Landscape Survey Program offers customers a free evaluation of their landscape and irrigation system.

The survey includes:

- A complete evaluation of the customer's irrigation system
- Determination of the landscape's water needs
- Accurate profile of the property's water consumption
- Generation of a water budget based on the local evapotranspiration and irrigated landscape area

Customer's also receive:

- Water saving tips
- Recommendations on how to improve overall efficiency of your irrigation system
- Rebate opportunities

In order to ensure water savings, it is recommended that the surveys also include follow up to verify any recommendations have been implemented and assist customers in making the upgrades and receiving the incentives.

Landscape Workshops

The landscape classes offered through the IEUA service areas are FREE of charge. The descriptions below provide a basic overview of the topics covered.

Drought Tolerant Plants - This class provides information on a variety of water efficient plants that fit both our climate and landscape design. The instructor will discuss native and other California friendly plants, the benefits they provide to your landscape, and when and how to plant them.

Landscape Design - This class provides residents with the initial basics on how to develop a landscape that combines both beauty and environmental benefits to their home. Both preparation and design techniques will be discussed.

Water Efficient Irrigation Systems - This class teaches residents the importance of using water wisely and how an efficient irrigation system enables them to play their part in efficient water use. Overhead sprinklers, drip systems and irrigation controllers will be discussed.

Turf Removal - This class is specialized to instruct residents on the proper techniques to remove turf and replace it with a water efficient landscape.

Composting, Fertilizer, & Maintenance - This class teaches residents about compost, fertilizer and their correct usage to help plants flourish. Participants will also learn about the correct maintenance to ensure growth for their plants.

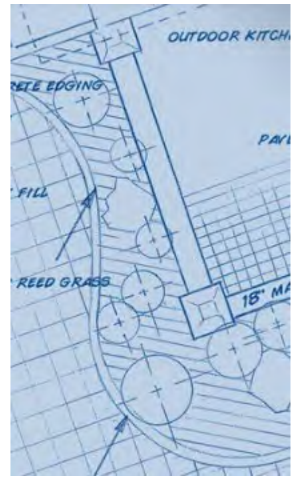
How the Drought Affects Your Water Timer - This class will help residents understand the watering restrictions and how to program their controller to align with their retail agency's outdoor watering restrictions.

Composting, Water Management, & Pest Control - This class provides instruction on composting, proper watering techniques, and integrated pest management. Participants will learn how often and how much to water plants, how to identify what can be used to compost, how to properly apply compost, and how to sustainably control pests.

Drought, El Nino, & What to do with Your Landscape - This class gives residents tips and tricks on how to maintain their landscape during transitioning seasons and weather changes.

Mini Class - Comprehensive four-hour class covering Landscape design basics, California friendly & native plants, landscape sprinkler systems, and planting and maintenance.

Landscape Design Services



Through a collaboration between CBWCD, IEUA and its member agencies, customers are offered landscape design services free of charge. This service has a market value of approximately $500.

Participants are required to attend a two-hour "What You Need to Know Before Your Landscape Transformation" class before they become eligible to register for the Landscape Design Assistance Program. The class is focused on providing all the information most people need to be successful with a turf replacement project, whether they are doing the work themselves or hiring a contractor.

Due to program demand, customers are provided design services for EITHER their front yard OR back yard. If a customer completes the first project, they can receive additional design services.

A CBMWD staff member consults with participants for approximately 1.5 - 2 hours in person at the Waterwise Community Center. At the appointment, customers discuss goals for their landscape area and then work with staff to create a computer-generated design for the landscape project.

After the consultation meeting, CBWCD staff finish the design, create a plant identification key and a custom plant list with the names and information about each plant selected for the designed landscape. Customers are also provided with a list of resources including sources of plants and other landscape materials.

WSCP Appendix B

November 2020 Notification Letter To Encourage Public Involvement

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

6075 Kimball Avenue • Chino, CA 91708
P.O. Box 9020 • Chino Hills, CA 91709
TEL (909) 993-1600 • FAX (909) 993-1985
www.ieua.org

24 November 2020

GM Name
GM Title
Agency Name
Street Address
City, State, Zip

SUBJECT: 2020 Urban Water Management Plan Update

Dear Agency Representative:

The Inland Empire Utilities Agency (IEUA) is undertaking the review, update, and revision of its Urban Water Management Plan (UWMP). The Urban Water Management Planning Act requires every urban water supplier of a certain size to prepare and adopt an UWMP at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. IEUA is in the process of preparing the 2020 UWMP Update.

As an urban water supplier, the IEUA is required pursuant to Section 10620(d)(3) of the California Water Code to coordinate with water management agencies, relevant public agencies, and other water suppliers regarding the preparation of the UWMP. Pursuant to Section 10621(b) of the California Water Code, the IEUA will be reviewing the UWMP and will make amendments or changes, as appropriate. Based on the IEUA's current schedule, we expect to have a draft available for public review by April 2021, at which point your agency will receive notification that the draft UWMP is available for public review and comment.

The IEUA invites you to submit written comments in anticipation of the development of our 2020 UWMP Update within the next 30 days to IEUA. If your agency would like to learn more about the UWMP, please feel free to contact me at 909.993.1698 or jaguilar@ieua.org.

Sincerely,

J. Aguilar

Joshua Aguilar
Senior Engineer

WSCP Appendix C

April 2021 60-Day Notification Letter to City, County and Others Within IEUA Service Area

NOTICE OF PUBLIC HEARING
BY THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY*
TO ADOPT THE 2020 URBAN WATER MANAGEMENT PLAN (UWMP),
ADDENDUM OF APPENDIX G TO THE 2015 UWMP,
AND WATER SHORTAGE CONTINGENCY PLAN
SAN BERNARDINO COUNTY, STATE OF CALIFORNIA

NOTICE IS HEREBY GIVEN that the Board of Directors of the Inland Empire Utilities Agency intends to hold a public hearing for adoption of the 2020 Urban Water Management Plan (UWMP), Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan.

NOTICE IS FURTHER GIVEN that said public hearing will be held on the following date and time for the purpose of hearing any and all public testimony on the above-stated issue.

DATE: Wednesday, June 16, 2021 – 10:00 a.m.

The meeting will be accessible via teleconference at:
Phone Number: (415) 856-9169 / Conference ID: 811 284 110#

In the effort to prevent the spread of COVID-19, until further notice, the Inland Empire Utilities Agency will hold all Board and Committee meetings by video and audio conference. As of the posting/publication of this notice, it is anticipated that the public hearing will be conducted virtually by video and audio conference. (Please visit www.ieua.org for the most up-to-date information regarding meeting participation.) There will be no public location available to attend the meeting; all interested persons are invited to participate in the public hearing and provide comments regarding the proposed 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan by calling into the number provided above. The public may also view the meeting live through the Agency's website at www.ieua.org. Oral statements will be heard, but for the accuracy of the record all important testimony should be submitted in writing. Written comments may be emailed to the Board Secretary/Office Manager Denise Garzaro at dgarzaro@ieua.org no later than 24 hours prior to the scheduled meeting time. Comments submitted in advance will be read into the record during the hearing.

NOTICE IS FURTHER GIVEN that the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan will be available on the Agency's website at www.ieua.org and via hard-copy upon request in Spring of 2021, no less than two weeks prior to the public hearing. All interested parties are noticed and invited to submit comments and consult with the Agency regarding its forthcoming 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan to the Strategic Planning and Resources Department, attention Joshua Aguilar at jaguilar@ieua.org. For additional information regarding the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan, please contact Senior Engineer, Joshua Aguilar at (909) 993-1694.

*a municipal water district

WSCP Appendix D

Newspaper Notice of Public Hearing

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

6075 Kimball Avenue • Chino, CA 91708
P.O. Box 9020 • Chino Hills, CA 91709
TEL (909) 993-1600 • FAX (909) 993-1985
www.ieua.org

May 11th, 2021

Retail Agency
Contact Information
Placed Here

SUBJECT: Posting of the 2020 Urban Water Management Plan, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan

Dear Agency Representative:

The Inland Empire Utilities Agency (IEUA) is inviting public review and comment on its Draft 2020 Urban Water Management Plan (UWMP). The Plan includes an updated Addendum of Appendix G to the 2015 UWMP and 2020 Water Shortage Contingency Plan (WSCP).

In compliance with California Water Code (§10610-10656, §10608 and §10632) the UWMP and WSCP are required to contain detailed evaluations of water supplies necessary to reliably meet demands of the California Water Code to coordinate with water management agencies, relevant public agencies, and other water suppliers regarding the preparation of the UWMP and other plans.

All plan documents are now available on IEUA's website here: https://www.ieua.org/read-our-reports/other-reports/.

Comments must be received no later than **5:00 p.m. Monday, May 24, 2021** and sent to the attention of Joshua Aguilar, 909.993.1698 or jaguilar@ieua.org.

If you or your agency would like more information on IEUA's UWMP, Addendum, or WSCP, please contact me.

Sincerely,

Joshua Aguilar
Senior Engineer

Water Smart - Thinking in Terms of Tomorrow

CALIFORNIA NEWSPAPER SERVICE BUREAU

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Denise Garzaro
INLAND EMPIRE UTILITIES AGENCY
6075 KIMBALL AVE BUILDING A
CHINO, CA 91710

COPY OF NOTICE

Notice Type: HRG NOTICE OF HEARING

Ad Description: Urban Water Management Plan (UWMP)- 5/17 and 5/24

To the right is a copy of the notice you sent to us for publication in the INLAND VALLEY DAILY BULLETIN/ONTARIO. Please read this notice carefully and call us with any corrections. The Proof of Publication will be filed with the County Clerk, if required, and mailed to you after the last date below. Publication date(s) for this notice is (are):

05/17/2021 , 05/24/2021

The charge(s) for this order is as follows. An invoice will be sent after the last date of publication. If you prepaid this order in full, you will not receive an invoice.

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CNS 3471155

NOTICE OF PUBLIC HEARING BY THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY* TO ADOPT THE 2020 URBAN WATER MANAGEMENT PLAN (UWMP), ADDENDUM OF APPENDIX G TO THE 2015 UWMP, AND 2020 WATER SHORTAGE CONTINGENCY PLAN SAN BERNARDINO COUNTY, STATE OF CALIFORNIA

NOTICE IS HEREBY GIVEN that the Board of Directors of the Inland Empire Utilities Agency intends to hold a public hearing for adoption of the 2020 Urban Water Management Plan (UWMP), Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan.

NOTICE IS FURTHER GIVEN that said public hearing will be held on the following date and time for the purpose of hearing any and all public testimony on the above-stated issue.

DATE: Wednesday, June 16, 2021 – 10:00 a.m.

The meeting will be accessible via teleconference at:
Phone Number: (415) 856-9169 / Conference ID: 811 284 110#

In the effort to prevent the spread of COVID-19, until further notice, the Inland Empire Utilities Agency will hold all Board and Committee meetings by video and audio conference. As of the posting/publication of this notice, it is anticipated that the public hearing will be conducted virtually by video and audio conference. (Please visit www.ieua.org for the most up-to-date information regarding meeting participation.) There will be no public location available to attend the meeting; all interested persons are invited to participate in the public hearing and provide comments regarding the proposed 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan by calling into the number provided above. The public may also view the meeting live through the Agency's website at www.ieua.org. Oral statements will be heard, but for the accuracy of the record all important testimony should be submitted in writing. Written comments may be emailed to the Board Secretary/Office Manager Denise Garzaro at dgarzaro@ieua.org no later than 24 hours prior to the scheduled meeting time. Comments submitted in advance will be read into the record during the hearing.

NOTICE IS FURTHER GIVEN that the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan will be available on the Agency's website at www.ieua.org and via hard-copy upon request in Spring of 2021, no less than two weeks prior to the public hearing. All interested parties are noticed and invited to submit comments and consult with the Agency regarding its forthcoming 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan to the Strategic Planning and Resources Department, attention Joshua Aguilar at jaguilar@ieua.org. For additional information regarding the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan, please contact Senior Engineer, Joshua Aguilar at (909) 993-1694.
5/17, 5/24/21
CNS-3471155#
INLAND VALLEY DAILY BULLETIN/ONTARIO

Inland Valley Daily Bulletin
(formerly The Daily Report)
9616 Archibald Avenue Suite 100
Rancho Cucamonga, CA 91730
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(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of San Bernardino

I am a citizen of the United States, I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of INLAND VALLEY DAILY BULLETIN, a newspaper of general circulation printed and published daily for the City of Ontario, County of San Bernardino, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of San Bernardino, State of California, on the date of August 24, 1951, Case Number 70663. The notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

05/17/2021, 05/24/2021

I declare under the penalty of perjury that the foregoing is true and correct.

Executed at Rancho Cucamonga, San Bernardino Co., California, on this 8th day of June, 2021.

Evangelina Almeida

Signature

Legal No. **0011462691**

NOTICE OF PUBLIC HEARING BY THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY* TO ADOPT THE 2020 URBAN WATER MANAGEMENT PLAN (UWMP), ADDENDUM OF APPENDIX G TO THE 2015 UWMP, AND 2020 WATER SHORTAGE CONTINGENCY PLAN SAN BERNARDINO COUNTY, STATE OF CALIFORNIA

NOTICE IS HEREBY GIVEN that the Board of Directors of the Inland Empire Utilities Agency intends to hold a public hearing for adoption of the 2020 Urban Water Management Plan (UWMP), Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan.

NOTICE IS FURTHER GIVEN that said public hearing will be held on the following date and time for the purpose of hearing any and all public testimony on the above-stated issue.

DATE: Wednesday, June 16, 2021 – 10:00 a.m.

The meeting will be accessible via teleconference at:
Phone Number: (415) 856-9169 / Conference ID: 811 284 110#

In the effort to prevent the spread of COVID-19, until further notice, the Inland Empire Utilities Agency will hold all Board and Committee meetings by video and audio conference. As of the posting/publication of this notice, it is anticipated that the public hearing will be conducted virtually by video and audio conference. (Please visit www.ieua.org for the most up-to-date information regarding meeting participation.) There will be no public location available to attend the meeting; all interested persons are invited to participate in the public hearing and provide comments regarding the proposed 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan by calling into the number provided above. The public may also view the meeting live through the Agency's website at www.ieua.org. Oral statements will be heard, but for the accuracy of the record all important testimony should be submitted in writing. Written comments may be emailed to the Board Secretary/Office Manager Denise Garzaro at dgarzaro@ieua.org no later than 24 hours prior to the scheduled meeting time. Comments submitted in advance will be read into the record during the hearing.

NOTICE IS FURTHER GIVEN that the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan will be available on the Agency's website at www.ieua.org and via hard-copy upon request in Spring of 2021, no less than two weeks prior to the public hearing. All interested parties are noticed and invited to submit comments

and consult with the Agency regarding its forthcoming 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan to the Strategic Planning and Resources Department, attention Joshua Aguilar at jaguilar@ieua.org. For additional information regarding the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan, please contact Senior Engineer, Joshua Aguilar at (909) 993-1694.
5/17, 5/24/21
CNS-3471155#
INLAND VALLEY DAILY BULLETIN/ONTARIO #11462691

WSCP Appendix E

Resolution of Adoption of UWMP, WSCP, and Addendum

RESOLUTION NO.2021-6-10

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY (IEUA), SAN BERNARDINO COUNTY, CALIFORNIA, ADOPTING THE 2020 URBAN WATER MANAGEMENT PLAN, 2020 WATER SHORTAGE CONTINGENCY PLAN, AND APPENDIX G AS AN ADDENDUM TO THE 2015 URBAN WATER MANAGEMENT PLAN

Whereas, the California Legislature enacted Assembly Bill 797, (Water Code Section 10610 et seq., known as the Urban Water Management Planning Act) during the 1983-1984 Regular Session, and as amended subsequently, which mandates that every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, prepare an Urban Water Management Plan at least once every five years; and

Whereas, the Urban Water Management Planning Act requires the preparation and adoption of a Water Shortage Contingency Plan, in accordance with prescribes requirements; and

Whereas, the Urban Water Management Planning Act specifies the requirements and procedures for amending and adopting such Urban Water Management Plans; and

Whereas, the Inland Empire Utilities Agency* is a wholesale supplier of water for 242-square miles in the western portion of San Bernardino; and

Whereas, pursuant to Section 10620 of the Urban Water Management Planning Act, the Inland Empire Utilities Agency has prepared the 2020 Urban Water Management Plan, 2020 Water Shortage Contingency Plan, and Appendix G as an addendum to the 2015 Urban Water Management Plan; and

Whereas, the Board of Directors of the Inland Empire Utilities Agency has duly reviewed, discussed, and considered the 2020 Urban Water Management Plan, 2020 Water Shortage Contingency Plan, and Appendix G as an addendum to the 2015 Urban Water Management Plan.

NOW, THEREFORE, BE IT RESOLVED, DETERMINED AND ORDERED BY THE INLAND EMPIRE UTILITIES AGENCY AS FOLLOWS:

Section 1. The 2020 Urban Water Management Plan is hereby adopted; and

Section 2. The 2020 Water Shortage Contingency Plan is hereby adopted; and

Section 3. The addendum of Appendix G to the 2015 Urban Water Management Plan is hereby adopted; and

Section 4. The General Manager is hereby authorized to file an electronic copy of the 2020 Urban Water Management Plan, 2020 Water Shortage Contingency Plan, and Appendix G to the 2015 Urban Water Management Plan with the State Department of Water Resources within 30 days following its adoption and no later than July 1, 2021.

Section 5. The General Manager is hereby authorized to file a CD or hardcopy of aforementioned plans with the California State Library no later than 30 days after its adoption.

Section 6. The General Manager is hereby authorized to submit an electronic copy or a CD or hardcopy of the adopted aforementioned plans to any city or county in which the suppliers provide water no later than 30 days after its adoption.

Section 7. The General Manager is hereby authorized and directed to implement the adopted aforementioned plans, including recommendations to the Board of Directors regarding necessary procedures, rules, and regulations in an effort to carry out effective and equitable water programs.

Section 8. The Resolution shall take effect upon adoption.

ADOPTED this 16th day of June 2021.

Jasmin A. Hall, President of the Inland Empire Utilities Agency* and the Board of Directors thereof

ATTEST:

Steven J. Elie, Secretary/Treasurer of the Inland Empire Utilities Agency* and of the Board of Directors thereof

The undersigned certifies that this is a true copy as on file in the permanent records of the Agency. This stamp must be in purple ink to constitute a certified copy.
Inland Empire Utilities Agency*
A Municipal Water Agency
By Denise Gy Date 6/16/2021

STATE OF CALIFORNIA)
)SS
COUNTY OF)
SAN BERNARDINO

I, Steven J. Elie, Secretary of the Inland Empire Utilities Agency*,

DO HEREBY CERTIFY that the foregoing Resolution being No. 2021-6-10, was adopted at a regular Board Meeting on June 16, 2021, of said Agency by the following vote:

AYES:	Camacho, Elie, Hall, Hofer, Tule
NOES:	None
ABSTAIN:	None
ABSENT:	None

Steven J. Elie, Secretary/Treasurer of the
Inland Empire Utilities Agency* and of
the Board of Directors thereof

(Seal)

*A Municipal Water District

2020 Water Shortage Contingency Plan

Project Lead

Joshua Aguilar, MsEM, P.E.
Senior Engineer

Prepared For

The Inland Empire Utilities Agency

6075 Kimball Avenue,

Chino, California 91708

Prepared By

Kennedy Jenks

300 N. Lake Ave, Suite 1020

Pasadena, CA 91101

Phone: 626-568-4300

Fax: 626-683-8938

Sachi Itagaki, P.E./QSD

Kennedy Jenks Reference

KJ 2044518*00

Kennedy Jenks

2020 Water Shortage Contingency Plan

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Kennedy Jenks Reference

KJ 2044518*00

Appendix C

DWR Planning Tool and Standardized Tables

Submittal Table 2-2: Plan Identification			
Select Only One	Type of Plan		Name of RUWMP or Regional Alliance *if applicable* (select from drop down list)
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☑	Supplier is a wholesaler
☐	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables are in calendar years
☑	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
7/1	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

Submittal Table 2-4 Wholesale: Water Supplier Information Exchange (select one)	
☑	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with Water Code Section 10631. Completion of the table below is optional. If not completed, include a list of the water suppliers that were informed.
	Provide page number for location of the list.
☐	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631. **Complete the table below.**

Water Supplier Name
Add additional rows as needed
Chino Basin Water Master
Chino Basin Desalter Authority
City of Chino
City of Chino Hills
Cucamonga Valley Water District
Fontana Water Company
Local Agency Formation Commission for San Bernardino County
City of Montclair
Monte Vista Water District
Metropolitan Water District
City of Ontario
City of Rancho Cucamonga
Santa Ana Regional Water Quality Control Board
San Antonio Water Company
Santa Ana Watershed Project Authority
San Bernardino County Planning Department
Three Valleys Municipal Water District
City of Upland
Water Facilities Authority
West Valley Water District
NOTES:

Submittal Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	906,046	945,849	987,401	1,031,771	1,074,773	1,119,568
NOTES: Population projections calculated using the 2020 Southern California Association of Government's population forecast.						

Submittal Table 4-1 Wholesale: Demands for Potable and Non-Potable Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only use types that will be recognized by the WUE data online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume*
Add additional rows as needed			
Sales to other agencies	MWD Imported Water	Raw Water	66,438
		TOTAL	66,438
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES: Volume values from IEUA Annual Water Use Database.			

Submittal Table 4-2 Wholesale: Use for Potable and Raw Water - Projected						
Use Type	Additional Description (as needed)	**Projected Water Use *** Report To the Extent that Records are Available				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool.		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Sales to other agencies	Imported Water from MWD provided to Retail Agencies	77,416	79,630	81,974	84,021	84,065
TOTAL		77,416	79,630	81,974	84,021	84,065

**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 4-3 Wholesale: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable and Raw Water From Tables 4-1W and 4-2W	66,438	77,416	79,630	81,974	84,021	84,065
Recycled Water Demand* From Table 6-4W	30,496	39,300	41,297	42,162	44,191	44,691
TOTAL WATER DEMAND	96,934	116,716	120,927	124,136	128,212	128,756

**Recycled water demand fields will be blank until Table 6-4 is complete.*

NOTES: 2020 Values from FY 19/20 Recycled Water Annual Report and FY 19/20 Annual Water Use Report. Projected potable and raw water volumes is the sum of each retail agency's expected use of imported water from IEUA. Recycled water projections are the sum of direct use from member agencies and groundwater recharge projections from IEUA.

Submittal Table 5-1 Baselines and Targets Summary
From SB X7-7 Verification Form
Retail Supplier or Regional Alliance Only

Baseline Period	Start Year *	End Year *	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	1995 - 1999	2004 - 2008	245	193
5 Year	2003 - 2005	2007 - 2009	227	

**All cells in this table should be populated manually from the supplier's SBX7-7 Verification Form and reported in Gallons per Capita per Day (GPCD)*

NOTES:

Submittal Table 5-2: 2020 Compliance From SB X7-7 2020 Compliance Form *Retail Supplier or Regional Alliance Only*				
2020 GPCD			2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* *(Adjusted if applicable)*		
171	0	0	193	Yes
**All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)*				
NOTES:				

Submittal Table 6-1 Wholesale: Groundwater Volume Pumped						
☑	Supplier does not pump groundwater. The supplier will not complete the table below.					
☐	All or part of the groundwater described below is desalinated.					
Groundwater Type Drop Down List	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
	TOTAL	0	0	0	0	0
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2020											
☐	Wholesale Supplier neither distributes nor provides supplemental treatment to recycled water. The Supplier will not complete the table below.										
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal ***Drop down list***	Does This Plant Treat Wastewater Generated Outside the Service Area? ***Drop down list***	Treatment Level ***Drop down list***	**2020 volumes** [1]				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Add additional rows as needed											
RP-1	DP-001	Prado Lake	8332818001	Lake outfall	Yes	Tertiary	26,932	25,889	30,495	0	0
	DP-002	Cucamonga Creek	8332818001	River or creek outfall	Yes	Tertiary				0	0
RP-4	DP-002	Cucamonga Creek	8332818001	River or creek outfall	Yes	Tertiary	10,718			0	0
RP-5	DP-003	Chino Creek	8332818001	River or creek outfall	Yes	Tertiary	9,699			0	0
CCWRF	DP-004	Chino Creek	8332818001	River or creek outfall	Yes	Tertiary	9,035			0	0
						Total	56,384	25,889	30,495	0	0

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.

[2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility

NOTES:

Submittal Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
☐	Recycled water is not directly treated or distributed by the Supplier. The Supplier will not complete the table below.						
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment *Drop down list*	2020*	2025*	2030*	2035*	2040*	2045* *(opt)*
Add additional rows as needed							
Direct Use	Tertiary	17,115	22,880	24,877	25,742	27,771	28,271
Groundwater Recharge	Tertiary	13,381	16,420	16,420	16,420	16,420	16,420
	Total	30,496	39,300	41,297	42,162	44,191	44,691
*** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.							
NOTES: 2020 value from FY 19/20 Recycled Water Annual Report. Direct use projected values from retail agencies. No projections were made for 2045, so the projected volume is set equal to 2040. Groundwater recharge projections from IEUA projections based on groundwater recharge annual report data.							

Submittal Table 6-5 Wholesale: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☐	Recycled water was not used or distributed by the supplier in 2015, nor projected for use or distribution in 2020. The wholesale supplier will not complete the table below.	
Name of Receiving Supplier or Direct Use by Wholesaler	2015 Projection for 2020*	2020 Actual Use*
Add additional rows as needed		
Direct Use	30,757	17,115
Groundwater Recharge	13,977	13,381
Total	44,734	30,496
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*		
NOTES: From 2015 IEUA UWMP and FY 19/20 Recycled Water Annual Report.		

Submittal Table 6-7 Wholesale: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☐	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description *(if needed)*	Planned Implementation Year	Planned for Use in Year Type *Drop Down list*	Expected Increase in Water Supply to Supplier*
	Drop Down Menu	*If Yes, Supplier Name*				
Add additional rows as needed						
Recharge Basin Improvements	*Yes*	*Chino Basin Watermaster*	See Section 4.4.5	2021	All Year Types	11,852 AF
Water Use Efficiency Business Plan	*Yes*	*Retail Agencies, MWD, and other agencies detailed in Section 8*	See Section 4.4.1	2020/2025	All Year Types	9,008 AF
Recycled Water and Intertie	*Yes*	*Western Riverside County Regional Wastewater Authority*	See Section 4.4.3	To be determined	All Year Types	6,000 AFY
RP-5 Liquids Treatment Expansion	*No*		See Section 4.4.3	2020/2025	All Year Types	See Notes
RP-1 Liquids Capacity Recovery and Solids Treatment Expansion	*No*		See Section 4.4.3	2030/2035	All Year Types	See Notes
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: The projects and schedule detailed in this table are subject to change. Expected Increase in Water Supply is not compatible with some of these projects as they give IEUA the capacity to meet flows and don’t provide water on their own. Recharge Basin improvements increase the amount of stormwater and recycled water that can be recharged to the Chino Basin.						

Submittal Table 6-8 Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Purchased or Imported Water	From MWD	66,438	Other Non-Potable Water	
Recycled Water	Direct Use and GWR	30,495	Recycled Water	
	Total	96,933		0
****Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*				
NOTES: GWR = Groundwater Recharge. Values from IEUA FY 19/20 Annual Water Use Report and FY19/20 Recycled Water Annual Report.				

OPTIONAL Table 6-8ds: Source Water Desalination

☐	Neither groundwater nor surface water are reduced in salinity prior to distribution.									
Plant Name or Well ID	Plant Capacity	Intake Type *Drop down list*	Source Water Type *Drop down list*	Influent TDS	Brine Discharge *Drop down list*	Volume of Water Desalinated				
						2016	2017	2018	2019	2020
Chino Desalter Authority	40,000	open-water intake (screened or unscreened)	groundwater	1,000 ppm	Brine Line	11,883	12,292	13,242	15,010	15,415
					Total	11883	12292	13242	15010	15415

**Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

Notes: Purchased by the cities of Chino, Chino Hills, and Ontario from Chino I Desalter. These three IEUA member agencies only purchase a portion of t

Submittal Table 6-9 Wholesale: Water Supplies — Projected											
Water Supply	Additional Detail on Water Supply	Projected Water Supply* Report To the Extent Practicable									
		2025		2030		2035		2040		2045 (opt)	
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Purchased or Imported Water	From MWD	93,283		93,283		93,283		93,283		93,283	
Recycled Water	Wastewater Plant Flows	60,073		63,207		64,142		66,836		66,836	
	Total	153,356	0	156,490	0	157,425	0	160,119	0	160,119	0

****Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 7-1 Wholesale: Basis of Water Year Data (Reliability Assessment)			
Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000	Available Supplies if Year Type Repeats	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ____________________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	% of Average Supply
Average Year	FY 15/16 - FY 19/20	147,503	100%
Single-Dry Year	FY 15/16	147,477	100%
Consecutive Dry Years 1st Year	FY 15/16	147,477	100%
Consecutive Dry Years 2nd Year	FY 15/16	147,477	100%
Consecutive Dry Years 3rd Year	FY 15/16	147,477	100%
Consecutive Dry Years 4th Year	FY 15/16	147,477	100%
Consecutive Dry Years 5th Year	FY 15/16	147,477	100%

Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table. Suppliers may create an additional worksheet for the additional tables.

***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Average year is the average of FY15/16 through FY19/20 wastewater plant flows plus the MWD contract amount from resolution 2014-12-1.

Submittal Table 7-2 Wholesale: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	153,356	156,490	157,425	160,119	160,119
Demand totals *(autofill fm Table 4-3)*	116,716	120,927	124,136	128,212	128,756
Difference	36,640	35,563	33,289	31,907	31,363
NOTES: Normal year based on the average of 2016-2020 conditions.					

Submittal Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040 (Opt)
Supply totals*	153,329	156,462	157,397	160,091	160,091
Demand totals*	118,899	123,938	128,009	133,007	133,571
Difference	34,431	32,524	29,388	27,084	26,519
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES: IEUA considers FY15/16 to represent the single dry year hydrologic conditions. The expected supply is 100% of normal year supply. The IEUA IRP forecasts a regional demand increase of 3.74% by 2040 for a single dry year due to above normal temperature and reduced wet periods (IEUA IRP Appendix E, 2016). Demand increase for prior years are interpolated (from 0.62% in 2015 to 3.74% in 2040). The demand increases for 2045 is assumed to be the same as 2040.					

Submittal Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	33,124	30,710	27,079	24,212	23,635
Second year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	33,124	30,710	27,079	24,212	23,635
Third year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	33,124	30,710	27,079	24,212	23,635
Fourth year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	33,124	30,710	27,079	24,212	23,635
Fifth year	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	33,124	30,710	27,079	24,212	23,635
Sixth year *(optional)*	Supply totals	153,329	156,462	157,397	160,091	160,091
	Demand totals	120,206	125,752	130,318	135,879	136,456
	Difference	33,124	30,710	27,079	24,212	23,635

***Units of measure (AF, CCF, MG) m** ust remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:
IEUA considers FY15/16 to represent each year of the multiple dry year hydrologic conditions. The expected supply is 100% of normal year supply. The IEUA IRP forecasts a regional demand increase of 5.98% by 2040 for a multi-dry year due to above normal temperature and reduced wet periods (IEUA IRP Appendix E, 2016). Demand increase for prior years are interpolated (from 1.00% in 2015 to 5.98% in 2040). The demand increases for 2045 is assumed to be the same as 2040. The supply and demand for each year of the multi-year drought is expected to be the same.

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Total Water Use	100,497
Total Supplies	148,650
Surplus/Shortfall w/o WSCP Action	48,153
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	48,153
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	105,098
Total Supplies	149,806
Surplus/Shortfall w/o WSCP Action	44,708
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	44,708
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	109,911
Total Supplies	150,972
Surplus/Shortfall w/o WSCP Action	41,061
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	41,061
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	114,943
Total Supplies	152,146
Surplus/Shortfall w/o WSCP Action	37,203
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	37,203
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	120,206
Total Supplies	153,329
Surplus/Shortfall w/o WSCP Action	33,124
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	33,124
Resulting % Use Reduction from WSCP action	0%

Notes: Years 2021 through 2024 are interpolated between the 2020 actual supply and use values and the 2025 projected supply and use for multi-year drought (from Table 7-4). 2020 actual supply is the average year supply from Table 7-1.

Submittal Table 8-1
Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage Range	Shortage Response Actions (*Narrative description)*
1	Up to 10%	Watch (DCP Level 1: 1-5%)
2	Up to 20%	Warning (DCP Level 2: 6-15%)
3	Up to 30%	Emergency (DCP Level 3: 16-25%)
4	Up to 40%	Critical (DCP Level 4: 26-50%)
5	Up to 50%	
6	>50%	Catastrophic (DCP Level 5: >50%)

NOTES: IEUA's 2020 DCP defined five drought stage conditions noted in the Water Shortage Condition column above. The cross-reference between these shortage stages and the water shortage levels in this table is included in Table 4-1 in the WSCP.

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
1	Expand Public Information Campaign	Minimum 1-5% of water use	Begin profiling high potential customers and develop messaging that will best resonate with those customers	
1	Provide Rebates on Plumbing Fixtures and Devices		SoCal WaterSmart Residential and Commercial Rebates	
1	Provide Rebates for Landscape Irrigation Efficiency		Residential Irrigation Tune-Up, Home Surveys, Landscape Workshops, and Design Services	
1	Provide Rebates for Turf Replacement		Turf Replacement Program	
2	Expand Public Information Campaign	Minimum 6-15% of water use	Introduce influencer marketing; continue targeting high potential customers	
2	Provide Rebates on Plumbing Fixtures and Devices		Implement direct installation programs	
2	Provide Rebates for Landscape Irrigation Efficiency		Expand Landscape Design Services; offer more frequent landscape workshops and home surveys	
2	Provide Rebates for Landscape Irrigation Efficiency		Continue Turf Replacement Program	
3	Expand Public Information Campaign	Minimum 16-25% of water use	Expand profiling and micro-targeting to include mid-range water users; increase influencer marketing	
3	Provide Rebates on Plumbing Fixtures and Devices		Continue base programs; Increase incentive amounts for certain programs; continue smart irrigation direct installation programs	

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
3	Provide Rebates for Landscape Irrigation Efficiency		Continue Stage 2 Actions	
3	Provide Rebates for Turf Replacement		Increase incentive amounts	
4, 5	Expand Public Information Campaign	Minimum 24-50% of water use	Strengthen message of urgency and community call to action	
4, 5	Provide Rebates on Plumbing Fixtures and Devices		Continue increase incentives and smart irrigation direct installation programs	
4, 5	Provide Rebates for Landscape Irrigation Efficiency		Continue Stage 2 Actions	
4, 5	Provide Rebates for Turf Replacement		Increase incentive amounts	
6	Expand Public Information Campaign	Minimum 50% of water use	Implement catastrophic messaging, announce essential use only	
6	Provide Rebates on Plumbing Fixtures and Devices		Only offer indoor plumbing and property leak detection programs.	
6	Provide Rebates for Landscape Irrigation Efficiency		Suspend all programs	
6	Provide Rebates for Turf Replacement		Suspend all programs	

NOTES: Each IEUA retail agency is responsible for enforcing local water waste ordinances; details of the restrictions by agency can be found in the 2020 DCP and each individual retail agency's 2020 WSCP. Additional details on drought response actions can be found in the IEUA's 2020 DCP and WSCP.

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
1 through 6	Other Actions (describe)	Undetermined amount	IEUA is always looking for opportunities to explore additional recycled water connections to increase supply.
6	Other Purchases	Up to 93,283 AFY (MWD Contract Amount)	Purchase MWD Tier 2 Imported Water
NOTES: MWD Contract Amount from Resolution No. 2014-12-1			

Submittal Table 10-1 Wholesale: Notification to Cities and Counties (select one)		
☑	Supplier has notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
Table 10-1	Provide the page or location of this list in the UWMP.	
☐	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
City of Chino	Yes	Yes
City of Chino Hills	Yes	Yes
Cucamonga Valley Water	Yes	Yes
Fontana Water Company	Yes	Yes
Monte Vista Water District	Yes	Yes
City of Ontario	Yes	Yes
San Antonio Water Company	Yes	Yes
City of Upland	Yes	Yes
City of Rancho Cucamonga	Yes	Yes
City of Montclair	Yes	Yes
West Valley Water District	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
San Bernardino County	Yes	Yes
NOTES: In addition, the following agencies were also given a 60 Day Notice and Notice of Public Hearing: Chino Basin Water Master, Chino Basin Desalter Authority, Local Agency Formation Commission for San Bernardino County, Metropolitan Water District, Santa Ana Regional Water Quality Control Board, Santa Ana Watershed Project Authority, Three Valleys Municipal Water District, West Valley Water District, and the Water Facilities Authority. Notification letters were sent out in November 2020, April 2021, and May 2021. Copies of these notification letters are included in Appendix E of the 2020 UWMP.		

Appendix D

IEUA Resolution 2021-6-10 2020,
Adopting the UWMP, 2020 WSCP

RESOLUTION NO.2021-6-10

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY (IEUA), SAN BERNARDINO COUNTY, CALIFORNIA, ADOPTING THE 2020 URBAN WATER MANAGEMENT PLAN, 2020 WATER SHORTAGE CONTINGENCY PLAN, AND APPENDIX G AS AN ADDENDUM TO THE 2015 URBAN WATER MANAGEMENT PLAN

Whereas, the California Legislature enacted Assembly Bill 797, (Water Code Section 10610 et seq., known as the Urban Water Management Planning Act) during the 1983-1984 Regular Session, and as amended subsequently, which mandates that every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, prepare an Urban Water Management Plan at least once every five years; and

Whereas, the Urban Water Management Planning Act requires the preparation and adoption of a Water Shortage Contingency Plan, in accordance with prescribes requirements; and

Whereas, the Urban Water Management Planning Act specifies the requirements and procedures for amending and adopting such Urban Water Management Plans; and

Whereas, the Inland Empire Utilities Agency* is a wholesale supplier of water for 242-square miles in the western portion of San Bernardino; and

Whereas, pursuant to Section 10620 of the Urban Water Management Planning Act, the Inland Empire Utilities Agency has prepared the 2020 Urban Water Management Plan, 2020 Water Shortage Contingency Plan, and Appendix G as an addendum to the 2015 Urban Water Management Plan; and

Whereas, the Board of Directors of the Inland Empire Utilities Agency has duly reviewed, discussed, and considered the 2020 Urban Water Management Plan, 2020 Water Shortage Contingency Plan, and Appendix G as an addendum to the 2015 Urban Water Management Plan.

NOW, THEREFORE, BE IT RESOLVED, DETERMINED AND ORDERED BY THE INLAND EMPIRE UTILITIES AGENCY AS FOLLOWS:

Section 1. The 2020 Urban Water Management Plan is hereby adopted; and

Section 2. The 2020 Water Shortage Contingency Plan is hereby adopted; and

Section 3. The addendum of Appendix G to the 2015 Urban Water Management Plan is hereby adopted; and

Section 4. The General Manager is hereby authorized to file an electronic copy of the 2020 Urban Water Management Plan, 2020 Water Shortage Contingency Plan, and Appendix G to the 2015 Urban Water Management Plan with the State Department of Water Resources within 30 days following its adoption and no later than July 1, 2021.

Section 5. The General Manager is hereby authorized to file a CD or hardcopy of aforementioned plans with the California State Library no later than 30 days after its adoption.

Section 6. The General Manager is hereby authorized to submit an electronic copy or a CD or hardcopy of the adopted aforementioned plans to any city or county in which the suppliers provide water no later than 30 days after its adoption.

Section 7. The General Manager is hereby authorized and directed to implement the adopted aforementioned plans, including recommendations to the Board of Directors regarding necessary procedures, rules, and regulations in an effort to carry out effective and equitable water programs.

Section 8. The Resolution shall take effect upon adoption.

ADOPTED this 16th day of June 2021.

Jasmin A. Hall, President of the Inland Empire Utilities Agency* and the Board of Directors thereof

ATTEST:

Steven J. Elie, Secretary/Treasurer of the Inland Empire Utilities Agency* and of the Board of Directors thereof

The undersigned certifies that this is a true copy as on file in the permanent records of the Agency. This stamp must be in purple ink to constitute a certified copy.
Inland Empire Utilities Agency*
A Municipal Water Agency
By Denise Garzo Date 6/16/2021

STATE OF CALIFORNIA)
)SS
COUNTY OF)
SAN BERNARDINO

I, Steven J. Elie, Secretary of the Inland Empire Utilities Agency*,

DO HEREBY CERTIFY that the foregoing Resolution being No. 2021-6-10, was adopted at a regular Board Meeting on June 16, 2021, of said Agency by the following vote:

AYES: Camacho, Elie, Hall, Hofer, Tule

NOES: None

ABSTAIN: None

ABSENT: None

Steven J. Elie, Secretary/Treasurer of the
Inland Empire Utilities Agency* and of
the Board of Directors thereof

(Seal)

*A Municipal Water District

Appendix E

Outreach Materials

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

6075 Kimball Avenue • Chino, CA 91708
P.O. Box 9020 • Chino Hills, CA 91709
TEL (909) 993-1600 • FAX (909) 993-1985
www.ieua.org

24 November 2020

GM Name
GM Title
Agency Name
Street Address
City, State, Zip

SUBJECT: 2020 Urban Water Management Plan Update

Dear Agency Representative:

The Inland Empire Utilities Agency (IEUA) is undertaking the review, update, and revision of its Urban Water Management Plan (UWMP). The Urban Water Management Planning Act requires every urban water supplier of a certain size to prepare and adopt an UWMP at least once every five years. The UWMP is a planning document in which water suppliers evaluate and compare their water supply and reliability to their existing and projected demands. IEUA is in the process of preparing the 2020 UWMP Update.

As an urban water supplier, the IEUA is required pursuant to Section 10620(d)(3) of the California Water Code to coordinate with water management agencies, relevant public agencies, and other water suppliers regarding the preparation of the UWMP. Pursuant to Section 10621(b) of the California Water Code, the IEUA will be reviewing the UWMP and will make amendments or changes, as appropriate. Based on the IEUA's current schedule, we expect to have a draft available for public review by April 2021, at which point your agency will receive notification that the draft UWMP is available for public review and comment.

The IEUA invites you to submit written comments in anticipation of the development of our 2020 UWMP Update within the next 30 days to IEUA. If your agency would like to learn more about the UWMP, please feel free to contact me at 909.993.1698 or jaguilar@ieua.org.

Sincerely,

J. Aguilar

Joshua Aguilar
Senior Engineer

NOTICE OF PUBLIC HEARING
BY THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY*
TO ADOPT THE 2020 URBAN WATER MANAGEMENT PLAN (UWMP),
ADDENDUM OF APPENDIX G TO THE 2015 UWMP,
AND WATER SHORTAGE CONTINGENCY PLAN
SAN BERNARDINO COUNTY, STATE OF CALIFORNIA

NOTICE IS HEREBY GIVEN that the Board of Directors of the Inland Empire Utilities Agency intends to hold a public hearing for adoption of the 2020 Urban Water Management Plan (UWMP), Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan.

NOTICE IS FURTHER GIVEN that said public hearing will be held on the following date and time for the purpose of hearing any and all public testimony on the above-stated issue.

DATE: Wednesday, June 16, 2021 – 10:00 a.m.

The meeting will be accessible via teleconference at:
Phone Number: (415) 856-9169 / Conference ID: 811 284 110#

In the effort to prevent the spread of COVID-19, until further notice, the Inland Empire Utilities Agency will hold all Board and Committee meetings by video and audio conference. As of the posting/publication of this notice, it is anticipated that the public hearing will be conducted virtually by video and audio conference. (Please visit www.ieua.org for the most up-to-date information regarding meeting participation.) There will be no public location available to attend the meeting; all interested persons are invited to participate in the public hearing and provide comments regarding the proposed 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan by calling into the number provided above. The public may also view the meeting live through the Agency's website at www.ieua.org. Oral statements will be heard, but for the accuracy of the record all important testimony should be submitted in writing. Written comments may be emailed to the Board Secretary/Office Manager Denise Garzaro at dgarzaro@ieua.org no later than 24 hours prior to the scheduled meeting time. Comments submitted in advance will be read into the record during the hearing.

NOTICE IS FURTHER GIVEN that the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan will be available on the Agency's website at www.ieua.org and via hard-copy upon request in Spring of 2021, no less than two weeks prior to the public hearing. All interested parties are noticed and invited to submit comments and consult with the Agency regarding its forthcoming 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan to the Strategic Planning and Resources Department, attention Joshua Aguilar at jaguilar@ieua.org. For additional information regarding the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and Water Shortage Contingency Plan, please contact Senior Engineer, Joshua Aguilar at (909) 993-1694.

*a municipal water district

CALIFORNIA NEWSPAPER SERVICE BUREAU

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Denise Garzaro
INLAND EMPIRE UTILITIES AGENCY
6075 KIMBALL AVE BUILDING A
CHINO, CA 91710

COPY OF NOTICE

Notice Type: HRG NOTICE OF HEARING

Ad Description: Urban Water Management Plan (UWMP)- 5/17 and 5/24

To the right is a copy of the notice you sent to us for publication in the INLAND VALLEY DAILY BULLETIN/ONTARIO. Please read this notice carefully and call us with any corrections. The Proof of Publication will be filed with the County Clerk, if required, and mailed to you after the last date below. Publication date(s) for this notice is (are):

05/17/2021 , 05/24/2021

The charge(s) for this order is as follows. An invoice will be sent after the last date of publication. If you prepaid this order in full, you will not receive an invoice.

* A 0 0 0 0 0 5 7 1 8 2 7 3 *

CNS 3471155

NOTICE OF PUBLIC HEARING BY THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY* TO ADOPT THE 2020 URBAN WATER MANAGEMENT PLAN (UWMP), ADDENDUM OF APPENDIX G TO THE 2015 UWMP, AND 2020 WATER SHORTAGE CONTINGENCY PLAN SAN BERNARDINO COUNTY, STATE OF CALIFORNIA

NOTICE IS HEREBY GIVEN that the Board of Directors of the Inland Empire Utilities Agency intends to hold a public hearing for adoption of the 2020 Urban Water Management Plan (UWMP), Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan.

NOTICE IS FURTHER GIVEN that said public hearing will be held on the following date and time for the purpose of hearing any and all public testimony on the above-stated issue.

DATE: Wednesday, June 16, 2021 – 10:00 a.m.

The meeting will be accessible via teleconference at:
Phone Number: (415) 856-9169 / Conference ID: 811 284 110#

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5/17, 5/24/21
CNS-3471155#
INLAND VALLEY DAILY BULLETIN/ONTARIO

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

6075 Kimball Avenue • Chino, CA 91708
P.O. Box 9020 • Chino Hills, CA 91709
TEL (909) 993-1600 • FAX (909) 993-1985
www.ieua.org

May 11th, 2021

Retail Agency
Contact Information
Placed Here

SUBJECT: Posting of the 2020 Urban Water Management Plan, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan

Dear Agency Representative:

The Inland Empire Utilities Agency (IEUA) is inviting public review and comment on its Draft 2020 Urban Water Management Plan (UWMP). The Plan includes an updated Addendum of Appendix G to the 2015 UWMP and 2020 Water Shortage Contingency Plan (WSCP).

In compliance with California Water Code (§10610-10656, §10608 and §10632) the UWMP and WSCP are required to contain detailed evaluations of water supplies necessary to reliably meet demands of the California Water Code to coordinate with water management agencies, relevant public agencies, and other water suppliers regarding the preparation of the UWMP and other plans.

All plan documents are now available on IEUA's website here: https://www.ieua.org/read-our-reports/other-reports/.

Comments must be received no later than **5:00 p.m. Monday, May 24, 2021** and sent to the attention of Joshua Aguilar, 909.993.1698 or jaguilar@ieua.org.

If you or your agency would like more information on IEUA's UWMP, Addendum, or WSCP, please contact me.

Sincerely,

J. Aguilar

Joshua Aguilar
Senior Engineer

Inland Valley Daily Bulletin
(formerly The Daily Report)
9616 Archibald Avenue Suite 100
Rancho Cucamonga, CA 91730
909-987-6397
legals@inlandnewspapers.com

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FILE NO. 3471155

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(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of San Bernardino

I am a citizen of the United States, I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of INLAND VALLEY DAILY BULLETIN, a newspaper of general circulation printed and published daily for the City of Ontario, County of San Bernardino, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of San Bernardino, State of California, on the date of August 24, 1951, Case Number 70663. The notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

05/17/2021, 05/24/2021

I declare under the penalty of perjury that the foregoing is true and correct.

Executed at Rancho Cucamonga, San Bernardino Co., California, on this 8th day of June, 2021.

Evangelina Almeida

Signature

NOTICE OF PUBLIC HEARING BY THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY* TO ADOPT THE 2020 URBAN WATER MANAGEMENT PLAN (UWMP), ADDENDUM OF APPENDIX G TO THE 2015 UWMP, AND 2020 WATER SHORTAGE CONTINGENCY PLAN SAN BERNARDINO COUNTY, STATE OF CALIFORNIA

NOTICE IS HEREBY GIVEN that the Board of Directors of the Inland Empire Utilities Agency intends to hold a public hearing for adoption of the 2020 Urban Water Management Plan (UWMP), Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan.

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DATE: Wednesday, June 16, 2021 – 10:00 a.m.

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Phone Number: (415) 856-9169 / Conference ID: 811 284 110#

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NOTICE IS FURTHER GIVEN that the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan will be available on the Agency's website at www.ieua.org and via hard-copy upon request in Spring of 2021, no less than two weeks prior to the public hearing. All interested parties are noticed and invited to submit comments

and consult with the Agency regarding its forthcoming 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan to the Strategic Planning and Resources Department, attention Joshua Aguilar at jaguilar@ieua.org. For additional information regarding the 2020 UWMP, Addendum of Appendix G to the 2015 UWMP, and 2020 Water Shortage Contingency Plan, please contact Senior Engineer, Joshua Aguilar at (909) 993-1694.
5/17, 5/24/21
CNS-3471155#
INLAND VALLEY DAILY BULLETIN/ONTARIO #11462691

Appendix F

SBX7-7 Verification Tables and DWR Population Tool Output

City of Chino

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

City of Chino

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☑	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☑	**4. Other** DWR recommends pre-review
NOTES: Data from the Department of Finance and the City of Chino's Water Master Plan was used to estimate the 2020 population.	

City of Chino

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	80,808
NOTES:	

City of Chino

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	15,273			-		-	**15,273**

*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

City of Chino

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment Complete one table for each source.			
Name of Source	Chino Basin Groundwater		
This water source is *(check one)* **:**			
☑	The supplier's own water source		
☐	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	5,149	-	5,149

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Chino

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment Complete one table for each source.			
Name of Source	Water Facilities Authority		
This water source is *(check one)* :			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	5,756		5,756

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment -*** *See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: 694 AF of water from City of Ontario was wheeled through WFA in 2020.

City of Chino

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Chino Basin Desalter Authority		
This water source is *(check one)* **:**			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	4,368		4,368

*[1] **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* *[2] **Meter Error Adjustment** - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Chino

SB X7-7 Table 4-B: 2020 Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*									
2020 Compliance Year	**2020 Surface Reservoir Augmentation**					**2020 Groundwater Recharge**			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
	Volume Discharged from Reservoir for Distribution System Delivery[1]	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss[1]	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility[1,2]	Transmission/ Treatment Losses[1]	Recycled Volume Entering Distribution System from Groundwater Recharge	
			-		-			-	-

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] *Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

NOTES:

City of Chino

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C: 2020 Process Water Deduction Eligibility (For use only by agencies that are deducting process water) Choose Only One	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

City of Chino

Data from this table will not be entered into WUEdata.
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SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*

Criteria 1
Industrial water use is equal to or greater than 12% of gross water use

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	15,273		0%	NO

NOTES:

City of Chino

Data from this table will not be entered into WUEdata.
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SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 2)*

Criteria 2
Industrial water use is equal to or greater than 15 GPCD

2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		80,808	-	NO

NOTES:

City of Chino

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.3: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 3)*

Criteria 3
Non-industrial use is equal to or less than 120 GPCD

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	15,273		15,273	80,808	169	NO

NOTES:

City of Chino

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 4)*

Criteria 4

Disadvantaged Community. A "Disadvantaged Community" (DAC) is a community with a median household income less than 80 percent of the statewide average.

SELECT ONE

"Disadvantaged Community" status was determined using one of the methods listed below:

1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/

☐ If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

2. 2020 Median Income

☐

California Median Household Income*		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2020	**$75,235**		0%	YES

*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.

NOTES

City of Chino

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water ***Fm SB X7-7 Table 4***	**2020 Population** ***Fm SB X7-7 Table 3***	**2020 GPCD**
15,273	80,808	**169**
NOTES:		

City of Chino

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	Did Supplier Achieve Targeted Reduction for 2020?
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
169	-	-	-	-	169	189	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

City of Chino Hills

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

City of Chino Hills

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☑	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

City of Chino Hills

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	82,409
NOTES:	

City of Chino Hills

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	14,493	-	-	-	-	-	**14,493**

*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

City of Chino Hills

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	WFA		
This water source is *(check one)* **:**			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	1,700	-	1,700

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	MVWD		
This water source is *(check one)* **:**			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	7,707		7,707

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment -*** *See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Chino Hills

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment Complete one table for each source.			
Name of Source	Chino Hills Wells		
This water source is *(check one)* :			
☑	The supplier's own water source		
☐	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	-		0

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment Complete one table for each source.			
Name of Source	CDA		
This water source is *(check one)* :			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	3,669		3,669

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Chino Hills

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment Complete one table for each source.			
Name of Source	IEUA (Recycled)		
This water source is *(check one)* **:**			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	1,417		1,417

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*
[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Chino Hills

SB X7-7 Table 4-B: 2020 Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*									
2020 Compliance Year	**2020 Surface Reservoir Augmentation**					**2020 Groundwater Recharge**			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
	Volume Discharged from Reservoir for Distribution System Delivery[1]	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss[1]	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility[1,2]	Transmission/ Treatment Losses[1]	Recycled Volume Entering Distribution System from Groundwater Recharge	
			-		-			-	-

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] *Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

City of Chino Hills

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C: 2020 Process Water Deduction Eligibility (For use only by agencies that are deducting process water) Choose Only One	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES: No Deductions	

City of Chino Hills

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*				
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use				
2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	14,493		0%	NO
NOTES:				

City of Chino Hills

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 2)*

Criteria 2
Industrial water use is equal to or greater than 15 GPCD

2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		82,409	-	NO

NOTES:

City of Chino Hills

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.3: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 3)*

Criteria 3
Non-industrial use is equal to or less than 120 GPCD

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	14,493		14,493	82,409	157	NO

NOTES:

City of Chino Hills

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 4)*

Criteria 4

Disadvantaged Community. A "Disadvantaged Community" (DAC) is a community with a median household income less than 80 percent of the statewide average.

SELECT ONE

"Disadvantaged Community" status was determined using one of the methods listed below:

1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/

☐ If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

2. 2020 Median Income

	California Median Household Income*		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
☐	**2020**	**$75,235**	$102,746	137%	NO

*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.

NOTES

City of Chino Hills

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water ***Fm SB X7-7 Table 4***	**2020 Population** ***Fm SB X7-7 Table 3***	**2020 GPCD**
14,493	82,409	**157**
NOTES:		

City of Chino Hills

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
157	-	-	-	-	157	173	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

Cucamonga Valley Water District

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

Cucamonga Valley Water District

SB X7-7 Table-1: Baseline Period Ranges			
Baseline	**Parameter**	**Value**	**Units**
10- to 15-year baseline period	2008 total water deliveries	58,175	Acre Feet
	2008 total volume of delivered recycled water	635	Acre Feet
	2008 recycled water as a percent of total deliveries	1.09%	Percent
	Number of years in baseline period[1, 2]	10	Years
	Year beginning baseline period range	1995	
	Year ending baseline period range[3]	2004	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2004	
	Year ending baseline period range[4]	2008	

[1] If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period. *[2] The Water Code requires that the baseline period is between 10 and 15 years. However, DWR recognizes that some water suppliers may not have the minimum 10 years of baseline data.*

[3] The ending year must be between December 31, 2004 and December 31, 2010.

[4] The ending year must be between December 31, 2007 and December 31, 2010.

NOTES:

Cucamonga Valley Water District

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☐	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2010 - 2020) when available
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☑	**4. Other** DWR recommends pre-review
NOTES: Historical Population within the service area is estimated based on average person per connection, based on the total number of dwelling units in District's financial software. This is multiplied by the average number of people per household, and also considered the	

Cucamonga Valley Water District

SB X7-7 Table 3: Service Area Population		
Year		**Population**
10 to 15 Year Baseline Population		
Year 1	1995	132,882
Year 2	1996	135,001
Year 3	1997	136,874
Year 4	1998	139,556
Year 5	1999	143,175
Year 6	2000	148,159
Year 7	2001	152,221
Year 8	2002	161,267
Year 9	2003	166,359
Year 10	2004	170,784
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2004	170,784
Year 2	2005	179,523
Year 3	2006	182,035
Year 4	2007	184,369
Year 5	2008	184,669
2020 Compliance Year Population		
2020		198,979
NOTES:		

Cucamonga Valley Water District

SB X7-7 Table 4: Annual Gross Water Use *								
Baseline Year *Fm SB X7-7 Table 3*		**Volume Into Distribution System** *This column will remain blank until SB X7-7 Table 4-A is completed.*	**Deductions**					**Annual Gross Water Use**
			Exported Water	**Change in Dist. System Storage** (+/-)	**Indirect Recycled Water** *This column will remain blank until SB X7-7 Table 4-B is completed.*	**Water Delivered for Agricultural Use**	**Process Water** *This column will remain blank until SB X7-7 Table 4-D is completed.*	
10 to 15 Year Baseline - Gross Water Use								
Year 1	1995	42,131	-		-	101	-	42,030
Year 2	1996	45,476	-		-	151	-	45,325
Year 3	1997	47,219	-		-	133	-	47,086
Year 4	1998	41,864	-		-	88	-	41,776
Year 5	1999	49,409	-		-	103	-	49,306
Year 6	2000	50,718	73		-	112	-	50,533
Year 7	2001	48,063	-		-	73	-	47,990
Year 8	2002	52,423	307		-	80	-	52,036
Year 9	2003	51,899	437		-	54	-	51,408
Year 10	2004	54,826	385		-	55	-	54,386
Year 11	0	-			-		-	-
Year 12	0	-			-		-	-
Year 13	0	-			-		-	-
Year 14	0	-			-		-	-
Year 15	0	-			-		-	-
10 - 15 year baseline average gross water use								**48,188**
5 Year Baseline - Gross Water Use								
Year 1	2004	54,826	385		-	55	-	54,386
Year 2	2005	55,978	437		-	18	-	55,523
Year 3	2006	57,977	165		-	18	-	57,794
Year 4	2007	61,034	165		-	22	-	60,847
Year 5	2008	57,541	-		-	16	-	57,525
5 year baseline average gross water use								**57,215**
2020 Compliance Year - Gross Water Use								
2020		46,021	-		-	**11**	-	**46,010**

* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3

NOTES:

Cucamonga Valley Water District

SB X7-7 Table 4-A: Volume Entering the Distribution System(s) Complete one table for each source.				
Name of Source		Chino Basin Groundwater		
This water source is:				
☑	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	6,297		6,297
Year 2	1996	7,311		7,311
Year 3	1997	7,764		7,764
Year 4	1998	5,101		5,101
Year 5	1999	7,737		7,737
Year 6	2000	6,195		6,195
Year 7	2001	6,899		6,899
Year 8	2002	10,580		10,580
Year 9	2003	10,020		10,020
Year 10	2004	12,582		12,582
Year 11	0			-
Year 12	0			-
Year 13	0			-
Year 14	0			-
Year 15	0			-
5 Year Baseline - Water into Distribution System				
Year 1	2004	12,582		12,582
Year 2	2005	13,328		13,328
Year 3	2006	16,814		16,814
Year 4	2007	16,781		16,781
Year 5	2008	19,232		19,232
2020 Compliance Year - Water into Distribution System				
2020		23,315		23,315
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				
NOTES: 17,394.77 AF of Chino Basin production is pumped as part of MWD's conjunctive-use program (in lieu of imported water).				

SB X7-7 Table 4-A: Volume Entering the Distribution	
Name of Source	Cucamonga Basin Groundwater
This water source is:	
☑	The supplier's own water source

Cucamonga Valley Water District

☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	14,200		14,200
Year 2	1996	15,319		15,319
Year 3	1997	14,180		14,180
Year 4	1998	9,764		9,764
Year 5	1999	13,661		13,661
Year 6	2000	10,642		10,642
Year 7	2001	6,604		6,604
Year 8	2002	6,719		6,719
Year 9	2003	5,051		5,051
Year 10	2004	6,714		6,714
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	6,714		6,714
Year 2	2005	7,518		7,518
Year 3	2006	6,497		6,497
Year 4	2007	5,019		5,019
Year 5	2008	4,450		4,450
2020 Compliance Year - Water into Distribution System				
2020		3,618		3,618

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		Imported Water (State Water Project)		
This water source is:				
☐	The supplier's own water source			
☑	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	12,412		12,412

Cucamonga Valley Water District

Year 2	1996	16,932		16,932
Year 3	1997	18,587		18,587
Year 4	1998	17,419		17,419
Year 5	1999	21,854		21,854
Year 6	2000	29,460		29,460
Year 7	2001	28,905		28,905
Year 8	2002	32,635		32,635
Year 9	2003	33,329		33,329
Year 10	2004	33,638		33,638
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	33,638		33,638
Year 2	2005	28,109		28,109
Year 3	2006	29,318		29,318
Year 4	2007	36,041		36,041
Year 5	2008	28,551		28,551
2020 Compliance Year - Water into Distribution System				
2020		14,343		14,343

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution

Name of Source	Cucamonga Canyon Water

This water source is:

- ☑ The supplier's own water source
- ☐ A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	0		0
Year 2	1996	0		0
Year 3	1997	586		586
Year 4	1998	1,612		1,612
Year 5	1999	1,664		1,664
Year 6	2000	1,053		1,053
Year 7	2001	1,648		1,648
Year 8	2002	492		492
Year 9	2003	958		958

Cucamonga Valley Water District

Year 10	2004	410		410
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	410		410
Year 2	2005	0		0
Year 3	2006	0		0
Year 4	2007	141		141
Year 5	2008	1,700		1,700
2020 Compliance Year - Water into Distribution System				
2020		931		931

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution	
Name of Source	Deer Canyon Water
This water source is:	
☑	The supplier's own water source
☐	A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	2,355		2,355
Year 2	1996	1,091		1,091
Year 3	1997	1,033		1,033
Year 4	1998	2,028		2,028
Year 5	1999	640		640
Year 6	2000	504		504
Year 7	2001	579		579
Year 8	2002	209		209
Year 9	2003	453		453
Year 10	2004	249		249
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	249		249

Cucamonga Valley Water District

Year 2	2005	603		603
Year 3	2006	187		187
Year 4	2007	73		73
Year 5	2008	78		78
2020 Compliance Year - Water into Distribution System				
2020		0		0
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				
NOTES:				

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		Day/East Canyon Water		
This water source is:				
☑	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	6,867		6,867
Year 2	1996	4,823		4,823
Year 3	1997	5,069		5,069
Year 4	1998	5,940		5,940
Year 5	1999	3,853		3,853
Year 6	2000	2,864		2,864
Year 7	2001	3,428		3,428
Year 8	2002	1,775		1,775
Year 9	2003	2,088		2,088
Year 10	2004	1,233		1,233
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	1233		1,233
Year 2	2005	6374		6,374
Year 3	2006	5161		5,161
Year 4	2007	2979		2,979
Year 5	2008	3485		3,485
2020 Compliance Year - Water into Distribution System				
2020		3,813		3,813
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				

Cucamonga Valley Water District

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		FWC Interconnection - Transfer from FWC		
This water source is:				
☐	The supplier's own water source			
☑	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	0		0
Year 2	1996	0		0
Year 3	1997	0		0
Year 4	1998	0		0
Year 5	1999	0		0
Year 6	2000	0		0
Year 7	2001	0		0
Year 8	2002	13		13
Year 9	2003	0		0
Year 10	2004	0		0
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	0		0
Year 2	2005	45.51		46
Year 3	2006	0.18		0
Year 4	2007	0		0
Year 5	2008	45		45
2020 Compliance Year - Water into Distribution System				
2020		0		0

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

Cucamonga Valley Water District

SB X7-7 Table 4-B: Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*										
		Surface Reservoir Augmentation					Groundwater Recharge			
Baseline Year *Fm SB X7-7 Table 3*		Volume Discharged from Reservoir for Distribution System Delivery	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility*	Transmission/ Treatment Losses	Recycled Volume Entering Distribution System from Groundwater Recharge	**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
10-15 Year Baseline - Indirect Recycled Water Use										
Year 1	1995			-		-			-	-
Year 2	1996			-		-			-	-
Year 3	1997			-		-			-	-
Year 4	1998			-		-			-	-
Year 5	1999			-		-			-	-
Year 6	2000			-		-			-	-
Year 7	2001			-		-			-	-
Year 8	2002			-		-			-	-
Year 9	2003			-		-			-	-
Year 10	2004			-		-			-	-
Year 11	0			-		-			-	-
Year 12	0			-		-			-	-
Year 13	0			-		-			-	-
Year 14	0			-		-			-	-
Year 15	0			-		-			-	-
5 Year Baseline - Indirect Recycled Water Use										
Year 1	2004			-		-			-	-
Year 2	2005			-		-			-	-
Year 3	2006			-		-			-	-
Year 4	2007			-		-			-	-
Year 5	2008			-		-			-	-
2020 Compliance - Indirect Recycled Water Use										
2020				-		-			-	-

**Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

NOTES:

Cucamonga Valley Water District

SB X7-7 Table 4-C: Process Water Deduction Eligibility *(For use only by agencies that are deducting process water) Choose Only One*	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

Cucamonga Valley Water District

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility					
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use					
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995	42,030	2,220	5%	NO
Year 2	1996	45,325	2,020	4%	NO
Year 3	1997	47,086	2,317	5%	NO
Year 4	1998	41,776	2,254	5%	NO
Year 5	1999	49,306	2,367	5%	NO
Year 6	2000	50,533	2,598	5%	NO
Year 7	2001	47,990	2,426	5%	NO
Year 8	2002	52,036	2,465	5%	NO
Year 9	2003	51,408	2,462	5%	NO
Year 10	2004	54,386	2,495	5%	NO
Year 11	0	-			NO
Year 12	0	-			NO
Year 13	0	-			NO
Year 14	0	-			NO
Year 15	0	-			NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004	54,386	2,495	5%	NO
Year 2	2005	55,523	2,446	4%	NO
Year 3	2006	57,794	2,755	5%	NO
Year 4	2007	60,847	2,506	4%	NO
Year 5	2008	57,525	2,589	5%	NO
2020 Compliance Year - Process Water Deduction Eligiblity					
2020		46,010	2,097	5%	NO
NOTES:					

Cucamonga Valley Water District

SB X7-7 Table 4-C.2: Process Water Deduction Eligibility					
Criteria 2 Industrial water use is equal to or greater than 15 GPCD					
Baseline Year *Fm SB X7-7 Table 3*		Industrial Water Use	Population	Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995	2,220	132,882	15	NO
Year 2	1996	2,020	135,001	13	NO
Year 3	1997	2,317	136,874	15	YES
Year 4	1998	2,254	139,556	14	NO
Year 5	1999	2,367	143,175	15	NO
Year 6	2000	2,598	148,159	16	YES
Year 7	2001	2,426	152,221	14	NO
Year 8	2002	2,465	161,267	14	NO
Year 9	2003	2,462	166,359	13	NO
Year 10	2004	2,495	170,784	13	NO
Year 11	0		-		NO
Year 12	0		-		NO
Year 13	0		-		NO
Year 14	0		-		NO
Year 15	0		-		NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004	2,495	170,784	13	NO
Year 2	2005	2,446	179,523	12	NO
Year 3	2006	2,755	182,035	14	NO
Year 4	2007	2,506	184,369	12	NO
Year 5	2008	2,589	184,669	13	NO
2020 Compliance Year - Process Water Deduction Eligibility					
2020		2,097	198,979	9	NO
NOTES:					

Cucamonga Valley Water District

SB X7-7 Table 4-C.3: Process Water Deduction Eligibility							
Criteria 3 Non-industrial use is equal to or less than 120 GPCD							
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	Industrial Water Use	Non-industrial Water Use	Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility							
Year 1	1995	42,030		42,030	132,882	282	NO
Year 2	1996	45,325		45,325	135,001	300	NO
Year 3	1997	47,086		47,086	136,874	307	NO
Year 4	1998	41,776		41,776	139,556	267	NO
Year 5	1999	49,306		49,306	143,175	307	NO
Year 6	2000	50,533		50,533	148,159	304	NO
Year 7	2001	47,990		47,990	152,221	281	NO
Year 8	2002	52,036		52,036	161,267	288	NO
Year 9	2003	51,408		51,408	166,359	276	NO
Year 10	2004	54,386		54,386	170,784	284	NO
Year 11	0	-		-	-		NO
Year 12	0	-		-	-		NO
Year 13	0	-		-	-		NO
Year 14	0	-		-	-		NO
Year 15	0	-		-	-		NO
5 Year Baseline - Process Water Deduction Eligibility							
Year 1	2004	54,386		54,386	170,784	284	NO
Year 2	2005	55,523		55,523	179,523	276	NO
Year 3	2006	57,794		57,794	182,035	283	NO
Year 4	2007	60,847		60,847	184,369	295	NO
Year 5	2008	57,525		57,525	184,669	278	NO
2020 Compliance Year - Process Water Deduction Eligiblity							
2020		46,010		46,010	198,979	206	NO
NOTES:							

Cucamonga Valley Water District

SB X7-7 Table 4-C.4: Process Water Deduction Eligibility

Criteria 4

Disadvantaged Community. A "Disadvantaged Community" (DAC) is a community with a median household income less than 80 percent of the statewide average.

SELECT ONE

"Disadvantaged Community" status was determined using one of the methods listed below:

☐ **1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/**

If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

☑ **2. 2020 Median Income**

California Median Household Income		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2020 Compliance Year - Process Water Deduction Eligibility				
2020	$80,440	$92,773	115%	NO

NOTES: Data obtained from data.census.gov/cedsci (California Business and Economy, Financial Characteristics)

Cucamonga Valley Water District

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1995	132,882	42,030	282
Year 2	1996	135,001	45,325	300
Year 3	1997	136,874	47,086	307
Year 4	1998	139,556	41,776	267
Year 5	1999	143,175	49,306	307
Year 6	2000	148,159	50,533	304
Year 7	2001	152,221	47,990	281
Year 8	2002	161,267	52,036	288
Year 9	2003	166,359	51,408	276
Year 10	2004	170,784	54,386	284
Year 11	0	-	-	
Year 12	0	-	-	
Year 13	0	-	-	
Year 14	0	-	-	
Year 15	0	-	-	
10-15 Year Average Baseline GPCD				**290**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2004	170,784	54,386	284
Year 2	2005	179,523	55,523	276
Year 3	2006	182,035	57,794	283
Year 4	2007	184,369	60,847	295
Year 5	2008	184,669	57,525	278
5 Year Average Baseline GPCD				**283**
2020 Compliance Year GPCD				
2020		198,979	46,010	**206**
NOTES:				

Cucamonga Valley Water District

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	290
5 Year Baseline GPCD	283
2020 Compliance Year GPCD	206
NOTES:	

Cucamonga Valley Water District

SB X7-7 Table 8: 2020 Compliance								
Actual 2020 GPCD	2020 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2020 GPCD *(Adjusted if applicable)*	**Did Supplier Achieve Targeted Reduction for 2020?**
		Enter "0" if Adjustment Not Used			TOTAL Adjustments	Adjusted 2020 GPCD		
		Extraordinary Events	Weather Normalization	Economic Adjustment				
206	261	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	-	206	206	**YES**

NOTES:

Fontana Water Company

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

Fontana Water Company

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

Fontana Water Company

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	229,041
NOTES:	

Fontana Water Company

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	39,445			-		-	**39,445**

*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

Fontana Water Company

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	GW + Local		
This water source is *(check one)* :			
☑	The supplier's own water source		
☐	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	29,418	-	29,418

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	IEUA + SBVMWD		
This water source is *(check one)* :			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	10,027		10,027

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment -*** *See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

Fontana Water Company

SB X7-7 Table 4-B: 2020 Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*									
2020 Compliance Year	**2020 Surface Reservoir Augmentation**					**2020 Groundwater Recharge**			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
	Volume Discharged from Reservoir for Distribution System Delivery[1]	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss[1]	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility[1,2]	Transmission/ Treatment Losses[1]	Recycled Volume Entering Distribution System from Groundwater Recharge	
			-		-			-	-

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] *Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

Fontana Water Company

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C: 2020 Process Water Deduction Eligibility (For use only by agencies that are deducting process water) Choose Only One	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

Fontana Water Company

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*				
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use				
2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	39,445		0%	NO
NOTES:				

Fontana Water Company

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 2)*

Criteria 2
Industrial water use is equal to or greater than 15 GPCD

2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		229,041	-	NO

NOTES:

Fontana Water Company

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.3: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 3)*

Criteria 3
Non-industrial use is equal to or less than 120 GPCD

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	39,445		39,445	229,041	154	NO

NOTES:

Fontana Water Company

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 4)*

Criteria 4

Disadvantaged Community. A “Disadvantaged Community” (DAC) is a community with a median household income less than 80 percent of the statewide average.

SELECT ONE

"Disadvantaged Community" status was determined using one of the methods listed below:

1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/

☐ If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

2. 2020 Median Income

	California Median Household Income*		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
☐	**2020**	**$75,235**		0%	YES

*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.

NOTES

Fontana Water Company

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water ***Fm SB X7-7 Table 4***	**2020 Population** ***Fm SB X7-7 Table 3***	**2020 GPCD**
39,445	229,041	**154**
NOTES:		

Fontana Water Company

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
154	-	-	-	-	154	176	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

Monte Vista Water District

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

Monte Vista Water District

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☑	**4. Other** DWR recommends pre-review
NOTES: Data from the Southern California Association of Governments was used to estimate 2020 population.	

Monte Vista Water District

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	57,787
NOTES:	

Monte Vista Water District

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	15,740	7,707		-		-	**8,033**

*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

Monte Vista Water District

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Chino Basin Groundwater

This water source is *(check one)* **:**

☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	8,197	-	8,197

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: Includes deliveries to the City of Chino Hills.

Monte Vista Water District

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment Complete one table for each source.			
Name of Source	Water Facilities Authority		
This water source is *(check one)* **:**			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	6,886		6,886

*[1] **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* *[2] **Meter Error Adjustment -** See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: Includes direct WFA deliveries to the City of Chino Hills. Excludes WFA deliveries for groundwater injection.

Monte Vista Water District

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment Complete one table for each source.			
Name of Source	San Antonio Water Company		
This water source is *(check one)* **:**			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	657		657

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

Monte Vista Water District

SB X7-7 Table 4-B: 2020 Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*									
2020 Compliance Year	**2020 Surface Reservoir Augmentation**					**2020 Groundwater Recharge**			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
	Volume Discharged from Reservoir for Distribution System Delivery[1]	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss[1]	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility[1,2]	Transmission/ Treatment Losses[1]	Recycled Volume Entering Distribution System from Groundwater Recharge	
			-		-			-	-

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] *Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

NOTES:

Monte Vista Water District

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C: 2020 Process Water Deduction Eligibility (For use only by agencies that are deducting process water) Choose Only One	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

Monte Vista Water District

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*

Criteria 1

Industrial water use is equal to or greater than 12% of gross water use

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	8,033		0%	NO

NOTES:

Monte Vista Water District

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 2)*				
Criteria 2 Industrial water use is equal to or greater than 15 GPCD				
2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		57,787	-	NO
NOTES:				

Monte Vista Water District

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.3: 2020 Process Water Deduction Eligibility

(For use only by agencies that are deducting process water using Criteria 3)

Criteria 3

Non-industrial use is equal to or less than 120 GPCD

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	8,033		8,033	57,787	124	NO

NOTES:

Monte Vista Water District

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 4)*

Criteria 4

Disadvantaged Community. A “Disadvantaged Community” (DAC) is a community with a median household income less than 80 percent of the statewide average.

SELECT ONE

"Disadvantaged Community" status was determined using one of the methods listed below:

1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/

☐ If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

2. 2020 Median Income

	California Median Household Income*		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
☐	**2020**	**$75,235**		0%	YES

*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.

NOTES

Monte Vista Water District

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water ***Fm SB X7-7 Table 4***	**2020 Population** ***Fm SB X7-7 Table 3***	**2020 GPCD**
8,033	57,787	**124**
NOTES:		

Monte Vista Water District

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
124	-	-	-	-	124	167	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

City of Ontario

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

City of Ontario

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☑	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES: Used service area boundary to approximate population determined by the Department of Finance for the City of Ontario.	

City of Ontario

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	178,409
NOTES:	

City of Ontario

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	**2020 Volume Into Distribution System** *This column will remain blank until SB X7-7 Table 4-A is completed.*	**2020 Deductions**					**2020 Gross Water Use**
		Exported Water *	**Change in Dist. System Storage*** (+/-)	**Indirect Recycled Water** *This column will remain blank until SB X7-7 Table 4-B is completed.*	**Water Delivered for Agricultural Use***	**Process Water** *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	32,109			-		-	**32,109**

*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

City of Ontario

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Chino Basin Groundwater

This water source is *(check one)* **:**

☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	18,395	-	18,395

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

City of Ontario

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	Water Facilities Authority

This water source is *(check one)* **:**

☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	6,513		6,513

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment -*** *See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Ontario

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment Complete one table for each source.			
Name of Source	Chino Basin Desalter Authority		
This water source is *(check one)* **:**			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	6,636		6,636

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Ontario

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	San Antonio Water Company

This water source is *(check one)* **:**

☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	565		565

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Ontario

SB X7-7 Table 4-B: 2020 Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*									
2020 Compliance Year	**2020 Surface Reservoir Augmentation**					**2020 Groundwater Recharge**			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
	Volume Discharged from Reservoir for Distribution System Delivery[1]	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss[1]	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility[1,2]	Transmission/ Treatment Losses[1]	Recycled Volume Entering Distribution System from Groundwater Recharge	
			-		-			-	-

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] *Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

City of Ontario

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C: 2020 Process Water Deduction Eligibility (For use only by agencies that are deducting process water) Choose Only One	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

City of Ontario

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*				
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use				
2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	32,109		0%	NO
NOTES:				

City of Ontario

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 2)*

Criteria 2
Industrial water use is equal to or greater than 15 GPCD

2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		178,409	-	NO

NOTES:

City of Ontario

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.3: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 3)*

Criteria 3
Non-industrial use is equal to or less than 120 GPCD

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	32,109		32,109	178,409	161	NO

NOTES:

City of Ontario

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility ***(For** use only by agencies that are deducting process water using Criteria 4)*

Criteria 4
Disadvantaged Community. A “Disadvantaged Community” (DAC) is a community with a median household income less than 80 percent of the statewide average.

SELECT ONE
"Disadvantaged Community" status was determined using one of the methods listed below:

1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/

☐ If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

2. 2020 Median Income

☐

California Median Household Income*		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2020	**$75,235**		0%	YES

*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.

NOTES

City of Ontario

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water ***Fm SB X7-7 Table 4***	**2020 Population** ***Fm SB X7-7 Table 3***	**2020 GPCD**
32,109	178,409	**161**
NOTES:		

City of Ontario

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
161	-	-	-	-	161	196	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

City of Upland

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:
Conversion Rate to Gallons:
325851
Conversion Rate to Gallons per Day:
892.7424658

City of Upland

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☑	**4. Other** DWR recommends pre-review
NOTES: Data developed by SCAG and provided by IEUA. Similar data as DOF.	

City of Upland

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	78,383
NOTES:	

City of Upland

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	18,431			-		-	**18,431**
*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.							
NOTES:							

City of Upland

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment Complete one table for each source.			
Name of Source	Purchased or Imported Water		
This water source is *(check one)* **:**			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	3,395	-	3,395

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment Complete one table for each source.			
Name of Source	Local Surface Water		
This water source is *(check one)* **:**			
☑	The supplier's own water source		
☐	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	3,365		3,365

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment -*** *See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Upland

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment Complete one table for each source.			
Name of Source	Groundwater		
This water source is *(check one)* **:**			
☑	The supplier's own water source		
☐	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	6,120		6,120

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment Complete one table for each source.			
Name of Source	Purchased groundwater		
This water source is *(check one)* **:**			
☐	The supplier's own water source		
☑	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	5,551		5,551

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

City of Upland

SB X7-7 Table 4-B: 2020 Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*									
2020 Compliance Year	**2020 Surface Reservoir Augmentation**					**2020 Groundwater Recharge**			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
	Volume Discharged from Reservoir for Distribution System Delivery[1]	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss[1]	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility[1,2]	Transmission/ Treatment Losses[1]	Recycled Volume Entering Distribution System from Groundwater Recharge	
			-		-			-	-

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] *Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

Although indirect recycled water use was credited to Upland by IEUA, the amount was not needed to meet its target.

City of Upland

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C: 2020 Process Water Deduction Eligibility (For use only by agencies that are deducting process water) Choose Only One	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

City of Upland

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*				
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use				
2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	18,431		0%	NO
NOTES:				

City of Upland

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 2)*

Criteria 2
Industrial water use is equal to or greater than 15 GPCD

2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		78,383	-	NO

NOTES:

City of Upland

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.3: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 3)*

Criteria 3
Non-industrial use is equal to or less than 120 GPCD

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	18,431		18,431	78,383	210	NO

NOTES:

City of Upland

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 4)*

Criteria 4
Disadvantaged Community. A "Disadvantaged Community" (DAC) is a community with a median household income less than 80 percent of the statewide average.

SELECT ONE
"Disadvantaged Community" status was determined using one of the methods listed below:

1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/

☐ If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

2. 2020 Median Income

	California Median Household Income*		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
☐	**2020**	**$75,235**		0%	YES

*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.

NOTES

City of Upland

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water ***Fm SB X7-7 Table 4***	**2020 Population** ***Fm SB X7-7 Table 3***	**2020 GPCD**
18,431	78,383	**210**

City of Upland

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
210	-	-	-	-	210	220	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

Appendix G

Addendum to the 2015 UWMP

ADDENDUM TO THE 2015 URBAN WATER MANAGEMENT PLAN

Addendum prepared by Kennedy Jenks Consultants

June 2021

2020 UWMP Appendix G
& 2015 UWMP Appendix P

Reduced Delta Reliance Reporting

6/29/2021

Inland Empire Utilities Agency Reduced Delta Reliance Reporting

G.1 Background

IEUA is an urban water supplier and a member agency of MWD. MWD provides IEUA with imported water supplies, which IEUA in turn distributes on a wholesale basis to its retail water purveyors. MWD is a contractor on the State Water Project (SWP) and, due to water quality considerations, all imported water supplies IEUA receives from MWD originate from the SWP system. The SWP system runs from Lake Oroville in Northern California to Southern California, crossing the Sacramento-San Joaquin Delta (Delta) along the way. MWD and its member agencies have made investments into water supply and demand management to regionally reduce impacts on the Delta. These investments bring regional reliability and reduced Delta reliance that make it infeasible for individual MWD member agencies to determine their individual Delta reliance.

As a recipient of imported water from the SWP delivered via MWD, IEUA may indirectly receive water through a proposed covered action, such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta. Through this appendix, IEUA is providing information in its 2015 and 2020 UWMPs that may be used in the covered action process, to demonstrate consistency with Delta Plan Policy WR P1, *Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance* (WR P1) [California Code of Regulations (CCR), Title 23, § 5003].

The Delta Plan is a comprehensive, long-term resource management plan for the Sacramento-San Joaquin Delta (Delta) that was developed as part of the Delta Reform Act of 2009 (Water code section 85000 et seq) and includes both regulatory policies and recommendations, aimed at promoting a healthy Delta ecosystem. Delta Plan Policy WR P1 is one of 14 regulatory policies in the Delta Plan. WR P1 identifies UWMPs as the tool to demonstrate consistency with state policy to reduce reliance on the Delta for any Supplier that is participating in or carrying out a proposed covered action or receiving Delta water from a proposed covered action.

Within the supplier's UWMP, information should be provided that can be used to demonstrate consistency with this policy. Section (c)(1) of WR P1 states that suppliers that have (A) completed an urban water management plan, (B) implemented the efficiency measures in that plan, and (C) shown a measurable reduction in Delta reliance and improvement in regional self-reliance in the plan, are contributing to reduced reliance on the Delta and are therefore consistent with WR P1 [CCR, Title 23, § 5003(c)(1)].

The analysis and documentation provided below include all elements described in WR P1(c)(1) and are included in IEUA's 2015 and 2020 UWMP to support a certification of consistency in the case of a future covered action.

G.2 Demonstration of Reduced Reliance

The methodology used to determine IEUA's reduced Delta reliance and improved regional self-reliance is consistent with the approach detailed in DWR's UWMP Guidebook Appendix C, including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources. Some of the key assumptions underlying IEUA's demonstration of reduced reliance includes:

- All data were obtained from the current 2020 UWMP or previously adopted UWMPs and represent average or normal water year conditions.

- All analyses were conducted at the IEUA service area level. Demands on IEUA are the total demands from all its retail agencies. Supplies are the total supplies IEUA manages, which are imported water from MWD and recycled water from its regional water recycling plants.

- No projects or programs that are described in the UWMPs as "Projects Under Development" were included in the accounting of supplies.

G.3 Summary of Expected Outcomes for Reduced Reliance on the Delta

As stated in WR P1(c)(1), the policy requires that, commencing in 2015, UWMPs include expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta.

It is important to note that MWD has prepared a detailed analysis that demonstrates the consistency with the Delta Plan Policy in its 2020 UWMP on a region-wide scale that includes its Member Agencies (MWD 2020 UWMP, Appendix 11). From its 2010 baseline, both long-term Regional Self-Reliance and Reduced Reliance on Supplies from the Delta are expected to increase over time. IEUA has adopted MWD's calculation of Reduced Reliance on Supplies from the Delta due to the infeasibility of separating out the delta supplies that IEUA receives from MWD (see Section G.6 and G.7 for details).

IEUA will report its own expected outcomes for Regional Self-Reliance in the following sections (G.4 and G.5). These expected outcomes use the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 (Guidebook Appendix C), finalized on March 29, 2021.

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for IEUA's regional self-reliance and MWD's regional reduction in reliance on Delta water supplies. The results show that IEUA is measurably improving regional self-reliance and MWD and its member agencies are reducing reliance on Delta supplies, both as an amount of water used and as a percentage of water used.

- Near-term (2025) – IEUA's normal water regional self-reliance is expected to increase by 25 thousand acre-feet (TAF) from the 2010 baseline; this represents an increase of about 10 percent of 2025 normal water year demands (Table G-2).

- Long-term (2045) – IEUA's normal water regional self-reliance is expected to increase by 50 TAF from the 2010 baseline; this represents an increase of about 17 percent of 2045 normal water year demands (Table G-2).

- Near-term (2025) – MWD's normal reliance on water supplies from the Delta Watershed is expected to decrease by 300 thousand acre-feet (TAF) from the 2010 baseline; this represents a decrease of about 3 percent of 2025 normal water year demands (Table G-3).

- Long-term (2045) – MWD’s normal reliance on water supplies from the Delta Watershed is expected to decrease by 314 thousand acre-feet (TAF) from the 2010 baseline; this represents a decrease of about 5 percent of 2045 normal water year demands (Table G-3).

G.4 Baseline and Calculation of Service Area Water Demands

In order to calculate the expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C.

Table G-1 shows the total service area water demands for IEUA for 2010 through 2045. These water demands include recycled water and imported water demand on IEUA from its retail agencies. The table also shows reported water use efficiency and calculates the total service area water demands without water use efficiency.

The data sources for the values in this table and calculations are explained below.

Service Area Demands with Water Use Efficiency Accounted For:

- Baseline (2010) value: The sum of the imported water and recycled water demands, as reported in IEUA’s 2010 UWMP, Tables 3-10 and 3-15.

- 2015 value: The sum of the imported water and recycled water demands on IEUA, as reported in IEUA’s 2015 UWMP, Table 2-8: IEUA Total Water Demands.

- 2020-2045 values: The sum of imported water and recycled water demands, from IEUA’s 2020 UWMP, Table 2-4: Total Water Use (Potable and Non-Potable).

Reported Water Use Efficiency:

- Baseline (2010) value: No water use efficiency value is estimated to establish a conservative baseline.

- 2015 value: From IEUA’s 2015 UWMP, Table 3-1. Only the 2015 value for WUE was selected.

- 2020 value: The volume of savings over the lifetime of water use efficiency measures implemented during FY 19/20, as reported in IEUA’s Annual UWE FY19/20 report and detailed in Section 8.8 of IEUA’s 2020 UWMP.

- 2025-2045 values: Projected water use efficiency savings, from IEUA’s 2020 UWMP, Table 7-2.

The Service Area Water Demands without Water Use Efficiency Accounted For is the sum of the two volumes above for each year.

G.5 Calculation of Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1(c)(1) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table G-2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in Table G-2 represent efforts to improve regional self-reliance for the IEUA service area, focused only on the supplies IEUA manages, which are water use efficiency and water recycling. Supporting narratives and documentation for the all the data shown in the table are provided below:

Water Use Efficiency

The water use efficiency information shown in Table G-2 is taken directly from Table G-1. It is now reflected as a supply contributing to regional self-reliance.

Water Recycling

The water recycling values shown in Table G-2 are the recycled water supplies to meet the recycled water portion of the projected “service area water demands with water use efficiency accounted for” shown in Table G-1. These values come from IEUA’s 2010 UWMP Table 3-15, IEUA’s 2015 UWMP Table 2-8, and IEUA’s 2020 UWMP Table 2-4. A description on these water supplies can be found in Section 5.4 – Current Recycled Water Uses in IEUA’s 2020 UWMP.

The results shown in Table G-2 demonstrate that IEUA is improving its regional self-reliance, since the volume of water supplies contributing to regional self-reliance are projected to increase over time. In the near term (2025), the expected outcome for normal water year regional self-reliance increases by over 25,000 AF from the 2010 baseline; this represents an increase of about 10 percent of 2025 normal water year demands. In the long term (2045), normal water year regional self-reliance is expected to increase by more than 50,000 AF from the 2010 baseline.

G.6 Calculation of Reliance on Water Supplies from the Delta Watershed

WR P1(c)(1) requires that water suppliers report the expected outcomes for measurable reductions in supplies from the Delta watershed either as an amount or as a percentage. This analysis provides both calculations.

Although IEUA is currently a SWP-exclusive MWD member agency, it is infeasible to individually account for the independent impact on the Delta. IEUA participates, through MWD, in various water supply investment and demand management programs that reduce reliance on the Delta. Reliance on water supplies from the Delta are taken from MWD’s Reduced Delta Reliance assessment (MWD 2020 UWMP, Appendix 11).

Regional reliance on supplies from the Delta watershed are expected to decrease by 314 TAF over the 2010 baseline, a decrease of about 5.2% of 2045 demands. Increased regional self-reliance primarily comes from water use efficiency, conjunctive use projects, water recycling, and local/regional water supply and storage projects. The water supply accounting completed by MWD does not include any supplies from potential future covered actions.

G.7 Infeasibility of Accounting Supplies from the Delta Watershed for Metropolitan's Member Agencies and their Customers

Metropolitan's service area, as a whole, reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies, and regional and local demand management measures. Metropolitan's member agencies coordinate reliance on the Delta through their membership in Metropolitan, a regional cooperative providing wholesale water service to its 26 member agencies. Accordingly, regional reliance on the Delta can only be measured regionally—not by individual Metropolitan member agencies and not by the customers of those member agencies.

Metropolitan's member agencies, and those agencies' customers, indirectly reduce reliance on the Delta through their collective efforts as a cooperative. Metropolitan's member agencies do not control the amount of Delta water they receive from Metropolitan. Metropolitan manages a statewide integrated conveyance system consisting of its participation in the State Water Project (SWP), its Colorado River Aqueduct (CRA) including Colorado River water resources, programs and water exchanges, and its regional storage portfolio. Along with the SWP, CRA, storage programs, and Metropolitan's conveyance and distribution facilities, demand management programs increase the future reliability of water resources for the region. In addition, demand management programs provide system-wide benefits by decreasing the demand for imported water, which helps to decrease the burden on Metropolitan's infrastructure and reduce system costs, and free up conveyance capacity to the benefit of all member agencies.

Metropolitan's costs are funded almost entirely from its service area, with the exception of grants and other assistance from government programs. Most of Metropolitan's revenues are collected directly from its member agencies. Properties within Metropolitan's service area pay a property tax that currently provides approximately 8 percent of the fiscal year 2021 annual budgeted revenues. The rest of Metropolitan's costs are funded through rates and charges paid by Metropolitan's member agencies for the wholesale services it provides to them. Thus, Metropolitan's member agencies fund nearly all operations Metropolitan undertakes to reduce reliance on the Delta, including Colorado River Programs, storage facilities, Local Resources Programs and Conservation Programs within Metropolitan's service area.

Because of the integrated nature of Metropolitan's systems and operations, and the collective nature of Metropolitan's regional efforts, it is infeasible to quantify each of Metropolitan member agencies' individual reliance on the Delta. It is infeasible to attempt to segregate an entity and a system that were designed to work as an integrated regional cooperative.

In addition to the member agencies funding Metropolitan's regional efforts, they also invest in their own local programs to reduce their reliance on any imported water. Moreover, the customers of those member agencies may also invest in their own local programs to reduce water demand. However, to the extent those efforts result in reduction of demands on Metropolitan, that reduction may not equate to a like reduction of reliance on the Delta. Demands on Metropolitan are not commensurate with demands on the Delta because most of Metropolitan member agencies receive blended resources from Metropolitan as determined by Metropolitan—not the individual member agency—and for most member agencies, the blend varies from month-to-month and year-to-year due to hydrology, operational constraints, use of storage and other factors.

The accounting of regional investments that contribute to reduced reliance on supplies from the Delta watershed is straightforward to calculate and report at the regional aggregate level. However, any similar accounting is infeasible for the individual member agencies or their customers. As described above, the region (through Metropolitan) makes significant investments in projects, programs and other resources that reduce reliance on the Delta. In fact, all of Metropolitan's investments in Colorado River supplies, groundwater and surface storage, local resources development and demand management measures that reduce reliance on the Delta are collectively funded by revenues generated from the member agencies through rates and charges.

Metropolitan's revenues cannot be matched to the demands or supply production history of an individual agency, or consistently across the agencies within the service area. Each project or program funded by the region has a different online date, useful life, incentive rate and structure, and production schedule. It is infeasible to account for all these things over the life of each project or program and provide a nexus to each member agency's contributions to Metropolitan's revenue stream over time. Accounting at the regional level allows for the incorporation of the local supplies and water use efficiency programs done by member agencies and their customers through both the regional programs and through their own specific local programs. As shown above, despite the infeasibility of accounting reduced Delta reliance below the regional level, Metropolitan's member agencies and their customers have together made substantial contributions to the region's reduced reliance.

Colorado River Programs

As a regional cooperative of member agencies, Metropolitan invests in programs to ensure the continued reliability and sustainability of Colorado River supplies. Metropolitan was established to obtain an allotment of Colorado River water, and its first mission was to construct and operate the CRA. The CRA consists of five pumping plants, 450 miles of high voltage power lines, one electric substation, four regulating reservoirs, and 242 miles of aqueducts, siphons, canals, conduits and pipelines terminating at Lake Mathews in Riverside County. Metropolitan owns, operates, and manages the CRA. Metropolitan is responsible for operating, maintaining, rehabilitating, and repairing the CRA, and is responsible for obtaining and scheduling energy resources adequate to power pumps at the CRA's five pumping stations.

Colorado River supplies include Metropolitan's basic Colorado River apportionment, along with supplies that result from existing and committed programs, including supplies from the Imperial Irrigation District (IID)-Metropolitan Conservation Program, the implementation of the Quantification Settlement Agreement (QSA) and related agreements, and the exchange agreement with San Diego County Water Authority (SDCWA). The QSA established the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. Since the QSA, additional programs have been implemented to increase Metropolitan's CRA supplies. These include the PVID Land Management, Crop Rotation, and Water Supply Program, as well as the Lower Colorado River Water Supply Project. The 2007 Interim Guidelines provided for the coordinated operation of Lake Powell and Lake Mead, as well as the Intentionally Created Surplus (ICS) program that allows Metropolitan to store water in Lake Mead.

IEUA has emergency service connections to the MWD's Upper Feeder, which includes CRA supplies. However, these connections are not currently utilized due to water quality concerns.

Storage Investments/Facilities

Surface and groundwater storage are critical elements of Southern California's water resources strategy and help Metropolitan reduce its reliance on the Delta. Because California experiences dramatic swings in weather and hydrology, storage is important to regulate those swings and mitigate possible supply shortages. Surface and groundwater storage provide a means of storing water during normal and wet years for later use during dry years, when imported supplies are limited. The Metropolitan system, for purposes of meeting demands during times of shortage, regulating system flows, and ensuring system reliability in the event of a system outage, provides over 1,000,000 acre-feet of system storage capacity. Diamond Valley Lake provides 810,000 acre-feet of that storage capacity, effectively doubling Southern California's previous surface water storage capacity. Other existing imported water storage available to the region consists of Metropolitan's raw water reservoirs, a share of the SWP's raw water reservoirs in and near the service area, and the portion of the groundwater basins used for conjunctive-use storage.

Since the early twentieth century, DWR and Metropolitan have constructed surface water reservoirs to meet emergency, drought/seasonal, and regulatory water needs for Southern California. These reservoirs include Pyramid Lake, Castaic Lake, Elderberry Forebay, Silverwood Lake, Lake Perris, Lake Skinner, Lake Mathews, Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, Orange County Reservoir, and Metropolitan's Diamond Valley Lake (DVL). Some reservoirs such as Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, and Orange County Reservoir, which have a total combined capacity of about 3,500 AF, are used solely for regulating purposes. The total gross storage capacity for the larger remaining reservoirs is 1,757,600 AF. However, not all of the gross storage capacity is available to Metropolitan; dead storage and storage allocated to others reduce the amount of storage that is available to Metropolitan to 1,665,200 AF.

Conjunctive use of the aquifers offers another important source of dry year supplies. Unused storage in Southern California groundwater basins can be used to optimize imported water supplies, and the development of groundwater storage projects allows effective management and regulation of the region's major imported supplies from the Colorado River and SWP. Over the years, Metropolitan has implemented conjunctive use through various programs in the service area; the following table lists the groundwater conjunctive use programs that have been developed in the region.

MWD Table 1: Metropolitan Groundwater Conjunctive Use Programs

Program	Metropolitan Agreement Partners	Program Term	Max Storage AF	Dry-Year Yield AF/Yr
Long Beach Conjunctive Use Storage Project (Central Basin)	Long Beach	June 2002-2027	13,000	4,300
Foothill Area Groundwater Storage Program (Monkhill/ Raymond Basin)	Foothill MWD	February 2003-2028	9,000	3,000
Orange County Groundwater Conjunctive Use Program	MWDOC OCWD	June 2003-2028	66,000+	22,000
Chino Basin Conjunctive Use Programs	IEUA TVMWD Watermaster	June 2003-2028	100,000	33,000
Live Oak Basin Conjunctive Use Project (Six Basins)	TVMWD City of La Verne	October 2002-2027	3,000	1,000
City of Compton Conjunctive Use Project (Central Basin)	Compton	February 2005-2030	2,289	763
Long Beach Conjunctive Use Program Expansion in Lakewood (Central Basin)	Long Beach	July 2005-2030	3,600	1,200
Upper Claremont Basin Groundwater Storage Program (Six Basins)	TVMWD	Sept. 2005- 2030	3,000	1,000
Elsinore Basin Conjunctive Use Storage Program	Western MWD Elsinore Valley MWD	May 2008- 2033	12,000	4,000
TOTAL			**211,889**	**70,263**

Metropolitan Demand Management Programs

Demand management costs are Metropolitan's expenditures for funding local water resource development programs and water conservation programs. These Demand Management Programs incentivize the development of local water supplies and the conservation of water to reduce the need to import water to deliver to Metropolitan's member agencies. These programs are implemented below the delivery points between Metropolitan's and its member agencies' distribution systems and, as such, do not add any water to Metropolitan's supplies. Rather, the effect of these downstream programs is to produce a local supply of water for the local agencies and to reduce demands by member agencies for water imported through Metropolitan's system. The following discussions outline how Metropolitan funds local resources and conservation programs for the benefit of all of its member agencies and the entire Metropolitan service area. Notably, the history of demand management by Metropolitan's member agencies and the local agencies that purchase water from Metropolitan's members has spanned more than four decades. The significant history of the programs is another reason it would be difficult to attempt to assign a portion of such funding to any one individual member agency.

Section 1: Local Resources Programs

In 1982, Metropolitan began providing financial incentives to its member agencies to develop new local supplies to assist in meeting the region’s water needs. Because of Metropolitan’s regional distribution system, these programs benefit all member agencies regardless of project location because they help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan’s infrastructure, reduce system costs and free up conveyance capacity to the benefit of all the agencies that rely on water from Metropolitan.

For example, the Groundwater Replenishment System (GWRS) operated by the Orange County Water District is the world’s largest water purification system for indirect potable reuse. It was funded, in part, by Metropolitan’s member agencies through the Local Resources Program. Annually, the GWRS produces approximately 103,000 acre-feet of reliable, locally controlled, drought-proof supply of high-quality water to recharge the Orange County Groundwater Basin and protect it from seawater intrusion. The GWRS is a premier example of a regional project that significantly reduced the need to utilize imported water for groundwater replenishment in Metropolitan’s service area, increasing regional and local supply reliability and reducing the region’s reliance on imported supplies, including supplies from the State Water Project.

Metropolitan’s local resource programs have evolved through the years to better assist Metropolitan’s member agencies in increasing local supply production. The following is a description and history of the local supply incentive programs.

Local Projects Program

In 1982, Metropolitan initiated the Local Projects Program (LPP), which provided funding to member agencies to facilitate the development of recycled water projects. Under this approach, Metropolitan contributed a negotiated up-front funding amount to help finance project capital costs. Participating member agencies were obligated to reimburse Metropolitan over time. In 1986, the LPP was revised, changing the up-front funding approach to an incentive-based approach. Metropolitan contributed an amount equal to the avoided State Water Project pumping costs for each acre-foot of recycled water delivered to end-use consumers. This funding incentive was based on the premise that local projects resulted in the reduction of water imported from the Delta and the associated pumping cost. The incentive amount varied from year to year depending on the actual variable power cost paid for State Water Project imports. In 1990, Metropolitan’s Board increased the LPP contribution to a fixed rate of $154 per acre-foot, which was calculated based on Metropolitan’s avoided capital and operational costs to convey, treat, and distribute water, and included considerations of reliability and service area demands.

Groundwater Recovery Program

The drought of the early 1990s sparked the need to develop additional local water resources, aside from recycled water, to meet regional demand and increase regional water supply reliability. In 1991, Metropolitan conducted the Brackish Groundwater Reclamation Study which determined that large amounts of degraded groundwater in the region were not being utilized. Subsequently, the Groundwater Recovery Program (GRP) was established to assist the recovery of otherwise unusable groundwater degraded by minerals and other contaminants, provide access to the storage assets of the degraded groundwater, and maintain the quality of groundwater resources by reducing the spread of degraded plumes.

Local Resources Program

In 1995, Metropolitan's Board adopted the Local Resources Program (LRP), which combined the LPP and GRP into one program. The Board allowed for existing LPP agreements with a fixed incentive rate to convert to the sliding scale up to $250 per acre-foot, similar to GRP incentive terms. Those agreements that were converted to LRP are known as "LRP Conversions."

Competitive Local Projects Program

In 1998, the Competitive Local Resources Program (Competitive Program) was established. The Competitive Program encouraged the development of recycled water and recovered groundwater through a process that emphasized cost-efficiency to Metropolitan, timing new production according to regional need while minimizing program administration cost. Under the Competitive Program, agencies requested an incentive rate up to $250 per acre-foot of production over 25 years under a Request for Proposals (RFP) for the development of up to 53,000 acre-feet per year of new water recycling and groundwater recovery projects. In 2003, a second RFP was issued for the development of an additional 65,000 acre-feet of new recycled water and recovered groundwater projects through the LRP.

Seawater Desalination Program

Metropolitan established the Seawater Desalination Program (SDP) in 2001 to provide financial incentives to member agencies for the development of seawater desalination projects. In 2014, seawater desalination projects became eligible for funding under the LRP, and the SDP was ended.

2007 Local Resources Program

In 2006, a task force comprised of member agency representatives was formed to identify and recommend program improvements to the LRP. As a result of the task force process, the 2007 LRP was established with a goal of 174,000 acre-feet per year of additional local water resource development. The new program allowed for an open application process and eliminated the previous competitive process. This program offered sliding scale incentives of up to $250 per acre-foot, calculated annually based on a member agency's actual local resource project costs exceeding Metropolitan's prevailing water rate.

2014 Local Resources Program

A series of workgroup meetings with member agencies was held to identify the reasons why there was a lack of new LRP applications coming into the program. The main constraint identified by the member agencies was that the $250 per acre-foot was not providing enough of an incentive for developing new projects due to higher construction costs to meet water quality requirements and to develop the infrastructure to reach end-use consumers located further from treatment plants. As a result, in 2014, the Board authorized an increase in the maximum incentive amount, provided alternative payment structures, included onsite retrofit costs and reimbursable services as part of the LRP, and added eligibility for seawater desalination projects. The current LRP incentive payment options are structured as follows:

- Option 1 – Sliding scale incentive up to $340/AF for a 25-year agreement term
- Option 2 – Sliding scale incentive up to $475/AF for a 15-year agreement term
- Option 3 – Fixed incentive up to $305/AF for a 25-year agreement term

On-site Retrofit Programs

In 2014, Metropolitan's Board also approved the On-site Retrofit Pilot Program which provided financial incentives to public or private entities toward the cost of small-scale improvements to their existing irrigation and industrial systems to allow connection to existing recycled water pipelines. The On-site Retrofit Pilot Program helped reduce recycled water retrofit costs to the end-use consumer which is a key constraint that limited recycled water LRP projects from reaching full production capacity. The program incentive was equal to the actual eligible costs of the on-site retrofit, or $975 per acre-foot of up-front cost, which equates to $195 per acre-foot for an estimated five years of water savings ($195/AF x 5 years) multiplied by the average annual water use in previous three years, whichever is less. The Pilot Program lasted two years and was successful in meeting its goal of accelerating the use of recycled water.

In 2016, Metropolitan's Board authorized the On-site Retrofit Program (ORP), with an additional budget of $10 million. This program encompassed lessons learned from the Pilot Program and feedback from member agencies to make the program more streamlined and improve its efficiency. As of fiscal year 2019/20, the ORP has successfully converted 440 sites, increasing the use of recycled water by 12,691 acre-feet per year.

Stormwater Pilot Programs

In 2019, Metropolitan's Board authorized both the Stormwater for Direct Use Pilot Program and a Stormwater for Recharge Pilot Program to study the feasibility of reusing stormwater to help meet regional demands in Southern California. These pilot programs are intended to encourage the development, monitoring, and study of new and existing stormwater projects by providing financial incentives for their construction/retrofit and monitoring/reporting costs. These pilot programs will help evaluate the potential benefits delivered by stormwater capture projects and provide a basis for potential future funding approaches. Metropolitan's Board authorized a total of $12.5 million for the stormwater pilot programs ($5 million for the District Use Pilot and $7.5 million for the Recharge Pilot).

Current Status and Results of Metropolitan's Local Resource Programs

Today, nearly one-half of the total recycled water and groundwater recovery production in the region has been developed with an incentive from one or more of Metropolitan's local resource programs. During fiscal year 2020, Metropolitan provided about $13 million for production of 71,000 acre-feet of recycled water for non-potable and indirect potable uses. Metropolitan provided about $4 million to support projects that produced about 50,000 acre-feet of recovered groundwater for municipal use. Since 1982, Metropolitan has invested $680 million to fund 85 recycled water projects and 27 groundwater recovery projects that have produced a cumulative total of about 4 million acre-feet.

<u>Conservation Programs</u>

Metropolitan's regional conservation programs and approaches have a long history. Decades ago, Metropolitan recognized that demand management at the consumer level would be an important part of balancing regional supplies and demands. Water conservation efforts were seen as a way to reduce the need for imported supplies and offset the need to transport or store additional water into or within the Metropolitan service area. The actual conservation of water takes place at the retail consumer level. Regional conservation approaches have proven to be effective at reaching retail consumers throughout Metropolitan's service area and successfully implementing water saving devices, programs and practices. Through the pooling of funding by Metropolitan's member agencies, Metropolitan is able to engage in regional campaigns with wide-reaching impact. Regional investments in demand management programs, of which conservation is a key part along with local supply programs, benefit all member agencies regardless of project location. These programs help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan's infrastructure, reduce system costs, and free up conveyance capacity to the benefit of all member agencies.

Incentive-Based Conservation Programs

Conservation Credits Program

In 1988, Metropolitan's Board approved the Water Conservation Credits Program (Credits Program). The Credits Program is similar in concept to the Local Projects Program (LPP). The purpose of the Credits Program is to encourage local water agencies to implement effective water conservation projects through the use of financial incentives. The Credits Program provides financial assistance for water conservation projects that reduce demands on Metropolitan's imported water supplies and require Metropolitan's assistance to be financially feasible.

Initially, the Credits Program provided 50 percent of a member agency's program cost, up to a maximum of $75 per acre-foot of estimated water savings. The $75 Base Conservation Rate was established based Metropolitan's avoided cost of pumping SWP supplies. The Base Conservation Rate has been revisited by Metropolitan's Board and revised twice since 1988, from $75 to $154 per acre-foot in 1990 and from $154 to $195 per acre-foot in 2005.

In fiscal year 2020 Metropolitan processed more than 30,400 rebate applications totaling $18.9 million.

Member Agency Administered Program

Some member agencies also have unique programs within their service areas that provide local rebates that may differ from Metropolitan's regional program. Metropolitan continues to support these local efforts through a member agency administered funding program that adheres to the same funding guidelines as the Credits Program. The Member Agency Administered Program allows member agencies to receive funding for local conservation efforts that supplement, but do not duplicate, the rebates offered through Metropolitan's regional rebate program.

Water Savings Incentive Program

There are numerous commercial entities and industries within Metropolitan's service area that pursue unique savings opportunities that do not fall within the general rebate programs that Metropolitan provides. In 2012, Metropolitan designed the Water Savings Incentive Program (WSIP) to target these unique commercial and industrial projects. In addition to rebates for devices, under this program, Metropolitan provides financial incentives to businesses and industries that created their own custom water efficiency projects. Qualifying custom projects can receive funding for permanent water efficiency changes that result in reduced potable demand.

Non-Incentive Conservation Programs

In addition to its incentive-based conservation programs, Metropolitan also undertakes additional efforts throughout its service area that help achieve water savings without the use of rebates. Metropolitan's non-incentive conservation efforts include:

- residential and professional water efficient landscape training classes
- water audits for large landscapes
- research, development and studies of new water saving technologies
- advertising and outreach campaigns
- community outreach and education programs
- advocacy for legislation, codes, and standards that lead to increased water savings

Current Status and Results of Metropolitan's Conservation Programs

Since 1990, Metropolitan has invested $824 million in conservation rebates that have resulted in a cumulative savings of 3.27 million acre-feet of water. These investments include $450 million in turf removal and other rebates during the last drought which resulted in 175 million square feet of lawn turf removed. During fiscal year 2020, 1.06 million acre-feet of water is estimated to have been conserved. This annual total includes Metropolitan's Conservation Credits Program; code-based conservation achieved through Metropolitan-sponsored legislation; building plumbing codes and ordinances; reduced consumption resulting from changes in water pricing; and pre-1990 device retrofits.

Infeasibility of Accounting Regional Investments in Reduced Reliance Below the Regional Level

The accounting of regional investments that contribute to reduced reliance on supplies from the Delta watershed is straightforward to calculate and report at the regional aggregate level. However, any similar accounting is infeasible for the individual member agencies or their customers. As described above, the region (through Metropolitan) makes significant investments in projects, programs and other resources that reduce reliance on the Delta. In fact, all of Metropolitan's investments in Colorado River supplies, groundwater and surface storage, local resources development and demand management measures that reduce reliance on the Delta are collectively funded by revenues generated from the member agencies through rates and charges.

Metropolitan's revenues cannot be matched to the demands or supply production history of an individual agency, or consistently across the agencies within the service area. Each project or program funded by the region has a different online date, useful life, incentive rate and structure, and production schedule. It is infeasible to account for all these things over the life of each project or program and provide a nexus to each member agency's contributions to Metropolitan's revenue stream over time. Accounting at the regional level allows for the incorporation of the local supplies and water use efficiency programs done by member agencies and their customers through both the regional programs and through their own specific local programs. As shown above, despite the infeasibility of accounting reduced Delta reliance below the regional level, Metropolitan's member agencies and their customers have together made substantial contributions to the region's reduced reliance.

G.8 2015 UWMP Appendix P

The information contained in this Appendix G is also intended to be a new Appendix P attached to IEUA's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). IEUA provided notice of the availability of the draft 2020 UWMP (including this Appendix G which will also be a new Appendix P to its 2015 UWMP) and WSCP and the public hearing to consider adoption of both plans and the addendum to the 2015 UWMP in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The notice of availability of the documents was sent to IEUA's member agencies, as well as cities and counties in IEUA service area. In addition, a public notice advertising the public hearing in English was published in the Inland Valley Daily Bulletin. The notification in English language newspapers was published on 17 May and 24 May 2021. Copies of: (1) the notification letter sent to the member agencies, cities and counties in IEUA service area, and (2) the notice published in the newspapers are included in the 2020 UWMP Appendix E.

Thus, this Appendix G to IEUA's 2020 UWMP, which was adopted with IEUA's 2020 UWMP, will also be recognized and treated as Appendix P to IEUA's 2015 UWMP. IEUA held the public hearing for the draft 2020 UWMP, draft Appendix G as an addendum to the 2015 UWMP, and draft WSCP on June 16, 2021, at the Board of Directors meeting, held online due to COVID-19 concerns. On June 16, IEUA's Board determined that the 2020 UWMP and the WSCP accurately represent the water resources plan for IEUA's service area. IEUA's Board determined that Appendix G to the 2020 UWMP and Appendix P to the 2015 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003), which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolution No. 2021-06-10, the Board adopted the 2020 UWMP, Appendix G as an addendum to the 2015 UWMP, and the WSCP and authorized their submittal to the State of California. Copies of Resolution No. 2021-06-10 is included in the 2020 UWMP Appendix D.

Table G-1: Calculation of IEUA Service Area Water Demands Without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For*	79,440	92,325	96,934	113,280	117,752	121,438	126,072	126,664
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline	-	1,975	3,292	9,788	11,984	17,257	22,570	27,802
Service Area Water Demands without Water Use Efficiency Accounted For	79,440	94,300	100,226	123,068	129,736	138,695	148,642	154,466

*Demands include imported and recycled water, as found in 2020 UWMP Table 4-3W

Table G-2: Calculation of IEUA Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Use Efficiency	-	1,975	3,292	9,788	11,984	17,257	22,570	27,802
Water Recycling	24,506	33,419	30,495	40,495	42,697	44,122	46,504	46,844
Stormwater Capture and Use	-	-	-	-	-	-	-	-
Advanced Water Technologies	-	-	-	-	-	-	-	-
Conjunctive Use Projects	-	-	-	-	-	-	-	-
Local and Regional Water Supply and Storage Projects	-	-	-	-	-	-	-	-
Other Programs and Projects the Contribute to Regional Self-Reliance	-	-	-	-	-	-	-	-
Water Supplies Contributing to Regional Self-Reliance	24,506	35,394	33,787	50,283	54,681	61,379	69,074	74,646

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	79,440	94,300	100,226	123,068	129,736	138,695	148,642	154,466

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies Contributing to Regional Self-Reliance	24,506	35,394	33,787	50,283	54,681	61,379	69,074	74,646
Change in Water Supplies Contributing to Regional Self-Reliance		10,888	9,281	25,777	30,175	36,873	44,568	50,140

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	30.8%	37.5%	33.7%	40.9%	42.1%	44.3%	46.5%	48.3%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		6.7%	2.9%	10.0%	11.3%	13.4%	15.6%	17.5%

Table G-3: Calculation of MWD Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
CVP/SWP Contract Supplies	1,472,000	1,029,000	984,000	1,133,000	1,130,000	1,128,000	1,126,000	1,126,000
Delta/Delta Tributary Diversions								
Transfers and Exchanges	20,000	44,000	91,000	58,000	52,000	52,000	52,000	52,000
Other Water Supplies from the Delta Watershed								
Total Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,182,000	1,180,000	1,178,000	1,178,000

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	5,032,000	5,156,000	5,261,000	5,374,000

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,182,000	1,180,000	1,178,000	1,178,000
Change in Water Supplies from the Delta Watershed		(419,000)	(417,000)	(301,000)	(310,000)	(312,000)	(314,000)	(314,000)

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies from the Delta Watershed	27.2%	19.5%	20.6%	24.2%	23.5%	22.9%	22.4%	21.9%
Change in Percent of Water Supplies from the Delta Watershed		-7.6%	-6.6%	-3.0%	-3.7%	-4.3%	-4.8%	-5.2%

2020 Urban Water Management Plan

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APPENDIX F

Water Facilities Authority (WFA) 2020 UWMP

WATER FACILITIES AUTHORITY

JUNE 2021

FINAL

2020 URBAN WATER MANAGEMENT PLAN

Northern California • Southern California • Arizona • Colorado • Oregon

Water Facilities Authority
(WFA)
2020 Urban Water Management Plan

JUNE 2021

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LIST OF ACRONYMS

AF	Acre-Feet
AFY	Acre-Feet per Year
CY	Calendar Year
CIMIS	California Irrigation Management Information System
CWC	California Water Code
DOF	California Department of Finance
Delta	Sacramento- San Joaquin Delta
DMM	Demand Management Measures
DRA	Drought Risk Assessment
DWR	California Department of Water Resources
EOP	San Bernardino County Emergency Operations Plan
ERP	Emergency Response Plan
ETo	Evapotranspiration
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GPCD	Gallons per Capita per Day
GIS	Geographical Information Systems
HECW	High- Efficiency Clothes Washing Machine
HETS	High Efficiency Toilets
IEUA	Inland Empire Utilities Agency
JPA	Joint Exercise of Powers Agreement
kWh	Kilowatt Hours
MGD	Million gallons per day
MWD	Metropolitan Water District of Southern California
M&I	Municipal and Industrial
PHET	Premium High- Efficiency Toilets
Plan	Urban Water Management Plan
PWS	Public Water System
RDM	Robust Decision Making
RRA	Risk and Resilience Assessment
SB	Senate Bill
SB X7-7	The Water Conservation Act of 2009
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SWRCB-DDW	State Water Resources Control Board - Division of Drinking Water
USEPA	United States Environmental Protection Agency
UWMP	Urban Water Management Plan
WEWAC	Water Education Water Awareness Committee
WSAP	MWD's Water Supply Allocation Plan

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CHAPTER 1

URBAN WATER MANAGEMENT PLAN INTRODUCTION AND OVERVIEW

LAY DESCRIPTION - INTRODUCTION

An urban water supplier is defined (pursuant to Section 10617 of the California Water Code (CWC)[1]) as "a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers."

The Water Facilities Authority (WFA) is classified as an urban water supplier because it indirectly serves more than 3,000 customers (i.e. individual metered accounts) and it directly supplies more than 3,000 acre-feet of water annually to its member agency customers for municipal purposes.

In accordance with the "Urban Water Management Planning Act", which was enacted by the California Legislature in 1983, every urban water supplier (including WFA) is required to prepare and adopt an Urban Water Management Plan (UWMP), periodically review its UWMP, and incorporate updated and new information into an updated UWMP at least once every five years.

WFA's most recent update was its 2015 UWMP (or 2015 Plan) which was submitted to, and approved by, the California Department of Water Resources (DWR). Urban water suppliers (including WFA) are required to complete and submit their 2020 UWMPs to DWR by July 1st, 2021.

The current requirements for preparing the UWMP are included in California Water Code (CWC) Sections 10608 and 10610 through 10657. WFA's 2020 UWMP (or 2020 Plan) was prepared consistent with the CWC and the recommended organization provided in DWR's Final "Urban Water Management Plan Guidebook 2020" (Final 2020 UWMP Guidebook), dated March 2021.

The UWMP provides urban water suppliers (including WFA) with a planning document for long-term resource planning to ensure adequate water supplies are available to meet existing and future water supply needs. In addition, the 2020 UMWP incorporates water supply reliability determinations resulting from potential prolonged drought, regulatory revisions, and/or changing climatic conditions.

---

1 References to CWC Sections in this 2020 UWMP were obtained from https://leginfo.legislature.ca.gov/

WFA's 2020 Plan consists of the following Chapters:

Chapter 1 Urban Water Management Plan Introduction and Overview
Chapter 2 Plan Preparation
Chapter 3 System Description
Chapter 4 Water Use Characterization
Chapter 5 SB X7-7 Baselines, Targets, and 2020 Compliance
Chapter 6 Water Supply Characterization
Chapter 7 Water Service Reliability and Drought Risk Assessment
Chapter 8 Water Shortage Contingency Plan
Chapter 9 Demand Management Measures
Chapter 10 Plan Adoption, Submittal, and Implementation

A lay description is presented at the beginning of each of these Chapters.

LAY DESCRIPTION – CHAPTER 1

URBAN WATER MANAGEMENT PLAN INTRODUCTION AND OVERVIEW

Chapter 1 (Urban Water Management Plan Introduction and Overview) of WFA's 2020 Plan discusses and provides the following:

- An overall lay description of the 2020 Plan, including California Water Code and Urban Water Management Plan Act requirements, is provided. WFA is required to prepare an Urban Water Management Plan.

- WFA's 2020 Plan was prepared consistent with the recommended organization provided in DWR's Final "Urban Water Management Plan Guidebook 2020", dated March2021. A description regarding the organization of the 2020 Plan, including a summary of each Chapter, is provided. WFA's Water Shortage Contingency Plan (discussed in Chapter 8) is also included in the 2020 Plan.

- The 2020 Plan incorporates DWR's water use and supply tables (standardized tables) for the reporting and submittal of UWMP data. These tables are included within the respective sections of the 2020 Plan and in Appendix A.

- WFA's coordination efforts with other planning agencies are discussed, including coordination efforts with the Inland Empire Utilities Agency and the Southern California Association of Governments.

- WFA's eligibility to receive grants and loans administered by the State of California and/or DWR, as a result of preparing the 2020 Plan, is discussed.

- Information is provided which demonstrates WFA's prior, continued, and projected reduction on imported water supplies obtained (either directly or indirectly) from the Sacramento-San Joaquin Delta (Delta). WFA's member agencies collectively have reduced its reliance on imported water supplies for Fiscal Year 2014-15 and Fiscal Year 2019-2020.

- In addition, WFA's member agencies are projected to continue reducing its reliance on imported water supplies through Fiscal Year 2044-45.

- The checklist developed by DWR and used by WFA to incorporate the specific UWMP requirements is discussed. The completed checklist is provided in Appendix C.

1.1 RECOMMENDED UWMP ORGANIZATION

WFA's 2020 UWMP (2020 Plan) was prepared consistent with the recommended organization provided in DWR's Final "Urban Water Management Plan Guidebook 2020" (Final 2020 UWMP Guidebook), dated March2021. WFA's 2020 Plan consists of the following Chapters:

Chapter 1	Urban Water Management Plan Introduction and Overview
Chapter 2	Plan Preparation
Chapter 3	System Description
Chapter 4	Water Use Characterization
Chapter 5	SB X7-7 Baselines, Targets, and 2020 Compliance
Chapter 6	Water Supply Characterization
Chapter 7	Water Service Reliability and Drought Risk Assessment
Chapter 8	Water Shortage Contingency Plan
Chapter 9	Demand Management Measures
Chapter 10	Plan Adoption, Submittal, and Implementation

Pursuant to CWC requirements, WFA's 2020 Plan incorporates DWR's water use and supply tables (standardized tables) for the reporting and submittal of UWMP data. DWR's standardized tables are provided within the body of the 2020 Plan text as well as in Appendix A. WFA also submitted the UWMP data (standardized tables) electronically through DWR's Online Submittal Tool.

WFA's 2020 Plan also provides supporting documents (appendices) including notification letters of the Plan update, public notice of the Plan hearing, and adoption resolution from WFA's governing body. Further discussions regarding these supporting documents are provided within the individual Chapters of WFA's 2020 Plan.

1.2 UWMPS IN RELATION TO OTHER EFFORTS

WFA is a wholesale water agency which treats and distributes imported water from Inland Empire Utilities Agency (IEUA), which in-turn is a wholesale supplier of imported water from Metropolitan Water District of Southern California (MWD). WFA's 2020 Plan was prepared in coordination with planning agencies including IEUA's Planning Division, MWD's Planning Division, the San Bernardino County Planning Division, and the

Southern California Association of Governments (SCAG). In addition, WFA's 2020 Plan was prepared using management documents including IEUA's "Strategic Plan Fiscal Years 2015 – 2019" and "Regional Water Use Efficiency Business Plan 2015 – 2020", MWD's "2020 Integrated Water Resources Plan", and San Bernardino County's 2017 "San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan" and "San Bernardino County Emergency Operations Plan (EOP).

WFA is a public water system formed under a Joint Exercise of Powers Agreement (JPA) by a group of local agencies including the Cities of Chino, Chino Hills, Ontario, Upland, and the Monte Vista Water District. Each of WFA's member agencies prepared a 2020 Plan which is incorporated in WFA's 2020 Plan by reference. In addition, WFA provided its 2020 Plan to its member agencies which includes water use projections of its water sales to its member agencies in five-year increments for a normal year, a single dry year, and a five consecutive year drought over the next 25 years.

WFA is a sub-agency of IEUA. WFA purchases untreated, imported water from IEUA. Some of IEUA's retail agencies, which include all of WFA's member agencies, then purchase treated water from WFA. IEUA prepared a 2020 Plan which is incorporated in WFA's 2020 Plan by reference. In addition, WFA provided its 2020 Plan to IEUA which includes water use projections of its water sales to its member agencies in five-year increments for a normal year, a single dry year, and a five consecutive year drought over the next 25 years.

1.3 UWMPS AND GRANT OR LOAN ELIGIBILITY

Pursuant to DWR's Final 2020 UWMP Guidebook:

"*In order for a Supplier to be eligible for any water grant or loan administered by DWR, the Supplier must have a current UWMP on file that has been determined by DWR to address the requirements of the Water Code. A current UWMP must also be maintained by the Supplier throughout the term of any grant or loan administered by DWR.*

A UWMP may also be required in order to be eligible for other state funding, depending on the conditions that are specified in the funding guidelines. Suppliers are encouraged to seek guidance on the specifics of any state funding source from the respective funding agencies. The following sections of the Water Code are pertinent to Suppliers considering pursuit of grants or loans."

WFA's 2020 Plan has been prepared to meet eligibility requirements for grants and loans administered by the State and/or DWR.

1.4 DEMONSTRATION OF CONSISTENCY WITH THE DELTA PLAN FOR PARTICIPANTS IN COVERED ACTIONS

Pursuant to DWR, an urban water supplier that anticipates participating in or receiving water from a proposed project (or "covered action") such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Sacramento-San Joaquin Delta (Delta) should provide information in their 2015 and 2020 UWMPs for use in demonstrating consistency with Delta Plan Policy WR P1, "*Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance.*" In addition, pursuant to California Code of Regulations, Title 23, § 5003:

> *(c)(1) Water suppliers that have done all of the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:*
>
> > *(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;*
> >
> > *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and*
> >
> > *(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).*

WFA's member agencies collectively have reduced their reliance on imported water supplies for FY 2014-15 and FY 2019-20. In addition, WFA's member agencies are projected to continue reducing their reliance on imported water supplies through FY 2044-45. A further discussion of WFA's member agencies' collective measurable reduction in imported water reliance and improvement in regional self-reliance is provided in Appendix B.

1.5 TIPS FOR UWMP PREPARERS

WFA's 2020 Plan (which includes WFA's 2020 Water Shortage Contingency Plan (WSCP)) is considered an update to WFA's 2015 Plan. However, the 2020 Plan and the WSCP are considered
stand-alone documents. As discussed in Section 1.1, WFA's 2020 Plan was prepared consistent with the recommended organization provided in DWR's Final 2020 UWMP Guidebook.

A checklist of specific UWMP requirements is included in Appendix C. The checklist includes the page number where the required elements are addressed to assist in DWR's review of the submitted Plan.

CHAPTER 2

PLAN PREPARATION

LAY DESCRIPTION – CHAPTER 2

PLAN PREPARATION

Chapter 2 (Plan Preparation) of WFA's 2020 Plan discusses and provides the following:

- The basis for preparing an Urban Water Management Plan is provided. WFA is required to prepare the 2020 Plan because it is an "urban water supplier" (WFA indirectly serves more than 3,000 customers and it directly supplies more than 3,000 acre-feet of water annually to its customers for municipal purposes).

- WFA's Plan has been prepared as an "individual" plan rather than a "regional" plan in an effort to provide information specific to WFA to best inform its employees, management, and its member agencies.

- Information presented in WFA's 2020 Plan is provided on "Fiscal Year" basis which is from July 1 through June 30 of the following year.

- Water quantities presented in WFA's 2020 Plan are provided on an "acre-foot" basis.

- WFA's coordination and outreach efforts with wholesale water agencies, other retail water agencies, and the community are described. WFA coordinated the preparation of its 2020 Plan with the following:

    - County of San Bernardino
    - City of Ontario
    - City of Chino
    - City of Chino Hills
    - Cucamonga Valley Water District
    - Monte Vista Water District
    - San Antonio Water Company
    - City of Upland
    - Fontana Water Company
    - Local Agency Formation Commission
    - Chino Basin Watermaster
    - Inland Empire Utilities Agency
    - Chino Basin Water Conservation District

- WFA's notification process to the cities and county within which WFA provides water supplies is discussed.

2.1 PLAN PREPARATION

As discussed in Section 1.1, WFA's 2020 Plan was prepared consistent with the recommended organization provided in DWR's Final 2020 UWMP Guidebook. Pursuant to DWR's Final 2020 UWMP Guidebook:

"*The California Water Code (Water Code) specifies several requirements for preparing a UWMP, including who is required to prepare a UWMP; how to prepare a UWMP, depending on whether the Supplier choses to participate in a regional or individual planning effort; selection of reporting year-type; and coordination, notification, and outreach.*"

Pursuant to CWC requirements, WFA's 2020 Plan incorporates DWR's water use and supply tables (standardized tables) for the reporting and submittal of UWMP data.

2.2 BASIS FOR PREPARING A PLAN

CWC 10617.

> *"Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.*

CWC 10620.

> *(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.*

CWC 10621.

> *(a) Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update.*

WFA's 2020 Plan was prepared in accordance with the UWMP Act which was established in 1983. The UWMP Act requires every "urban water supplier" to prepare and adopt a Plan, to periodically review its Plan at least once every five years and make any amendments or changes which are indicated by the review. An "Urban Water Supplier" is defined as a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually.

Section 10621(a) of the CWC states, "*Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update*". As a result, DWR requires the 2020 Plans be submitted by July 1, 2021.

WFA is an "urban water supplier" pursuant to Section 10617 of the CWC and indirectly serves potable water to more than 3,000 customers and directly supplies more than 3,000 acre-feet per year (AFY) at retail for municipal purposes. WFA's 2020 Plan is an update to WFA's 2015 Plan.

2.2.1 PUBLIC WATER SYSTEMS

CWC 10644.

(a)(2) The plan, or amendments to the plan, submitted to the department … shall include any standardized forms, tables, or displays specified by the department.

California Health and Safety Code 116275.

(h) "Public water system" means a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year.

Pursuant to CWC requirements, WFA's 2020 Plan incorporates DWR's standardized tables for the reporting and submittal of UWMP data. The standardized tables are provided within the body of the 2020 Plan text as well as in Appendix A. WFA also submitted the UWMP data (from the standardized tables) electronically through DWR's Online Submittal Tool.

WFA is a Public Water System (PWS) which is regulated by the State Water Resources Control Board - Division of Drinking Water (SWRCB-DDW). The PWS number for WFA is CA3610006. However, as a wholesale water agency, WFA is not required by DWR to provide PWS information.

Table 2-1 Public Water Systems (Not Applicable to Wholesalers)

2.2.2 SUPPLIERS SERVING MULTIPLE SERVICE AREAS / PUBLIC WATER SYSTEMS

WFA has developed its 2020 Plan reporting solely on its water sales to its member agencies to address all requirements of the CWC. However, based upon their 2020 water production and imported water deliveries, the following urban water suppliers (or PWS) receiving water supplies from WFA are also required to prepare a Plan:

- City of Chino
- City of Chino Hills
- City of Ontario
- City of Upland
- Monte Vista Water District

2.3 REGIONAL PLANNING

WFA has developed its 2020 Plan reporting solely on its water sales to its member agencies to address all requirements of the CWC. WFA's 2020 Plan was not developed as a Regional Plan. However, WFA's Plan is available for use and reference to its member agencies.

WFA coordinated with its member agencies regarding the development of their 2020 Plans. Likewise, IEUA's and MWD's 2020 Plans are available for use and reference by its member agencies and urban water suppliers within those member agencies.

2.4 INDIVIDUAL OR REGIONAL PLANNING AND COMPLIANCE

As shown in Table 2-2, WFA's 2020 Plan is an "Individual UWMP". WFA has developed its 2020 Plan reporting solely on its water sales to its member agencies to address all requirements of the CWC. WFA notified and coordinated with appropriate regional agencies and constituents (See Section 2.6).

Table 2-2 Plan Identification Type

Submittal Table 2-2: Plan Identification			
Select Only One	Type of Plan		Name of RUWMP or Regional Alliance *if applicable* (select from drop down list)
☑	Individual UWMP		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	Regional Urban Water Management Plan (RUWMP)		
NOTES:			

2.4.1 REGIONAL UWMP

CWC 10620.

> *(d)(1) An urban water supplier may satisfy the requirements of this part by participation in area wide, regional, watershed, or basin wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.*

As indicated in Table 2-2, WFA's 2020 Plan was developed as an "Individual UWMP" and not part of a Regional Plan.

2.4.2 REGIONAL ALLIANCE

CWC 10608.20.

(a)(1) …Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28…

CWC 10608.28.

(a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

(1) Through an urban wholesale water supplier.
(2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31 (commencing with Section 81300)).
(3) Through a regional water management group as defined in Section 10537.
(4) By an integrated regional water management funding area.
(5) By hydrologic region.
(6) Through other appropriate geographic scales for which computation methods have been developed by the department.

(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

As indicated in Table 2-2, WFA's 2020 Plan was developed as an "Individual UWMP" and not part of a Regional Alliance.

2.5 FISCAL OR CALENDAR YEAR AND UNITS OF MEASURE

CWC 10608.20.

(a)(1) Urban retail water suppliers…may determine the targets on a fiscal or calendar year basis.

2.5.1 FISCAL OR CALENDAR YEAR

The data provided in WFA's 2020 Plan is reported on a fiscal year (FY) basis, unless noted otherwise, as shown in Table 2-3. A FY begins on July 1st of every year.

2.5.2 REPORTING COMPLETE 2020 DATA

The data provided in WFA's 2020 Plan is provided on a FY basis through June 30, 2020.

2.5.3 UNITS OF MEASURE

As shown in Table 2-3, the data provided in WFA's 2020 Plan is reported in units of AF, unless noted otherwise.

Table 2-3 Supplier Identification

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☑	Supplier is a wholesaler
☐	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables are in calendar years
☑	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
07/01	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

2.6 COORDINATION AND OUTREACH

CWC 10631.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

2.6.1 WHOLESALE AND RETAIL COORDINATION

WFA is a wholesale agency serving five (5) member agencies. The following is a list of WFA's member agencies:

- City of Chino
- City of Chino Hills
- City of Ontario
- City of Upland
- Monte Vista Water District

As indicated in Table 2-4, WFA has provided its 2020 Plan to its member agencies which includes water use projections of its water sales to its member agencies in five-year increments for a normal year, a single dry year, and a five consecutive year drought conditions over the next 25 years.

Table 2-4 Water Supplier Information Exchange

Submittal Table 2-4 Wholesale: Water Supplier Information Exchange (select one)	
☑	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with Water Code Section 10631. Completion of the table below is optional. If not completed, include a list of the water suppliers that were informed.
Section 2.6	**Provide page number for location of the list.**
☐	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631. **Complete the table below.**
Water Supplier Name	
Add additional rows as needed	
NOTES:	

2.6.2 COORDINATION WITH OTHER AGENCIES AND THE COMMUNITY

CWC 10620.

(d)(3) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

CWC 10642.

Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of both the plan…

WFA is a wholesale water supplier that provides treated imported water from the State Water Project through IEUA to its member agencies. WFA notified its member agencies (including cities within the area receiving its water supplies) and public agencies that share a common source of supply of the preparation of WFA's 2020 Plan. WFA regularly updated its member agencies on the development of its 2020 Plan. In addition to its member agencies, WFA informed the following agencies regarding the availability of copies of the draft plan for their review:

- County of San Bernardino
- City of Ontario
- City of Chino
- City of Chino Hills
- Cucamonga Valley Water District
- Monte Vista Water District
- San Antonio Water Company
- City of Upland
- Fontana Water Company
- Local Agency Formation Commission
- Chino Basin Watermaster
- Inland Empire Utilities Agency
- Chino Basin Water Conservation District

As discussed in Section 10.2, WFA notified these agencies, as well as the cities and county within which WFA provides water supplies, at least sixty (60) days prior to the public hearing of the preparation of the 2020 Plan and invited them to participate in the development of the 2020 Plan. A copy of the notification letters sent to these agencies is provided in Appendix D.

2.6.3 NOTICE TO CITIES AND COUNTIES

CWC 10621.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

As discussed in Section 10.2, notification was provided to the cities and county within which WFA provides water supplies that WFA was reviewing and considering amendments (updates) to the previous 2015 Plan, and as a result prepare the 2020 Plan. Notification was provided at least 60 days prior to the public hearing (see Appendix D).

CHAPTER 3

SYSTEM DESCRIPTION

LAY DESCRIPTION – CHAPTER 3

SYSTEM DESCRIPTION

Chapter 3 (System Description) of WFA's 2020 Plan discusses and provides the following:

- A description of the area receiving water supplies from WFA is provided. The area receiving water supplies from WFA encompasses the Cities of Chino, Chino Hills, Montclair, Ontario, and Upland and portions of San Bernardino County. WFA was formed under a JPA to acquire and construct facilities to supply and distribute potable water to its member agencies.

- The area receiving water supplies from WFA encompasses an area of approximately 148 square miles. The location of the area receiving water supplies form WFA is provided in Figure 1.

- A description regarding the climate of the area receiving water supplies from WFA is provided. The monthly historical average temperatures (including minimum and maximum), monthly historical average rainfall, and monthly evapotranspiration in the vicinity of the area receiving water supplies from WFA area is summarized. The sources of the climate information are also discussed.

- The population within the area receiving water supplies from WFA is discussed and projected. The sources of the population information are also discussed. WFA provides water service to an area with a current population of 476,580. The area receiving water supplies from WFA is projected to have a population of 588,893 by Fiscal Year 2044-45.

- A discussion of land use information used by WFA to develop the 2020 Plan is provided. WFA reviewed the current and projected land uses within its service area. WFA also reviewed data provided by the Southern California of Governments, the Department of Finance, and the United States Census Bureau and prepared for counties, cities, and unincorporated areas within Southern California.

3.1 GENERAL DESCRIPTION

CWC 10631.

> *(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.*

On February 19, 1980, WFA was formed under a JPA to acquire and construct facilities to supply and distribute potable water to its member agencies. Member agencies are entirely within San Bernardino County. A map showing the area which receives water supplies from WFA, which is 148 square miles, is provided in Figure 1.

WFA purchases untreated imported water from MWD through IEUA, then treats and delivers the water to its member agencies. WFA owns and operates the Agua de Lejos Treatment Plant in the City of Upland, a conventional surface water treatment facility that treats and disinfects water supplies from the State Water Project provided by MWD. The Agua de Lejos Treatment Plant began operating in 1988 and has a treatment capacity of 81 million gallons per day (MGD).

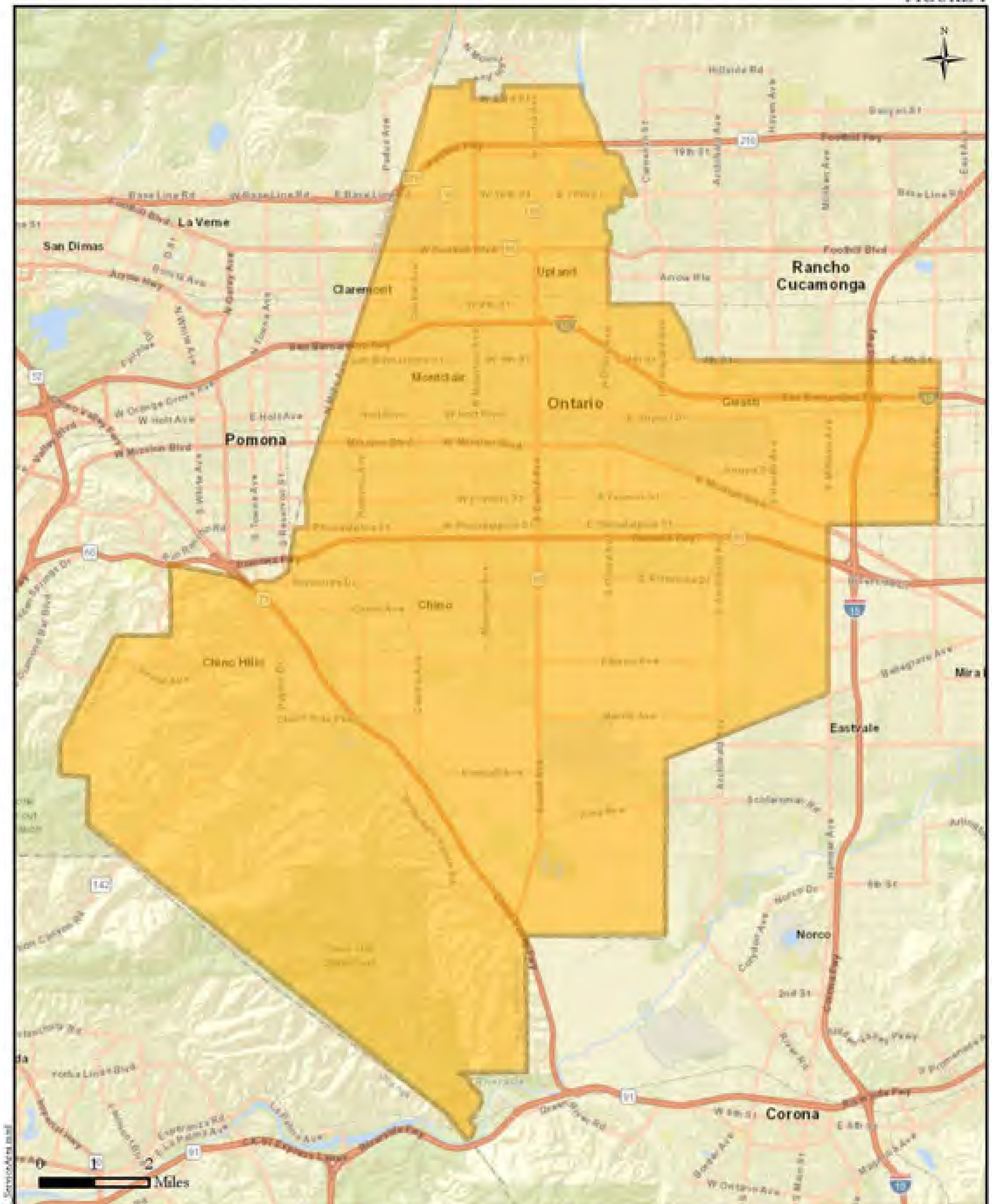
WFA is guided by a five-member Board of Directors. Each retail agency of WFA appoints, by Resolution of its governing body, one member of its governing body to act as its representative on the Board.

3.2 SERVICE AREA BOUNDARY MAPS

As discussed in Section 3.1, the area receiving water supplies from WFA covers approximately 148 square miles, encompassing the Cities of Chino, Chino Hills, Montclair, Ontario, and Upland and portions of San Bernardino County. The area receiving water supplies from WFA relative to the municipal boundaries within the Counties of Los Angeles, San Bernardino, and Riverside is also provided in Figure 2. The locations of WFA's member agency service areas are provided in Figure 3.

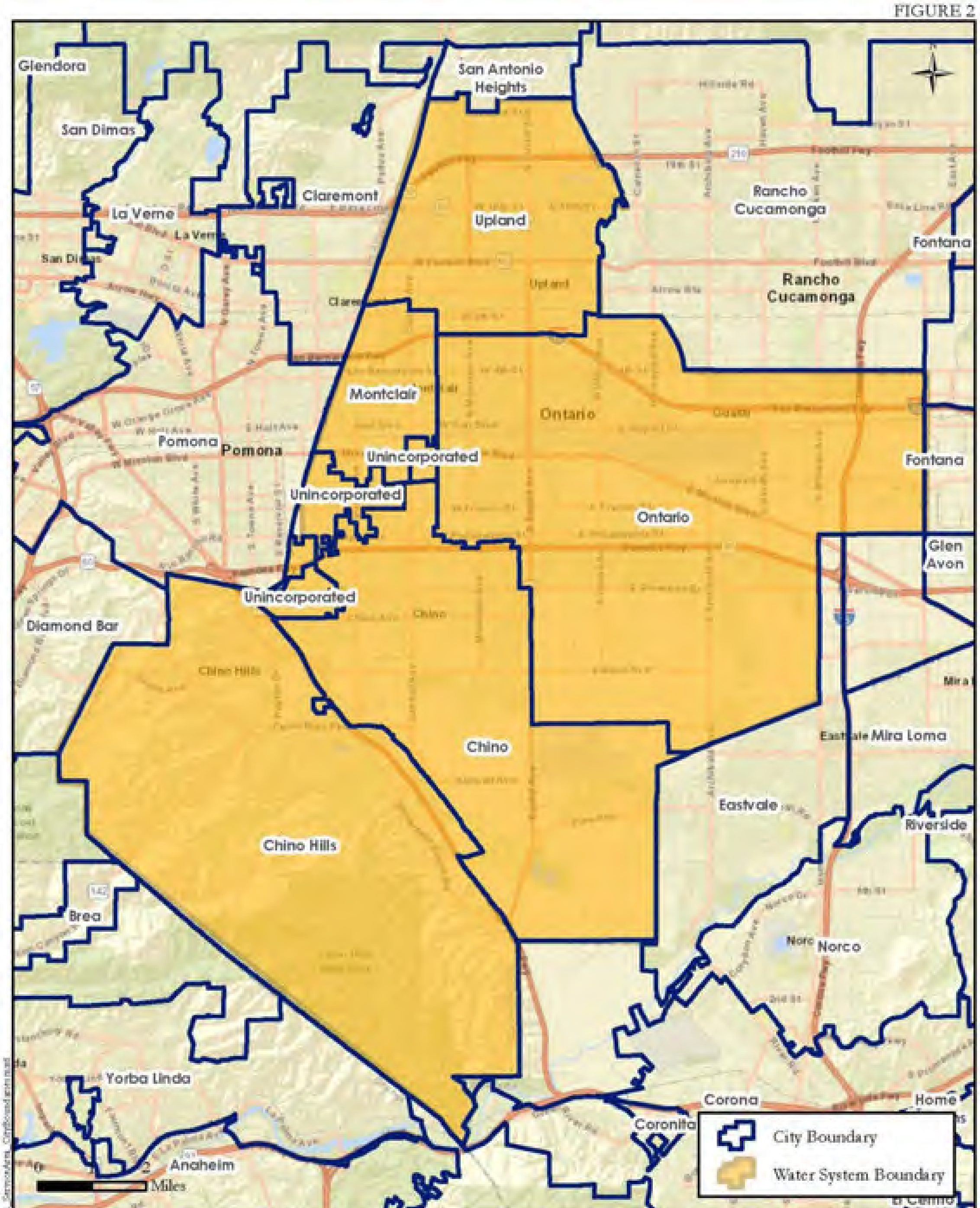
A map of the area receiving water supplies from WFA was submitted online through DWR's Population Tool in a "KML" file format (i.e. Google Earth format). The KML file was originally

FIGURE 1



WATER FACILITIES AUTHORITY
WATER SERVICE AREA

FIGURE 2

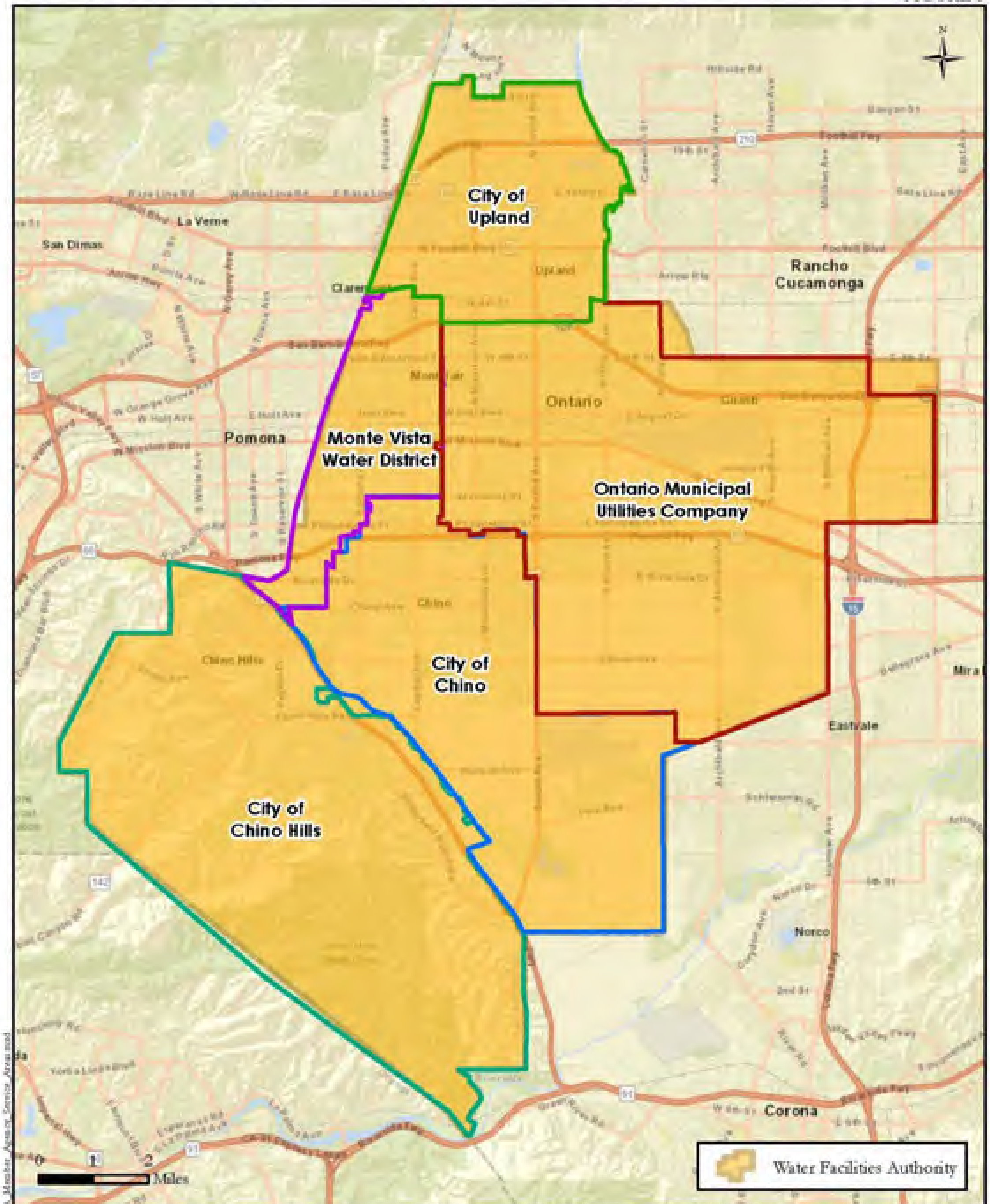


WATER FACILITIES AUTHORITY
SERVICE AREA
AND CITY BOUNDARIES

City Boundaries Source:
Census 2010 (TIGER 2011)

STETSON ENGINEERS INC.

FIGURE 3



STETSON ENGINEERS INC.

WATER FACILITIES AUTHORITY
MEMBER AGENCY SERVICE AREAS

created in a Geographical Information Systems (GIS) shape file format and converted into a KML format. To the extent information was available, metadata was included in the KML file (including map projection, contact information, start and end dates for which the map is valid, constraints, attribute table definitions, and digitizing base).

3.3 SERVICE AREA CLIMATE

CWC 10631.

(a) Describe the service area of the supplier, including … climate…

CWC 10630.

It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

The monthly historical average temperatures (including minimum and maximum), monthly historical average rainfall, and monthly evapotranspiration in the vicinity of the area receiving water supplies from WFA is summarized in the tabulation below. Historical climate information was obtained from the Western Regional Climate Center (WRCC), the National Oceanic and Atmospheric Administration, and from DWR's California Irrigation Management Information System (CIMIS).

Service Area Climate Information

Month	Average Temperature (F)	Average Minimum Temperature (F)	Average Maximum Temperature (F)	Average Total Precipitation (Inches)	ETo (Inches)
January	55.5	44.1	67.6	2.2	1.95
February	55.1	44.9	67.4	2.7	2.41
March	58.8	48.2	58.8	1.3	3.75
April	60.9	51.0	74.8	0.9	4.55
May	67.9	55.6	79.6	0.3	5.19
June	71.2	59.8	86.2	0.0	5.97
July	77.8	64.7	93.1	0.1	6.60
August	78.9	65.2	94.2	0.0	6.41
September	75.4	62.9	90.7	0.1	4.88
October	67.8	56.6	82.0	0.5	3.46
November	58.9	48.6	73.9	0.8	2.31
December	54.7	43.2	66.2	1.9	1.72
Annual	65.2	53.7	77.9	10.7	49.20

Source:

Historical average monthly precipitation and temperature information was obtained from the National Oceanic and Atmospheric Administration (https://search.usa.gov/search?utf8=%E2%9C%93&affiliate=noaa.gov&query=ontario+ca) from 1998 through 2020 (for Ontario International Airport). Historical monthly average ETo information was obtained from the California Irrigation Management Information Systems (http://wwwcimis.water.ca.gov) and is based on data collected from Station 255 (Chino).

The historical average rainfall in the vicinity of the area receiving water supplies from WFA is 10.7 inches. WFA's service area has a Mediterranean climate and summers can reach maximum daily temperatures of over 90 degrees Fahrenheit. Although changes in climatic conditions may have an impact (as discussed in Section 4.5), the projected water supply demands of its member agencies will be based on an average year, a single dry year, and a five consecutive year drought conditions, based on historical data and projected member agency demands. Precipitation within the vicinity of the area receiving water supplies from WFA is discussed further in Section 7.2. A discussion of WFA's source of supply, how that may be impacted by climate change, and the proactive actions WFA and other local/regional water managers may take to address the potential climate change on the water supply is provided in Section 4.5.

3.4 SERVICE AREA POPULATION AND DEMOGRAPHICS

3.4.1 *SERVICE AREA POPULATION*

CWC 10631.

(a) Describe the service area of the supplier, including current and projected population… The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

WFA provides water service to an area with a current population of 476,580. Table 3-1 presents the current and projected population of the area receiving water supplies from WFA from FY 2019-20 to FY 2044-45. The area receiving water supplies from WFA is projected to have a population of 588,893 by FY 2044-45.

A discussion of the methodology used to calculate the current FY 2019-20 population within the area receiving water supplies from WFA is provided in Section 5.4 and is consistent with DWR requirements.

Projected populations in the area receiving water supplies from WFA were based on growth rate projections obtained from data provided by the SCAG. The data provided by SCAG was based on their "The 2020-2045 Regional Transportation Plan / Sustainable Communities Strategy of the SCAG", dated September 2020, and incorporates demographic trends, existing land use, general plan land use policies, and input and projections through the year 2045 from the Department of Finance (DOF) and the U.S. Census Bureau for counties, cities, and unincorporated areas within Southern California.

Table 3-1 Population – Current and Projected

Submittal Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045 *(opt)*
	476,580	497,517	519,373	542,712	565,331	588,893
NOTES: The 2020 population and the populations projected through 2045 were based on SCAG population data, IEUA's projected population, and the percentage of WFA's service area within IEUA's service area (See Section 3.4.1 and Section 5.4.1).						

3.4.2 OTHER SOCIAL, ECONOMIC, AND DEMOGRAPHIC FACTORS

CWC 10631.

(a) Describe the service area of the supplier, including… other social, economic, and demographic factors affecting the supplier's water management planning.

No other demographic factors affect WFA's water management planning. However, increased population in general will have an impact on water demand. WFA's member agencies have limited allocations of treated water from the treatment plant, based on their ownership and treatment capacity. Further, the Tier 1 allocation of imported water available to the treatment plant is also limited to 31,384 AF per year by Inland Empire Utilities Agency (IEUA), under normal conditions. Under dry conditions, this allocation can be further reduced by Metropolitan Water District's (MWD) implementation of their Water Supply Allocation Plan. As a result, while the member agencies, as retail agencies, may directly experience additional urban development (where available), changing demographics and economic factors, their imported water supply from the WFA is limited, as indicated. To exceed their annual allocated supply, significant price increases are imposed by MWD for those purchases made in excess of the Tier 1 allocation. For the WFA, the individual demands from its member agencies for imported water supply collectively creates the demand at the treatment plant. Before exceeding their Tier 1 allocation, the member agencies will draw from their other sources of supply in their water supply portfolio and examine their opportunities for improved efficiencies. The imported water supply made available to WFA limits what is made available to its member agencies through the Tier 1 allocation. Other factors may influence how the member agencies utilize their water supply portfolio, including their limited imported water supply, with WFA's management planning focused primarily on the factors impacting the imported water supply allocation from MWD. During shortage allocations, IEUA has the ability to augment its imported water supply to its member agencies up to 23,531 AF per year in accordance with its contract with MWD (Draft IEUA 2020 WSCP Section 5.3). Therefore, WFA's imported water allocation may be supplemented by IEUA's augmented imported water supply.

3.5 LAND USES WITHIN SERVICE AREA

WFA is a wholesale water agency which treats and provides imported water to its retail member agencies. Therefore, WFA does not provide water directly to retail customers. As discussed in Section 3.4, WFA also obtained data from the SCAG document entitled "The 2020-2045 Regional Transportation Plan / Sustainable Communities Strategy of the SCAG", dated September 2020. Projected populations in the area receiving water supplies from WFA were based on growth rate projections developed by SCAG. The data provided by SCAG incorporates demographic trends, existing land use, general plan land use policies, and input and projections through the year 2045 from the Department of Finance and the U.S. Census Bureau for counties, cities, and unincorporated areas within Southern California. The projected population within the area receiving water supplies from WFA was used to project future demand from its member agencies through the year 2045. As discussed in Section 2.6, WFA coordinated the preparation of the 2020 Plan with the Cities of Chino, Chino Hills, Ontario, Upland, the County of San Bernardino, Monte Vista Water District, and other agencies.

CHAPTER 4
WATER USE CHARACTERIZATION

LAY DESCRIPTION – CHAPTER 4

WATER USE CHARACTERIZATION

Chapter 4 (Water Use Characterization) of WFA's 2020 Plan discusses and provides the following:

- WFA provides water service to an individual water use category. This water use category is sales to other agencies. A description for this water use category is provided in Section 4.2.1.
- WFA's total water demands from its member agencies over the past 10 years have ranged from 15,387 AFY to 28,455 AFY, with an average of 23,952 AFY. WFA currently measures its water use through meter data and billing records.
- WFA's current and projected water demands from its member agencies are provided in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 4-3.
- WFA's source of water supply and how that source may be impacted by climate change are discussed. The proactive actions WFA and other local/regional water managers may take to address the potential climate change impacts on water supplies are also discussed.

4.1 NON-POTABLE VERSUS POTABLE WATER USE

Chapter 4 addresses WFA's potable water demands. Recycled water demands are addressed separately in Section 6.5; however, recycled water is not served by WFA, as shown in Table 4-3. Raw water also is not served by WFA and is not applicable.

4.2 PAST, CURRENT, AND PROJECTED WATER USES BY SECTOR

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

CWC 10631.

(d)(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following…

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(4)(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

- *(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.*
- *(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.*

The current and projected water demands from WFA's member agencies are provided in five-year increments over the next 25 years (through FY 2044-45) in Tables 4-1, 4-2, and 4-3. Total water demands from its member agencies were projected based on the current water use factor incorporating recent water demands from member agencies within the area receiving water supplies from WFA.

WFA provides water service to one individual "water use sector" as identified by the CWC. The water use sector supplied by WFA is discussed in Section 4.2.1. The water use for this sector during FY 2019-20 is provided in Table 4-1. The projected water use for this water use sector is provided in Table 4-2 and is based on the water use factor from the water use sector in FY 2019-20 (the projected populations within the area receiving water supplies from WFA were then applied to the water use factor).

4.2.1 WATER USE SECTORS LISTED IN WATER CODE

CWC 10631.

(d)(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.
(J) Distribution system water loss.

As shown in Table 4-1, WFA's includes the following water use sector listed in the CWC:

- Sales to Other Agencies
  (Water sales made to another agency. Projected sales may be based on projected demand provided by the receiving agency. There is inherent uncertainty in future projections, therefore, any projected sales reported in the Plan are for planning purposes only and are not considered a commitment on the part of the seller. This is a wholesale demand.)

4.2.2 WATER USE SECTORS IN ADDITION TO THOSE LISTED IN WATER CODE

WFA's does not include other water demand sectors which are not listed in the CWC (including exchanges, surface water augmentation, transfers, and wetlands or wildlife habitat).

4.2.3 PAST WATER USE

Chapter 6 provides a discussion of the source of water supply WFA uses to meet its water demands from its member agencies. Section 6.1 provides a tabulation of WFA's historical annual water demands from its member agencies for its water supply source. Over the past ten years, the total water demands have ranged from 15,387 AFY to 28,455 AFY, with an average of 23,952 AFY. In addition, WFA recently experienced a five consecutive year drought within the area receiving its water supplies from FY 2011-12 to FY 2015-16. WFA also reviewed its historical water demands from its member agencies to determine the projected water demands from its member agencies and water supply reliability (discussed in Chapter 7).

4.2.4 DISTRIBUTION SYSTEM WATER LOSS

CWC 10631.

(d)(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following…

(J) Distribution system water loss.

CWC 10631.

(3)(A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.

(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met the distribution loss standards enacted by the board pursuant to Section 10608.34.

As a wholesale supplier, WFA is not required by DWR to perform water loss audits and report distribution system water loss.

4.2.5 CURRENT WATER USE

WFA currently measures its water use through meter data and billing records. The water use for WFA's water use sector during FY 2019-20 is provided in Table 4-1. Recycled water demands are addressed separately in Section 6.5; however, recycled water is not served by WFA, as shown in Table 4-3. Raw water also is not served by WFA and is not applicable.

DWR has created an optional "Planning Tool Worksheet" for water suppliers to review and assess monthly water use trends. However, DWR has deemed the tool as optional and WFA is not required by DWR to use the tool. However, Section 6.1 provides a tabulation of WFA's historical annual water use for its water supply source. During the past 10 years, WFA experienced a five consecutive year drought within the area receiving its water supplies from FY 2011-12 to FY 2015-16. A further discussion regarding the reliability of WFA's water supply source is provided in Chapter 7.

4.2.6 PROJECTED WATER USE

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

CWC 10631.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

CWC 10631.

(d)(4)(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(d)(4)(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.
(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

WFA's projected water demands from its member agencies are provided in five-year increments over the next 25 years (through FY 2044-45) in Table 4-3. WFA's projected water demands from its member agencies and water supplies during a normal year, a single dry year, and a five consecutive year drought are provided in Chapter 7. The projected water demands for WFA's water use sector is provided in Table 4-2.

WFA's water demands from its member agencies were projected based on the existing water use factor incorporating recent water demands from its member agencies, and the total population projections based on land use trends within the area receiving water supplies from WFA. A discussion of WFA's water supplies from IEUA, a wholesaler, are discussed in Section 6.2. As discussed in Section 2.6, WFA has coordinated its water demand projections from its member agencies with IEUA for the water use sector.

As a wholesale supplier, WFA's water demand projections from its member agencies are not required by DWR to incorporate water savings, or "passive savings", which are the result of implementation of new plumbing codes along with consumer awareness of the need to conserve water.

4.2.7 CHARACTERISTIC FIVE-YEAR WATER USE

CWC 10635.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

WFA's projected water demands from its member agencies are provided in five-year increments over the next 25 years (and through FY 2044-45) in Table 4-3. WFA's projected water demands from its member agencies and water supply during a normal year, a single dry year, and a five consecutive year drought over the next 25 years (and through FY 2044-45) are provided in Chapter 7.

WFA's "Drought Risk Assessment" (DRA) for the next five years (from FY 2020-21 through FY 2024-25) is discussed in Section 7.3. The DRA includes WFA's projected annual water demands from its member agencies and supplies for each of the next five years and was prepared based on the five driest consecutive years on record. The DRA provides an assessment of WFA's water service reliability during a drought lasting five years. The DRA reflects anticipated water demands from its member agencies and supplies prior to any expected benefits associated with water supply shortage responses included in WFA's WSCP (provided in Chapter 8). In addition to historical drought hydrology, WFA considered impacts to water supplies and demands from its member agencies based on climate change conditions (discussed in Section 4.5).

4.3 WORKSHEETS AND REPORTING TABLES

WFA's current and projected water demands from its member agencies, including the water demands for WFA's water use sector, is provided in five-year increments over the next 25 years (and through FY 2044-45) in Tables 4-1, 4-2, and 4-3.

4.3.1 OPTIONAL PLANNING TOOL USE ANALYSIS WORKSHEET

As discussed in Section 4.2.5, DWR has deemed the "Planning Tool Worksheet" as optional and WFA is not required by DWR to use the tool. A further discussion regarding the reliability of WFA's water supply source is provided in Chapter 7.

4.3.2 DWR 2020 UWMP SUBMITTAL TABLES

WFA's current water demands from its member agencies for its water use sector during FY 2019- 20 are provided in Table 4-1. WFA's projected water demands from its member agencies for the water use sector, in five-year increments over the next 25 years (and through FY 2044-45), are provided in Table 4-2. WFA's total projected water demands from its member agencies in five- year increments over the next 25 years (and through FY 2044-45), are summarized in Table 4-3. As a wholesale supplier, WFA is not required by DWR to perform water loss audits and report distribution system water loss.

Table 4-1 Demands for Potable and Non-Potable Water – Actual

Submittal Table 4-1 Wholesale: Demands for Potable and Non-Potable[1] Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only use types that will be recognized by the WUE data online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Sales to other agencies	Member Agencies	Drinking Water	23,435
Groundwater recharge	MVWD Aquifer Injection	Drinking Water	2,051
Other Non-Potable	Upland #3	Raw Water	5
		TOTAL	25,491
[1] Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4. *[2] Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES: "Other Non-Potable" was a temporary connection that is no longer in use.			

Table 4-2 Use for Potable and Non-Potable Water – Projected

Submittal Table 4-2 Wholesale: Use for Potable and Raw Water [1] - Projected						
Use Type	Additional Description (as needed)	**Projected Water Use [2]** Report To the Extent that Records are Available				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool.		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Sales to other agencies		28,185	29,422	30,745	32,027	33,361
Groundwater recharge		2,466	2,575	2,690	2,802	2,919
	TOTAL	30,651	31,997	33,435	34,829	36,280
[1] Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4. *[2] Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Table 4-3 Total Gross Water Use (Potable and Non-Potable)

Submittal Table 4-3 Wholesale: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable and Raw Water From Tables 4-1W and 4-2W	25,491	30,651	31,997	33,435	34,829	36,280
Recycled Water Demand* From Table 6-4W	0	0	0	0	0	0
TOTAL WATER DEMAND	25,491	30,651	31,997	33,435	34,829	36,280
**Recycled water demand fields will be blank until Table 6-4 is complete.*						
NOTES:						

Table 4-4 12 Month Water Loss Audit Report (Not Applicable to Wholesalers)

4.4 WATER USE FOR LOWER INCOME HOUSEHOLDS

CWC 10631.1.

(a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

California Health and Safety Code 50079.5.

(a) "Lower income households" means persons and families whose income does not exceed the qualifying limits for lower income families… In the event the federal standards are discontinued, the department shall, by regulation, establish income limits for lower income households for all geographic areas of the state at 80 percent of area median income, adjusted for family size and revised annually.

As a wholesale supplier, WFA is not required by DWR to report projected water demands for lower income single-family and multi-family households.

4.5 CLIMATE CHANGE CONSIDERATIONS

CWC 10630.

> *It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.*

CWC 10635.

> *(b)Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following…*
>
> *(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.*

Climate is defined as "the average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity and precipitation[2]". A change in the climate which produces a greater amount of precipitation (i.e. more runoff and/or snowpack) and lower temperatures is generally a benefit to water supplies. However, drought conditions which may result in decreased precipitation, decreased runoff, and increased temperature may adversely affect an urban water supplier's ability to meet demands by potentially impacting supplies. Consequently, the focus of impacts of climate change is on these adverse consequences.

Section 6.2 of this Plan describes WFA's source of water supply, management practices associated with that source, and the long-term reliability of that source. Section 7.3 includes a Drought Risk Assessment which considers the potential impacts of climate change to WFA's water supply source. Chapter 8 provides a detailed discussion of WFA's WSCP, including but not limited to, the six standard water shortage levels in the event climate change results in a reduction to water supplies associated with a periodic drought condition. The following is a discussion of WFA's source of supply, how that source may be impacted by climate change, and the proactive actions WFA and other local/regional water managers may take to address the potential climate change impacts on water supplies.

[2] www.merriam-webster.com

Imported Water Supplies

WFA receives untreated imported from MWD through IEUA as discussed in Section 6.2.1. MWD has prepared a Regional 2020 UWMP which includes a discussion (Section 2.6 in MWD's 2020 UWMP) of the reliability of its water supplies and the impacts of climate change and is incorporated by reference in this Plan. Furthermore, WFA is a sub-agency of IEUA which has also provided a discussion of climate change considerations and that discussion is included by reference. The following is a brief summary of MWD's efforts:

Resource Planning

- MWD has established the Robust Decision Making (RDM) approach to identify vulnerabilities to its water supplies. Climate change information was applied to MWD's simulated water supply scenarios to demonstrate the vulnerability of water supplies to climate change.

Knowledge Sharing and Research Support

- MWD is an active and founding member of the Water Utility Climate Alliance (WUCA) which includes 12 nationwide partners collaborating on climate change considerations. As such, MWD shares agency actions on climate change and adaptation. WUCA has also released numerous research papers on climate change.

Implementation of Programs and Policies

- MWD's programs include the use of solar energy, use of ride share programs, and reduction of greenhouse emissions. Collectively these actions are intended to impact the effects of climate change.

CHAPTER 5

SB X7-7 BASELINES, TARGETS, AND 2020 COMPLIANCE

LAY DESCRIPTION – CHAPTER 5

SB X7-7 BASELINES, TARGETS, AND 2020 COMPLIANCE

Chapter 5 (SB X7-7 Baselines, Targets, and 2020 Compliance) of WFA's 2020 Plan discusses and provides the following:

- The Water Conservation Act of 2009 (or SB X7-7) required the State of California achieve a 20 percent reduction in urban water use by the year 2020.
- SB X7-7 required urban water suppliers to develop a "2020 Water Use Target" to assist the State of California to achieve the 20 percent reduction. The 2020 Water Use Target represents the amount of water each person should use per day (i.e. gallons per capita per day or GPCD) by the year 2020.
- As a wholesale water agency, WFA is not required to calculate a 2020 Water Use Target or show compliance with the 2020 Water Use Target. However, an assessment regarding WFA's present and proposed future measures, programs, and policies to assist the retail water suppliers in WFA's service area achieve their individual 2020 Water Use Targets is provided (in Chapter 9).

5.1 GUIDANCE FOR WHOLESALE AGENCIES

CWC 10608.12.

> *(I) "Urban wholesale water supplier," means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.*

WFA is a wholesale agency and is not required by DWR to complete Section 5.2 through Section 5.8. However, an assessment of present and proposed future measures, programs, and policies that will assist retail water agencies within WFA's service area to achieve their water use reduction targets is provided in Chapter 9.

5.2 SB X7-7 FORMS AND SUMMARY TABLE

CWC 10608.20.

(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

WFA is a wholesale agency and is not required by DWR to complete Section 5.2.

5.2.1 SB X7-7 VERIFICATION FORM (BASELINES AND TARGETS)

5.2.2 SB X7-7 COMPLIANCE FORM

5.2.3 SUBMITTAL TABLES 5-1 AND 5-2

Table 5-1 Baselines and Targets Summary from SB X7-7 Verification Form (Not Applicable to Wholesalers)

Table 5-2 2020 Compliance from SB X7-7 2020 Compliance Form (Not Applicable to Wholesalers)

5.2.4 REGIONAL UWMP/ REGIONAL ALLIANCE

5.3 BASELINE AND TARGET CALCULATIONS FOR 2020 UWMPs

WFA is a wholesale agency and is not required by DWR to complete Section 5.3.

5.3.1 SUPPLIER SUBMITTED 2015 UWMP, NO CHANGE TO SERVICE AREA

5.4 METHODS FOR CALCULATING POPULATION AND GROSS WATER USE

WFA is a wholesale agency and is not required by DWR to complete Section 5.4.

5.4.1 SERVICE AREA POPULATION

CWC 10608.20.

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

CWC 10644.

(a)(2) The plan… shall include any standardized forms, tables, or displays specified by the department.

5.4.2 GROSS WATER USE

5.5 2020 COMPLIANCE DAILY PER CAPITA WATER USE (GPCD)

CWC 10608.12.

(h) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.
(2) The net volume of water that the urban retail water supplier places into long-term storage.
(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.
(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

California Code of Regulations Title 23 Division 2 Chapter 5.1 Article 1, Section 596.

(a) An urban retail water supplier that has a substantial percentage of industrial water use in its service area is eligible to exclude the process water use of existing industrial water customers from the calculation of its gross water use to avoid a disproportionate burden on another customer sector.

WFA is a wholesale agency and is not required by DWR to complete Section 5.5.

5.5.1 2020 ADJUSTMENTS FOR FACTORS OUTSIDE OF SUPPLIER'S CONTROL

5.5.2 SPECIAL SITUATIONS

5.5.3 IF SUPPLIER DOES NOT MEET 2020 TARGET

5.6 REGIONAL ALLIANCE

WFA is a wholesale agency and is not required by DWR to complete Section 5.6.

CHAPTER 6

WATER SUPPLY CHARACTERIZATION

LAY DESCRIPTION – CHAPTER 6

WATER SUPPLY CHARACTERIZATION

Chapter 6 (Water Supply Characterization) of WFA's 2020 Plan discusses and provides the following:

- WFA's water supply source consists of imported surface water from Metropolitan Water District of Southern California purchased through Inland Empire Utilities Agency and treated at WFA's treatment facility. A tabulation of WFA's historical water supplies is provided in Section 6.1.

- A discussion regarding WFA's purchased imported water supplies from MWD through IEUA is provided. Information regarding imported water connections, capacities, reliability, and historical production is provided.

- WFA's proposed future projects to maximize its water supply resources are discussed.

- WFA's "energy intensity" is discussed and represents the quantity of energy consumed, measured in kilowatt hours, divided by the volume of water, measured in acre-feet over a one-year period. The total energy intensity associated with WFA's water management processes was estimated during FY 2019-20.

  In this Chapter, WFA will identify and describe its source of water supply. In addition, WFA will describe the following:

- Management of the water supply source;

- Measures WFA is taking to develop potential new sources of water supply (as applicable); and

- Opportunities for exchanges and transfers on a long- or short-term basis.

The characterization of WFA's water supply source will account for the anticipated availability during a normal year, a single dry year, a five consecutive year drought, along with projections through FY 2044-45.

6.1 WATER SUPPLY ANALYSIS OVERVIEW

CWC 10631.

(b) *Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:*

(1) *A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.*

(2) *When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies*

CWC 10631.

(h) *An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five- year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).*

WFA's water supply source consists of imported surface water from Metropolitan Water District of Southern California purchased through Inland Empire Utilities Agency and treated at WFA's treatment facility. A tabulation of WFA's historical imported water purchases to meet its collective demand from its member agencies is provided in the following tabulation on the next page. WFA's allocated imported water supply from IEUA is 31,384 AF per year, unless reduced by MWD's implementation of its Water Supply Allocation Plan under dry conditions.

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Fiscal Year	Purchased Water (AF)
	Inland Empire Utilities Agency Imported Water
2010-11	21,069
2011-12	25,676
2012-13	27,954
2013-14	28,455
2014-15	27,606
2015-16	15,387
2016-17	18,280
2017-18	25,022
2018-19	24,575
2019-20	25,492

Source: Data provided by Water Facilities Authority

6.1.1 SPECIFIC ANALYSIS APPLICABLE TO ALL WATER SUPPLY SOURCES

The section below provides a discussion of the following information to the extent practical:

- WFA's existing and planned source of water supplies are identified;
- The source of supply is quantified in five-year increments through FY 2044-45;
- The anticipated supply availability under normal, single dry, and five consecutive dry years, and any other water year conditions included in the DRA (see Chapter 7) are described;
- The management of the water supply in correlation with other identified supplies is described; and,
- Information pertinent to the reliability analysis, is considered.

WFA has historically relied on imported surface water supplies purchased from MWD through IEUA to serve its member agencies. The following descriptions summarize WFA's source of supply (detailed descriptions are provided in Section 6.2).

Existing and Planned Sources of Supply

Purchased Untreated Imported Water

WFA has historically purchased untreated imported water from MWD through IEUA, as described in Section 6.2.1. In addition, Section 6.2.1 provides a detailed discussion of the existing and planned supply of the untreated imported water, including a description of the management and reliability of those untreated imported water supplies. Table 6-8 summarizes the actual untreated imported water supply for FY 2019-20. In addition, Table 6-9 summarizes the projected water supply, in five-year increments, through FY 2044-45 under varying water supply conditions.

Groundwater

WFA does not use groundwater supplies to meet its water demands from its member agencies.

Surface Water

WFA does not use self-supplied surface water sources to meets its water demands from its member agencies. WFA purchases untreated surface water supplies from MWD through IEUA, as discussed in Section 6.2.1.

Storm Water

WFA has historically received untreated imported water purchased from MWD through IEUA. Management and use of the stormwater runoff from the groundwater basin watershed, which is crucial to groundwater management and surface water supplies, is described in Section 6.2.4. However, WFA currently does not have its own program to beneficially use stormwater runoff as a direct source of supply.

Wastewater and Recycled Water

WFA does not use wastewater and recycled water supplies to meet its water demands from its member agencies.

6.1.2 OTHER CHARACTERIZATION CONSIDERATIONS

A description of WFA's water system along with a map of the area which receives water supplies from WFA is included in Chapter 3. In addition, the agencies which manage the water supply treated by WFA are identified in Section 6.2.1 (imported water), 6.2.2 (groundwater), 6.2.3 (surface water), 6.2.4 (stormwater), and 6.2.5 (recycled water).

6.1.3 OPTIONAL PLANNING TOOL

As discussed in Section 4.2.5, DWR has created an optional "Planning Tool Worksheet" for water suppliers to review and assess monthly water use trends. However, DWR has deemed the tool as optional and WFA is not required by DWR to use the tool. However, Section 6.1 provides a tabulation of WFA's historical annual water use. During the past 10 years, WFA's member agencies experienced a five consecutive year drought from FY 2011-12 to FY 2015-16.

6.2 NARRATIVE SECTIONS FOR SUPPLIER'S UWMP WATER SUPPLY CHARACTERIZATION

6.2.1 PURCHASED OR IMPORTED WATER

WFA receives untreated imported water supplies from MWD, through IEUA, and may be impacted during a five consecutive year drought or other conditions which limits MWD from delivering sufficient water supplies to all of its member agencies, and consequently to WFA. In anticipation of such a reduction in supplies, MWD developed a Water Supply Allocation Plan (WSAP) which is briefly described below. The WSAP provides a means of equitably providing reduced water supplies to each of MWD's member agencies for up to 10 levels of reduction representing up to a 50 percent reduction.

During calendar year 2007, critically dry conditions impacted MWD's water supply sources. In addition, a ruling in the Federal Courts in August 2007 provided protective measures for the Delta Smelt (and subsequently other aquatic species) in the Sacramento-San Joaquin River Delta resulting in restrictions on the availability of State Water Project water. As a result, MWD adopted a Water Supply Allocation Plan in February 2008 to allocate available water supplies to its member agencies. MWD revised the WSAP in December 2014.

The WSAP establishes ten different shortage levels and a corresponding Allocation to each member agency, including IEUA. Based on the shortage levels established by MWD, the WSAP provides a separate reduced Allocation to a member agency for its 1) Municipal and Industrial (M&I) retail demand and 2) replenishment demand. The WSAP formula considers historical local water production, full service treated water deliveries, agricultural deliveries and water conservation efforts when calculating each member agency's Allocation.

In general, the WSAP process calculates total historical member agency demand. That historical demand is then compared to member agency projected local supply for a specific Allocation year. The balance required from MWD, less an Allocation reduction factor, is the member agency's "Water Supply Allocation" of imported water from MWD. When a member agency reduces its local demand through conservation or other means, the Allocation of imported water will increase. Depending on MWD's available supply, MWD can establish a specific WSAP shortage level. The shortage level causes a regional reduction and calculates an allocation for each of its member agency. Additional information about MWD's WSAP is provided in MWD's Regional 2020 UWMP which is incorporated by reference. The following is a summary of MWD's water shortage levels:

Level 1 – Regional Percent Reduction of 5%

Level 2 – Regional Percent Reduction of 10%

Level 3 – Regional Percent Reduction of 15%

Level 4 – Regional Percent Reduction of 20%

Level 5 – Regional Percent Reduction of 25%

Level 6 – Regional Percent Reduction of 30%

Level 7 – Regional Percent Reduction of 35%

Level 8 – Regional Percent Reduction of 40%

Level 9 – Regional Percent Reduction of 45%

Level 10 – Regional Percent Reduction of 50%

In response to a fourth consecutive year of below average rainfall and critically dry conditions, MWD declared a WSAP Allocation Level 3 for FY 2015-16, which represented a regional reduction of 15 percent. MWD rescinded the WSAP for FY 2016-17 and has not reinstated the WSAP since that time.

WFA can purchase untreated imported water from MWD, through IEUA. WFA's imported water purchases over the past five years have been tabulated in Section 6.1. Over the past five years, the WFA purchased 15,387 AFY to 25,492 AFY, with an average of 21,751 AFY. WFA's projected purchases of untreated imported water, over the next 25 years in five-year increments, is provided in Table 6-9.

6.2.2 GROUNDWATER

CWC 10631.

(b)(4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(C) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(D) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

WFA has a Local Groundwater Supply Connection Agreement (dated September 3, 2014) with San Antonio Water Company, to provide for the opportunity to bring in additional groundwater supplies to the WFA treatment plant in an attempt to further develop options for San Antonio Water Company and Cities of Chino, Ontario, and Upland and Monte Vista Water District. However, WFA does not purchase this groundwater supply. San Antonio Water Company simply uses the WFA treatment plant as indirect pass-through conveyance of their limited supplies for delivery to its shareholders.

Table 6-1 Groundwater Volume Pumped

Submittal Table 6-1 Wholesale: Groundwater Volume Pumped						
☑	Supplier does not pump groundwater. The supplier will not complete the table below.					
☐	All or part of the groundwater described below is desalinated.					
Groundwater Type	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
	TOTAL	0	0	0	0	0
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

6.2.3 SURFACE WATER

WFA does not directly use surface water to meet its water demands from its member agencies.

6.2.4 STORMWATER

WFA does not use stormwater to meet its water demands from its member agencies.

6.2.5 WASTEWATER AND RECYCLED WATER

CWC 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

As a wholesale water supplier, WFA provides water to its member agencies which in turn provides water to their retail customers. Wholesale suppliers are not required to summarize wastewater generation or treatment within their service area. WFA does not provide supplemental treatment to recycled water prior to distribution.

WFA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by WFA and there are no plans for its use within the planning horizon of this UWMP.

6.2.5.1 RECYCLED WATER COORDINATION

CWC 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area…

WFA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by WFA and there are no plans for its use within the planning horizon of this UWMP. This section is not applicable to WFA.

6.2.5.2 WASTEWATER COLLECTION, TREATMENT, AND DISPOSAL

<u>CWC 10633.</u>

> *(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.*

WFA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by WFA and there are no plans for its use within the planning horizon of this UWMP. This section is not applicable to WFA.

Table 6-2 Wastewater Collected Within Area in 2020 (Not Applicable to Wholesalers)

Table 6-3 Wastewater Treatment and Discharge within Service Area in 2020

Submittal Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2020											
☑	Wholesale Supplier neither distributes nor provides supplemental treatment to recycled water. The Supplier will not complete the table below.										
							2020 volumes [1]				
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area? *Drop down list*	Treatment Level *Drop down list*	Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Add additional rows as needed											
						Total	0	0	0	0	0

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.

[2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility

NOTES:

6.2.5.3 RECYCLED WATER SYSTEM DESCRIPTION

CWC 10633.

> *(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.*

WFA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by WFA and there are no plans for its use within the planning horizon of this UWMP. This section is not applicable to WFA.

6.2.5.4 POTENTIAL, CURRENT, AND PROJECTED RECYCLED WATER USES

CWC 10633.

> *(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use. A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.*
>
> *(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.*
>
> *(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.*

WFA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by WFA and there are no plans for its use within the planning horizon of this UWMP. This section is not applicable to WFA.

Table 6-4 Current and Projected Recycled Water Direct Beneficial Uses Within Service Area

Submittal Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
☑	Recycled water is not directly treated or distributed by the Supplier. The Supplier will not complete the table below.						
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment *Drop down list*	2020*	2025*	2030*	2035*	2040*	2045* *(opt)*
Add additional rows as needed							
	Total	0	0	0	0	0	0
*** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.							
NOTES:							

Table 6-5 2015 Recycled Water Use Projection Compared to 2020 Actual

Submittal Table 6-5 Wholesale: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☑	Recycled water was not used or distributed by the supplier in 2015, nor projected for use or distribution in 2020. The wholesale supplier will not complete the table below.	
Name of Receiving Supplier or Direct Use by Wholesaler	2015 Projection for 2020*	2020 Actual Use*
Add additional rows as needed		
Total	0	0
****Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*		
NOTES:		

6.2.5.5 ACTIONS TO ENCOURAGE AND OPTIMIZE FUTURE RECYCLED WATER USE

WFA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by WFA and there are no plans for its use within the planning horizon of this UWMP. This section is not applicable to WFA.

CWC 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

Table 6-6 Methods to Expand Future Recycled Water Use (Not Applicable to Wholesalers)

6.2.6 DESALINATED WATER OPPORTUNITIES

CWC 10631.

(g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

WFA's water supply source consists of imported water from Metropolitan Water District of Southern California purchased through Inland Empire Utilities Agency and treated at WFA's treatment facility. WFA does not use groundwater supplies to meet its water demands from its member agencies. No desalinated water opportunities presently exist for WFA.

6.2.7 WATER EXCHANGES AND TRANSFERS

CWC 10631.

(c) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

6.2.7.1 EXCHANGES

Pursuant to DWR's 2020 Final Guidebook, "*Water exchanges are typically water delivered by one water user to another water user, with the receiving water user providing water in return at a specified time or when the conditions of the parties' agreement are met. Water exchanges can be strictly a return of water on a basis agreed upon by the participants or it can include payment and the return of water.*"

WFA does not have any current or planned water exchange opportunities. However, WFA's member agencies participate in MWD's Dry-Year Yield Program. The DYYP is a groundwater storage and recovery program where supplemental water is stored in the Chino Basin during surplus years and could be recovered in-lieu of imported water from MWD through IEUA. The DYYP allows maximum use of imported water supplies available during wet years and stored groundwater in the Chino Basin during dry years. The DYYP can store up to 100,000 AF with maximum replenishment of 25,000 AFY and maximum extraction of 33,000 AFY. During FY 2019-20, there was 45,961 AF within the DYYP account. The agreement that authorized the DYYP will expire in 2028.

6.2.7.2 TRANSFERS

Pursuant to DWR's 2020 Final Guidebook, "*The Water Code defines a water transfer as a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer, sale, lease, or exchange of water or water rights.*"

Transfers are not generally available to WFA from a supplier because WFA is a wholesale water supplier that provides treated imported water from the State Water Project through IEUA to its member agencies. However, WFA's member agencies are able to make transfers between each other pursuant to the Optimum Basin Management Plan and the Peace Agreement which provide for interagency transfer of water rights.

6.2.7.3 EMERGENCY INTERTIES

Emergency interconnections are distribution system interconnections between water agencies for use during critical situations where one system or the other is temporarily unable to provide sufficient potable water to meet its water demands and/or fire protection needs. An emergency interconnection will allow a water system to continue serving water during critical situations such as local water supply shortages as a result of earthquakes, fires, prolonged power outages, and droughts.

WFA is a wholesale water agency that treats, and provides imported water supplies, solely to its member agencies and has no emergency interconnections. However, WFA is able to provide additional treated imported water in the event that one or several of its member agencies has a need for additional emergency supplies, subject to imported water availability from MWD. In addition, WFA's member agencies have emergency interconnections between each other which can be utilized during emergency situations.

6.2.8 FUTURE WATER PROJECTS

CWC 10631.

(f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single-dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

WFA currently has no future water projects in development. WFA is part of a regional task force exploring concepts that might provide alternative water supply options to mitigate the planned long-term shutdown of the Rialto Feeder in approximately 10 to 13 years. The Rialto Reliability Long-Term Shutdown Task Force includes IEUA, Cucamonga Valley Water District, Three Valleys Municipal Water District, Fontana Water Company, and MWD. A list of regional project concepts can be found in IEUA's 2015 Integrated Water Resources Plan, incorporated in this UWMP by reference.

Table 6-7 Expected Future Water Supply Projects or Programs

Submittal Table 6-7 Wholesale: Expected Future Water Supply Projects or Programs						
☑	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☐	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description *(if needed)*	Planned Implementation Year	Planned for Use in Year Type *Drop Down list*	Expected Increase in Water Supply to Supplier*
	Drop Down Menu	*If Yes, Supplier Name*				
Add additional rows as needed						
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

6.2.9 SUMMARY OF EXISTING AND PLANNED SOURCES OF WATER

CWC 10631.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following…

(b)(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five- year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

6.2.9.1 DESCRIPTION OF SUPPLIES

As discussed in Section 6.2, WFA's water supply source consists of untreated imported water purchased from MWD through IEUA (see Section 6.2.1). The actual quantity of the water supply source available to WFA during FY 2019-20 is summarized in Table 6-8. The reliable quantity of projected water supply source available to WFA in five-year increments through FY 2044-45 during normal or average years is summarized in Table 6-9. The reliability of this source of supply is addressed in Section 7.2.3, including during normal years, single dry years, and five consecutive year droughts.

6.2.9.2 QUANTIFICATION OF SUPPLIES

The actual quantity of the water supply source available to WFA during FY 2019-20 is summarized in Table 6-8. The reliable quantity of projected water supply source available to WFA in five-year increments through FY 2044-45 during average years is summarized in Table 6-9. The reliability of this source of supply is addressed in Section 7.2.3, including during normal years, single dry years, and five consecutive year droughts.

WFA's projected quantities of untreated imported water supplies are based on historical long-term averages and available supplies during previous dry year conditions. Consequently, it is anticipated WFA will have sufficient water supplies available to meet projected demands from its member agencies.

Table 6-8 Water Supplies – Actual

Submittal Table 6-8 Wholesale: Water Supplies — Actual				
Water Supply		2020		
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool	Additional Detail on Water Supply	Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Purchased or Imported Water	Inland Empire Utilities Agency	25,492	Drinking Water	
	Total	25,492		0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*				
NOTES:				

Table 6-9 Water Supplies – Projected

Submittal Table 6-9 Wholesale: Water Supplies — Projected											
Water Supply		Projected Water Supply* Report to the Extent Practicable									
		2025		2030		2035		2040		2045 (opt)	
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool	Additional Detail on Water Supply	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Purchased or Imported Water	Inland Empire Utilities Agency	30,651		31,997		33,435		34,829		36,280	
	Total	30,651	0	31,997	0	33,435	0	34,829	0	36,280	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*											
NOTES:											

6.2.10 SPECIAL CONDITIONS

6.2.10.1 CLIMATE CHANGE EFFECTS

WFA receives untreated imported surface water from MWD through IEUA as discussed in Section 6.2.1. MWD has prepared a Regional 2020 UWMP which includes a discussion (Section 2.6 in MWD's 2020 UWMP) of the reliability of its water supplies and the impacts of climate change and is incorporated by reference in this Plan.

MWD has almost one hundred years of hydrological data regarding weather and water supply, providing a foundation for forecasting drought conditions and above-average rainfall. However, they recognize that weather patterns can shift dramatically and unpredictably due to climate change. MWD believes that the region's reliability will be more secure with a long-term plan that recognizes risk and provides resource development to offset that risk. MWD has established an intensive, comprehensive technical process to identify key vulnerabilities to regional reliability. When their analyses and modeling indicate unacceptable levels of reliability in the future, MWD will use this as a "signpost" to take action. Further, MWD's reliance on climate change experts and their active participation in the Water Utility Climate Alliance provides a collaborative approach toward climate change adaptation.

Furthermore, WFA is a sub-agency of IEUA which has also provided a discussion of climate change considerations in their Regional 2020 UWMP (Section 7.2.7). IEUA recognizes that changing climate patterns are expected to shift precipitation patterns and affect water supply. Further, it believes that adequate supplies are available to meet demands throughout the 25-year planning period. Decreases in imported water supplies from MWD are not expected due to its extensive storage, transfer, and water supply management efforts. IEUA prioritizes maximizing the use of local water resources and focus on their water use efficiency program, to reduce the regions reliance on imported water supplies.

6.2.10.2 REGULATORY CONDITIONS AND PROJECT DEVELOPMENT

WFA has considered the implications of changing regulatory conditions and project development on the availability of planned water supplies.

6.2.10.3 OTHER LOCALLY APPLICABLE CRITERIA

There are no locally applicable criteria which applies to WFA.

6.3 SUBMITTAL TABLES COMPLETION USING THE OPTIONAL PLANNING TOOL

As discussed in Section 4.2.5, DWR has created an optional "Planning Tool Worksheet" for water suppliers to review and assess monthly water use trends. However, DWR has deemed the tool as optional and WFA is not required by DWR to use the tool. However, Section 6.1 provides a tabulation of WFA's historical annual water use. During the past 10 years, WFA's member agencies experienced a five consecutive year drought from FY 2011-12 to FY 2015-16.

6.4 ENERGY USE

CWC 10631.2.

(a) In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain:

(1) An estimate of the amount of energy used to extract or divert water supplies.

(2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.

(3) An estimate of the amount of energy used to treat water supplies.

(4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.

(5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.

(6) An estimate of the amount of energy used to place water into or withdraw from storage.

(7) Any other energy-related information the urban water supplier deems appropriate.

"Energy intensity" is defined as the quantity of energy consumed, measured in kilowatt hours (kWh), divided by the volume of water, measured in AF for a water management process over a one-year period. The information used to calculate the estimated energy intensity associated with WFA's water system is provided below. The energy intensity information is based on readily obtainable energy and water use data for the following water management processes: 1) extraction or diversion of water supplies; 2) placement into storage; 3) conveyance to distribution; 4) treatment; and 5) water system distribution.

WFA has tabulated its energy intensity using readily obtainable energy consumption data obtained from monthly electricity bills from Southern California Edison (SCE) for the whole water system and the corresponding water use data obtained from available water meter readings. WFA has reported the energy intensity associated with the water management processes which occur within its operational control. Because WFA does not track individual energy usage for each water management process identified above, WFA has estimated the energy intensity using the "total utility approach" (i.e. sum of all water management processes). The total energy consumed was approximately 473,145 kWh during FY 2019-20. Although the total energy consumption reported includes electricity usage for general administration (e.g. at WFA's main office) which is not associated with any water management processes, the general administration energy usage is considered negligible compared to overall water system use and has not been netted out.

The total volume of water entering the potable water system was approximately 25,492 AF during FY 2019-20 and is consistent with the total volume of water provided in Table 4-1.

The total energy intensity associated with WFA's water management processes is estimated at 19 kWh/AF. The energy intensity data and calculations based on the "total utility approach" are provided in Table O-1B below.

WFA's water management processes do not include "consequential hydropower generation" where the energy generation is a direct consequence of water delivery (i.e. all water passing through the energy generation devices is delivered to users. WFA's water management processes do not include "non-consequential hydropower generation" where the energy generation is not a direct consequence of water delivery (i.e. energy could be generated even if no water was being delivered to water users). In addition, WFA's water management processes do not include any substantial "self-generated energy sources" including solar, wind, geothermal, biomass, and co-generation sources WFA does have an emergency diesel generator to maintain operations in the event of an SCE power outage, however, this is not a substantial "self-generated energy source" and is considered negligible.

Table O-1B. Recommended Energy Reporting — Total Utility Approach

Urban Water Supplier: *Water Facilities Authority*

Water Delivery Product (If delivering more than one type of product use Table O-1C)

Wholesale Potable Deliveries

Table O-1B: Recommended Energy Reporting - Total Utility Approach				
Enter Start Date for Reporting Period	7/1/2019	Urban Water Supplier Operational Control		
End Date	6/30/2020			
☐ Is upstream embedded in the values reported?		Sum of All Water Management Processes	Non-Consequential Hydropower	
Water Volume Units Used	*AF*	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (volume unit)		25492	0	25492
Energy Consumed (kWh)		473145	0	473145
Energy Intensity (kWh/volume)		18.6	0.0	18.6

Quantity of Self-Generated Renewable Energy

kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Combination of Estimates and Metered Data

Data Quality Narrative:

The total energy consumed was identified based on Southern California Edison (SCE) billing records. Although the total energy consumed includes electricity usage for general administration (which is not an identified water management process), general administration energy use is considered to be negligible compared to overall water system use and has not been netted out.

Narrative:

The total energy consumption includes energy associated with operating surface water treatment, including plant lighting and air conditioning, the Supervisory Control and Data Acquisition (SCADA) system, and chemical pumps (including chlorination injection).

CHAPTER 7

WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

LAY DESCRIPTION – CHAPTER 7

WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

Chapter 7 (Water Service Reliability and Drought Risk Assessment) of WFA's 2020 Plan discusses and provides the following:

- FY 2019-20 represents an "average" or "normal" water year for WFA in which the total amount of rainfall was similar to the historical average rainfall.

- A "single dry" year for WFA was represented in FY 2017-18, in which the total amount of rainfall was below the historical average rainfall.

- A "five consecutive year drought" period for WFA is represented from FY 2011-12 to FY 2015-16, where the total amount of rainfall during each of these years was less than the historical average rainfall.

- WFA's current and projected water supplies available during normal years in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 7-2.

- WFA's current and projected water supplies available during single dry years in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 7-3.

- WFA's current and projected water supplies available during each year of a five consecutive year drought in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 7-4.

- The reliability of WFA's water supply source, including a review of water supply constraints, is provided. A single dry year or a five consecutive year drought period will not compromise WFA's ability to provide a reliable supply of water to its member agencies.

- A Drought Risk Assessment is provided which includes an assessment of WFA's water supply reliability over a five consecutive year drought period. WFA's DRA assumes a five consecutive year drought from FY 2020-21 through FY 2024-25 and includes a review of water supplies, water uses, and water supply reliability during this period. WFA has the ability to pass through varying water shortage levels imposed by IEUA and MWD (see Chapter 8) to its member agencies.

7.1 INTRODUCTION

This section of WFA's UWMP describes WFA's ability to meet water demands from its member agencies by analyzing a variety of factors which affect WFA's water supply. This section assesses WFA's water service reliability during average years, single dry years, and during a five consecutive year drought period to meet the water needs of its member agencies. This section also includes the discussion of a DRA which provides a mechanism for WFA to evaluate the risk to its water supply under a drought lasting for the next five consecutive years.

7.2 WATER SERVICE RELIABILITY ASSESSMENT

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

Information regarding the reliability of WFA's water supplies is based on the availability of imported water from IEUA and MWD. and Table 7-1 summarizes these "base years" for average, single dry, and five consecutive year drought and provides the total amount of water supplies available to WFA during those base years. The following discussion assesses the water service reliability of WFA's water supply sources.

Water Service Reliability - Imported Water

WFA's untreated imported water supplies from MWD, through IEUA, may be impacted during a five consecutive year drought or other conditions which limits MWD from delivering sufficient water supplies to all of its member agencies, and consequently to WFA. In anticipation of such a reduction in supplies, MWD developed a WSAP which is briefly described below. The WSAP provides a means of equitably providing reduced water supplies to each of MWD's member agencies for up to 10 levels of reduction representing up to a 50 percent reduction.

During calendar year 2007, critically dry conditions impacted MWD's water supply sources. In addition, a ruling in the Federal Courts in August 2007 provided protective measures for the Delta Smelt (and subsequently other aquatic species) in the Sacramento-San Joaquin River Delta resulting in restrictions on the availability of State Water Project water. As a result, MWD adopted a WSAP in February 2008 to allocate available water supplies to its member agencies. MWD revised the WSAP in December 2014.

The WSAP establishes ten different shortage levels and a corresponding Allocation to each member agency. Based on the shortage levels established by MWD, the WSAP provides a separate reduced Allocation to a member agency for its 1) M&I retail demand and 2) replenishment demand. The WSAP formula considers historical local water production, full service treated water deliveries, agricultural deliveries, and water conservation efforts when calculating each member agency's Allocation.

In general, the WSAP process calculates total historical member agency demand. That historical demand is then compared to member agency projected local supply for a specific Allocation year. The balance required from MWD, less an Allocation reduction factor, is the member agency's "Water Supply Allocation" of imported water from MWD. When a member agency reduces its local demand through conservation or other means, the Allocation of imported water will increase. Depending on MWD's available supply, MWD can establish a specific WSAP shortage level. The shortage level causes a regional reduction and calculates an allocation for each of its member agencies. Additional information about MWD's WSAP is provided in MWD's Regional 2020 UWMP which is incorporated by reference. The following is a summary of MWD's water shortage levels:

Level 1 – Regional Percent Reduction of 5%

Level 2 – Regional Percent Reduction of 10%

Level 3 – Regional Percent Reduction of 15%

Level 4 – Regional Percent Reduction of 20%

Level 5 – Regional Percent Reduction of 25%

Level 6 – Regional Percent Reduction of 30%

Level 7 – Regional Percent Reduction of 35%

Level 8 – Regional Percent Reduction of 40%

Level 9 – Regional Percent Reduction of 45%

Level 10 – Regional Percent Reduction of 50%

In response to a fourth consecutive year of below average rainfall and critically dry conditions, MWD declared a WSAP Allocation Level 3 for FY 2015-16, which represented a regional reduction of 15 percent. MWD rescinded the WSAP for FY 2016-17 and has not reinstated the WSAP since that time.

Water Service Reliability Summary

Table 7-1 shows the water supplies during the base years (for average year, single dry year, and a five consecutive year drought). WFA will provide all available treated water to its member agencies, but it is the member agencies' responsibility to manage their water supplies during a five consecutive year drought.

7.2.1 CONSTRAINTS ON WATER SOURCES

CWC 10631.

(b)(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

WFA's source of supply consists of imported surface water from Metropolitan Water District of Southern California purchased through Inland Empire Utilities Agency and treated at WFA's treatment facility, as described in Section 6.2. Although this supply is managed, the following constraints may occur which WFA has considered in this reliability analysis.

Imported Water

WFA receives untreated surface water from MWD through IEUA, from the State Water Project. Water quality from MWD relating to supply reliability is addressed separately in MWD's 2020 Regional Urban Water Management Plan.

MWD estimates its SWP supply using the 2019 SWP Delivery Capability Report distributed by DWR in August 2020 (Draft MWD 2020 UWMP, Section 2.3). Accordingly, the 2019 SWP Delivery Capability Report presents current Department of Water Resources' estimates of the amount of water deliveries for current conditions and conditions 20 years in the future, assuming the use of existing SWP facilities and does not include new facilities proposed under the Delta Conveyance Project and Sites Reservoir.

Further, their estimates include restrictions on SWP and Central Valley Project operations with water quality objectives established by the State Water Resources Control Board, the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fisheries Service issued on October 21, 2019, and the Incidental Take Permit issued by the California Department of Fish and Wildlife on March 31, 2020. Additionally, these estimates also incorporate amendments to the Coordinated Operations Agreement between the Central Valley Project and the State Water Project made in 2018.

A detailed description of SWP supply programs are included in MWD's Draft MWD 2020 UWMP Section 3.2 and Appendix 3.2. MWD has the flexibility to increase SWP supplies by developing flexible Central Valley/SWP storage and transfer programs, with the goal to develop additional dry-year supplies that can be conveyed through the California Aqueduct during dry hydrologic conditions and regulatory restrictions. MWD describes these storage and transfer programs in their Draft MWD 2020 UWMP Section 3.3 and Appendix 3.2.

A key component of MWD's water supply capability is their development of a large regional storage portfolio that includes both dry-year and emergency storage capacity, which is a key component of water management. Storage enables their capture of surplus amounts of water in normal and wet climate and hydrologic conditions when it is plentiful for supply and environmental uses. Stored water can then be used in dry years and in conditions where augmented water supplies are needed to meet demands.

MWD's long-term water service reliability assessment performed for the UWMP forecasts sufficient supplies to meet projected demands from 2025 through 2045 under a normal water year, a single dry year, and five consecutive drought year conditions as specified by the Act. Their assessment is restricted to the specific conditions and assumptions stated in the UWMP.

The key water quality issues for the SWP are disinfection byproduct precursors, in particular, total organic carbon, bromide, and low alkalinity (Draft MWD 2020 UWMP Section 4). Disinfection byproducts (DBPs) result from total organic carbon and bromide in the source water reacting with disinfectants at the water treatment plant. At the treatment plant, WFA conducts online monitoring of the total organic carbon levels to ensure operational measures are taken for a higher level of total organic carbon removal in order to reduce disinfection byproduct formation.

The Federal Stage 1 Disinfectants and Disinfection Byproducts (D/DBP) Rule, requires water systems to comply with new MCLs and a treatment technique to improve control of DBPs. USEPA then promulgated the Stage 2 D/DBP Rule in January 2006 requiring systems to comply at terminus locations in the distribution system to be more representative of maximum residence time and to protect the public. WFA has been in compliance with the Stage 2 D/DBP Rule since it became effective.

MWD recognizes that arsenic is also of concern in some groundwater storage programs. Groundwater inflows into the California Aqueduct are managed by MWD to comply with regulations and protect downstream water quality while meeting supply targets. Additionally, nutrient levels are significantly higher in the SWP than within the Colorado River, leading to the potential for algal related concerns that may lead to treatment strategies in the California aqueduct and/or natural reservoirs.

MWD can implement selective withdrawals from storage programs and exchanges to improve water quality. Although these programs were initially designed to provide dry-year supply reliability, they can also be used to store SWP water at periods of better water quality so the stored water may be withdrawn at times of lower water quality, thus diluting SWP water deliveries.

7.2.2 YEAR TYPE CHARACTERIZATION

7.2.2.1 TYPES OF YEARS

WFA's base years for an average year, a single dry year, and a five consecutive year drought and are summarized in Table 7-1. As indicated in Chapter 6, WFA has provided all available treated imported water supplies to help meet its member agencies' water demands during an average year, a single dry year, and a five consecutive year drought.

Table 7-1 Basis of Water Year Data (Reliability Assessment)

Submittal Table 7-1 Wholesale: Basis of Water Year Data (Reliability Assessment)			
Year Type	Base Year If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000	Available Supplies if Year Type Repeats	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ______________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	% of Average Supply
Average Year	2020	25,492	100%
Single-Dry Year	2018	25,022	98.2%
Consecutive Dry Years 1st Year	2012	25,676	100.7%
Consecutive Dry Years 2nd Year	2013	27,954	109.7%
Consecutive Dry Years 3rd Year	2014	28,455	111.6%
Consecutive Dry Years 4th Year	2015	27,606	108.3%
Consecutive Dry Years 5th Year	2016	15,387	60.4%
Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table. Suppliers may create an additional worksheet for the additional tables.			
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES:			

7.2.2.2 SOURCES FOR WATER DATA

The monthly historical average temperatures (including minimum and maximum), monthly historical average rainfall, and monthly ETo in the vicinity of the area receiving water supplies from WFA are discussed in Section 3.3 Historical climate information was obtained from the WRCC, the National Oceanic and Atmospheric Administration, and from DWR's CIMIS.

7.2.3 WATER SERVICE RELIABILITY – SUPPLY AND DEMAND COMPARISON

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

WFA obtains its water supplies from imported surface water from Metropolitan Water District of Southern California purchased through Inland Empire Utilities Agency, and treated at WFA's treatment facility and made available to its member agencies.

As previously discussed in Section 4.2.6, WFA's projected normal year water demands from its member agencies over the next 25 years, in five-year increments is provided in Table 4-3. The ratio of total water supplies available to WFA during a historical average year in FY 2019-20 (or 25,492 AF) and during a historical single dry year in FY 2017-18 (or 25,022 AF) was used to estimate WFA's projected water demands from its member agencies during single dry years. The ratio of total water supplies available to WFA during a historical average year in FY 2019-20 (or 25,492 AF) and a historical five consecutive year drought period from FY 2011-12 to FY 2015-16 (or 25,676 AF, 27,954 AF, 28,455 AF, 27,606 AF, and 15,387 AF, respectively) was used to estimate WFA's projected water demands from its member agencies during a five consecutive year drought period. WFA's projected dry year water supplies over the next 25 years were based on the minimum supplies needed by WFA to meet projected single-dry year demands from its member agencies. Table 7-2, Table 7-3, and Table 7-4 summarize WFA's projected water demands from its member agencies and supplies over the next 25 years in five-year increments, including during normal years, single dry years, and a five consecutive year drought periods. These tables indicate WFA will provide all available water to assist its member agencies meet their water demands during normal years, single dry years, and a five consecutive year drought periods over the next 25 years.

7.2.3.1 WATER SERVICE RELIABILITY – NORMAL YEAR

Table 7-2 summarizes WFA's projected water demands from its member agencies and supplies over the next 25 years in five-year increments during normal years. Table 7-2 indicates WFA can meet water demands from its member agencies during normal years over the next 25 years.

Table 7-2 Normal Year Supply and Demand Comparison

Submittal Table 7-2 Wholesale: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	30,651	31,997	33,435	34,829	36,280
Demand totals *(autofill from Table 4-3)*	30,651	31,997	33,435	34,829	36,280
Difference	0	0	0	0	0
NOTES:					

7.2.3.2 WATER SERVICE RELIABILITY – SINGLE DRY YEAR

Table 7-3 summarizes WFA's projected water demands from its member agencies and supplies over the next 25 years in five-year increments during single dry years. Table 7-3 indicates WFA can meet water demands from its member agencies during single dry years over the next 25 years.

Table 7-3 Single Dry Year Supply and Demand Comparison

Submittal Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	30,086	31,408	32,819	34,187	35,612
Demand totals*	30,086	31,408	32,819	34,187	35,612
Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES:					

7.2.3.3 WATER SERVICE RELIABILITY – FIVE CONSECUTIVE DRY YEARS

Table 7-4 summarizes WFA's projected water demands from its member agencies and supplies over the next 25 years in five-year increments during five consecutive year drought periods. Table 7-4 indicates WFA can meet water demands from its member agencies during five consecutive year drought periods over the next 25 years.

Table 7-4 Multiple Dry Years Supply and Demand Comparison

Submittal Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	30,873	32,229	33,678	35,081	36,543
	Demand totals	30,873	32,229	33,678	35,081	36,543
	Difference	0	0	0	0	0
Second year	Supply totals	33,611	35,088	36,665	38,193	39,784
	Demand totals	33,611	35,088	36,665	38,193	39,784
	Difference	0	0	0	0	0
Third year	Supply totals	34,214	35,717	37,322	38,877	40,498
	Demand totals	34,214	35,717	37,322	38,877	40,498
	Difference	0	0	0	0	0
Fourth year	Supply totals	33,193	34,651	36,208	37,717	39,289
	Demand totals	33,193	34,651	36,208	37,717	39,289
	Difference	0	0	0	0	0
Fifth year	Supply totals	18,502	19,314	20,182	21,023	21,900
	Demand totals	18,502	19,314	20,182	21,023	21,900
	Difference	0	0	0	0	0
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG) m** ust remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

7.2.4 DESCRIPTION OF MANAGEMENT TOOLS AND OPTIONS

CWC 10620.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

WFA obtains imported water from the Metropolitan Water District of Southern California through IEUA. Section 6.2.1 describes the planning conducted by MWD regarding untreated imported water supplies available to WFA. The reliability of MWD's supplies is also discussed in its 2020 Regional UWMP and is incorporated by reference. WFA purchases untreated imported water which is delivered directly within its distribution system, after treatment.

7.3 DROUGHT RISK ASSESSMENT

CWC 10635.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

(1) A description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive water years, starting from the year following when the assessment is conducted.

(2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

WFA's sources of supplies consist of imported surface water from Metropolitan Water District of Southern California purchased through Inland Empire Utilities Agency and treated at WFA's treatment facility. The following discussion provides a DRA which assesses WFA's water supply reliability over a five consecutive year drought period. WFA's DRA incorporates a five consecutive year drought from FY 2020-21 through FY 2024-25 and includes a review of water supplies, water uses, and water supply reliability.

7.3.1 DRA DATA, METHODS, AND BASIS FOR WATER SHORTAGE CONDITIONS

WFA's DRA was prepared using historical production data from WFA's water supply source. The following assumptions were considered during the preparation of WFA's DRA for each year of the five consecutive year drought.

- The five consecutive year drought period associated with the 2020 UWMP is based on five consecutive dry years from FY 2020-21 through FY 2024-25.
- The projected water supplies available during each year of this five consecutive year drought are assumed to be identical to the water supplies produced during each year between FY 2011-12 and FY 2015-16 (which represents the most recent and historical five consecutive year drought).
- The projected demands from its member agencies during this five consecutive year drought are based on water demands from its member agencies from FY 2019-20 (a normal year) which were adjusted based on projected population within the area receiving water supplies from WFA over the next five years along with the ratio of the normal year demands from its member agencies to actual demands from its member agencies over each year of the most recent and historical five consecutive year drought period (from FY 2011-12 and FY 2015-16).
- The projected demands from its member agencies were compared to the projected supplies to identify potential water supply deficits which may require implementation of the Water Shortage Contingency Plan (discussed further in Chapter 8).

The following methodologies were considered during the preparation of WFA's DRA during for each year of the five consecutive year drought:

- Drought Year 1: The region receiving water supplies from WFA had experienced an average to above average year of precipitation in the prior year. Member agencies' retail water use in the prior year had been below average due to a reduced need for outdoor water use, the groundwater basin had been replenished from above average local stormwater runoff, and imported water supplies were not restricted.

- Drought Year 2: The region receiving water supplies from WFA experienced a second year of below average precipitation and runoff. Member agencies' retail customers increased water use for outdoor irrigation to compensate for lack of precipitation. Groundwater and imported water supplies have not been impacted.

- Drought Year 3: The region receiving water supplies from WFA experienced a third year of below average precipitation and runoff. Member agencies' retail customers increase water use for outdoor irrigation to compensate for lack of precipitation. Groundwater and imported water supplies have not been impacted. However, there is an increased demand on both groundwater and treated imported water.

- Drought Year 4: The region receiving water supplies from WFA experienced a fourth year of below average precipitation and runoff. Groundwater supplies have not been impacted. However, there is an increased demand on groundwater and treated imported because member agencies' local surface water supplies continue to be significantly impacted.
- Drought Year 5: Fifth year of below average precipitation and runoff. Groundwater supplies have not been impacted. However, there is an increased demand on groundwater and treated imported water because member agencies' local surface water supplies continue to be significantly impacted.

7.3.2 DRA WATER SOURCE RELIABILITY

WFA's DRA incorporates a five consecutive year drought based on five consecutive dry years commencing in FY 2021-22. WFA obtains imported water from Metropolitan Water District of Southern California through IEUA, and treats the imported water on behalf of its member agencies. The quantity of water supplies that WFA is able to treat and provide to its member agencies is based on the availability of water supplies from MWD and IEUA. However, for the purposes of the DRA, the quantity of water supplies available for each year during this five consecutive year drought period included in WFA's DRA is assumed9 to be the same as the quantity of water supplies produced by WFA (i.e. demands) during the most recent and historical five consecutive year drought which occurred from FY 2011-12 through FY 2015-16. Production data for those years have been tabulated in Section 6.1. The following describes the anticipated reliability of the water source for each year of the five consecutive year drought based on recent experience.

Imported Water

WFA obtains imported water from the Metropolitan Water District of Southern California through IEUA. Section 6.2.1 describes the planning conducted by MWD regarding untreated imported water supplies available to WFA. The reliability of MWD's supplies is also discussed in its 2020 Regional UWMP and its 2021 WSCP and are incorporated by reference. MWD's long-term water service reliability assessment performed for the UWMP forecasts sufficient supplies to meet projected demands from 2025 through 2045 under a normal water year, a single dry year, and five consecutive drought year conditions as specified by the Act. Their assessment is restricted to the specific conditions and assumptions stated in the UWMP Section 2.3 and 2021 WSCP Section A.4.2. IEUA expects to have surplus supplies for each year of their DRA, tabulated Table 7-7 (Draft IEUA 2020 UWMP, Section 7.5), due to their ability to augment with recycled water and imported water surplus to the allocated imported water supplies.

WFA purchases untreated imported water which is delivered directly within its distribution system, after treatment. WFA's purchases of untreated imported water over the past ten years have been tabulated in Section 6.1.

The imported water purchases by WFA during the most recent and historical five consecutive year drought period have been tabulated in Section 6.1. Because WFA's DRA assumes the most recent and historical five consecutive year drought scenario will be repeated over the next five years, it is assumed the quantity of untreated imported water supplies purchased during the most recent and historical five consecutive year drought scenario will be available. Furthermore, this constitutes the minimum amount of untreated imported water which may be available in a future five consecutive year drought absent MWD's programs which it has since implemented.

Summary

WFA's water system has previously experienced a five consecutive year drought. WFA has the ability to pass along varying water shortage levels (see Chapter 8) to encourage its member agencies to reduce demand in response to water shortages.

7.3.3 DRA TOTAL WATER SUPPLY AND USE COMPARISON

Gross water use for the projected five consecutive year drought is shown on Table 7-5, relying on estimates described in Section 7.2.3. Section 7.3.2 describes the water source reliability for the source of supply WFA will rely on during a five consecutive year drought. WFA obtains imported water from Metropolitan Water District of Southern California through IEUA, and treats this imported water on behalf of its member agencies. The quantity of water supplies that WFA is able to treat and provide to its member agencies is based on the availability of water supplies from MWD and IEUA. However, when necessary, WFA's member agencies can implement various water shortage levels of their respective Water Shortage Contingency Plans (discussed in Chapter 8) in order to reduce their water demands placed on WFA.

For the purposes of the DRA, the total water supplies available to WFA shown in Table 7-5 to meet its member agencies' demands are based on the quantity of supplies produced by WFA (i.e. demands) relying on information from the most recent historical five consecutive year drought period (from FY 2011- 12 through FY 2015-16), as a recent example. As shown in Table 7-5, WFA will provide treated imported water to meet its member agencies' requests up to the quantity of imported water made available from IEUA and MWD. WFA's member agencies will implement various stages of their respective Water Shortage Contingency Plans to balance water demands with available supplies during years 1, 2, 3, 4, and 5 of the projected five consecutive year drought.

MWD 's DRA indicates total supply shortfalls in years 2021 and 2023 while the other years indicate surpluses in Table 2-7 (Draft 2020 UWMP, Section 2.4). For the shortfalls, MWD provides a supply augmentation benefit to fill the gap. It should be noted that their total supplies include both Colorado River Aqueduct supplies in fixed volumes and variable supplies from the State Water Project, for each of the study years.

IEUA expects to have surplus supplies for each year of their DRA, tabulated Table 7-7 (Draft IEUA 2020 UWMP, Section 7.5), due to their ability to augment with recycled water and imported water surplus to the allocated imported water supplies.

Table 7-5 Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b)

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)	
2021	**Total**
Total Water Use	26,716
Total Supplies	25,676
Surplus/Shortfall w/o WSCP Action	(1,040)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	1,040
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	4%
2022	**Total**
Total Water Use	30,217
Total Supplies	27,954
Surplus/Shortfall w/o WSCP Action	(2,263)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	2,263
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	7%
2023	**Total**
Total Water Use	31,910
Total Supplies	28,455
Surplus/Shortfall w/o WSCP Action	(3,455)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	3,455
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	11%
2024	**Total**
Total Water Use	32,076
Total Supplies	27,606
Surplus/Shortfall w/o WSCP Action	(4,470)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	4,470
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	14%
2025	**Total**
Total Water Use	18,502
Total Supplies	15,387
Surplus/Shortfall w/o WSCP Action	(3,115)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	3,115
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	17%

7.3.4 OPTIONAL PLANNING TOOL WORKBOOK

DWR has deemed the “Planning Tool Worksheet” as optional and WFA is not required by DWR to use the tool. WFA has provided sufficient water supplies to its member agencies, including during long-term droughts and years with historically high water demands from its member agencies. WFA has also been able to provide water service to meet maximum day water demands from its member agencies for these years, including during the summer months. Consequently, an evaluation regarding water supplies on a monthly basis was not considered.

CHAPTER 8

WATER SHORTAGE CONTINGENCY PLAN

LAY DESCRIPTION – CHAPTER 8

WATER SHORTAGE CONTINGENCY PLAN

Chapter 8 (Water Shortage Contingency Plan) of WFA's 2020 Plan discusses and provides the following:

- WFA's Water Shortage Contingency Plan serves as a guide which presents how WFA intends to act, or respond, in the case of an actual water shortage contingency.

- Preparation of WFA's "Annual Water Supply and Demand Assessment" (or Annual Assessment) is discussed. Commencing July 1, 2022, WFA is required to submit the Annual Assessment. The Annual Assessment will include a review of WFA's "unconstrained" water demands from its member agencies for the current year and for a potential upcoming single dry year. Unconstrained water demands from its member agencies represent WFA's water demands from its member agencies prior to any "response actions" WFA may invoke pursuant to WFA's Water Shortage Contingency Plan.

- WFA will manage water supplies, in collaboration with its member agencies to minimize the adverse impacts of water shortages. WFA's plan for water usage during periods of shortage is designed to incorporate six standard water shortage levels corresponding to progressive ranges from up to a 10, 20, 30, 40, and 50 percent shortage, and greater than a 50 percent shortage, as required.

- For each declared water supply shortage level, member agencies are encouraged to reduce their consumption by the percentage specified in the corresponding water supply shortage level.

- For each declared water supply shortage level, WFA has established response actions to assist member agencies to reduce their demand on limited water supplies and to mitigate any shortage gaps in water supplies.

- The operational changes WFA will consider in addressing water shortages on a short-term basis are discussed to encourage demand reduction measures.

- WFA's Emergency Response Plan is summarized. The Emergency Response Plan provides the management, procedures, and designated actions WFA and its employees will implement during emergency situations (including catastrophic water shortages) resulting from natural disasters, system failures, and other unforeseen circumstances.

- The preparation of WFA's seismic risk assessment and mitigation plan is discussed. The locations of earthquake faults in the vicinity of the area receiving water supplies from WFA are provided.

- The effectiveness of the shortage response actions for each of WFA's standard water shortage levels is presented. WFA has been able to provide sufficient water supplies to its member agencies, including during long-term droughts and years with historically high water demands.

- The communication protocols implemented by WFA when it declares any water shortage level are presented.

- The legal authorities associated with WFA's standard water shortage levels are presented.

- The financial consequences associated with WFA's standard water shortage levels are presented.

- WFA will evaluate the need for revising the Water Shortage Contingency Plan in order to resolve any water shortage gaps, as necessary. The steps necessary for WFA to adopt and amend its Water Shortage Contingency Plan are presented.

The following Water Shortage Contingency Plan includes references to Chapters and Sections from Water Facilities Authority's 2020 Urban Water Management Plan:

8.1 WATER SUPPLY RELIABILITY ANALYSIS

CWC 10632.

(a)(1) The analysis of water supply reliability conducted pursuant to Section 10635.

WFA's source of supply was discussed in Section 6.2 of the 2020 UWMP and consists of untreated imported water purchased from IEUA. The reliability of the source of supply is discussed in Chapter 7 of this UWMP. Imported water supplies may be impacted in the event MWD implements its WSAP due to a water supply shortage.

MWD's long-term water service reliability assessment performed for the UWMP forecasts sufficient supplies to meet projected demands from 2025 through 2045 under a normal water year, a single dry year, and five consecutive drought year conditions as specified by the Act. Their assessment is restricted to the specific conditions and assumptions stated in the UWMP Section 2.3 and 2021 WSCP Section A.4.2. IEUA expects to have surplus supplies for each year of their DRA, tabulated Table 7-7 (Draft IEUA 2020 UWMP, Section 7.5), due to their ability to augment with recycled water and imported water surplus to the allocated imported water supplies.

IEUA expects to have surplus supplies for each year of their DRA, tabulated Table 7-7 (Draft IEUA 2020 UWMP, Section 7.5), due to their ability to augment with recycled water and imported water surplus to the allocated imported water supplies.

8.2 ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

CWC 10632.

(a)(2) The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:

(A) The written decision-making process that an urban water supplier will use each year to determine its water supply reliability.

(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:

(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.

(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.

(iii) Existing infrastructure capabilities and plausible constraints.

(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.

(v) A description and quantification of each source of water supply.

CWC 10632.1.

An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later.

Commencing July 1, 2022, WFA is required to submit an "Annual Water Supply and Demand Assessment" (Annual Assessment) in accordance with DWR's guidance and requirements. The Annual Assessment will include a review of WFA's unconstrained water demands from its member agencies (i.e. water demands from its member agencies prior to any projected response actions WFA may trigger under this WSCP) for the current year and the upcoming (potential single dry) year. WFA will also include information regarding anticipated shortages, triggered shortage response actions, and communication actions consistent with WFA's WSCP.

For each Annual Assessment, WFA plans to prepare a preliminary assessment which evaluates the adequacy of its water supplies for the current and upcoming years by April of each year. The preliminary assessment will include a review of water supplies for at least a single dry year.

The components of an Annual Assessment consist of the following:

- A written decision-making process
- Key data inputs and assessment methodology

8.2.1 DECISION MAKING PROCESS

WFA purchases untreated water from MWD through IEUA, then treats and delivers the potable water for use by its member agencies. WFA owns and operates the Agua de Lejos Treatment Plant in the City of Upland, a conventional surface water treatment facility that treats and disinfects surface water from MWD's State Water Project. This information will be used to help develop the Annual Assessment. A draft of the Annual Assessment will be circulated internally within WFA for peer review and comment by the Technical Advisory Committee, consisting of representatives from each of the member agencies, for approval and recommendation to the Board of Directors. Based on comments received, a redraft will be prepared and provided to the General Manager for final review. Subsequently, a final draft of the Annual Assessment will be provided to WFA's Board of Directors for review and included in the agenda as part of a Board meeting such that it can be approved and any recommended specific shortage response actions may be enacted. The final Annual Assessment will be provided to DWR no later than July 1 of each year.

The Annual Assessments will be instrumental in providing guidance to WFA and its member agencies regarding decisions regarding potential declarations of a water supply shortage and implementation of water reduction stages, instituting mandatory water restrictions, promoting water use efficiency and conservation programs, water rates and drought rate surcharges, and the necessity of pursuing alternative water supplies. This process will help ensure adequate water supply resources are available to WFA.

8.2.2 DATA AND METHODOLOGIES

The key data inputs and methodologies which will be evaluated by WFA during the preparation of the preliminary assessment will include the following:

1) Evaluation Criteria: The locally applicable evaluation criteria used to prepare the Annual Assessment will be identified. The evaluation criteria will include, but is not limited to, an analysis of current water demands from WFA's member agencies, and a review of water treatment system improvement plans which may impact infrastructure availability.

2) Water Supply: A description of the available water supply source will be provided. The description will include a quantification of the available imported water supply source from MWD and will be based on review of the State's water supply conditions, (e.g. State Water Project), current treatment capacities, historical deliveries, Urban Water Management Plans, and pertinent water supply studies (including Water Supply Assessments and/or Master Plans).

3) Unconstrained Water Demand: The potential unconstrained water demands from its member agencies during the current year and the upcoming (potential single dry) year, prior to any special shortage response actions, will be reviewed. The review will include factors effecting member agencies' demands such as weather, existing and projected land growth projections, actual member agency consumption and water use factors, and existing water shortage levels (see Section 8.3).

4) Planned Water Use for Current Year Considering Dry Subsequent Year: The water supplies available to meet the demands from its member agencies during the current year and the upcoming (potential single dry) year will be considered. The evaluation will include factors such as estimated water demands from its member agencies, weather, water quality results, available treatment capacities, imported water allocations, contractual obligations, regulatory issues, and the costs associated with treating the imported water supply source.

5) Infrastructure Considerations: The capabilities of the water treatment and distribution system infrastructure to meet the water demands from its member agencies during the current year and the upcoming (potential single dry) year will be considered. In addition, capital improvement and replacement projects, as well as potential projects which may increase water system and treatment capacities (see Section 6.2.8), will be considered.

6) Other Factors: Additional local considerations, if any, which can affect the availability of water supplies will be described.

8.3 SIX STANDARD WATER SHORTAGE LEVELS

CWC 10632.

(a)(3)(A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.
(a)(3)(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross reference relating its existing categories to the six standard water shortage levels.

WFA obtains imported water from Metropolitan Water District of Southern California through IEUA, and treats the imported water on behalf of its member agencies. The quantity of water supplies that WFA is able to treat and provide to its member agencies is based on the availability of water supplies from MWD and IEUA. However, WFA will manage water supplies, in collaboration with its member agencies to minimize the adverse impacts of water shortages. WFA's member agencies have water usage plans during periods of shortage which are designed to incorporate six standard water shortage levels corresponding to progressive ranges from up to 10, 20, 30, 40, and 50 percent shortages, and greater than 50 percent shortage, as required.

WFA is a wholesale water supplier that treats and provides imported water from the State Water Project through IEUA to its member agencies upon request. However, imported supplies from WFA are usually one of several supply sources available to its member agencies. Depending on their individual water supply constraints, member agencies may employ their appropriate water shortage level. The standard shortage levels for each member agency can be found in their individual 2020 UWMPs. These standard shortage levels are executed by the individual member agency, independent of WFA.

WFA's member agencies are also retail member agencies of IEUA. As a result, member agencies may be subject to IEUA's "Regional Drought Contingency Plan", adopted in April 2020, which previously established six (6) water shortage levels. However, IEUA's "Regional Drought Contingency Plan" notes that a retail agency may employ a shortage level that varies from the regional shortage level. A copy of the "Regional Drought Contingency Plan" is provided and incorporated by reference. In accordance with the CWC in which urban water suppliers are required to define six standard water shortage levels, WFA has provided the crosswalk illustrated below that translates IEUA's previously established shortage levels to the mandated standard shortage levels for its member agencies.

Corresponding Relationships Between IEUA's 2015 Shortage Levels and the 2020 WSCP Mandated Shortage Levels

Established Level	Supply Condition/ Shortage
0	0%
1	1 to 5%
2	6 to 15%
3	16 to 25%
4	26 to 50%
5	> 50%

2020 Standard Level	Shortage Level
1	≤10%
2	10 to 20%
3	20 to 30%
4	30 to 40%
5	40 to 50%
6	> 50%

Table 8-1 provides a description of the six water shortage levels, which may be triggered by a shortage in WFA's imported water supply source, depending on the severity of the shortage and its anticipated duration.

Table 8-1 Water Shortage Contingency Planning Levels

Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions** *(Narrative description)*
1	Up to 10%	IEUA member agencies may be subject to implement direct installation programs, hold more landscape workshops, consider escalation of local water waste prohibitions, etc.
2	Up to 20%	In addition to Shortage Level 1; IEUA member agencies may expand micro-targeting customers and increase marketing efforts.
3	Up to 30%	In addition to Shortage Level 2; IEUA member agencies may increase penalties, implement emergency alerts, etc.
4	Up to 40%	In addition to Shortage Level 3; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies.
5	Up to 50%	In addition to Shortage Level 4; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies.
6	>50%	In addition to Shortage Level 5; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies.
NOTES:		

8.4 SHORTAGE RESPONSE ACTIONS

CWC 10632.

(a)(4) Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:

(A) Locally appropriate supply augmentation actions.

(B) Locally appropriate demand reduction actions to adequately respond to shortages.

(C) Locally appropriate operational changes.

(D) Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions.

(E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.

8.4.1 DEMAND REDUCTION

WFA obtains imported water from Metropolitan Water District of Southern California through IEUA, and treats the imported water on behalf of its member agencies. The quantity of water supplies that WFA is able to treat and provide to its member agencies is based on the availability of water supplies from MWD and IEUA. However, WFA encourages prudent water shortage response actions for its member agencies to reduce demand on water supplies. Member agencies may employ their own demand reduction actions and/or IEUA demand reduction actions at their own discretion.

Once a drought enters a specific stage, the IEUA Drought Response Taskforce will assemble to finalize the Response Plan for that stage and begin the implementation process for retail customer targeting and increased outreach. The taskforce is comprised of representatives from IEUA's retail agencies, other stakeholders and regional personnel from IEUA. The group, including WFA's member agencies, works in a collaborative fashion to gain consensus on appropriate regional response actions. These recommendations will be brought to each agency's respective management for approval.

There are a number of response actions available to WFA's member agencies which are provided by IEUA. These include escalation of customer messaging content and frequency, expanded outreach channels, enhanced water efficiency incentives and programs, and as necessary, water use restrictions. Suggested actions for retail member agencies are available, as follows:

Standard Water Shortage Level 1

The following may be implemented by WFA's member agencies during a Standard Water Shortage Level 1:

- Implement direct installation programs including the Residential Smart Irrigation Direct Installation and the School Smart Irrigation Direct Installation.
- Hire additional landscape designers to expand landscape design services.
- Hold more frequent landscape workshops.
- Increase the volume of home surveys performed.
- Utilize general customer messaging to communicate need to increase water efficiency levels.
- Profile customers and micro-target high potential customers, utilizing messaging that will best resonate with those customers.
- Consider escalation of local water waste prohibitions.
- Introduce influencer marketing (role models and respected community members)
- Prepare IEUA WEFlex funding proposal and plans for expanded customer communication and enforcement administration.
- Additional requirements deemed necessary by WFA, IEUA, and individual member agencies.

Standard Water Shortage Level 2

In addition to tasks implemented in Standard Water Shortage Level 1, the following may be applied to Standard Water Shortage Level 2 by WFA's member agencies:

- Continue base programs and incentive amounts for turf replacement, high efficiency nozzles, smart controllers, laminar flow restrictor, and plumbing control valves.
- Continue smart irrigation direct installation programs.
- Expand profiling and micro-targeting to include mid-range water users as well as high- water use customers.
- Increase influencer marketing.
- Hire additional local staff and set up operations for expanded customer communication and enforcement administration.
- Additional requirements deemed necessary by WFA, IEUA, and/or individual member agencies.

Standard Water Shortage Level 3

In addition to tasks implemented in Standard Water Shortage Level 2, the following may be applied to Standard Water Shortage Level 3 by WFA's member agencies:

- Increase penalties.
- Implement emergency alerts.
- Implement news media coverage.
- Additional requirements deemed necessary by WFA, IEUA, and/or individual member agencies.

Standard Water Shortage Level 4

In addition to tasks implemented in Standard Water Shortage Level 3, the following may be applied to Standard Water Shortage Level 4 by WFA's member agencies:

- Additional requirements deemed necessary by WFA, IEUA, and/or individual member agencies.

Standard Water Shortage Level 5

In addition to tasks implemented in Standard Water Shortage Level 4, the following may be applied to Standard Water Shortage Level 5 by WFA's member agencies:

- Additional requirements deemed necessary by WFA, IEUA, and/or individual member agencies.

Standard Water Shortage Level 6

In addition to tasks implemented in Standard Water Shortage Level 5, the following may be applied to Standard Water Shortage Level 6 by WFA's member agencies:

- Only offer indoor plumbing and property leak detection programs.
- Suspend all landscape and irrigation programs.
- Conduct stringent enforcement of restrictions.
- Additional requirements deemed necessary by WFA, IEUA, and/or individual member agencies.

Table 8-2 Demand Reduction Actions

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions *Drop down list* *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? *For Retail Suppliers Only* *Drop Down List*
Add additional rows as needed				
1	Expand Public Information Campaign	Collective reduction from all Shortage Level 1 actions is up to 3,065 AFY	Applicable to IEUA member agencies	No
1	Increase Frequency of Meter Reading	Collective reduction from all Shortage Level 1 actions is up to 3,065 AFY	Applicable to IEUA member agencies	No
1	Increase Water Waste Patrols	Collective reduction from all Shortage Level 1 actions is up to 3,065 AFY	Applicable to IEUA member agencies	Yes
2	Other	Collective reduction from Shortage Level 1 plus all Shortage Level 2 actions is up to 6,130 AFY	All actions under Shortage Level 1	Yes
2	Moratorium or Net Zero Demand Increase on New Connections	Collective reduction from all Shortage Level 2 actions is up to 6,130 AFY	Applicable to IEUA member agencies	No
3	Other	Collective reduction from Shortage Level 2 plus all Shortage Level 3 actions is up to 9,195 AFY	All actions under Shortage Level 2	Yes
4	Other	Collective reduction from Shortage Level 3 plus all Shortage Level 4 actions is up to 12,260 AFY	All actions under Shortage Level 3	Yes
5	Other	Collective reduction from Shortage Level 4 plus all Shortage Level 5 actions is up to 15,325 AFY	All actions under Shortage Level 4	Yes
6	Other	Collective reduction from Shortage Level 6 actions is greater than 15,325 AFY	All actions under Shortage Level 5	Yes
NOTES: WFA encourages IEUA water shortage response actions for its member agencies to reduce demand on water supplies. Member agencies may employ their own demand reduction actions and/or IEUA demand reduction actions at their own discretion.				

8.4.2 SUPPLY AUGMENTATION

As discussed in Chapter 6, WFA's source of water supply is strictly imported surface water from Metropolitan Water District of Southern California purchased through Inland Empire Utilities Agency and treated at WFA's treatment facility. WFA does not anticipate augmenting water supplies. However, WFA's member agencies will consider increased supplies from other existing sources. Table 8-3 reflects this approach and does not identify any new supplies. Additionally, WFA's member agencies will focus on demand reduction measures in the event existing sources of supply are not sufficient to meet retail customer demands. As noted in Section 8.2, beginning July 1, 2022, WFA will prepare and submit an Annual Assessment which will include a review of its water supply available to meet water demands from its member agencies for the current and upcoming years.

Due to previous critically dry conditions, MWD developed the WSAP whereby available supplies are equitably allocated to its member agencies, including IEUA. The WSAP establishes ten

different shortage levels and a corresponding drought allocation to each member agency. Based on the shortage level established by MWD, the WSAP provides a reduced drought allocation to a member agency for its M&I retail demand. The ratio of MWD water supply drought allocation to local water supply will change based on the WSAP stage. The MWD drought allocation can be used to make Full Service untreated water deliveries at the Tier 1 rate up to a Tier 1 allocation.

Any Full-Service untreated water delivered in excess of a drought allocation is subject to a penalty rate in addition to the normal rate paid for the water. In addition to the WSAP, MWD describes supply augmentation actions in its Regional 2020 UWMP, which is incorporated by reference. MWD's primary first response to any gap between core supplies (from the State Water Project and Colorado River) and demand is to make optimal use of its supply augmentation options, consisting of drawing from flexible supply programs and storage reserves. MWD has developed and actively manages a portfolio of water supply programs including water transfer, storage, and exchange agreements. MWD pursues voluntary water transfer and exchange programs to help mitigate supply/demand imbalances and provide additional dry-year supply sources. In addition, MWD has developed significant storage capacity in reservoirs, conjunctive use, and other groundwater storage programs totaling approximately 6.0 million AF. Pursuant to MWD's "Emergency Storage Objective", updated in 2019, approximately 750,000 AF of total stored water is emergency storage reserved by MWD for use in the event of supply interruptions. Based on MWD's historical and on-going water supply and storage programs and management practices, WFA will purchase its allocated untreated imported water supply made available from MWD through IEUA in association with each of the standard water shortage levels identified in Section 8.3. Member agencies' water demands will be addressed through increased use of member agencies' local groundwater supplies and implementation of demand reduction measures through the various stages of action.

Table 8-3 Supply Augmentation and Other Actions

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
1	Transfers	Not applicable (see Notes)	
2	Transfers	Not applicable (see Notes)	
3	Transfers	Not applicable (see Notes)	
4	Transfers	Not applicable (see Notes)	
5	Transfers	Not applicable (see Notes)	
6	Transfers	Not applicable (see Notes)	
NOTES: WFA is a wholesale water supplier that provides treated imported water from the State Water Project through IEUA to its member agencies. WFA does not anticipate augmenting water supplies. However, WFA's member agencies will consider increased production from the Chino Basin (through potential transfer of water rights) using existing facilities to address increased demands. As noted on Table 8-2, WFA's member agencies plan to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.			

8.4.3 OPERATIONAL CHANGES

During a water supply shortage situation, WFA will collaborate with its member agencies to determine how best to manage its reduced imported water supply to meet its member agencies' demands. Section 8.4.1 describes WFA's water supply source. Section 8.4.2 describes WFA's standard water shortage levels and associated demand reduction measures. Demand reduction measures, when implemented, may also potentially result in short-term operational changes which are necessary to allow WFA to utilize all available water supply sources in response to water shortage situations.

As noted in Section 8.2, beginning July 1, 2022, WFA will prepare and submit an Annual Assessment which will include a review of the water supplies available to meet water demands from member agencies for the current and upcoming years. Preparation of the Annual Assessment will assist WFA in determining any potential operational changes. The operational changes WFA will consider in addressing non-catastrophic water shortages on a short-term basis include the following:

- The reduced annual volume of available water supply may be distributed throughout the year whereby more volume is allocated to high demand summer months with lower volumes made available in the lower demand winter months. WFA may consider brief short-term treatment plant shutdowns during the winter.

- Improved monitoring, maintenance, and repairs to reduce water distribution system losses.

8.4.4 ADDITIONAL MANDATORY RESTRICTIONS

The mandatory restrictions which are implemented by WFA to reduce member agencies' demands are discussed in Section 8.4.2. There are no additional mandatory restrictions planned at this time.

8.4.5 EMERGENCY RESPONSE PLAN

Catastrophic water shortages are incorporated in WFA's standard water shortage levels (identified in Section 8.3) and the associated demand reduction measures (described in Section 8.4.2). In addition to potential operational changes (Section 8.4.3) which WFA may consider in order to continue providing water supplies, WFA will review and implement any necessary steps included in its "Emergency Response Plan".

As part of the "America's Water Infrastructure Act of 2018", community water systems serving a population greater than 3,300 people, including WFA, are required to review and update their "Risk and Resilience Assessment" (RRA) and the associated "Emergency Response Plan" (ERP) every five (5) years. However, due to security concerns regarding the submitting of these reports, water systems are required to submit certifications to the United States Environment Protection Agency (USEPA), from March 31, 2020 and December 30, 2021, confirming the current RRA and ERP have been reviewed and updated.

WFA's RRA, prepared in 2020, evaluates the vulnerabilities, threats, and consequences from potential hazards to WFA's water system. WFA prepared its RRA (which is incorporated by reference) by evaluating the following items:

- Natural hazards and malevolent acts (i.e., all hazards).
- Resilience of water facility infrastructure (including pipes, physical barriers, water sources and collection, treatment, storage and distribution facilities, and electronic, computer and other automated systems).
- Monitoring practices.
- Financial systems (e.g., billing systems).
- Chemical storage and handling.
- Operation and maintenance.

WFA's RRA evaluated a series of potential malevolent acts, natural hazards, and other threats in order to estimate the potential "monetized risks" (i.e. associated economic consequences to both the water system and surrounding region, and the likelihood of occurrence) associated with WFA's water facility assets. The cost-effectiveness of implementing potential countermeasures to reduce risks was also reviewed.

WFA's ERP Update, prepared in 2020, provides the management, procedures, and designated actions WFA and its employees will implement during emergency situations (including catastrophic water shortages) resulting from natural disasters, system failures and other unforeseen circumstances. WFA's ERP Update (which is incorporated by reference) provides the guidelines for evaluating an emergency situation, procedures for activating an emergency response, and details of the different response phases in order to ensure that customers receive a reliable and adequate supply of potable water. The scope of the ERP Update includes emergencies which directly affect the water system and the ability to maintain safe operations (such as a chlorine release, and earthquake or a threat of contamination). The ERP Update also incorporates the results of WFA's RRA and includes the following:

- Strategies and resources to improve resilience, including physical and cybersecurity.
- Plans and procedures for responding to a natural hazard or malevolent act.
- Actions and equipment to lessen the impact of a natural hazard or malevolent act.
- Strategies to detect natural hazards or malevolent act.

WFA will review the ERP Update for procedures regarding the utilization of alternative water supply sources in response to water supply shortages, including during the standard water shortage levels. WFA will also review applicable procedures described in the ERP Update regarding any necessary temporary shutdown of water supply facilities, including appropriate regulatory and public notifications.

8.4.6 SEISMIC RISK ASSESSMENT AND MITIGATION PLAN

CWC 10632.5.

(a) In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.

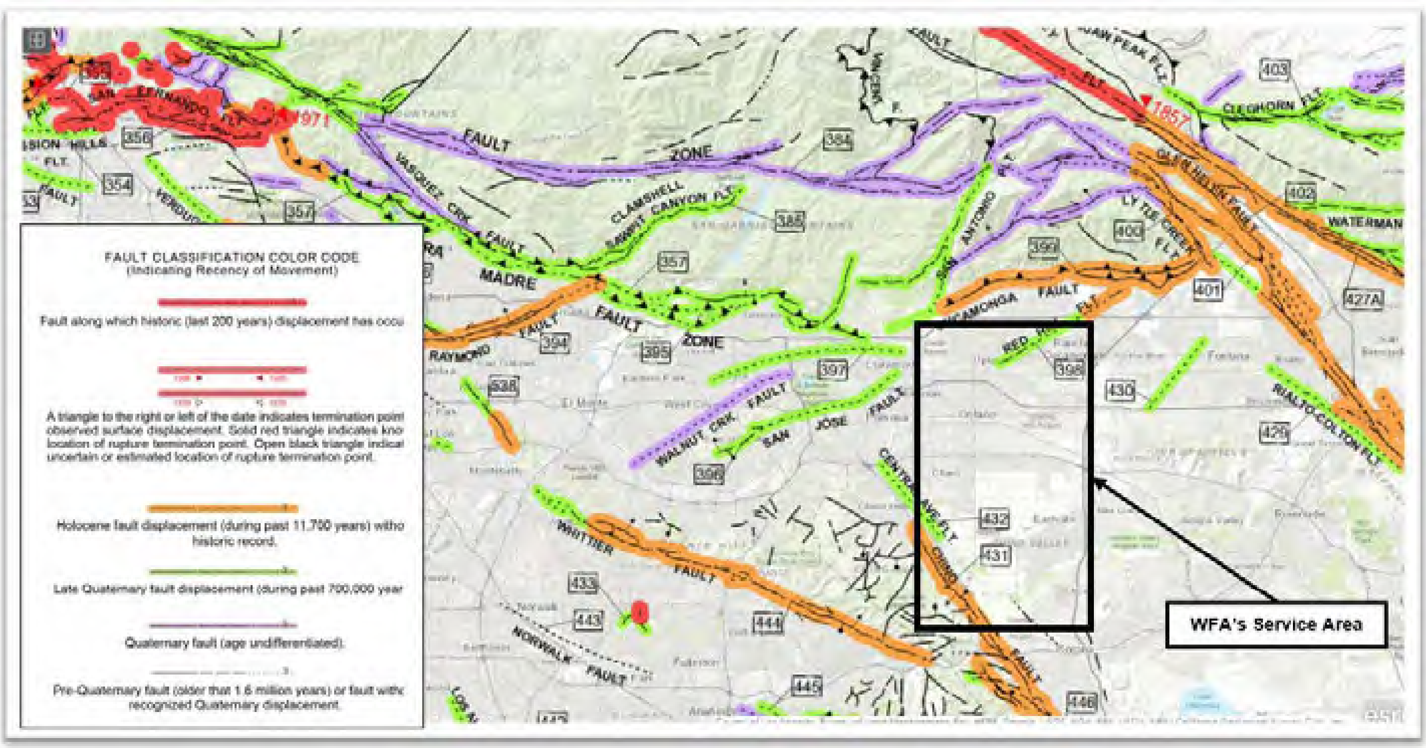
(b) An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.

(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

The County of San Bernardino prepared a “Multi-Jurisdictional Hazard Mitigation Plan” which was approved by the Federal Emergency Management Agency (FEMA) in June 2017. The County’s Multi-Jurisdictional Hazard Mitigation Plan identified methods to assess significant natural hazards (including earthquakes) affecting areas throughout San Bernardino County, and the mitigation strategies necessary to reduce risks, including seismic risk. The County’s Multi- Jurisdictional Hazard Mitigation Plan is provided in Appendix E.

The California Geological Survey has published the locations of numerous faults which have been mapped in the Southern California region. Although the San Andreas fault is the most recognized and is capable of producing an earthquake with a magnitude greater than 8 on the Richter scale, some of the lesser-known faults have the potential to cause significant damage. The locations of these earthquake faults in the vicinity of the area receiving water from WFA are provided in the figure below. The faults that are located in close proximity to and could potentially cause significant shaking in the area receiving water supplies from WFA include the San Andreas fault, the Walnut Creek fault, the San Jose fault, the Red Hill fault, the Cucamonga fault, the Chino fault, the Central Avenue fault, and the Sierra Madre fault.

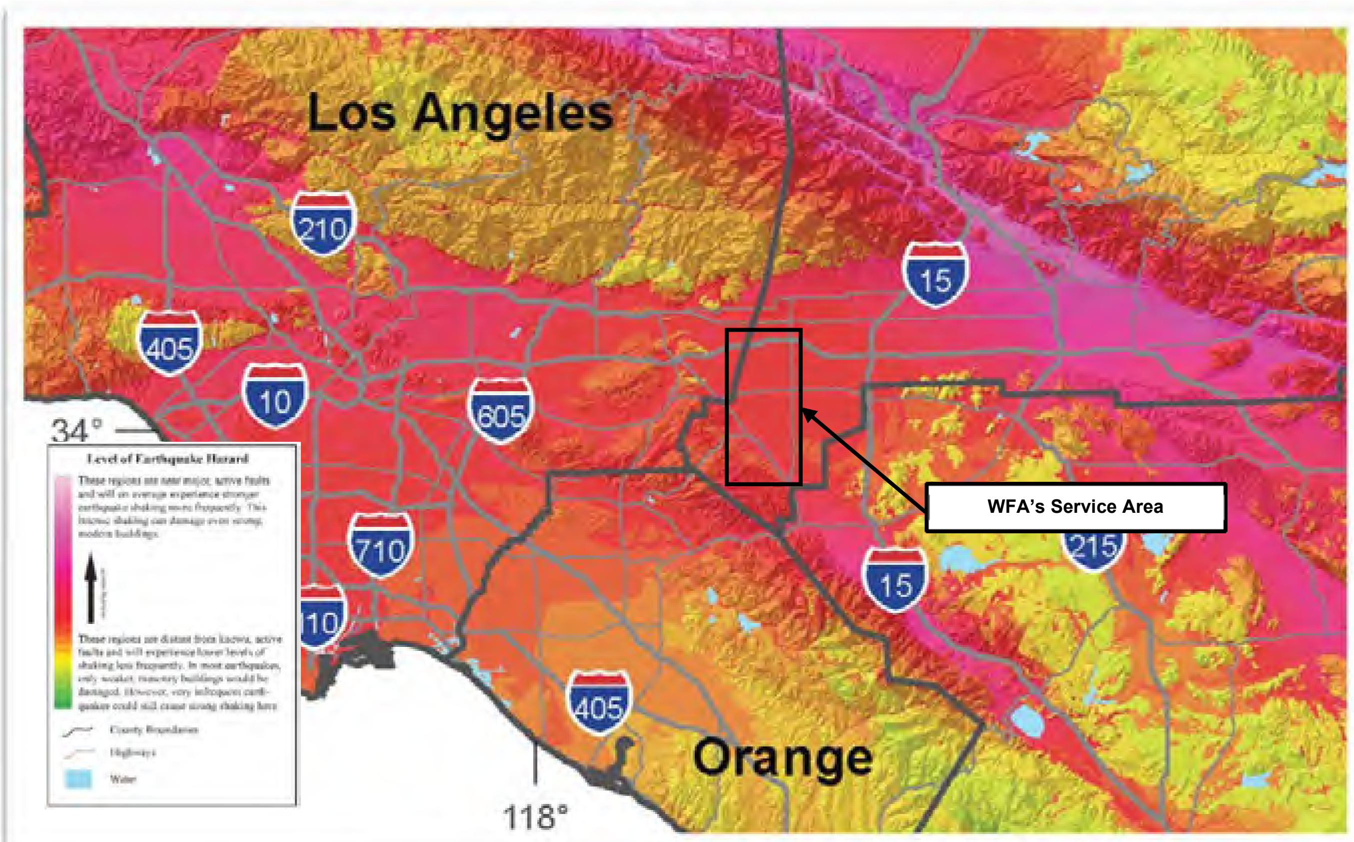
Location of Earthquake Faults



Source: https://maps.conservation.ca.gov/cgs/fam/App/

The following figure provides the relative intensity of ground shaking in the vicinity of the area receiving water supplies from WFA from anticipated future earthquakes. The locations of relatively long-period (1.0 second) earthquake shaking, including within the area receiving water supplies from WFA, are provided. Long-period shaking affects tall, relatively flexible buildings, but also correlates with earthquake damage. The shaking potential is calculated based on the level of ground motion that has a 2 percent chance of being exceeded in 50 years (or the level of ground- shaking with an approximate 2,500-year average repeat time). As discussed in Section 8.4.5, WFA has prepared an Emergency Response Plan Update which provides the management, procedures, and designated actions WFA and its employees will implement during emergency situations resulting from natural disasters, including during earthquakes, to ensure that customers receive a reliable and adequate supply of potable water. WFA's ERP Update is incorporated by reference.

Earthquake Shaking Potential



Source: "Earthquake Shaking Potential for California", 2016, California Geological Survey and United States Geological Survey

8.4.7 SHORTAGE RESPONSE ACTION EFFECTIVENESS

The effectiveness of the shortage response actions for each of the standard water shortage levels identified in Section 8.3 is evident in WFA's member agencies' historical ability to meet its their water demands in response to a water supply shortage. The effectiveness of each of the WFA's member agencies' shortage response actions, in order to reduce any potential gaps between supply and demand, has been quantified in the expected demand reduction provided in Table 8-2 and Table 8-3.

Section 6.1 provides a tabulation of WFA's historical annual water demands. During the past 10 years, WFA experienced a five consecutive year drought within the area receiving its water supplies from FY 2011-12 to FY 2015-16. Throughout this extended dry year period, WFA's annual water production ranged from 15,387 AF to 28,455 AF, with an average of approximately 25,015 AF. In addition, historical records indicate WFA previously produced a maximum of up to 28,455 AF during FY 2013-14. WFA has been able to provide water supplies to its member agencies, including during long-term droughts and years with historically high water demands.

WFA's projected collective water demands from its member agencies (during normal, single dry, and multiple dry years) are provided in Section 7.2.3 and are anticipated to incorporate similar reductions in water use rates as a result of the shortage response actions, ongoing conservation efforts, and demand management measures. In addition, as discussed in Section 8.4.1, based on historical and on-going management practices, WFA member agencies will be able to continue relying on their water supply source from local groundwater supplies for adequate supply augmentation in response to each of the standard water shortage levels identified in Section 8.3.

Although adequate water supplies are anticipated, the cost of those water supplies may become incrementally more expensive. WFA's member agencies' will enact varying levels of their WSCP to encourage retail customers to reduce water consumption and at the same time reduce the need to use the more expensive water supplies. Notwithstanding, the effectiveness of each of WFA's shortage response actions, in order to reduce any potential gaps between supply and demand, has been quantified in the expected demand reduction section provided in Table 8-2 and Table 8-3. The effectiveness of WFA's member agencies' shortage response actions is based on WFA's water demands prior to 2015 (unconstrained demands). WFA experienced reduced water demands from its member agencies in 2015 in response to the Governor's April 1, 2015 Executive Order B-29- 15 which mandated statewide reduction in water use of 25 percent. WFA's actual water demand reduction during this period was used to estimate the extent of water use reductions for WFA's Water Shortage Stages. WFA's Water Shortage Levels 1, 2, 3, 4, 5, and 6 are expected to reduce water demands by up to 10%, 20%, 30%, 40%, 50%, and greater than 50%, respectively.

8.5 COMMUNICATION PROTOCOLS

CWC 10632.

(a)(5) Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:

(A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.

(B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.

(C) Any other relevant communications.

Pursuant to CWC 10632.1, WFA's Annual Assessment will be submitted to DWR by July1 of each year or within 14 days of receiving its final allocation, whichever is later. The Annual Assessment will include a review of WFA’s unconstrained water demands from its member agencies (i.e. water demands from its member agencies prior to any projected response actions WFA may trigger under this WSCP) for the current year and the upcoming (potential single dry) year. WFA will also include information regarding anticipated shortages, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with WFA’s WSCP. See Section 8.2 for more information regarding the Annual Assessment.

WFA will participate in the IEUA Drought Response Taskforce to gain consensus on appropriate regional response actions, in collaboration with WFA’s member agencies. These recommendations will be considered by each member agency’s respective management for approval.

WFA will support its member agencies’ broad messaging (news stories, radio/tv ads, billboards, etc.) to communicate water scarcity, urgency to act, and commitment to continue to provide safe, reliable supply. Additionally, IEUA and its member agencies will utilize targeted action messaging aimed towards specific customers via phone, letter, email, etc.

8.6 COMPLIANCE AND ENFORCEMENT

CWC 10632.

(a)(6) For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.

As a wholesale supplier, WFA is not required by DWR to complete Section 8.6. However, a discussion regarding enforcement and customer compliance actions are discussed in Section 8.4.1.

8.7 LEGAL AUTHORITIES

CWC 10632.

(a)(7)(A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions.

(B) A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1.

(C) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

CWC Division 1, Section 350

The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, shall declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

WFA will manage its imported water supplies prudently to minimize the adverse impacts of water shortages. WFA's response actions during periods of shortage is described in Section 8.4.

Member agencies may employ their own appropriate water shortage level and response actions. The standard shortage levels for each member agency can be found in their individual 2020 UWMPs. These standard shortage levels are executed by the individual member agency, independent of WFA.

WFA may declare a water shortage emergency in accordance with CWC Chapter 3 (commencing with Section 350) of Division 1 or one of the standard shortage levels, in collaboration with its member agencies, and encourage the response actions noted in the appropriate level designated in this WSCP. The list of measures of the designated water shortage level will then be considered by WFA's member agencies for their implementation at the retail level. Implementation of operational adjustments at the treatment plant in response to a water shortage will be considered by WFA.

Upon proclamation by the Governor of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions, the state will defer to implementation of locally adopted water shortage contingency plans to the extent practicable.

WFA shall coordinate with any city, county, or agency within which it provides water supply services for the possible proclamation of a local emergency as necessary under California Government Code, California Emergency Services Act (Article 2, Section 8558).

8.8 FINANCIAL CONSEQUENCES OF WSCP

CWC 10632.

(a)(8) A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:

(A) A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(B) A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(C) A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.

A reduction of imported water supply will increase the unit cost of treatment for each member agency, depending on the proportionate water deliveries. WFA has a mixture of cost recovery mechanisms based on entitlement, flow and member agencies 10-year average, and maintains a reserve for annual capital cost replacements with some limited funds to cover operating expenses for a short period of time. WFA plans to review its reserve policy and consider additional actions that will make WFA's finances less vulnerable to unexpected and drastic reductions in water supply.

8.9 MONITORING AND REPORTING

CWC 10632.

(a)(9) For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.

As a wholesale supplier, WFA is not required by DWR to complete Section 8.9.

8.10 WSCP REFINEMENT PROCEDURES

CWC 10632.

(a)(10) Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.

WFA's Water Shortage Contingency Plan has been prepared as an adaptive management plan. WFA will review the implementation results for any current or potential shortage gaps between water supplies and demands. WFA will evaluate the need for revising the Water Shortage Contingency Plan in order to resolve any shortage gaps, as necessary. WFA will consider the following potential revisions in the event of a potential shortage gap:

- Additional public outreach, education, and communication programs (in addition to the programs discussed in Chapter 9) to WFA's member agencies for their implementation at the retail level.

- Implementation of more stringent water use restrictions under the standard water shortage levels (discussed in Section 8.4.2).

- Improvements to the water supply augmentation responses (discussed in Section 8.4.1), as well as any associated operational changes (discussed in Section 8.4.3) which may be required.

- Incorporation of additional actions recommended by WFA staff and/or the Technical Advisory Committee, consisting of representatives from each of the member agencies.

This Water Shortage Contingency Plan is adopted as part of WFA's 2020 Urban Water Management Plan adoption process discussed in Section 10.3. It is anticipated WFA will review, revise, and adopt an updated Water Shortage Contingency Plan as part of preparing its 2025 Urban Water Management Plan as necessary. However, WFA will continue to review the monitoring and reporting data, and if needed, update the Water Shortage Contingency Plan more frequently. Any updates to WFA's Water Shortage Contingency Plan will include a public hearing and adoption process by WFA's Board (see Section 8.12).

8.11 SPECIAL WATER FEATURE DISTINCTION

CWC 10632.

(b) For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

As a wholesale supplier, WFA is not required by DWR to complete Section 8.11.

8.12 PLAN ADOPTION, SUBMITTAL, AND AVAILABILITY

CWC 10632.

(c) The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.

WFA's Water Shortage Contingency Plan is adopted as part of WFA's 2020 Urban Water Management Plan adoption process discussed in Chapter 10. The process for adopting WFA's Water Shortage Contingency Plan includes the following:

- WFA will conduct a public hearing and make the Water Shortage Contingency Plan available for public inspection.
- WFA will provide notification of the time and place of the public hearing to any city or county in which water is provided.
- WFA will publish notice of public hearing in a newspaper once a week, for two successive weeks (with at least five days between publication dates).
- WFA's Board will adopt the 2020 Urban Water Management Plan and the Water Shortage Contingency Plan.
- As part of submitting the 2020 Urban Water Management Plan to DWR, WFA will also submit the Water Shortage Contingency Plan (electronically through DWR's online submittal tool) within 30 days of adoption and by July 1, 2021. WFA will submit a copy of the Water Shortage Contingency Plan to the California State Library and to any city or county in which water is provided within 30 days of adoption. In addition, WFA will make the Water Shortage Contingency Plan available for public review within 30 days of adoption.

If there are any subsequent amendments required, the process for adopting an amended Water Shortage Contingency Plan includes the following:

- WFA will conduct a public hearing and make the amended Water Shortage Contingency Plan available for public inspection.

- WFA's Board will adopt the amended Water Shortage Contingency Plan.
- WFA will submit the amended Water Shortage Contingency Plan to DWR (electronically through DWR's online submittal tool) within 30 days of adoption.

Additional information regarding the adoption, submittal, and availability of WFA's Water Shortage Contingency Plan (and 2020 Urban Water Management Plan) is provided in Chapter 10.

CHAPTER 9

DEMAND MANAGEMENT MEASURES

LAY DESCRIPTION – CHAPTER 9

DEMAND MANAGEMENT MEASURES

Chapter 9 (Demand Management Measures) of WFA's 2020 Plan discusses and provides the following:

- WFA works closely with its member agencies regarding "Demand Management Measures" to reduce the member agencies' water demands to allow them to achieve their individual retail water use targets.
- WFA's Demand Management Measures include metering of all its water supply connections with its retail member agencies.
- WFA's Demand Management Measures supports its member agencies' public education and outreach programs regarding water conservation.
- Additional Demand Management Measures including rebate, conservation, and asset management are discussed, which may be offered by its member agencies.
- A summary of the Demand Management Measures WFA has implemented or supported over the past five (5) years is provided.

9.1 DEMAND MANAGEMENT MEASURES FOR WHOLESALE SUPPLIERS

CWC 10631.

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:
(ii) Metering.
(iii) Public education and outreach.
(vi) Water conservation program coordination and staffing support.
(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.
(2) For an urban wholesale water supplier, as defined in Section 10608.12, a narrative description of the items in clauses (ii), (iv), (vi), and (vii) of subparagraph (B) of paragraph (1), and a narrative description of its distribution system asset management and wholesale supplier assistance programs.

WFA was formed under a JPA to acquire and construct facilities to supply and distribute potable water to its member agencies. WFA purchases untreated imported water from MWD through IEUA, then treats and delivers the water to its member agencies. WFA owns and operates the Agua de Lejos Treatment Plant in the City of Upland, a conventional surface water treatment facility that treats and disinfects water supplies from the State Water Project provided by MWD. WFA's member agencies work closely with IEUA to facilitate the installation of water saving technology and devices and the implementation of public outreach and education programs. Water use efficiency programs are a significant part of IEUA's Water Resources Program.

9.1.1 METERING

WFA fully meters its connections to its member agencies. WFA's meters are maintained by WFA staff and supplemented by third party evaluations.

9.1.2 PUBLIC EDUCATION AND OUTREACH

WFA's member agencies are also retail member agencies of IEUA. As a result, WFA's member agency customers have direct access to IEUA's Regional Water Use Efficiency Program, promoting water conservation or indirect access through WFA's member agencies. IEUA provides marketing and outreach materials to their retail member agencies' customers by using social media platforms, IEUA's website, community events, education training, and monthly newsletters. Those customers also learn about rebates and additional programs through the member agencies' websites and promotional materials and IEUA's website.

IEUA offers conservation programs, water saving tips, and rebates to WFA's member agencies for their retail customers. Programs include free landscape design training, consultations, design renderings, irrigation auditing, and pressure regulation valve installation, repair, and maintenance. IEUA also participates in a wide range of community events including Earth Day Celebration, compost giveaways, Days at the LA Fair, and a Landscape Water Conservation Fair, for the public's benefit.

IEUA conducts water conservation school education programs to the regional elementary schools. Programs include school assemblies and lesson materials to educate students on the topics of water conservation. IEUA is also a member of the Water Education Water Awareness Committee (WEWAC) that promotes the education of water issues to local schools, including schools within WFA's member agencies' service areas. WEWAC hosts art and essay contests and provides financial support for lesson plan materials about water issues. IEUA plans to continue the school education programs to further promote water conservation.

9.1.3 WATER CONSERVATION PROGRAM COORDINATION AND STAFFING SUPPORT

WFA supports IEUA's Regional Water Use Efficiency Program for the benefit of its member agencies. WFA's member agencies maintain staff who are responsible for setting policies and priorities for their respective agencies. Monthly board and city council meetings are conducted to adopt policies and programs contributing to water reliability which the WFA member agency staff then implement through conservation programs, including individual and regional programs. Key objectives include promoting water education and water use efficiency to enhance water supplies and to reduce demand on water supplies, including imported water. WFA's member agency staff are responsible for marketing, outreach, and possible augmentation programs within their individual service areas.

9.1.4 OTHER DEMAND MANAGEMENT MEASURES

In addition to the DMMs discussed above, WFA supports MWD's SoCal Water$mart Program through IEUA and offered to WFA's member agencies. This program is a regional rebate program available to residential and commercial customers. There are rebates available for indoor plumbing including high efficiency clothes washers and toilets. Rebates are also available for outdoor plumbing, including those for weather-based irrigation controllers, rotating sprinkler nozzles, and replacement of irrigated lawn with drought tolerant plants or other approved landscape options. IEUA plans to continue implementation of these programs to promote water conservation.

9.1.5 ASSET MANAGEMENT

WFA's treatment facility and distribution system assets are maintained by monthly water delivery reports, annual budget allocations, annual financial reports, and annual water quality reports. All report documents are available on WFA's website. Further, these assets are managed and maintained by a formal asset management plan, including maintenance tracking software.

WFA identifies capital improvement projects to provide greater operational flexibility, efficiency, and service life extension. Capital improvement projects are funded by WFA's member agencies through the normal annual budget process based on each agency's percent ownership or entitlement of the treatment plant. In addition, capital replacement projects are forecasted and budgeted through the normal annual budget process and are funded by the member agencies based on different criteria, including how the equipment service life is utilized in the treatment plant process, if the replacement is part of a member agency-owned turnout or by other funding mechanisms. WFA conducts routine preventative maintenance on a regular basis and repairs are made upon failure of certain equipment, when there are signs of fatigue or depending upon the criticality of the asset.

9.1.6 WHOLESALE SUPPLIER ASSISTANCE PROGRAMS

In addition to the conservation assistance programs discussed in Section 9.1.2, WFA supports IEUA's water use efficiency programs, offered to WFA's member agencies. Some of these programs include (but are not limited to) incentives for indoor appliances, outdoor irrigation devices, commercial plumbing & equipment rebates, turf removal and landscape evaluation & audit program administered by Chino Basin Water Conservation District.

IEUA's Regional Water Use Efficiency Program is further described in its Regional 2020 UWMP and on its website, which is incorporated herein by reference. WFA, representing its five member agencies, recognizes the individuality of its member agencies and their desire to support their retail customers. Retail agencies may supplement or customize how these programs are promoted and offered, to meet their specific needs.

9.2 EXISTING DEMAND MANAGEMENT MEASURES FOR RETAIL SUPPLIERS

CWC 10631.

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

- *(i) Water waste prevention ordinances.*
- *(ii) Metering.*
- *(iii) Conservation pricing.*
- *(iv) Public education and outreach.*

(v) *Programs to assess and manage distribution system real loss.*

(vi) *Water conservation program coordination and staffing support.*

(vii) *Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.*

As a wholesale agency, WFA is not required by DWR to complete Section 9.2.

9.3 REPORTING IMPLEMENTATION

9.3.1 IMPLEMENTATION OVER THE PAST FIVE YEARS

CWC 10631.

(e) *Provide a description of the supplier's water demand management measures. This description shall include all of the following:*

(1) *(A) …a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years.*

WFA supports water conservation programs and demand management measures implemented by its member agencies, some of which may be offered through IEUA or through their own programs to promote water conservation to their customers.

As discussed in Section 9.1.1, WFA fully meters its connections to its member agencies. WFA's meters are maintained by WFA staff and supplemented by third party evaluations.

As discussed in Section 9.1.2, WFA's member agency customers have direct access to IEUA's Regional Water Use Efficiency Program promoting water conservation or indirect access through WFA's member agencies. IEUA provides marketing and outreach materials to their retail member agencies' customers by using social media platforms, IEUA's website, community events (such as Earth Day Celebration, compost giveaways, Days at the LA Fair, and a Landscape Water Conservation Fair) for the public's benefit, education training, and monthly newsletters. Programs include free landscape design training, consultations, design renderings, irrigation auditing, and pressure regulation valve installation, repair, and maintenance. School education programs include school assemblies and lesson materials to educate students on the topics of water conservation. IEUA is also a member of the Water Education Water Awareness Committee that promotes the education of water issues to local schools, including schools within WFA's member agencies' service areas. WEWAC hosts art and essay contests and provides financial support for lesson plan materials about water issues.

As discussed in Section 9.1.3, WFA's member agencies maintain staff who are responsible for setting policies and priorities for their respective agencies. Monthly board and city council meetings are conducted to adopt objectives towards water reliability which the WFA member agency staff implements through conservation programs, including IEUA's water use efficiency programs.

As discussed in Section 9.1.4, WFA supports MWD's SoCal Water$mart Program through IEUA and offered by WFA's member agencies. This program is a regional rebate program available to residential and commercial customers. There are rebates available for indoor plumbing including high efficiency clothes washers and toilets. Rebates are also available for outdoor plumbing include those for weather-based irrigation controllers, rotating sprinkler nozzles, and replacement of irrigated lawn with drought tolerant plants or other approved landscape options.

As described in Section 9.1.5, WFA's treatment facility and distribution system assets are maintained by monthly delivery reports, annual budget allocations, annual financial reports, and annual water quality reports. All report documents are available on WFA's website. Further, these assets are managed and maintained by a formal asset management plan, including maintenance tracking software. WFA identifies capital improvement projects to provide greater operational flexibility, efficiency, and service life extension. Capital replacement projects are forecasted and budgeted through the normal annual budget process and are funded by the member agencies based on different criteria, including how the equipment service life is utilized in the treatment plant process, if the replacement is part of a member agency owned turnout or by other funding mechanisms. WFA conducts routine preventative maintenance on a regular basis and repairs are made upon failure of certain equipment, when there are signs of fatigue or depending upon the criticality of the asset.

As summarized in Section 9.1.6, in addition to the conservation assistance programs discussed in Section 9.1.2, WFA supports the following IEUA programs:

- MWD So Cal Water$mart Residential Rebate Program
- Multi-Family Toilet Installation Program
- IEUA Water Softener Rebate Program
- MWD SoCalWaterSmart.com CII Rebate Program
- MWD CII Save-A-Buck Program
- Weather-Based Irrigation Controller Rebate
- Residential Landscape Transformation Program

- IEUA Regional Residential Landscape Retrofit Program
- FreeSpinklerNozzles.com Voucher Program
- Landscape Evaluation and Audit Program (LEAP)

Retail agencies may supplement or customize how these programs are promoted and offered, to meet their specific needs.

9.3.2 IMPLEMENTATION TO ACHIEVE WATER USE TARGETS

CWC 10631.

(F)(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

The Demand Management Measures implemented by WFA are discussed in Section 9.1. Descriptions regarding the nature and extent of these Demand Management Measures implemented or supported by WFA over the past five years are discussed in Section 9.3. WFA will continue to support these Demand Management Measures and other water conservation programs and work collaboratively with IEUA to provide water conservation programs for its member agencies' residents.

9.4 WATER USE OBJECTIVES (FUTURE REQUIREMENTS)

Retail water agencies are currently working with DWR to develop Water Use Objectives pursuant to AB 1668 and SB 606. Beginning in 2024, retail water agencies are required to begin reporting compliance of their Water Use Objectives consisting of indoor residential water use, outdoor residential water use, commercial, industrial and institutional, irrigation with dedicated meters, water loss, and other unique local uses.

WFA is not a retail water agency and is not required to comply with the Water Use Objectives. However, WFA will continue to implement the Demand Management Measures discussed in Section 9.1.

CHAPTER 10

PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

LAY DESCRIPTION – CHAPTER 10

PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Chapter 10 (Plan Adoption, Submittal, and Implementation) of WFA's 2020 Plan discusses and provides the following:

- The steps WFA has performed to adopt and submit its 2020 Plan are detailed.
- The steps WFA has performed to adopt and submit its Water Shortage Contingency Plan are detailed.
- WFA coordinated the preparation of its 2020 Plan with the following:
    - County of San Bernardino
    - City of Ontario
    - City of Chino
    - City of Chino Hills
    - Cucamonga Valley Water District
    - Monte Vista Water District
    - San Antonio Water Company
    - City of Upland
    - Fontana Water Company
    - Local Agency Formation Commission
    - Chino Basin Watermaster
    - Inland Empire Utilities Agency
    - Chino Basin Water Conservation District

- WFA notified these agencies at least sixty (60) days prior to the public hearing of the preparation of the 2020 Plan and invited these agencies to participate in the development of the 2020 Plan.
- WFA provided a notice of the public hearing to the same agencies regarding the time, date, and place of the public hearing.
- WFA published a newspaper notification of the public hearing, once a week for two successive weeks.
- WFA conducted a public hearing to discuss and adopt WFA's 2020 Plan and WFA's Water Shortage Contingency Plan.
- Within 30 days of adoption, WFA submitted the 2020 Plan and Water Shortage Contingency Plan to the California Department of Water Resources.

- Within 30 days of adoption, WFA submitted all data tables associated with the 2020 Plan to the California Department of Water Resources.
- Within 30 days of adoption, WFA submitted a copy of the 2020 Plan to the State of California Library.
- Within 30 days of adoption, WFA submitted a copy of the 2020 Plan (and Water Shortage Contingency Plan) to the County of San Bernardino Assessor- Recorder/ Clerk's office and the County of Riverside Assessor- County Clerk-Recorder's office.
- Within 30 days after submittal of the 2020 Plan to the California Department of Water Resources, WFA made the 2020 Plan (including the Water Shortage Contingency Plan) available at WFA's main office and on WFA's website.
- The steps WFA will perform to amend the 2020 Plan and/or the Water Shortage Contingency Plan, if necessary, are provided.

10.1 INCLUSION OF ALL 2020 DATA

The data provided in WFA's 2020 Plan and the WSCP is provided on a FY basis through June 30, 2020 (as discussed in Section 2.5).

10.2 NOTICE OF PUBLIC HEARING

WFA's public hearing notification process for its 2020 Plan and the WSCP is discussed below.

10.2.1 NOTICE TO CITIES AND COUNTIES

CWC 10621.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

CWC 10642.

…The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area…

10.2.1.1 60 DAY NOTIFICATION

As discussed in Section 2.6.2., WFA coordinated the preparation of the 2020 Plan with the following:

- County of San Bernardino
- City of Ontario
- City of Chino
- City of Chino Hills
- Cucamonga Valley Water District
- Monte Vista Water District
- San Antonio Water Company
- City of Upland
- Fontana Water Company
- Local Agency Formation Commission
- Chino Basin Watermaster
- Inland Empire Utilities Agency
- Chino Basin Water Conservation District

WFA notified these agencies, as well as the cities and county within which WFA provides water supplies, at least sixty (60) days prior to the public hearing of the preparation of the 2020 Plan and invited them to participate in the development of the Plan. A copy of the notification letters sent to these agencies is provided in Appendix D.

10.2.1.2 NOTICE OF PUBLIC HEARING

WFA provided a notice of the public hearing to the cities, county, and other agencies listed in Section 2.6.2. The notice includes the time and place of the public hearing. To ensure that the Plan and the WSCP were available for review, WFA placed a copy of the draft 2020 Plan and the draft WSCP for review on its website. Copies of the notice of the public hearing are provided in Appendix D.

10.2.1.3 SUBMITTAL TABLES

Table 10-1 Notification to Cities and Counties

Submittal Table 10-1 Wholesale: Notification to Cities and Counties (select one)		
☐	Supplier has notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
	Provide the page or location of this list in the UWMP.	
☑	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Chino	Yes	Yes
Chino Hills	Yes	Yes
Ontario	Yes	Yes
Upland	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
San Bernardino County	Yes	Yes
NOTES:		

10.2.2 NOTICE TO THE PUBLIC

CWC 10642.

…Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies.

Government Code 6066.

Publication of notice pursuant to this section shall be once a week for two successive weeks. Two publications in a newspaper published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the fourteenth day, including therein the first day.

WFA encouraged the active involvement of the population within its service area prior to and during the preparation of the Plan. Pursuant to Section 6066 of the Government Code, WFA published a notice of public hearing in the newspaper during the weeks of June 3, 2021 and June 10, 2021. A notice of public hearing was also provided to IEUA and was posted on WFA's website. A copy of the published notice is provided in Appendix D. To ensure that the draft 2020 Plan and the draft WSCP were available for review, WFA placed a copy for review on its website.

10.3 PUBLIC HEARING AND ADOPTION

CWC 10642.

…Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon.

CWC 10608.26.

(a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:
(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.
(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.
(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

10.3.1 PUBLIC HEARING

Prior to adopting the draft 2020 Plan and the WSCP, WFA held a public hearing on June 17, 2021 which included input from the community regarding WFA's draft 2020 Plan and the draft WSCP. In addition, WFA considered the economic impacts measures described in Section 8.8.

10.3.2 ADOPTION

CWC 10642.

… After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

Following the public hearing, WFA adopted both the draft 2020 Plan and the draft WSCP (included in Chapter 8). Copies of the resolutions adopting the 2020 Plan, the 2015 Plan Addendum, and the WSCP, are provided in Appendix F and CEQA Notice of Exemption is provided in Appendix G.

10.4 PLAN SUBMITTAL

CWC 10621.

(e) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.

CWC 10644.

(a) (1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption.

CWC 10635.

(c) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

WFA's submittal process for its 2020 Plan and the WSCP is discussed below.

10.4.1 SUBMITTING A UWMP AND WATER SHORTAGE CONTINGENCY PLAN TO DWR

WFA's Board of Directors adopted the 2020 Plan on June 17, 2021 and within 30 days, WFA submitted the adopted 2020 Plan (including the WSCP) to DWR. The 2020 Plan and WSCP were submitted through DWR's "Water Use Efficiency (WUE) Data Portal" website.

DWR developed a checklist which was used by WFA to assist DWR with its determination that WFA's 2020 Plan has addressed the requirements of the CWC. WFA has completed the DWR checklist by indicating where the required CWC elements can be found within WFA's 2020 Plan (See Appendix C).

10.4.2 ELECTRONIC DATA SUBMITTAL

CWC 10644.

> *(a)(2) The plan, or amendments to the plan, submitted to the department …shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.*

Within 30 days of adoption of the 2020 Plan, WFA submitted all data tables associated with the 2020 Plan through DWR's "Water Use Efficiency Data Portal" website.

10.4.3 SUBMITTING A UWMP, INCLUDING WSCP, TO THE CALIFORNIA STATE LIBRARY

Within 30 days of adoption of the 2020 Plan by the WFA Board of Directors, a copy (CD or hardcopy) of the 2020 Plan was submitted to the State of California Library. A copy of the letter to the State Library will be maintained in WFA's file. The 2020 Plan will be mailed to the following address if sent by regular mail:

California State Library
Government Publications Section
Attention: Coordinator, Urban Water Management Plans
P.O. Box 942837
Sacramento, CA 94237-0001

The 2020 Plan will be mailed to the following address if sent by courier or overnight carrier:

California State Library
Government Publications Section
Attention: Coordinator, Urban Water Management Plans
900 N Street
Sacramento, CA 95814

10.4.4 SUBMITTING A UWMP TO CITIES AND COUNTIES

Within 30 days of adoption of the 2020 Plan (including the WSCP) by the WFA Board of Directors, a copy of the 2020 Plan was submitted to the County of San Bernardino's Assessor- Recorder/ Clerk's office and IEUA. A copy of the letter to the County of San Bernardino will be maintained in WFA's file.

10.5 PUBLIC AVAILABILITY

CWC 10645.

(a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

Within 30 days after submittal of the 2020 Plan to DWR, WFA made the 2020 Plan (including the WSCP) available at the WFA's main office during normal business hours and on WFA's website.

10.6 NOTIFICATION TO PUBLIC UTILITIES COMMISSION

CWC 10621.

(c) An urban water supplier regulated by the Public Utilities Commission shall include its most recent plan and water shortage contingency plan as part of the supplier's general rate case filings.

WFA is not regulated by the California Public Utilities Commission.

10.7 AMENDING AN ADOPTED UWMP OR WATER SHORTAGE CONTINGENCY PLAN

CWC 10621.

(d) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

CWC 10644.

(a)(1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

WFA's amendment process for its 2020 Plan is discussed below.

10.7.1 AMENDING A UWMP

If WFA amends the adopted 2020 Plan (and/or the WSCP), the amended Plan will undergo adoption by WFA's governing board. Within 30 days of adoption, the amended Plan will then be submitted to DWR, the State of California Library, the County of San Bernardino's Assessor- Recorder/ Clerk's office, and IEUA.

10.7.2 AMENDING A WATER SHORTAGE CONTINGENCY PLAN

CWC 10644.

(b) If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

If WFA amends the adopted 2020 Plan (including the WSCP), the amended Plan (and WSCP) will undergo adoption by WFA's governing board. Within 30 days of adoption, the amended Plan will then be submitted to DWR, the State of California Library, the County of San Bernardino's Assessor-Recorder/ Clerk's, and IEUA.

APPENDIX A

DWR STANDARDIZED TABLES

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Submittal Table 2-2: Plan Identification			
Select Only One	Type of Plan		Name of RUWMP or Regional Alliance *if applicable* (select from drop down list)
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☑	Supplier is a wholesaler
☐	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables are in calendar years
☑	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
07/01	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

Submittal Table 2-4 Wholesale: Water Supplier Information Exchange (select one)	
☑	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with Water Code Section 10631. Completion of the table below is optional. If not completed, include a list of the water suppliers that were informed.
Section 2.6	**Provide page number for location of the list.**
☐	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631. **Complete the table below.**

Water Supplier Name
Add additional rows as needed
NOTES:

Submittal Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	476,580	497,517	519,373	542,712	565,331	588,893
NOTES: The 2020 population and the populations projected through 2045 were based on SCAG population data, IEUA's projected population, and the percentage of WFA's service area within IEUA's service area (See Section 3.4.1 and Section 5.4.1).						

Submittal Table 4-1 Wholesale: Demands for Potable and Non-Potable[1] Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only use types that will be recognized by the WUE data online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Sales to other agencies	Member Agencies	Drinking Water	23,435
Groundwater recharge	MVWD Aquifer Injection	Drinking Water	2,051
Other Non-Potable	Upland #3	Raw Water	5
		TOTAL	25,491

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*
[2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: "Other Non-Potable" was a temporary connection that is no longer in use.

Submittal Table 4-2 Wholesale: Use for Potable and Raw Water [1] - Projected						
Use Type	Additional Description (as needed)	Projected Water Use [2] Report To the Extent that Records are Available				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool.		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Sales to other agencies		28,185	29,422	30,745	32,027	33,361
Groundwater recharge		2,466	2,575	2,690	2,802	2,919
	TOTAL	30,651	31,997	33,435	34,829	36,280

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*

[2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 4-3 Wholesale: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable and Raw Water From Tables 4-1W and 4-2W	25,491	30,651	31,997	33,435	34,829	36,280
Recycled Water Demand* From Table 6-4W	0	0	0	0	0	0
TOTAL WATER DEMAND	25,491	30,651	31,997	33,435	34,829	36,280
**Recycled water demand fields will be blank until Table 6-4 is complete.*						
NOTES:						

Submittal Table 6-1 Wholesale: Groundwater Volume Pumped						
☑	Supplier does not pump groundwater. The supplier will not complete the table below.					
☐	All or part of the groundwater described below is desalinated.					
Groundwater Type	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
	TOTAL	0	0	0	0	0
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2020

☑ Wholesale Supplier neither distributes nor provides supplemental treatment to recycled water.
The Supplier will not complete the table below.

Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area? *Drop down list*	Treatment Level *Drop down list*	2020 volumes [1] Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Add additional rows as needed											
						Total	0	0	0	0	0

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.
[2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility

NOTES:

Submittal Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
☑	Recycled water is not directly treated or distributed by the Supplier. The Supplier will not complete the table below.						
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment *Drop down list*	2020*	2025*	2030*	2035*	2040*	2045* *(opt)*
Add additional rows as needed							
	Total	0	0	0	0	0	0
*** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.							
NOTES:							

Submittal Table 6-5 Wholesale: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☑	Recycled water was not used or distributed by the supplier in 2015, nor projected for use or distribution in 2020. The wholesale supplier will not complete the table below.	
Name of Receiving Supplier or Direct Use by Wholesaler	2015 Projection for 2020*	2020 Actual Use*
Add additional rows as needed		
Total	0	0
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*		
NOTES:		

Submittal Table 6-7 Wholesale: Expected Future Water Supply Projects or Programs						
☑	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☐	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description *(if needed)*	Planned Implementation Year	Planned for Use in Year Type *Drop Down list*	Expected Increase in Water Supply to Supplier*
	Drop Down Menu	*If Yes, Supplier Name*				
Add additional rows as needed						
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 6-8 Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Purchased or Imported Water	Inland Empire Utilities Agency	25,492	Drinking Water	
Total		25,492		0
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*				
NOTES:				

Submittal Table 6-9 Wholesale: Water Supplies — Projected											
Water Supply	Additional Detail on Water Supply	Projected Water Supply* Report To the Extent Practicable									
		2025		2030		2035		2040		2045 (opt)	
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Purchased or Imported Water	Inland Empire Utilities Agency	30,651		31,997		33,435		34,829		36,280	
	Total	30,651	0	31,997	0	33,435	0	34,829	0	36,280	0
****Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*											
NOTES:											

Submittal Table 7-1 Wholesale: Basis of Water Year Data (Reliability Assessment)			
Year Type	Base Year If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000	Available Supplies if Year Type Repeats	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ___________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	% of Average Supply
Average Year	2020	25,492	100%
Single-Dry Year	2018	25,022	98.2%
Consecutive Dry Years 1st Year	2012	25,676	100.7%
Consecutive Dry Years 2nd Year	2013	27,954	109.7%
Consecutive Dry Years 3rd Year	2014	28,455	111.6%
Consecutive Dry Years 4th Year	2015	27,606	108.3%
Consecutive Dry Years 5th Year	2016	15,387	60.4%

Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table. Suppliers may create an additional worksheet for the additional tables.

****Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 7-2 Wholesale: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	30,651	31,997	33,435	34,829	36,280
Demand totals *(autofill fm Table 4-3)*	30,651	31,997	33,435	34,829	36,280
Difference	0	0	0	0	0
NOTES:					

Submittal Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	30,086	31,408	32,819	34,187	35,612
Demand totals*	30,086	31,408	32,819	34,187	35,612
Difference	0	0	0	0	0
Units of measure (AF, CCF, MG) *must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES:					

Submittal Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	30,873	32,229	33,678	35,081	36,543
	Demand totals	30,873	32,229	33,678	35,081	36,543
	Difference	0	0	0	0	0
Second year	Supply totals	33,611	35,088	36,665	38,193	39,784
	Demand totals	33,611	35,088	36,665	38,193	39,784
	Difference	0	0	0	0	0
Third year	Supply totals	34,214	35,717	37,322	38,877	40,498
	Demand totals	34,214	35,717	37,322	38,877	40,498
	Difference	0	0	0	0	0
Fourth year	Supply totals	33,193	34,651	36,208	37,717	39,289
	Demand totals	33,193	34,651	36,208	37,717	39,289
	Difference	0	0	0	0	0
Fifth year	Supply totals	18,502	19,314	20,182	21,023	21,900
	Demand totals	18,502	19,314	20,182	21,023	21,900
	Difference	0	0	0	0	0
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG) m** ust remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Total Water Use	26,716
Total Supplies	25,676
Surplus/Shortfall w/o WSCP Action	(1,040)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	1,040
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	4%

2022	Total
Total Water Use	30,217
Total Supplies	27,954
Surplus/Shortfall w/o WSCP Action	(2,263)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	2,263
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	7%

2023	Total
Total Water Use	31,910
Total Supplies	28,455
Surplus/Shortfall w/o WSCP Action	(3,455)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	3,455
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	11%

2024	Total
Total Water Use	32,076
Total Supplies	27,606
Surplus/Shortfall w/o WSCP Action	(4,470)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	4,470
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	14%

2025	Total
Total Water Use	18,502
Total Supplies	15,387
Surplus/Shortfall w/o WSCP Action	(3,115)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	3,115
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	17%

Submittal Table 8-1
Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage Range	Shortage Response Actions (*Narrative description)*
1	Up to 10%	IEUA member agencies may be subject to implement direct installation programs, hold more landscape workshops, consider escalation of local water waste prohibitions, etc.
2	Up to 20%	In addition to Shortage Level 1; IEUA member agencies may expand micro-targeting customers and increase marketing efforts.
3	Up to 30%	In addition to Shortage Level 2; IEUA member agencies may increase penalties, implement emergency alerts, etc.
4	Up to 40%	In addition to Shortage Level 3; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies.
5	Up to 50%	In addition to Shortage Level 4; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies.
6	>50%	In addition to Shortage Level 5; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies.

NOTES:

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
1	Expand Public Information Campaign	Collective reduction from all Shortage Level 1 actions is up to 3,065 AFY	Applicable to IEUA member agencies	No
1	Increase Frequency of Meter Reading	Collective reduction from all Shortage Level 1 actions is up to 3,065 AFY	Applicable to IEUA member agencies	No
1	Increase Water Waste Patrols	Collective reduction from all Shortage Level 1 actions is up to 3,065 AFY	Applicable to IEUA member agencies	Yes
2	Other	Collective reduction from Shortage Level 1 plus all Shortage Level 2 actions is up to 6,130 AFY	All actions under Shortage Level 1	Yes
2	Moratorium or Net Zero Demand Increase on New Connections	Collective reduction from all Shortage Level 2 actions is up to 6,130 AFY	Applicable to IEUA member agencies	No
3	Other	Collective reduction from Shortage Level 2 plus all Shortage Level 3 actions is up to 9,195 AFY	All actions under Shortage Level 2	Yes
4	Other	Collective reduction from Shortage Level 3 plus all Shortage Level 4 actions is up to 12,260 AFY	All actions under Shortage Level 3	Yes
5	Other	Collective reduction from Shortage Level 4 plus all Shortage Level 5 actions is up to 15,325 AFY	All actions under Shortage Level 4	Yes
6	Other	Collective reduction from Shortage Level 6 actions is greater than 15,325 AFY	All actions under Shortage Level 5	Yes
NOTES: WFA encourages IEUA water shortage response actions for its member agencies to reduce demand on water supplies. Member agencies may employ their own demand reduction actions and/or IEUA demand reduction actions at their own discretion.				

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
1	Transfers	Not applicable (see Notes)	
2	Transfers	Not applicable (see Notes)	
3	Transfers	Not applicable (see Notes)	
4	Transfers	Not applicable (see Notes)	
5	Transfers	Not applicable (see Notes)	
6	Transfers	Not applicable (see Notes)	
NOTES: WFA is a wholesale water supplier that provides treated imported water from the State Water Project through IEUA to its member agencies. WFA does not anticipate augmenting water supplies. However, WFA's member agencies will consider increased production from the Chino Basin (through potential transfer of water rights) using existing facilities to address increased demands. As noted on Table 8-2, WFA's member agencies plan to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.			

Submittal Table 10-1 Wholesale: Notification to Cities and Counties (select one)		
☐	Supplier has notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
	Provide the page or location of this list in the UWMP.	
☑	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Chino	Yes	Yes
Chino Hills	Yes	Yes
Ontario	Yes	Yes
Upland	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
San Bernardino County	Yes	Yes
NOTES:		

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APPENDIX B

ADDENDUM TO 2015 URBAN WATER MANAGEMENT PLAN

DEMONSTRATION OF REDUCED IMPORTED WATER RELIANCE

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DEMONSTRATION OF CONSISTENCY WITH THE DELTA PLAN
FOR PARTICIPANTS IN COVERED ACTIONS
(FY 2014-2015 THROUGH FY 2044-45)
WATER FACILITIES AUTHORITY (WFA)

The information contained in this document is intended to be Appendix B to WFA's 2020 Urban Water Management Plan (UWMP) as well as an Addendum attached to WFA's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). WFA provided notice of the availability of the draft 2020 UWMP (including Appendix B which is also a new Addendum to its 2015 UWMP) and the Water Shortage contingency Plan (WSCP) for the public hearing to consider adoption of both the 2020 UWMP and WSCP and the new Addendum to the 2015 UWMP in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. Thus, this Appendix B to WFA's 2020 UWMP, which was adopted with WFA's 2020 UWMP, will also serve as an Addendum to WFA's 2015 UWMP.

Introduction

Pursuant to the California Department of Water Resources (DWR), an urban water supplier that anticipates participating in or receiving water from a proposed project (or "covered action") such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Sacramento-San Joaquin Delta (Delta) should provide information in their 2015 and 2020 Urban Water Management Plans (UWMPs) for use in demonstrating consistency with Delta Plan Policy WR P1, "*Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance"*. In addition, pursuant to California Code of Regulations, Title 23, § 5003:

> *(c)(1) Water suppliers that have done all of the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:*

(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;

(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).

WFA is member agency of the Inland Empire Utilities Agency (IEUA), which in turn is a member agency of the Metropolitan Water District of Southern California (MWD).

IEUA is an urban water supplier and a member agency of MWD. MWD provides IEUA with imported water supplies, which IEUA in turn distributes on a wholesale basis to its retail water purveyors. MWD is a contractor on the State Water Project (SWP) and, due to water quality considerations, all imported water supplies IEUA receives from MWD originate from the SWP system. The SWP system runs from Lake Oroville in Northern California to Southern California, crossing the Sacramento-San Joaquin Delta (Delta) along the way. MWD and its member agencies have made investments into water supply and demand management to regionally reduce impacts on the Delta. These investments bring regional reliability and reduced Delta reliance that make it infeasible for individual MWD member agencies to determine their individual Delta reliance. As a recipient of imported water from the SWP delivered via MWD, IEUA may indirectly receive water through a proposed covered action, such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta. Through this appendix, IEUA and WFA are providing information in its 2015 and 2020 UWMPs that may be used in the covered action process, to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1) [California Code of Regulations (CCR), Title 23, § 5003].

As noted in MWD's document entitled "*Infeasibility of Accounting Supplies from the Delta Watershed for Metropolitan's Member Agencies and their Customers*" (which is included in MWD's Regional 2020 UWMP and is provided as Attachment 1 below), "... Metropolitan's service area, as a whole, reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies, and regional and local demand management measures. Metropolitan's member agencies coordinate reliance on the Delta through their membership to Metropolitan, a regional cooperative providing wholesale water service to its 26 member agencies. Accordingly, regional reliance on the Delta can only be measured regionally—not by individual Metropolitan member agencies and not by the customers of those member agencies...."

In addition, MWD's 2020 Regional UWMP indicates "...in accordance with UMWP requirements, Metropolitan's member agencies and their customers (many of them, retail agencies) also report demands and supplies for their service areas in their respective UWMPs. The data reported by those agencies are not additive to the regional totals shown in Metropolitan's UWMP; rather, their reporting represents subtotals of the regional total and should be considered as such for the purposes of determining reduced reliance on the Delta…While the demands that Metropolitan's member agencies and their customers report in their UWMPs are a good reflection of the demands in their respective service areas, they do not adequately represent each water supplier's contributions to reduced reliance on the Delta. In order to calculate and report their reliance on water supplies from the Delta watershed, water suppliers that receive water from the Delta through other regional or wholesale water suppliers would need to determine the amount of Delta water that they receive from the regional or wholesale supplier. Two specific pieces of information are needed to accomplish this: first is the quantity of demands on the regional or wholesale water supplier that accurately reflect a supplier's contributions to reduced reliance on the Delta, and second is the quantity of a supplier's demands on the regional or wholesale water supplier that are met by supplies from the Delta watershed…For water suppliers that make investments in regional projects or programs it may be infeasible to quantify their demands on the regional or wholesale water supplier in a way that accurately reflects their individual contributions to reduced reliance on the Delta." Nonetheless, WFA has taken proactive measures to help reduce regional reliance on imported water supplies and is discussed in the following sections.

Reduced Reliance Calculation Tables

Pursuant to DWR guidance, Tables C-1 through C-4 were prepared to show the potential reduction of reliance on imported water supplies for WFA. WFA has used these tables to demonstrate its reduced regional reliance on imported water supplies, but not specifically Delta Watershed supplies. For each of the tables, a "Baseline year" was selected. Water demands from member agencies during subsequent years (from 2015 through 2045 in five-year increments) were compared to water demands from member agencies during the Baseline year. Table C-1 considers the population and water demands within the area receiving water supplies from WFA, and a demand per capita per day (GPCD) water use rate was calculated for each of the years following the Baseline year. The calculated reduction in GPCD from the Baseline year was then translated to an estimated amount of water saved as a result of water conservation measures. Table C-2 references the estimated amount of water saved from Table C-1 and shows WFA water demand from member agencies without water use efficiency in effect.

The calculation of reduced regional reliance on imported water supplies is shown on Table C-4. Table C-4 also shows the percent change in imported water supplies relative to WFA's total supply. A negative percent change of imported water supplies indicates WFA has reduced its regional reliance on imported water supplies.

Since the Baseline year, WFA has decreased regional reliance on imported water supplies in 2015, 2020, and anticipates doing so through 2045.

WFA has reduced its regional reliance on imported water supplies by the following:

- The collective demand in GPCD from its member agencies for the "Baseline year" was compared to the GPCD in subsequent years (from FY 2014-15 through FY 2044-45, in five-year increments). The reduced GPCD multiplied by the collective population within the area served by WFA water supplies in these subsequent years is indicative of the potential reduced regional reliance on imported water supplies and is included in Table C-1.

This category of reduced regional reliance on imported water supplies is discussed below. The sum of the reduced regional reliance on imported water supplies resulting from this category is reflected on Table C-1 and is reflective of WFA's overall reduced reliance.

Reduced GPCD

WFA relies on purchases of untreated imported water from IEUA. The imported water which is subsequently treated by WFA and delivered to its member agencies can be quantified on a GPCD basis. The reduced GPCD from the baseline year is indicative of a reduced reliance on imported water supplies.

Chapter 9 of this Plan describes the Demand Management Measures (DMMs) which member agencies have implemented to reduce the amount of water used. Collectively these actions translate to a reduction in the GPCD usage rate by its member agencies which is described in their 2020 UWMPs regarding SB X7-7 water use targets. These actions directly impact total water demands from its member agencies, and consequently, the quantity of water which may be required imported water supplies. Absent the proactive measures taken by WFA's member agencies, it is anticipated there may have been a greater demand on imported water.

Pursuant to DWR guidance, reduced regional reliance on imported water supplies can be demonstrated by first selecting a "Baseline" water demand from its member agencies, represented by total potable water demands from its member agencies during FY 2007-

08. Table C-1 summarizes the “Baseline” water usage by WFA in FY 2007-08 (assuming demand reduction efforts had not been implemented); actual water usage in FY 2014-15 and FY 2019-20; and projected water usage through CY 2044-45 in five-year increments. Table C-2 demonstrates that if water conservation measures had not been implemented by WFA’s member agencies, there may have been a greater reliance on untreated imported water supplies during subsequent years as compared to the Baseline year. However, as discussed below and shown in Table C-1, the reduced water demands have resulted in reduced regional reliance on imported water supplies as compared to the Baseline year.

WFA’s potable water demand from its member agencies of 33,571 AF during FY 2007-08, along with the corresponding population within the area receiving its water supplies of approximately 438,000, were used to determine the Baseline GPCD. Subsequently, the actual demands from its member agencies for FY 2014-15 and FY 2019-20 were compared to the calculated population within the area receiving its water supplies to obtain the recent GPCD which includes the water conservations measures which have been implemented (those DMMs are described in Chapter 9 of this Plan). The differences between the Baseline GPCD and the FY 2014-15 and FY 2019-20 GPCDs are effectively considered a demonstration of the reduced regional reliance on imported water supplies with the understanding that any potential increased demand from WFA’s member agencies resulting from increased population within the area receiving its water supplies, could have been required from imported water, absent WFA’s new water supplies which contribute to self-reliance. A similar methodology is used for the projected potable water demands from its member agencies (2020 UWMP Table 4-3) and populations within the area receiving its water supplies (2020 UWMP Table 3-1).

<u>Metropolitan Water District of Southern California</u>

In addition, as the wholesale provider, MWD has included a detailed discussion regarding measurable reduction in Delta reliance in Appendix 11 for 2015 and 2020 as part of its 2015 Regional Urban Water Management Plan and 2020 Regional Urban Water Management Plan, respectively, and are also included in Attachment 1 below.

Inland Empire Utilities Agency

As the wholesale provider, IEUA has included a detailed discussion regarding measurable reduction in Delta reliance in Appendix G for 2015 and 2020 as part of its 2020 Regional Urban Water Management Plan, respectively, and is also included in Attachment 2 below.

Reduced Reliance Calculation - Water Facilities Authority

Table C-1: Optional Calculation of Water Use Efficiency -To be completed if Water Supplier does not specifically estimate Water Use Efficiency as a supply

Service Area Water Use Efficiency Demands (Acre-Feet)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	33,571	15,387	25,492	30,651	31,997	33,435	34,829	36,280
Non-Potable Water Demands	-	-	-	-	-	-	-	-
Potable Service Area Demands with Water Use Efficiency Accounted For	33,571	15,387	25,492	30,651	31,997	33,435	34,829	36,280

Total Service Area Population	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Population	438,000	450,041	476,580	497,517	519,373	542,712	565,331	588,893

Water Use Efficiency Since Baseline (Acre-Feet)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Per Capita Water Use (GPCD)	68	31	48	55	55	55	55	55
Change in Per Capita Water Use from Baseline (GPCD)		(38)	(21)	(13)	(13)	(13)	(13)	(13)
Estimated Water Use Efficiency Since Baseline		19,107	11,037	7,482	7,810	8,161	8,502	8,856

Table C-2: Calculation of Service Area Water Demands Without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	33,571	15,387	25,492	30,651	31,997	33,435	34,829	36,280
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline	-	19,107	11,037	7,482	7,810	8,161	8,502	8,856
Service Area Water Demands without Water Use Efficiency Accounted For	33,571	34,494	36,528	38,133	39,808	41,597	43,330	45,136

Table C-3: Calculation of Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Use Efficiency	-	19,107	11,037	7,482	7,810	8,161	8,502	8,856
Water Recycling								
Stormwater Capture and Use								
Advanced Water Technologies								
Conjunctive Use Projects								
Local and Regional Water Supply and Storage Projects								
Other Programs and Projects the Contribute to Regional Self-Reliance								
Water Supplies Contributing to Regional Self-Reliance	-	19,107	11,037	7,482	7,810	8,161	8,502	8,856

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	33,571	34,494	36,528	38,133	39,808	41,597	43,330	45,136

Change in Regional Self Reliance (Acre-Feet)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies Contributing to Regional Self-Reliance	-	19,107	11,037	7,482	7,810	8,161	8,502	8,856
Change in Water Supplies Contributing to Regional Self-Reliance		19,107	11,037	7,482	7,810	8,161	8,502	8,856

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	0.0%	55.4%	30.2%	19.6%	19.6%	19.6%	19.6%	19.6%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		55.4%	30.2%	19.6%	19.6%	19.6%	19.6%	19.6%

Table C-4: Calculation of Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
CVP/SWP Contract Supplies								
Delta/Delta Tributary Diversions								
Transfers and Exchanges								
Other Water Supplies from the Delta Watershed[1]	33,571	15,387	25,492	30,651	31,997	33,435	34,829	36,280
Total Water Supplies from the Delta Watershed	33,571	15,387	25,492	30,651	31,997	33,435	34,829	36,280

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	33,571	34,494	36,528	38,133	39,808	41,597	43,330	45,136

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies from the Delta Watershed	33,571	15,387	25,492	30,651	31,997	33,435	34,829	36,280
Change in Water Supplies from the Delta Watershed		(18,184)	(8,080)	(2,920)	(1,574)	(136)	1,258	2,709

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2008)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies from the Delta Watershed	100.0%	44.6%	69.8%	80.4%	80.4%	80.4%	80.4%	80.4%
Change in Percent of Water Supplies from the Delta Watershed		-55.4%	-30.2%	-19.6%	-19.6%	-19.6%	-19.6%	-19.6%

Baseline Year is FY 2007-08

[1] Represents imported water from Inland Empire Utilities Agency.

APPENDIX B
ATTACHMENT 1

- **Infeasibility of Accounting Supplies from the Delta Watershed for Metropolitan's Member Agencies and their Customers**

- **Appendix 11 Addendum to the Metropolitan Water District of Southern California's 2015 Urban Water Management Plan**

- **Appendix 11 "Quantifying Regional Self-Reliance and Reliance on Water Supplies from the Delta Watershed", Metropolitan Water District of Southern California's 2020 Urban Water Management Plan**

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Infeasibility of Accounting Supplies from the Delta Watershed for Metropolitan's Member Agencies and their Customers

Metropolitan's service area, as a whole, reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies, and regional and local demand management measures. Metropolitan's member agencies coordinate reliance on the Delta through their membership in Metropolitan, a regional cooperative providing wholesale water service to its 26 member agencies. Accordingly, regional reliance on the Delta can only be measured regionally—not by individual Metropolitan member agencies and not by the customers of those member agencies.

Metropolitan's member agencies, and those agencies' customers, indirectly reduce reliance on the Delta through their collective efforts as a cooperative. Metropolitan's member agencies do not control the amount of Delta water they receive from Metropolitan. Metropolitan manages a statewide integrated conveyance system consisting of its participation in the State Water Project (SWP), its Colorado River Aqueduct (CRA) including Colorado River water resources, programs and water exchanges, and its regional storage portfolio. Along with the SWP, CRA, storage programs, and Metropolitan's conveyance and distribution facilities, demand management programs increase the future reliability of water resources for the region. In addition, demand management programs provide system-wide benefits by decreasing the demand for imported water, which helps to decrease the burden on the district's infrastructure and reduce system costs, and free up conveyance capacity to the benefit of all member agencies.

Metropolitan's costs are funded almost entirely from its service area, with the exception of grants and other assistance from government programs. Most of Metropolitan's revenues are collected directly from its member agencies. Properties within Metropolitan's service area pay a property tax that currently provides approximately 8 percent of the fiscal year 2021 annual budgeted revenues. The rest of Metropolitan's costs are funded through rates and charges paid by Metropolitan's member agencies for the wholesale services it provides to them.[1] Thus, Metropolitan's member agencies fund nearly all operations Metropolitan undertakes to reduce reliance on the Delta, including Colorado River Programs, storage facilities, Local Resources Programs and Conservation Programs within Metropolitan's service area.

Because of the integrated nature of Metropolitan's systems and operations, and the collective nature of Metropolitan's regional efforts, it is infeasible to quantify each of Metropolitan member agencies' individual reliance on the Delta. It is infeasible to attempt to segregate an entity and a system that were designed to work as an integrated regional cooperative.

In addition to the member agencies funding Metropolitan's regional efforts, they also invest in their own local programs to reduce their reliance on any imported water. Moreover, the customers of those member agencies may also invest in their own local programs to reduce water demand. However, to the extent those efforts result in reduction of demands on Metropolitan, that reduction does not equate to a like reduction of reliance on the Delta. Demands on Metropolitan are not commensurate with demands on the Delta because most of Metropolitan member agencies receive blended resources from

[1] A standby charge is collected from properties within the service areas of 21 of Metropolitan's 26 member agencies, ranging from $5 to $14.20 per acre annually, or per parcel if smaller than an acre. Standby charges go towards those member agencies' obligations to Metropolitan for the Readiness-to-Serve Charge. The total amount collected annually is approximately $43.8 million, approximately 2 percent of Metropolitan's fiscal year 2021 annual budgeted revenues.

Metropolitan as determined by Metropolitan—not the individual member agency—and for most member agencies, the blend varies from month-to-month and year-to-year due to hydrology, operational constraints, use of storage and other factors.

Colorado River Programs

As a regional cooperative of member agencies, Metropolitan invests in programs to ensure the continued reliability and sustainability of Colorado River supplies. Metropolitan was established to obtain an allotment of Colorado River water, and its first mission was to construct and operate the CRA. The CRA consists of five pumping plants, 450 miles of high voltage power lines, one electric substation, four regulating reservoirs, and 242 miles of aqueducts, siphons, canals, conduits and pipelines terminating at Lake Mathews in Riverside County. Metropolitan owns, operates, and manages the CRA. Metropolitan is responsible for operating, maintaining, rehabilitating, and repairing the CRA, and is responsible for obtaining and scheduling energy resources adequate to power pumps at the CRA's five pumping stations.

Colorado River supplies include Metropolitan's basic Colorado River apportionment, along with supplies that result from existing and committed programs, including supplies from the Imperial Irrigation District (IID)-Metropolitan Conservation Program, the implementation of the Quantification Settlement Agreement (QSA) and related agreements, and the exchange agreement with San Diego County Water Authority (SDCWA). The QSA established the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. Since the QSA, additional programs have been implemented to increase Metropolitan's CRA supplies. These include the PVID Land Management, Crop Rotation, and Water Supply Program, as well as the Lower Colorado River Water Supply Project. The 2007 Interim Guidelines provided for the coordinated operation of Lake Powell and Lake Mead, as well as the Intentionally Created Surplus (ICS) program that allows Metropolitan to store water in Lake Mead.

Storage Investments/Facilities

Surface and groundwater storage are critical elements of Southern California's water resources strategy and help Metropolitan reduce its reliance on the Delta. Because California experiences dramatic swings in weather and hydrology, storage is important to regulate those swings and mitigate possible supply shortages. Surface and groundwater storage provide a means of storing water during normal and wet years for later use during dry years, when imported supplies are limited. The Metropolitan system, for purposes of meeting demands during times of shortage, regulating system flows, and ensuring system reliability in the event of a system outage, provides over 1,000,000 acre-feet of system storage capacity. Diamond Valley Lake provides 810,000 acre-feet of that storage capacity, effectively doubling Southern California's previous surface water storage capacity. Other existing imported water storage available to the region consists of Metropolitan's raw water reservoirs, a share of the SWP's raw water reservoirs in and near the service area, and the portion of the groundwater basins used for conjunctive-use storage.

Since the early twentieth century, DWR and Metropolitan have constructed surface water reservoirs to meet emergency, drought/seasonal, and regulatory water needs for Southern California. These reservoirs include Pyramid Lake, Castaic Lake, Elderberry Forebay, Silverwood Lake, Lake Perris, Lake Skinner, Lake Mathews, Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, Orange County Reservoir, and Metropolitan's Diamond Valley Lake (DVL). Some reservoirs such as Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, and Orange County Reservoir, which have a total combined capacity of about 3,500 AF, are used solely for regulating purposes. The total gross storage capacity for the larger remaining reservoirs is 1,757,600 AF. However, not all of the gross storage capacity is available to Metropolitan; dead storage and storage allocated to others reduce the amount of storage that is available to Metropolitan to 1,665,200 AF.

Conjunctive use of the aquifers offers another important source of dry year supplies. Unused storage in Southern California groundwater basins can be used to optimize imported water supplies, and the development of groundwater storage projects allows effective management and regulation of the region's major imported supplies from the Colorado River and SWP. Over the years, Metropolitan has implemented conjunctive use through various programs in the service area; the following table lists the groundwater conjunctive use programs that have been developed in the region.

Program	Metropolitan Agreement Partners	Program Term	Max Storage AF	Dry-Year Yield AF/Yr
Long Beach Conjunctive Use Storage Project (Central Basin)	Long Beach	June 2002-2027	13,000	4,300
Foothill Area Groundwater Storage Program (Monkhill/ Raymond Basin)	Foothill MWD	February 2003-2028	9,000	3,000
Orange County Groundwater Conjunctive Use Program	MWDOC OCWD	June 2003-2028	66,000+	22,000
Chino Basin Conjunctive Use Programs	IEUA TVMWD Watermaster	June 2003-2028	100,000	33,000
Live Oak Basin Conjunctive Use Project (Six Basins)	TVMWD City of La Verne	October 2002-2027	3,000	1,000
City of Compton Conjunctive Use Project (Central Basin)	Compton	February 2005-2030	2,289	763
Long Beach Conjunctive Use Program Expansion in Lakewood (Central Basin)	Long Beach	July 2005-2030	3,600	1,200
Upper Claremont Basin Groundwater Storage Program (Six Basins)	TVMWD	Sept. 2005- 2030	3,000	1,000
Elsinore Basin Conjunctive Use Storage Program	Western MWD Elsinore Valley MWD	May 2008- 2033	12,000	4,000
TOTAL			**211,889**	**70,263**

Metropolitan Demand Management Programs

Demand management costs are Metropolitan's expenditures for funding local water resource development programs and water conservation programs. These Demand Management Programs incentivize the development of local water supplies and the conservation of water to reduce the need to import water to deliver to Metropolitan's member agencies. These programs are implemented below the delivery points between Metropolitan's and its member agencies' distribution systems and, as such, do not add any water to Metropolitan's supplies. Rather, the effect of these downstream programs is to produce a local supply of water for the local agencies and to reduce demands by member agencies for water imported through Metropolitan's system. The following discussions outline how Metropolitan funds local resources and conservation programs for the benefit of all of its member agencies and the entire Metropolitan service area. Notably, the history of demand management by Metropolitan's member agencies and the local agencies that purchase water from Metropolitan's members has spanned more than four decades. The significant history of the programs is another reason it would be difficult to attempt to assign a portion of such funding to any one individual member agency.

Local Resources Programs

In 1982, Metropolitan began providing financial incentives to its member agencies to develop new local supplies to assist in meeting the region's water needs. Because of Metropolitan's regional distribution system, these programs benefit all member agencies regardless of project location because they help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan's infrastructure, reduce system costs and free up conveyance capacity to the benefit of all the agencies that rely on water from Metropolitan.

For example, the Groundwater Replenishment System (GWRS) operated by the Orange County Water District is the world's largest water purification system for indirect potable reuse. It was funded, in part, by Metropolitan's member agencies through the Local Resources Program. Annually, the GWRS produces approximately 103,000 acre-feet of reliable, locally controlled, drought-proof supply of high-quality water to recharge the Orange County Groundwater Basin and protect it from seawater intrusion. The GWRS is a premier example of a regional project that significantly reduced the need to utilize imported water for groundwater replenishment in Metropolitan's service area, increasing regional and local supply reliability and reducing the region's reliance on imported supplies, including supplies from the State Water Project.

Metropolitan's local resource programs have evolved through the years to better assist Metropolitan's member agencies in increasing local supply production. The following is a description and history of the local supply incentive programs.

Local Projects Program

In 1982, Metropolitan initiated the Local Projects Program (LPP), which provided funding to member agencies to facilitate the development of recycled water projects. Under this approach, Metropolitan contributed a negotiated up-front funding amount to help finance project capital costs. Participating member agencies were obligated to reimburse Metropolitan over time. In 1986, the LPP was revised, changing the up-front funding approach to an incentive-based approach. Metropolitan contributed an amount equal to the avoided State Water Project pumping costs for each acre-foot of recycled water delivered to end-use consumers. This funding incentive was based on the premise that local projects resulted in the reduction of water imported from the Delta and the associated pumping cost. The incentive amount varied from year to year depending on the actual variable power cost paid for State Water Project imports. In 1990, Metropolitan's Board increased the LPP contribution to a fixed rate of $154 per acre-foot, which was calculated based on Metropolitan's avoided capital and operational costs to convey, treat, and distribute water, and included considerations of reliability and service area demands.

Groundwater Recovery Program

The drought of the early 1990s sparked the need to develop additional local water resources, aside from recycled water, to meet regional demand and increase regional water supply reliability. In 1991, Metropolitan conducted the Brackish Groundwater Reclamation Study which determined that large amounts of degraded groundwater in the region were not being utilized. Subsequently, the Groundwater Recovery Program (GRP) was established to assist the recovery of otherwise unusable groundwater degraded by minerals and other contaminants, provide access to the storage assets of the degraded groundwater, and maintain the quality of groundwater resources by reducing the spread of degraded plumes.

Local Resources Program

In 1995, Metropolitan's Board adopted the Local Resources Program (LRP), which combined the LPP and GRP into one program. The Board allowed for existing LPP agreements with a fixed incentive rate to convert to the sliding scale up to $250 per acre-foot, similar to GRP incentive terms. Those agreements that were converted to LRP are known as "LRP Conversions."

Competitive Local Projects Program

In 1998, the Competitive Local Resources Program (Competitive Program) was established. The Competitive Program encouraged the development of recycled water and recovered groundwater through a process that emphasized cost-efficiency to Metropolitan, timing new production according to regional need while minimizing program administration cost. Under the Competitive Program, agencies requested an incentive rate up to $250 per acre-foot of production over 25 years under a Request for Proposals (RFP) for the development of up to 53,000 acre-feet per year of new water recycling and groundwater recovery projects. In 2003, a second RFP was issued for the development of an additional 65,000 acre-feet of new recycled water and recovered groundwater projects through the LRP.

Seawater Desalination Program

Metropolitan established the Seawater Desalination Program (SDP) in 2001 to provide financial incentives to member agencies for the development of seawater desalination projects. In 2014, seawater desalination projects became eligible for funding under the LRP, and the SDP was ended.

2007 Local Resources Program

In 2006, a task force comprised of member agency representatives was formed to identify and recommend program improvements to the LRP. As a result of the task force process, the 2007 LRP was established with a goal of 174,000 acre-feet per year of additional local water resource development. The new program allowed for an open application process and eliminated the previous competitive process. This program offered sliding scale incentives of up to $250 per acre-foot, calculated annually based on a member agency's actual local resource project costs exceeding Metropolitan's prevailing water rate.

2014 Local Resources Program

A series of workgroup meetings with member agencies was held to identify the reasons why there was a lack of new LRP applications coming into the program. The main constraint identified by the member agencies was that the $250 per acre-foot was not providing enough of an incentive for developing new projects due to higher construction costs to meet water quality requirements and to develop the infrastructure to reach end-use consumers located further from treatment plants. As a result, in 2014, the Board authorized an increase in the maximum incentive amount, provided alternative payment structures, included onsite retrofit costs and reimbursable services as part of the LRP, and added eligibility for seawater desalination projects. The current LRP incentive payment options are structured as follows:

- Option 1 – Sliding scale incentive up to $340/AF for a 25-year agreement term
- Option 2 – Sliding scale incentive up to $475/AF for a 15-year agreement term
- Option 3 – Fixed incentive up to $305/AF for a 25-year agreement term

On-site Retrofit Programs

In 2014, Metropolitan's Board also approved the On-site Retrofit Pilot Program which provided financial incentives to public or private entities toward the cost of small-scale improvements to their existing irrigation and industrial systems to allow connection to existing recycled water pipelines. The On-site Retrofit Pilot Program helped reduce recycled water retrofit costs to the end-use consumer which is a key constraint that limited recycled water LRP projects from reaching full production capacity. The program incentive was equal to the actual eligible costs of the on-site retrofit, or $975 per acre-foot of up-front cost, which equates to $195 per acre-foot for an estimated five years of water savings ($195/AF x 5 years) multiplied by the average annual water use in previous three years, whichever is less. The Pilot Program lasted two years and was successful in meeting its goal of accelerating the use of recycled water.

In 2016, Metropolitan's Board authorized the On-site Retrofit Program (ORP), with an additional budget of $10 million. This program encompassed lessons learned from the Pilot Program and feedback from member agencies to make the program more streamlined and improve its efficiency. As of fiscal year 2019/20, the ORP has successfully converted 440 sites, increasing the use of recycled water by 12,691 acre-feet per year.

Stormwater Pilot Programs

In 2019, Metropolitan's Board authorized both the Stormwater for Direct Use Pilot Program and a Stormwater for Recharge Pilot Program to study the feasibility of reusing stormwater to help meet regional demands in Southern California. These pilot programs are intended to encourage the development, monitoring, and study of new and existing stormwater projects by providing financial incentives for their construction/retrofit and monitoring/reporting costs. These pilot programs will help evaluate the potential benefits delivered by stormwater capture projects and provide a basis for potential future funding approaches. Metropolitan's Board authorized a total of $12.5 million for the stormwater pilot programs ($5 million for the District Use Pilot and $7.5 million for the Recharge Pilot).

Current Status and Results of Metropolitan's Local Resource Programs

Today, nearly one-half of the total recycled water and groundwater recovery production in the region has been developed with an incentive from one or more of Metropolitan's local resource programs. During fiscal year 2020, Metropolitan provided about $13 million for production of 71,000 acre-feet of recycled water for non-potable and indirect potable uses. Metropolitan provided about $4 million to support projects that produced about 50,000 acre-feet of recovered groundwater for municipal use. Since 1982, Metropolitan has invested $680 million to fund 85 recycled water projects and 27 groundwater recovery projects that have produced a cumulative total of about 4 million acre-feet.

Conservation Programs

Metropolitan's regional conservation programs and approaches have a long history. Decades ago, Metropolitan recognized that demand management at the consumer level would be an important part of balancing regional supplies and demands. Water conservation efforts were seen as a way to reduce the need for imported supplies and offset the need to transport or store additional water into or within the Metropolitan service area. The actual conservation of water takes place at the retail consumer level. Regional conservation approaches have proven to be effective at reaching retail consumers throughout Metropolitan's service area and successfully implementing water saving devices, programs and practices. Through the pooling of funding by Metropolitan's member agencies, Metropolitan is able to engage in regional campaigns with wide-reaching impact. Regional investments in demand management programs, of which conservation is a key part along with local supply programs, benefit all member agencies regardless of project location. These programs help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan's infrastructure, reduce system costs, and free up conveyance capacity to the benefit of all member agencies.

Incentive-Based Conservation Programs

Conservation Credits Program

In 1988, Metropolitan's Board approved the Water Conservation Credits Program (Credits Program). The Credits Program is similar in concept to the Local Projects Program (LPP). The purpose of the Credits Program is to encourage local water agencies to implement effective water conservation projects through the use of financial incentives. The Credits Program provides financial assistance for water conservation projects that reduce demands on Metropolitan's imported water supplies and require Metropolitan's assistance to be financially feasible.

Initially, the Credits Program provided 50 percent of a member agency's program cost, up to a maximum of $75 per acre-foot of estimated water savings. The $75 Base Conservation Rate was established based Metropolitan's avoided cost of pumping SWP supplies. The Base Conservation Rate has been revisited by Metropolitan's Board and revised twice since 1988, from $75 to $154 per acre-foot in 1990 and from $154 to $195 per acre-foot in 2005.

In fiscal year 2020 Metropolitan processed more than 30,400 rebate applications totaling $18.9 million.

Member Agency Administered Program

Some member agencies also have unique programs within their service areas that provide local rebates that may differ from Metropolitan's regional program. Metropolitan continues to support these local efforts through a member agency administered funding program that adheres to the same funding guidelines as the Credits Program. The Member Agency Administered Program allows member agencies to receive funding for local conservation efforts that supplement, but do not duplicate, the rebates offered through Metropolitan's regional rebate program.

Water Savings Incentive Program

There are numerous commercial entities and industries within Metropolitan's service area that pursue unique savings opportunities that do not fall within the general rebate programs that Metropolitan provides. In 2012, Metropolitan designed the Water Savings Incentive Program (WSIP) to target these unique commercial and industrial projects. In addition to rebates for devices, under this program, Metropolitan provides financial incentives to businesses and industries that created their own custom water efficiency projects. Qualifying custom projects can receive funding for permanent water efficiency changes that result in reduced potable demand.

Non-Incentive Conservation Programs

In addition to its incentive-based conservation programs, Metropolitan also undertakes additional efforts throughout its service area that help achieve water savings without the use of rebates. Metropolitan's non-incentive conservation efforts include:

- residential and professional water efficient landscape training classes
- water audits for large landscapes
- research, development and studies of new water saving technologies
- advertising and outreach campaigns
- community outreach and education programs
- advocacy for legislation, codes, and standards that lead to increased water savings

Current Status and Results of Metropolitan's Conservation Programs

Since 1990, Metropolitan has invested $824 million in conservation rebates that have resulted in a cumulative savings of 3.27 million acre-feet of water. These investments include $450 million in turf removal and other rebates during the last drought which resulted in 175 million square feet of lawn turf removed. During fiscal year 2020, 1.06 million acre-feet of water is estimated to have been conserved. This annual total includes Metropolitan's Conservation Credits Program; code-based conservation achieved through Metropolitan-sponsored legislation; building plumbing codes and ordinances; reduced consumption resulting from changes in water pricing; and pre-1990 device retrofits.

Infeasibility of Accounting Regional Investments in Reduced Reliance Below the Regional Level

The accounting of regional investments that contribute to reduced reliance on supplies from the Delta watershed is straightforward to calculate and report at the regional aggregate level. However, any similar accounting is infeasible for the individual member agencies or their customers. As described above, the region (through Metropolitan) makes significant investments in projects, programs and other resources that reduce reliance on the Delta. In fact, all of Metropolitan's investments in Colorado River supplies, groundwater and surface storage, local resources development and demand management measures that reduce reliance on the Delta are collectively funded by revenues generated from the member agencies through rates and charges.

Metropolitan's revenues cannot be matched to the demands or supply production history of an individual agency, or consistently across the agencies within the service area. Each project or program funded by the region has a different online date, useful life, incentive rate and structure, and production schedule. It is infeasible to account for all these things over the life of each project or program and provide a nexus to each member agency's contributions to Metropolitan's revenue stream over time. Accounting at the regional level allows for the incorporation of the local supplies and water use efficiency programs done by member agencies and their customers through both the regional programs and through their own specific local programs. As shown above, despite the infeasibility of accounting reduced Delta reliance below the regional level, Metropolitan's member agencies and their customers have together made substantial contributions to the region's reduced reliance.

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Link to Metropolitan's 2020 UWMP once final

Appendix 11

Addendum to

The Metropolitan Water District of Southern California's

2015 Urban Water Management Plan

Quantifying Regional Self-Reliance and Reduced Reliance on Water Supplies from the Delta Watershed

June 2021

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Appendix 11
METROPOLITAN'S REDUCED DELTA RELIANCE REPORTING
Addendum to Metropolitan's 2015 Urban Water Management Plan

A.11.1 Background

Under the Sacramento-San Joaquin Delta Reform Act of 2009, state and local public agencies proposing a covered action in the Delta,[1] prior to initiating the implementation of that action, must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the Delta Stewardship Council.[2] Anyone may appeal a certification of consistency, and if the Delta Stewardship Council grants the appeal, the covered action may not be implemented until the agency proposing the covered action submits a revised certification of consistency, and either no appeal is filed, or the Delta Stewardship Council denies the subsequent appeal.[3]

An urban water supplier that anticipates participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta should provide information in their 2015 and 2020 Urban Water Management Plans (UWMPs) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1).[4]

WR P1 details what is needed for a covered action to demonstrate consistency with reduced reliance on the Delta and improved regional self-reliance. WR P1 subsection (a) states that:

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

> *(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c);*
>
> *(2) That failure has significantly caused the need for the export, transfer, or use; and*
>
> *(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.*

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

> *(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;*

[1] Water Code, § 85057.5; Cal. Code Regs. tit. 23, § 5001.
[2] Water Code, § 85225; Delta Plan, App. D.
[3] Water Code, §§ 85225.10-85225.25; Delta Plan, App. D.
[4] Cal. Code Regs., tit. 23, § 5003.

(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).

The analysis and documentation provided below include all of the elements described in WR P1(c)(1) that need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action.

A.11.2 Summary of Expected Outcomes for Reduced Reliance on the Delta

As stated in WR P1(c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta.

The expected outcomes for Metropolitan's Delta reliance and regional self-reliance were developed using the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 (Guidebook Appendix C) issued in March 2021.

The data used in this analysis represent the total regional efforts of Metropolitan and its member agencies and their customers (many of them, retail agencies) and were developed in conjunction with Metropolitan's member agencies as part of the UWMP coordination process as described in Section 5 of Metropolitan's UWMP. In accordance with UMWP requirements, Metropolitan's member agencies and their customers (many of them, retail agencies) also report demands and supplies for their service areas in their respective UWMPs. The data reported by those agencies are not additive to the regional totals shown in Metropolitan's UWMP; rather, their reporting represents subtotals of the regional total and should be considered as such for the purposes of determining reduced reliance on the Delta.

While the demands that Metropolitan's member agencies and their customers report in their UWMPs are a good reflection of the demands in their respective service areas, they do not adequately represent each water supplier's contributions to reduced reliance on the Delta. In order to calculate and report their reliance on water supplies from the Delta watershed, water suppliers that receive water from the Delta through other regional or wholesale water suppliers would need to determine the amount of Delta water that they receive from the regional or wholesale supplier. Two specific pieces of information are needed to accomplish this: first is the quantity of demands on the regional or wholesale water supplier that accurately reflect a supplier's contributions to reduced reliance on the Delta, and second is the quantity of a supplier's demands on the regional or wholesale water supplier that are met by supplies from the Delta watershed.

For water suppliers that make investments in regional projects or programs it may be infeasible to quantify their demands on the regional or wholesale water supplier in a way that accurately reflects their individual contributions to reduced reliance on the Delta. Due to the extensive, long-standing and successful implementation of regional demand management and local resource incentive programs in Metropolitan's service area, this infeasibility holds true for Metropolitan's members as well their customers. For Metropolitan's service area, reduced reliance on supplies from the Delta watershed can only be accurately accounted at the regional level, as is demonstrated in this analysis.

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for Metropolitan's Delta reliance and regional self-reliance. The results show that as a region, Metropolitan and its members as well as their customers are measurably reducing reliance on the Delta and improving regional self-reliance, both as an amount of water used and as a percentage of water used.

Expected Outcomes for Regional Self-Reliance

- Near-term (2025) – Normal water year regional self-reliance is expected to increase by 813 TAF from the 2010 baseline; this represents an increase of almost 25 percent of 2025 normal water year retail demands (Table A.11-2).
- Long-term (2045) – Normal water year regional self-reliance is expected to increase by more than 1.28 MAF from the 2010 baseline, this represents an increase of more than 25 percent of 2045 normal water year retail demands (Table A.11-2).

Expected Outcomes for Reduced Reliance on Supplies from the Delta Watershed

- Near-term (2025) – Normal water year reliance on supplies from the Delta watershed decreased by 301 TAF from the 2010 baseline, this represents a decrease of 3 percent of 2025 normal water year retail demands (Table A.11-3).
- Long-term (2045) – Normal water year reliance on supplies from the Delta watershed decreased by 314 TAF from the 2010 baseline, this represents a decrease of just over 5 percent of 2045 normal water year retail demands (Table A.11-3).

A11.3 Demonstration of Reduced Reliance on the Delta

The methodology used to determine Metropolitan's reduced Delta reliance and improved regional self-reliance is consistent with the approach detailed in DWR's UWMP Guidebook Appendix C, including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources. Some of the key assumptions underlying Metropolitan's demonstration of reduced reliance include:

- All data were obtained from the current 2020 UWMP or previously adopted UWMPs and represent average or normal water year conditions.
- All analyses were conducted at the service area level, and all data reflect the total contributions of Metropolitan and its members as well as their customers.
- No projects or programs that are described in the UWMPs as "Projects Under Development" were included in the accounting of supplies.

Baseline and Expected Outcomes

In order to calculate the expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C. Data for the 2010 baseline were taken from Metropolitan's 2005 UWMP as the UWMPs generally do not provide normal water year data for the year that they are adopted (i.e., 2005 UWMP forecasts begin in 2010, 2010 UWMP forecasts begin in 2015, and so on).

Consistent with the 2010 baseline data approach, the expected outcomes for reduced Delta reliance and improved regional self-reliance for 2015 and 2020 were taken from Metropolitan's 2010 and 2015 UWMPs respectively. Expected outcomes for 2025-2045 are from the current 2020 UWMP. Documentation of the specific data sources and assumptions are included in the discussions below.

Service Area Demands without Water Use Efficiency

In alignment with the Guidebook Appendix C, this analysis uses normal water year demands, rather than normal water year supplies to calculate expected outcomes in terms of the percentage of water used. Using normal water year demands serves as a proxy for the amount of supplies that would be used in a normal water year, which helps alleviate issues associated with how supply capability is presented to fulfill requirements of the Act versus how supplies might be accounted for to demonstrate consistency with WR P1.

Because WR P1 considers water use efficiency savings a source of water supply, water suppliers such as Metropolitan that explicitly calculate and report water use efficiency savings in their UWMP will need to make an adjustment to properly reflect normal water year demands in the calculation of reduced reliance. As explained in the Guidebook Appendix C, water use efficiency savings must be added back to the normal year demands to represent demands without water use efficiency savings accounted for; otherwise the effect of water use efficiency savings on regional self-reliance would be overestimated. Table A.11-1 shows the results of this adjustment for Metropolitan. Supporting narratives and documentation for all of the data shown in Table A.11-1 are provided below.

Table A.11-1
Demands without Water Use Efficiency Accounted For

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Demands with Water Use Efficiency Accounted For	4,628,000	4,563,000	4,163,000	3,763,000	3,821,000	3,893,000	3,936,000	3,985,000
Reported Water Use Efficiency	865,000	936,000	1,056,000	1,162,000	1,211,000	1,263,000	1,325,000	1,389,000
Service Area Demands without Water Use Efficiency Accounted For	**5,493,000**	**5,499,000**	**5,219,000**	**4,925,000**	**5,032,000**	**5,156,000**	**5,261,000**	**5,374,000**

Service Area Demands without Water Use Efficiency

The service area demands shown in Table A.11-1 represent the total retail water demands for Metropolitan's service area and include municipal and industrial demands, agricultural demands, seawater barrier demands, and storage replenishment demands. These demand types and the modeling methodologies used to calculate them are described in Section 2.2 and Appendix 1 of Metropolitan's UWMP.

Water Use Efficiency

The water use efficiency numbers shown in Table A.11-1 represent the total water use efficiency savings (conservation) for Metropolitan's region, including savings from active, code-based, price-effect and pre-1990 sources. These sources of water use efficiency and the methodologies used to calculate them are described in Section 2.2, Section 3.4, Section 3.7 and Appendix 1 of Metropolitan's UWMP.

The demand and water use efficiency data shown in Table A.11-1 were collected from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table 2-6: Metropolitan Regional Water Demand Average Year
- 2015 values – Metropolitan's 2010 UWMP, Table 2-8: Metropolitan Regional Water Demands Average Year
- 2020 values – Metropolitan's 2015 UWMP, Table 2-3: Metropolitan Regional Water Demands Average Year
- 2025-2045 values – Metropolitan's 2020 UWMP, Table 2-3: Metropolitan Regional Water Demands Normal Water Year

Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table A.11-2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in Table A.11-2 represent efforts to improve regional self-reliance for Metropolitan's entire service area and include the total contributions of Metropolitan and its members as well as their customers. Supporting narratives and documentation for the all of the data shown in Table A.11-2 are provided below.

The results shown in Table A.11-2 demonstrate that Metropolitan's service area is measurably improving its regional self-reliance. In the near-term (2025), the expected outcome for normal water year regional self-reliance increases by 747 TAF from the 2010 baseline; this represents an increase of about 23 percent of 2025 normal water year retail demands. In the long-term (2045), normal water year regional self-reliance is expected to increase by more than 1.2 MAF from the 2010 baseline; this represents an increase of 25 percent of 2045 normal water year retail demands.

Table A.11-2
Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Use Efficiency	865,000	936,000	1,056,000	1,162,000	1,211,000	1,263,000	1,325,000	1,389,000
Water Recycling	316,000	348,000	436,000	550,000	613,000	687,000	698,000	706,000
Stormwater Capture and Use	100,000	103,000	110,000	80,000	82,000	82,000	82,000	82,000
Advanced Water Technologies	111,000	101,000	194,000	194,000	208,000	209,000	209,000	210,000
Conjunctive Use Projects	1,416,000	1,429,000	1,303,000	1,255,000	1,273,000	1,296,000	1,311,000	1,326,000
Local and Regional Water Supply and Storage Projects	252,000	224,000	261,000	257,000	257,000	258,000	258,000	258,000
Other Programs and Projects that Contribute to Regional Self-Reliance	875,000	1,250,000	1,200,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Water Supplies Contributing to Regional Self-Reliance	**3,935,000**	**4,391,000**	**4,560,000**	**4,748,000**	**4,894,000**	**5,045,000**	**5,133,000**	**5,221,000**

Service Area Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	5,032,000	5,156,000	5,261,000	5,374,000

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Supplies Contributing to Regional Self-Reliance	3,935,000	4,391,000	4,560,000	4,748,000	4,894,000	5,045,000	5,133,000	5,221,000
Change in Supplies Contributing to Regional Self-Reliance	**NA**	**456,000**	**625,000**	**813,000**	**959,000**	**1,110,000**	**1,198,000**	**1,286,000**

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Percent of Supplies Contributing to Regional Self-Reliance	71.6%	79.9%	87.4%	96.4%	97.3%	97.8%	97.6%	97.2%
Change in Percent of Supplies Contributing to Regional Self-Reliance	**NA**	**8.2%**	**15.7%**	**24.8%**	**25.6%**	**26.2%**	**25.9%**	**25.5%**

Water Use Efficiency

The water use efficiency information shown in Table A.11-2 is taken directly from Table A.11-1 above.

Water Recycling

The water recycling values shown in Table A.11-2 reflect the total recycled water production in Metropolitan's service area as described in Section 3.5 and Appendix 2 of Metropolitan's UWMP.

Stormwater Capture and Use

The stormwater capture and use data shown in Table A.11-2 include supplies from local surface water production as described in Section 1.4 and Appendix 2 of Metropolitan's UWMP.

These values do not include production from regional storage reservoirs; storage in these reservoirs is comprised of previously stored water from sources already reflected in Tables A.11-2 and A.11-3. These regional storage resources are generally used to provide additional regional self-reliance in dry years, which is not reflected in this normal water year analysis. The regional storage reservoirs and their yields are described in Section 3.6, Appendix 2 and Appendix 3 of Metropolitan's UWMP.

The stormwater capture and use values shown in Table A.11-2 also do not include stormwater capture that is used to recharge local groundwater basins. Stormwater capture for groundwater recharge supports production of groundwater in the region, and for the purposes of this analysis that production is already captured in Table A.11-2 under conjunctive use projects.

Advanced Water Technologies

The advanced water technologies data shown in Table A.11-2 include total groundwater recovery and seawater desalination production in Metropolitan's service area as described in Section 3.5 and Appendix 2 of Metropolitan's UWMP.

Conjunctive Use Projects

The values for conjunctive use projects shown in Table A.11-2 represent total groundwater production in the region as described in Section 1.4 and Appendix 2 of Metropolitan's UWMP.

The conjunctive use projects numbers shown in Table A.11-2 do not include production from regional groundwater conjunctive use programs. As described in the stormwater capture and use discussion above, these regional storage programs rely on previously stored water from sources already reflected in Tables A.11-2 and A.11-3 and are generally used to provide additional regional self-reliance in dry-years. The regional groundwater conjunctive use programs and their yields are described in Section 3.6 and Appendix 3.

Local and Regional Water Supply and Storage Programs

The data for local and regional water supply and storage programs shown in Table A.11-2 include supplies from the Los Angeles Aqueduct. This supply is described in Section 1.4 and Appendix 2 of Metropolitan's UWMP.

The local and regional supply numbers shown in Table A.11-2, except for "Other Programs and Projects that Contribute to Regional Self-Reliance" which is discussed below, were obtained from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table 2-6: Metropolitan Regional Water Demand Average Year

- 2015 values – Metropolitan's 2010 UWMP, Table 2-8: Metropolitan Regional Water Demands Average Year
- 2020 values – Metropolitan's 2015 UWMP, Table 2-3: Metropolitan Regional Water Demands Average Year
- 2025-2045 values – Metropolitan's 2020 UWMP, Table 2-3: Metropolitan Regional Water Demands Normal Water Year

Other Programs and Projects that Contribute to Regional Self-Reliance

Other programs and projects that contribute to regional self-reliance shown in Table A.11-2 include current programs from the Colorado River Aqueduct. Colorado River supplies include Metropolitan's basic Colorado River apportionment, as well as supplies that result from existing and committed programs, including those from the IID-MWD Conservation Program, the implementation of the Quantification Settlement Agreement (QSA), related agreements, and the exchange agreement with SDCWA. Colorado River Aqueduct supplies and programs are described in Section 3.1 and Appendix 3 of Metropolitan's UWMP.

The values shown in Table A.11-2 for other programs and projects that contribute to regional self-reliance come from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Year 2010 (Average Year)
- 2015 values – Metropolitan's 2010 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Year 2015 (Average Year)
- 2020 values – Metropolitan's 2015 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Year 2020 (Average Year)
- 2025-2045 values – Metropolitan's 2020 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Years 2025, 2030, 2035, 2040, 2045 (Normal Water Year)

Reliance on Water Supplies from the Delta Watershed

In order for a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) requires that water suppliers report the expected outcomes for measurable reductions in supplies from the Delta watershed either as an amount or as a percentage. This analysis provides both calculations. Based on the methodology described in Guidebook Appendix C, and consistent with the approach of this analysis in not including projects under development, this accounting does not include any supplies from potential future covered actions. Table A.11-3 shows the expected outcomes for reliance on supplies from the Delta watershed for Metropolitan's service area. Supporting narratives and documentation for the all of the data shown in Table A.11-3 are provided below.

The results shown in Table A.11-3 demonstrate that Metropolitan's service area is measurably reducing its Delta reliance. In the near-term (2025), the expected outcome for normal water year reliance on supplies from the Delta watershed decreased by 301 TAF from the 2010 baseline; this represents a decrease of 3 percent of 2025 normal water year retail demands. In the long-term (2045), normal water year reliance on supplies from the Delta watershed decreased by 314 TAF from the 2010 baseline; this represents a decrease of just over 5 percent of 2045 normal water year retail demands.

Table A.11-3
Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
CVP/SWP Contract Supplies	1,472,000	1,029,000	984,000	1,133,000	1,130,000	1,128,000	1,126,000	1,126,000
Delta/Delta Tributary Diversions	-	-	-	-	-	-	-	-
Transfers and Exchanges of Supplies from the Delta Watershed	20,000	44,000	91,000	58,000	52,000	52,000	52,000	52,000
Other Water Supplies from the Delta Watershed	-	-	-	-	-	-	-	-
Total Water Supplies from the Delta Watershed	**1,492,000**	**1,073,000**	**1,075,000**	**1,191,000**	**1,182,000**	**1,180,000**	**1,178,000**	**1,178,000**
Service Area Demands without Water Use Efficiency (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Service Area Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	5,032,000	5,156,000	5,261,000	5,374,000
Change in Supplies from the Delta Watershed (Acre-Feet)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,182,000	1,180,000	1,178,000	1,178,000
Change in Supplies from the Delta Watershed	**NA**	**(419,000)**	**(417,000)**	**(301,000)**	**(310,000)**	**(312,000)**	**(314,000)**	**(314,000)**
Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Percent of Supplies from the Delta Watershed	27.2%	19.5%	20.6%	24.2%	23.5%	22.9%	22.4%	21.9%
Change in Percent of Supplies from the Delta Watershed	**NA**	**-7.6%**	**-6.6%**	**-3.0%**	**-3.7%**	**-4.3%**	**-4.8%**	**-5.2%**

CVP/SWP Contract Supplies

The CVP/SWP contract supplies shown in Table A.11-3 include Metropolitan's SWP Table A and Article 21 supplies. These supplies are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

The values shown in Table A.11-3 do not include Desert Water Agency/Coachella Valley Water District SWP contract supplies. These supplies are exchanged with Desert Water Agency and Coachella Valley Water District for an equal amount of Colorado River water, which is reflected in the Colorado River Aqueduct supplies shown in Table A.11-2. In addition, Desert Water Agency and Coachella Valley Water District should include their SWP contract supplies in their own accountings of reduced reliance. Additional information on these exchange agreements can be found in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

These values also do not include supplies from San Luis Carryover storage or Central Valley storage programs because storage in these programs comprises previously stored water from sources already reflected in Table A.11-3. These storage programs are generally used to provide additional regional self-reliance in dry years, which is not reflected in this normal water year analysis. The Central Valley storage projects and their yields are described in Section 3.3, and Appendix 3. San Luis Carryover storage is described in Section 3.2 and Appendix 3.

Transfers and Exchanges of Supplies from the Delta Watershed

The transfers and exchanges of supplies from the Delta watershed shown in Table A.11-3 include supplies from the San Bernardino Valley MWD Program, Yuba River Accord Purchase Program, the San Gabriel Valley MWD Program, Irvine Ranch Water District Storage and Exchange Program, and other generic SWP and Central Valley transfers and exchanges. These programs are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

Supplies from the Delta Watershed shown in Table A.11-3 are from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table A.3-7: California Aqueduct Program Capabilities Year 2010 (Average Year)

- 2015 values – Metropolitan’s 2010 UWMP, Table A.3-7: California Aqueduct Program Capabilities Year 2015 (Average Year)
- 2020 values – Metropolitan’s 2015 UWMP, Table A.3-7: California Aqueduct Program Capabilities Year 2020 (Average Year)
- 2025-2045 values – Metropolitan’s 2020 UWMP, Table A.3-7: California Aqueduct Program Capabilities Years 2025, 2030, 2035, 2040, 2045 (Normal Water Year)

A.11.4 UWMP Implementation

In addition to the analysis and documentation described above, WR P1 subsection (c)(1)(B) requires that all programs and projects included in the UWMP that are locally cost-effective and technically feasible, which reduce reliance on the Delta, are identified, evaluated, and implemented consistent with the implementation schedule. WR P1 (c)(1)(B) states that:

> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta*[.]

In accordance with Water Code Section 10631(f), water suppliers must already include in their UWMP a detailed description of expected future projects and programs that they may implement to increase the amount of water supply available to them in normal and single-dry water years and for a period of drought lasting five consecutive years. The UWMP description must also identify specific projects, include a description of the increase in water supply that is expected to be available from each project, and include an estimate regarding the implementation timeline for each project or program.

Section 3 of Metropolitan’s UWMP summarizes the implementation plan and continued progress in developing a diversified water portfolio to meet the region’s water needs.

Water Use Efficiency

The water use efficiency numbers used in this analysis include the total water use efficiency savings (conservation) for the service area, including savings from active, code-based, price-effect and pre-1990 savings. The specific water use efficiency programs and their implementation are described in Section 3.4 of Metropolitan’s UWMP.

Water Recycling

The water recycling values used in this analysis reflect the total recycled water production in Metropolitan’s service area. Water recycling programs and implementation are discussed in Section 3.5 of Metropolitan’s UWMP. In addition, individual project-level details are provided in Appendix 5.

Stormwater Capture and Use

The stormwater capture and use data used in this analysis include supplies from local surface water production. Local surface water production and its implementation are discussed in Appendix 2 of Metropolitan’s UWMP.

Advanced Water Technologies

The advanced water technologies data used in this analysis include total groundwater recovery and seawater desalination production in Metropolitan’s service. Groundwater recovery and seawater desalination programs and implementation are described in Section 3.5 of Metropolitan’s UWMP. In addition, individual project-level details are provided in Appendix 5.

Conjunctive Use Projects

The values for conjunctive use projects used in this analysis represent total groundwater production in the region. Groundwater production and its implementation are discussed in Appendix 2 of Metropolitan's UWMP.

Local and Regional Water Supply and Storage Programs

The data for local and regional water supply and storage programs shown this analysis include supplies from the Los Angeles Aqueduct. This program and its implementation are described in Appendix 2 of Metropolitan's UWMP.

Other Programs and Projects that Contribute to Regional Self-Reliance

Other programs and projects that contribute to regional self-reliance used in this analysis include current programs from the Colorado River Aqueduct. Colorado River supplies include Metropolitan's basic Colorado River apportionment, as well as supplies that result from existing and committed programs, including those from the IID-MWD Conservation Program, the implementation of the Quantification Settlement Agreement (QSA), related agreements, and the exchange agreement with SDCWA. Colorado River Aqueduct programs and their implementation are described in Section 3.1 and Appendix 3 of Metropolitan's UWMP.

CVP/SWP Contract Supplies

The CVP/SWP contract supplies shown in this analysis include Metropolitan's SWP Table A and Article 21 supplies. These supplies and their implementation are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

Transfers and Exchanges of Supplies from the Delta Watershed

The transfers and exchanges of supplies from the Delta watershed shown in this analysis include supplies from the San Bernardino Valley MWD Program, Yuba River Accord Purchase Program, the San Gabriel Valley MWD Program, Irvine Ranch Water District Storage and Exchange Program, and other generic SWP and Central Valley transfers and exchanges. These programs and their implementation are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

A.11.5 2015 UWMP Appendix 11

The information contained in this Appendix 11 is also intended to be a new Appendix 11 attached to Metropolitan's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). Metropolitan provided notice of the availability of the draft 2020 UWMP (including this Appendix 11 which will also be a new Appendix 11 to its 2015 UWMP) and WSCP and the public hearing to consider adoption of both plans and Appendix 11 to the 2015 UWMP in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP were posted prominently on Metropolitan's website, mwdh2o.com, starting February 1, 2021, more than 60 days in advance of the public hearing on April 12, 2021. The notice of availability of the documents was sent to Metropolitan's member agencies, as well as cities and counties in Metropolitan's service area. In addition, a public notice advertising the public hearing in English and Spanish was published in 12 Southern California newspapers. The notification in English language newspapers was published on February 1 and 8, 2021. The notification was published on January 28-30, 2021 and February 1, 4-6, and 8, 2021 in Spanish language newspapers, satisfying the requirement for non-English language notification. Copies of: (1) the notification letter sent to the member agencies, cities and counties in Metropolitan's service area, and (2) the notice published in the newspapers are included in the 2020 UWMP Section 5. Thus, this Appendix 11 to Metropolitan's 2020 UWMP, which was adopted with Metropolitan's 2020 UWMP, will also be recognized and treated as Appendix 11 to Metropolitan's 2015 UWMP.

Metropolitan held the public hearing for the draft 2020 UWMP, draft Appendix 11 to the 2015 UWMP, and draft WSCP on April 12, 2021, at the Board's Water Planning and Stewardship Committee meeting, held online due to COVID-19 concerns. On May 11, 2021, Metropolitan's Board determined that the 2020 UWMP and the WSCP are consistent with the MWD Act and accurately represent the water resources plan for Metropolitan's service area. In addition, Metropolitan's Board determined that Appendix 11 to both the 2015 UWMP and the 2020 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003), which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolutions 9279, 9280, and 9281, the Board adopted the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP and authorized their submittal to the State of California. Copies of Resolutions 9279, 9280, and 9281 are included in the 2020 UWMP Section 5, and Resolution 9281 for the WSCP is attached to the WSCP as Attachment C.

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Appendix 11

QUANTIFYING REGIONAL SELF-RELIANCE AND REDUCED RELIANCE ON WATER SUPPLIES FROM THE DELTA WATERSHED

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Appendix 11
METROPOLITAN'S
REDUCED DELTA RELIANCE REPORTING

A.11.1 Background

Under the Sacramento-San Joaquin Delta Reform Act of 2009, state and local public agencies proposing a covered action in the Delta,[1] prior to initiating the implementation of that action, must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the Delta Stewardship Council.[2] Anyone may appeal a certification of consistency, and if the Delta Stewardship Council grants the appeal, the covered action may not be implemented until the agency proposing the covered action submits a revised certification of consistency, and either no appeal is filed, or the Delta Stewardship Council denies the subsequent appeal.[3]

An urban water supplier that anticipates participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta should provide information in their 2015 and 2020 Urban Water Management Plans (UWMPs) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1).[4]

WR P1 details what is needed for a covered action to demonstrate consistency with reduced reliance on the Delta and improved regional self-reliance. WR P1 subsection (a) states that:

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

> *(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c);*
>
> *(2) That failure has significantly caused the need for the export, transfer, or use; and*
>
> *(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.*

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

> *(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;*

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[1] Water Code, § 85057.5; Cal. Code Regs. tit. 23, § 5001.
[2] Water Code, § 85225; Delta Plan, App. D.
[3] Water Code, §§ 85225.10-85225.25; Delta Plan, App. D.
[4] Cal. Code Regs., tit. 23, § 5003.

> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and*
>
> *(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code Section 1011(a).*

The analysis and documentation provided below include all of the elements described in WR P1(c)(1) that need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action.

A.11.2 Summary of Expected Outcomes for Reduced Reliance on the Delta

As stated in WR P1(c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta.

The expected outcomes for Metropolitan's Delta reliance and regional self-reliance were developed using the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 (Guidebook Appendix C) issued in March 2021.

The data used in this analysis represent the total regional efforts of Metropolitan and its member agencies and their customers (many of them, retail agencies) and were developed in conjunction with Metropolitan's member agencies as part of the UWMP coordination process as described in Section 5 of Metropolitan's UWMP. In accordance with UMWP requirements, Metropolitan's member agencies and their customers (many of them, retail agencies) also report demands and supplies for their service areas in their respective UWMPs. The data reported by those agencies are not additive to the regional totals shown in Metropolitan's UWMP; rather, their reporting represents subtotals of the regional total and should be considered as such for the purposes of determining reduced reliance on the Delta.

While the demands that Metropolitan's member agencies and their customers report in their UWMPs are a good reflection of the demands in their respective service areas, they do not adequately represent each water supplier's contributions to reduced reliance on the Delta. In order to calculate and report their reliance on water supplies from the Delta watershed, water suppliers that receive water from the Delta through other regional or wholesale water suppliers would need to determine the amount of Delta water that they receive from the regional or wholesale supplier. Two specific pieces of information are needed to accomplish this: first is the quantity of demands on the regional or wholesale water supplier that accurately reflect a supplier's contributions to reduced reliance on the Delta, and second is the quantity of a supplier's demands on the regional or wholesale water supplier that are met by supplies from the Delta watershed.

For water suppliers that make investments in regional projects or programs it may be infeasible to quantify their demands on the regional or wholesale water supplier in a way that accurately reflects their individual contributions to reduced reliance on the Delta. Due to the extensive, long-standing and successful implementation of regional demand management and local resource incentive programs in Metropolitan's service area, this infeasibility holds true for Metropolitan's members as well their customers. For Metropolitan's service area, reduced reliance on supplies from the Delta watershed can only be accurately accounted at the regional level, as is demonstrated in this analysis.

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for Metropolitan's Delta reliance and regional self-reliance. The results show that as a region, Metropolitan and its members as well as their customers are measurably reducing reliance on the Delta and improving regional self-reliance, both as an amount of water used and as a percentage of water used.

Expected Outcomes for Regional Self-Reliance

- Near-term (2025) – Normal water year regional self-reliance is expected to increase by 813 TAF from the 2010 baseline; this represents an increase of almost 25 percent of 2025 normal water year retail demands (Table A.11-2).
- Long-term (2045) – Normal water year regional self-reliance is expected to increase by more than 1.28 MAF from the 2010 baseline, this represents an increase of more than 25 percent of 2045 normal water year retail demands (Table A.11-2).

Expected Outcomes for Reduced Reliance on Supplies from the Delta Watershed

- Near-term (2025) – Normal water year reliance on supplies from the Delta watershed decreased by 301 TAF from the 2010 baseline, this represents a decrease of 3 percent of 2025 normal water year retail demands (Table A.11-3).
- Long-term (2045) – Normal water year reliance on supplies from the Delta watershed decreased by 314 TAF from the 2010 baseline, this represents a decrease of just over 5 percent of 2045 normal water year retail demands (Table A.11-3).

A11.3 Demonstration of Reduced Reliance on the Delta

The methodology used to determine Metropolitan's reduced Delta reliance and improved regional self-reliance is consistent with the approach detailed in DWR's UWMP Guidebook Appendix C, including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources. Some of the key assumptions underlying Metropolitan's demonstration of reduced reliance include:

- All data were obtained from the current 2020 UWMP or previously adopted UWMPs and represent average or normal water year conditions.
- All analyses were conducted at the service area level, and all data reflect the total contributions of Metropolitan and its members as well as their customers.
- No projects or programs that are described in the UWMPs as "Projects Under Development" were included in the accounting of supplies.

Baseline and Expected Outcomes

In order to calculate the expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C. Data for the 2010 baseline were taken from Metropolitan's 2005 UWMP as the UWMPs generally do not provide normal water year data for the year that they are adopted (i.e., 2005 UWMP forecasts begin in 2010, 2010 UWMP forecasts begin in 2015, and so on).

Consistent with the 2010 baseline data approach, the expected outcomes for reduced Delta reliance and improved regional self-reliance for 2015 and 2020 were taken from Metropolitan's 2010 and 2015 UWMPs respectively. Expected outcomes for 2025-2045 are from the current 2020 UWMP. Documentation of the specific data sources and assumptions are included in the discussions below.

Service Area Demands without Water Use Efficiency

In alignment with the Guidebook Appendix C, this analysis uses normal water year demands, rather than normal water year supplies to calculate expected outcomes in terms of the percentage of water used. Using normal water year demands serves as a proxy for the amount of supplies that would be used in a normal water year, which helps alleviate issues associated with how supply capability is presented to fulfill requirements of the Act versus how supplies might be accounted for to demonstrate consistency with WR P1.

Because WR P1 considers water use efficiency savings a source of water supply, water suppliers such as Metropolitan that explicitly calculate and report water use efficiency savings in their UWMP will need to make an adjustment to properly reflect normal water year demands in the calculation of reduced reliance. As explained in the Guidebook Appendix C, water use efficiency savings must be added back to the normal year demands to represent demands without water use efficiency savings accounted for; otherwise the effect of water use efficiency savings on regional self-reliance would be overestimated. Table A.11-1 shows the results of this adjustment for Metropolitan. Supporting narratives and documentation for all of the data shown in Table A.11-1 are provided below.

Table A.11-1
Demands without Water Use Efficiency Accounted For

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Demands with Water Use Efficiency Accounted For	4,628,000	4,563,000	4,163,000	3,763,000	3,821,000	3,893,000	3,936,000	3,985,000
Reported Water Use Efficiency	865,000	936,000	1,056,000	1,162,000	1,211,000	1,263,000	1,325,000	1,389,000
Service Area Demands without Water Use Efficiency Accounted For	**5,493,000**	**5,499,000**	**5,219,000**	**4,925,000**	**5,032,000**	**5,156,000**	**5,261,000**	**5,374,000**

Service Area Demands without Water Use Efficiency

The service area demands shown in Table A.11-1 represent the total retail water demands for Metropolitan's service area and include municipal and industrial demands, agricultural demands, seawater barrier demands, and storage replenishment demands. These demand types and the modeling methodologies used to calculate them are described in Section 2.2 and Appendix 1 of Metropolitan's UWMP.

Water Use Efficiency

The water use efficiency numbers shown in Table A.11-1 represent the total water use efficiency savings (conservation) for Metropolitan's region, including savings from active, code-based, price-effect and pre-1990 sources. These sources of water use efficiency and the methodologies used to calculate them are described in Section 2.2, Section 3.4, Section 3.7 and Appendix 1 of Metropolitan's UWMP.

The demand and water use efficiency data shown in Table A.11-1 were collected from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table 2-6: Metropolitan Regional Water Demand Average Year
- 2015 values – Metropolitan's 2010 UWMP, Table 2-8: Metropolitan Regional Water Demands Average Year
- 2020 values – Metropolitan's 2015 UWMP, Table 2-3: Metropolitan Regional Water Demands Average Year
- 2025-2045 values – Metropolitan's 2020 UWMP, Table 2-3: Metropolitan Regional Water Demands Normal Water Year

Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table A.11-2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in Table A.11-2 represent efforts to improve regional self-reliance for Metropolitan's entire service area and include the total contributions of Metropolitan and its members as well as their customers. Supporting narratives and documentation for the all of the data shown in Table A.11-2 are provided below.

The results shown in Table A.11-2 demonstrate that Metropolitan's service area is measurably improving its regional self-reliance. In the near-term (2025), the expected outcome for normal water year regional self-reliance increases by 747 TAF from the 2010 baseline; this represents an increase of about 23 percent of 2025 normal water year retail demands. In the long-term (2045), normal water year regional self-reliance is expected to increase by more than 1.2 MAF from the 2010 baseline; this represents an increase of 25 percent of 2045 normal water year retail demands.

Table A.11-2
Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Use Efficiency	865,000	936,000	1,056,000	1,162,000	1,211,000	1,263,000	1,325,000	1,389,000
Water Recycling	316,000	348,000	436,000	550,000	613,000	687,000	698,000	706,000
Stormwater Capture and Use	100,000	103,000	110,000	80,000	82,000	82,000	82,000	82,000
Advanced Water Technologies	111,000	101,000	194,000	194,000	208,000	209,000	209,000	210,000
Conjunctive Use Projects	1,416,000	1,429,000	1,303,000	1,255,000	1,273,000	1,296,000	1,311,000	1,326,000
Local and Regional Water Supply and Storage Projects	252,000	224,000	261,000	257,000	257,000	258,000	258,000	258,000
Other Programs and Projects that Contribute to Regional Self-Reliance	875,000	1,250,000	1,200,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Water Supplies Contributing to Regional Self-Reliance	**3,935,000**	**4,391,000**	**4,560,000**	**4,748,000**	**4,894,000**	**5,045,000**	**5,133,000**	**5,221,000**

Service Area Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	5,032,000	5,156,000	5,261,000	5,374,000

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Supplies Contributing to Regional Self-Reliance	3,935,000	4,391,000	4,560,000	4,748,000	4,894,000	5,045,000	5,133,000	5,221,000
Change in Supplies Contributing to Regional Self-Reliance	**NA**	**456,000**	**625,000**	**813,000**	**959,000**	**1,110,000**	**1,198,000**	**1,286,000**

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Percent of Supplies Contributing to Regional Self-Reliance	71.6%	79.9%	87.4%	96.4%	97.3%	97.8%	97.6%	97.2%
Change in Percent of Supplies Contributing to Regional Self-Reliance	**NA**	**8.2%**	**15.7%**	**24.8%**	**25.6%**	**26.2%**	**25.9%**	**25.5%**

Water Use Efficiency

The water use efficiency information shown in Table A.11-2 is taken directly from Table A.11-1 above.

Water Recycling

The water recycling values shown in Table A.11-2 reflect the total recycled water production in Metropolitan's service area as described in Section 3.5 and Appendix 2 of Metropolitan's UWMP.

Stormwater Capture and Use

The stormwater capture and use data shown in Table A.11-2 include supplies from local surface water production as described in Section 1.4 and Appendix 2 of Metropolitan's UWMP.

These values do not include production from regional storage reservoirs; storage in these reservoirs is comprised of previously stored water from sources already reflected in Tables A.11-2 and A.11-3. These regional storage resources are generally used to provide additional regional self-reliance in dry years, which is not reflected in this normal water year analysis. The regional storage reservoirs and their yields are described in Section 3.6, Appendix 2 and Appendix 3 of Metropolitan's UWMP.

The stormwater capture and use values shown in Table A.11-2 also do not include stormwater capture that is used to recharge local groundwater basins. Stormwater capture for groundwater recharge supports production of groundwater in the region, and for the purposes of this analysis that production is already captured in Table A.11-2 under conjunctive use projects.

Advanced Water Technologies

The advanced water technologies data shown in Table A.11-2 include total groundwater recovery and seawater desalination production in Metropolitan's service area as described in Section 3.5 and Appendix 2 of Metropolitan's UWMP.

Conjunctive Use Projects

The values for conjunctive use projects shown in Table A.11-2 represent total groundwater production in the region as described in Section 1.4 and Appendix 2 of Metropolitan's UWMP.

The conjunctive use projects numbers shown in Table A.11-2 do not include production from regional groundwater conjunctive use programs. As described in the stormwater capture and use discussion above, these regional storage programs rely on previously stored water from sources already reflected in Tables A.11-2 and A.11-3 and are generally used to provide additional regional self-reliance in dry-years. The regional groundwater conjunctive use programs and their yields are described in Section 3.6 and Appendix 3.

Local and Regional Water Supply and Storage Programs

The data for local and regional water supply and storage programs shown in Table A.11-2 include supplies from the Los Angeles Aqueduct. This supply is described in Section 1.4 and Appendix 2 of Metropolitan's UWMP.

The local and regional supply numbers shown in Table A.11-2, except for "Other Programs and Projects that Contribute to Regional Self-Reliance" which is discussed below, were obtained from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table 2-6: Metropolitan Regional Water Demand Average Year

- 2015 values – Metropolitan's 2010 UWMP, Table 2-8: Metropolitan Regional Water Demands Average Year
- 2020 values – Metropolitan's 2015 UWMP, Table 2-3: Metropolitan Regional Water Demands Average Year
- 2025-2045 values – Metropolitan's 2020 UWMP, Table 2-3: Metropolitan Regional Water Demands Normal Water Year

Other Programs and Projects that Contribute to Regional Self-Reliance

Other programs and projects that contribute to regional self-reliance shown in Table A.11-2 include current programs from the Colorado River Aqueduct. Colorado River supplies include Metropolitan's basic Colorado River apportionment, as well as supplies that result from existing and committed programs, including those from the IID-MWD Conservation Program, the implementation of the Quantification Settlement Agreement (QSA), related agreements, and the exchange agreement with SDCWA. Colorado River Aqueduct supplies and programs are described in Section 3.1 and Appendix 3 of Metropolitan's UWMP.

The values shown in Table A.11-2 for other programs and projects that contribute to regional self-reliance come from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Year 2010 (Average Year)
- 2015 values – Metropolitan's 2010 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Year 2015 (Average Year)
- 2020 values – Metropolitan's 2015 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Year 2020 (Average Year)
- 2025-2045 values – Metropolitan's 2020 UWMP, Table A.3-7: Maximum Expected Colorado River Aqueduct Deliveries Years 2025, 2030, 2035, 2040, 2045 (Normal Water Year)

Reliance on Water Supplies from the Delta Watershed

In order for a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) requires that water suppliers report the expected outcomes for measurable reductions in supplies from the Delta watershed either as an amount or as a percentage. This analysis provides both calculations. Based on the methodology described in Guidebook Appendix C, and consistent with the approach of this analysis in not including projects under development, this accounting does not include any supplies from potential future covered actions. Table A.11-3 shows the expected outcomes for reliance on supplies from the Delta watershed for Metropolitan's service area. Supporting narratives and documentation for the all of the data shown in Table A.11-3 are provided below.

The results shown in Table A.11-3 demonstrate that Metropolitan's service area is measurably reducing its Delta reliance. In the near-term (2025), the expected outcome for normal water year reliance on supplies from the Delta watershed decreased by 301 TAF from the 2010 baseline; this represents a decrease of 3 percent of 2025 normal water year retail demands. In the long-term (2045), normal water year reliance on supplies from the Delta watershed decreased by 314 TAF from the 2010 baseline; this represents a decrease of just over 5 percent of 2045 normal water year retail demands.

Table A.11-3
Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
CVP/SWP Contract Supplies	1,472,000	1,029,000	984,000	1,133,000	1,130,000	1,128,000	1,126,000	1,126,000
Delta/Delta Tributary Diversions	-	-	-	-	-	-	-	-
Transfers and Exchanges of Supplies from the Delta Watershed	20,000	44,000	91,000	58,000	52,000	52,000	52,000	52,000
Other Water Supplies from the Delta Watershed	-	-	-	-	-	-	-	-
Total Water Supplies from the Delta Watershed	**1,492,000**	**1,073,000**	**1,075,000**	**1,191,000**	**1,182,000**	**1,180,000**	**1,178,000**	**1,178,000**

Service Area Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	5,032,000	5,156,000	5,261,000	5,374,000

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,182,000	1,180,000	1,178,000	1,178,000
Change in Supplies from the Delta Watershed	**NA**	**(419,000)**	**(417,000)**	**(301,000)**	**(310,000)**	**(312,000)**	**(314,000)**	**(314,000)**

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Percent of Supplies from the Delta Watershed	27.2%	19.5%	20.6%	24.2%	23.5%	22.9%	22.4%	21.9%
Change in Percent of Supplies from the Delta Watershed	**NA**	**-7.6%**	**-6.6%**	**-3.0%**	**-3.7%**	**-4.3%**	**-4.8%**	**-5.2%**

CVP/SWP Contract Supplies

The CVP/SWP contract supplies shown in Table A.11-3 include Metropolitan's SWP Table A and Article 21 supplies. These supplies are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

The values shown in Table A.11-3 do not include Desert Water Agency/Coachella Valley Water District SWP contract supplies. These supplies are exchanged with Desert Water Agency and Coachella Valley Water District for an equal amount of Colorado River water, which is reflected in the Colorado River Aqueduct supplies shown in Table A.11-2. In addition, Desert Water Agency and Coachella Valley Water District should include their SWP contract supplies in their own accountings of reduced reliance. Additional information on these exchange agreements can be found in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

These values also do not include supplies from San Luis Carryover storage or Central Valley storage programs because storage in these programs comprises previously stored water from sources already reflected in Table A.11-3. These storage programs are generally used to provide additional regional self-reliance in dry years, which is not reflected in this normal water year analysis. The Central Valley storage projects and their yields are described in Section 3.3, and Appendix 3. San Luis Carryover storage is described in Section 3.2 and Appendix 3.

Transfers and Exchanges of Supplies from the Delta Watershed

The transfers and exchanges of supplies from the Delta watershed shown in Table A.11-3 include supplies from the San Bernardino Valley MWD Program, Yuba River Accord Purchase Program, the San Gabriel Valley MWD Program, Irvine Ranch Water District Storage and Exchange Program, and other generic SWP and Central Valley transfers and exchanges. These programs are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

Supplies from the Delta Watershed shown in Table A.11-3 are from the following sources:

- Baseline (2010) values – Metropolitan's 2005 UWMP, Table A.3-7: California Aqueduct Program Capabilities Year 2010 (Average Year)

- 2015 values – Metropolitan's 2010 UWMP, Table A.3-7: California Aqueduct Program Capabilities Year 2015 (Average Year)
- 2020 values – Metropolitan's 2015 UWMP, Table A.3-7: California Aqueduct Program Capabilities Year 2020 (Average Year)
- 2025-2045 values – Metropolitan's 2020 UWMP, Table A.3-7: California Aqueduct Program Capabilities Years 2025, 2030, 2035, 2040, 2045 (Normal Water Year)

A.11.4 UWMP Implementation

In addition to the analysis and documentation described above, WR P1 subsection (c)(1)(B) requires that all programs and projects included in the UWMP that are locally cost-effective and technically feasible, which reduce reliance on the Delta, are identified, evaluated, and implemented consistent with the implementation schedule. WR P1 (c)(1)(B) states that:

> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta*[.]

In accordance with Water Code Section 10631(f), water suppliers must already include in their UWMP a detailed description of expected future projects and programs that they may implement to increase the amount of water supply available to them in normal and single-dry water years and for a period of drought lasting five consecutive years. The UWMP description must also identify specific projects, include a description of the increase in water supply that is expected to be available from each project, and include an estimate regarding the implementation timeline for each project or program.

Section 3 of Metropolitan's UWMP summarizes the implementation plan and continued progress in developing a diversified water portfolio to meet the region's water needs.

Water Use Efficiency

The water use efficiency numbers used in this analysis include the total water use efficiency savings (conservation) for the service area, including savings from active, code-based, price-effect and pre-1990 savings. The specific water use efficiency programs and their implementation are described in Section 3.4 of Metropolitan's UWMP.

Water Recycling

The water recycling values used in this analysis reflect the total recycled water production in Metropolitan's service area. Water recycling programs and implementation are discussed in Section 3.5 of Metropolitan's UWMP. In addition, individual project-level details are provided in Appendix 5.

Stormwater Capture and Use

The stormwater capture and use data used in this analysis include supplies from local surface water production. Local surface water production and its implementation are discussed in Appendix 2 of Metropolitan's UWMP.

Advanced Water Technologies

The advanced water technologies data used in this analysis include total groundwater recovery and seawater desalination production in Metropolitan's service. Groundwater recovery and seawater desalination programs and implementation are described in Section 3.5 of Metropolitan's UWMP. In addition, individual project-level details are provided in Appendix 5.

Conjunctive Use Projects

The values for conjunctive use projects used in this analysis represent total groundwater production in the region. Groundwater production and its implementation are discussed in Appendix 2 of Metropolitan's UWMP.

Local and Regional Water Supply and Storage Programs

The data for local and regional water supply and storage programs shown this analysis include supplies from the Los Angeles Aqueduct. This program and its implementation are described in Appendix 2 of Metropolitan's UWMP.

Other Programs and Projects that Contribute to Regional Self-Reliance

Other programs and projects that contribute to regional self-reliance used in this analysis include current programs from the Colorado River Aqueduct. Colorado River supplies include Metropolitan's basic Colorado River apportionment, as well as supplies that result from existing and committed programs, including those from the IID-MWD Conservation Program, the implementation of the Quantification Settlement Agreement (QSA), related agreements, and the exchange agreement with SDCWA. Colorado River Aqueduct programs and their implementation are described in Section 3.1 and Appendix 3 of Metropolitan's UWMP.

CVP/SWP Contract Supplies

The CVP/SWP contract supplies shown in this analysis include Metropolitan's SWP Table A and Article 21 supplies. These supplies and their implementation are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

Transfers and Exchanges of Supplies from the Delta Watershed

The transfers and exchanges of supplies from the Delta watershed shown in this analysis include supplies from the San Bernardino Valley MWD Program, Yuba River Accord Purchase Program, the San Gabriel Valley MWD Program, Irvine Ranch Water District Storage and Exchange Program, and other generic SWP and Central Valley transfers and exchanges. These programs and their implementation are described in Section 3.2 and Appendix 3 of Metropolitan's UWMP.

A.11.5 2015 UWMP Appendix 11

The information contained in this Appendix 11 is also intended to be a new Appendix 11 attached to Metropolitan's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). Metropolitan provided notice of the availability of the draft 2020 UWMP (including this Appendix 11 which will also be a new Appendix 11 to its 2015 UWMP) and WSCP and the public hearing to consider adoption of both plans and Appendix 11 to the 2015 UWMP in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP were posted prominently on Metropolitan's website, mwdh2o.com, starting February 1, 2021, more than 60 days in advance of the public hearing on April 12, 2021. The notice of availability of the documents was sent to Metropolitan's member agencies, as well as cities and counties in Metropolitan's service area. In addition, a public notice advertising the public hearing in English and Spanish was published in 12 Southern California newspapers. The notification in English language newspapers was published on February 1 and 8, 2021. The notification was published on January 28-30, 2021 and February 1, 4-6, and 8, 2021 in Spanish language newspapers, satisfying the requirement for non-English language notification. Copies of: (1) the notification letter sent to the member agencies, cities and counties in Metropolitan's service area, and (2) the notice published in the newspapers are included in the 2020 UWMP Section 5. Thus, this Appendix 11 to Metropolitan's 2020 UWMP, which was adopted with Metropolitan's 2020 UWMP, will also be recognized and treated as Appendix 11 to Metropolitan's 2015 UWMP.

Metropolitan held the public hearing for the draft 2020 UWMP, draft Appendix 11 to the 2015 UWMP, and draft WSCP on April 12, 2021, at the Board's Water Planning and Stewardship Committee meeting, held online due to COVID-19 concerns. On May 11, 2021, Metropolitan's Board determined that the 2020 UWMP and the WSCP are consistent with the MWD Act and accurately represent the water resources plan for Metropolitan's service area. In addition, Metropolitan's Board determined that Appendix 11 to both the 2015 UWMP and the 2020 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003), which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolutions 9279, 9280, and 9281, the Board adopted the 2020 UWMP, Appendix 11 to the 2015 UWMP, and the WSCP and authorized their submittal to the State of California. Copies of Resolutions 9279, 9280, and 9281 are included in the 2020 UWMP Section 5, and Resolution 9281 for the WSCP is attached to the WSCP as Attachment C.

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APPENDIX B

ATTACHMENT 2

- **Appendix G "Inland Empire Utilities Agency Reduced Delta Reliance Reporting", Inland Empire Utilities Agency's 2020 Urban Water Management Plan**

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ADDENDUM TO THE 2015 URBAN WATER MANAGEMENT PLAN

Addendum prepared by Kennedy Jenks Consultants

June 2021

2020 UWMP Appendix G
& 2015 UWMP Appendix P

Reduced Delta Reliance Reporting

6/29/2021

Inland Empire Utilities Agency Reduced Delta Reliance Reporting

G.1 Background

IEUA is an urban water supplier and a member agency of MWD. MWD provides IEUA with imported water supplies, which IEUA in turn distributes on a wholesale basis to its retail water purveyors. MWD is a contractor on the State Water Project (SWP) and, due to water quality considerations, all imported water supplies IEUA receives from MWD originate from the SWP system. The SWP system runs from Lake Oroville in Northern California to Southern California, crossing the Sacramento-San Joaquin Delta (Delta) along the way. MWD and its member agencies have made investments into water supply and demand management to regionally reduce impacts on the Delta. These investments bring regional reliability and reduced Delta reliance that make it infeasible for individual MWD member agencies to determine their individual Delta reliance.

As a recipient of imported water from the SWP delivered via MWD, IEUA may indirectly receive water through a proposed covered action, such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta. Through this appendix, IEUA is providing information in its 2015 and 2020 UWMPs that may be used in the covered action process, to demonstrate consistency with Delta Plan Policy WR P1, *Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance* (WR P1) [California Code of Regulations (CCR), Title 23, § 5003].

The Delta Plan is a comprehensive, long-term resource management plan for the Sacramento-San Joaquin Delta (Delta) that was developed as part of the Delta Reform Act of 2009 (Water code section 85000 et seq) and includes both regulatory policies and recommendations, aimed at promoting a healthy Delta ecosystem. Delta Plan Policy WR P1 is one of 14 regulatory policies in the Delta Plan. WR P1 identifies UWMPs as the tool to demonstrate consistency with state policy to reduce reliance on the Delta for any Supplier that is participating in or carrying out a proposed covered action or receiving Delta water from a proposed covered action.

Within the supplier's UWMP, information should be provided that can be used to demonstrate consistency with this policy. Section (c)(1) of WR P1 states that suppliers that have (A) completed an urban water management plan, (B) implemented the efficiency measures in that plan, and (C) shown a measurable reduction in Delta reliance and improvement in regional self-reliance in the plan, are contributing to reduced reliance on the Delta and are therefore consistent with WR P1 [CCR, Title 23, § 5003(c)(1)].

The analysis and documentation provided below include all elements described in WR P1(c)(1) and are included in IEUA's 2015 and 2020 UWMP to support a certification of consistency in the case of a future covered action.

G.2 Demonstration of Reduced Reliance

The methodology used to determine IEUA's reduced Delta reliance and improved regional self-reliance is consistent with the approach detailed in DWR's UWMP Guidebook Appendix C, including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources. Some of the key assumptions underlying IEUA's demonstration of reduced reliance includes:

- All data were obtained from the current 2020 UWMP or previously adopted UWMPs and represent average or normal water year conditions.

- All analyses were conducted at the IEUA service area level. Demands on IEUA are the total demands from all its retail agencies. Supplies are the total supplies IEUA manages, which are imported water from MWD and recycled water from its regional water recycling plants.

- No projects or programs that are described in the UWMPs as “Projects Under Development” were included in the accounting of supplies.

G.3 Summary of Expected Outcomes for Reduced Reliance on the Delta

As stated in WR P1(c)(1), the policy requires that, commencing in 2015, UWMPs include expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta.

It is important to note that MWD has prepared a detailed analysis that demonstrates the consistency with the Delta Plan Policy in its 2020 UWMP on a region-wide scale that includes its Member Agencies (MWD 2020 UWMP, Appendix 11). From its 2010 baseline, both long-term Regional Self-Reliance and Reduced Reliance on Supplies from the Delta are expected to increase over time. IEUA has adopted MWD’s calculation of Reduced Reliance on Supplies from the Delta due to the infeasibility of separating out the delta supplies that IEUA receives from MWD (see Section G.6 and G.7 for details).

IEUA will report its own expected outcomes for Regional Self-Reliance in the following sections (G.4 and G.5). These expected outcomes use the approach and guidance described in Appendix C of DWR’s Urban Water Management Plan Guidebook 2020 (Guidebook Appendix C), finalized on March 29, 2021.

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for IEUA’s regional self-reliance and MWD’s regional reduction in reliance on Delta water supplies. The results show that IEUA is measurably improving regional self-reliance and MWD and its member agencies are reducing reliance on Delta supplies, both as an amount of water used and as a percentage of water used.

- Near-term (2025) – IEUA’s normal water regional self-reliance is expected to increase by 25 thousand acre-feet (TAF) from the 2010 baseline; this represents an increase of about 10 percent of 2025 normal water year demands (Table G-2).

- Long-term (2045) – IEUA’s normal water regional self-reliance is expected to increase by 50 TAF from the 2010 baseline; this represents an increase of about 17 percent of 2045 normal water year demands (Table G-2).

- Near-term (2025) – MWD’s normal reliance on water supplies from the Delta Watershed is expected to decrease by 300 thousand acre-feet (TAF) from the 2010 baseline; this represents a decrease of about 3 percent of 2025 normal water year demands (Table G-3).

- Long-term (2045) – MWD's normal reliance on water supplies from the Delta Watershed is expected to decrease by 314 thousand acre-feet (TAF) from the 2010 baseline; this represents a decrease of about 5 percent of 2045 normal water year demands (Table G-3).

G.4 Baseline and Calculation of Service Area Water Demands

In order to calculate the expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C.

Table G-1 shows the total service area water demands for IEUA for 2010 through 2045. These water demands include recycled water and imported water demand on IEUA from its retail agencies. The table also shows reported water use efficiency and calculates the total service area water demands without water use efficiency.

The data sources for the values in this table and calculations are explained below.

Service Area Demands with Water Use Efficiency Accounted For:

- Baseline (2010) value: The sum of the imported water and recycled water demands, as reported in IEUA's 2010 UWMP, Tables 3-10 and 3-15.

- 2015 value: The sum of the imported water and recycled water demands on IEUA, as reported in IEUA's 2015 UWMP, Table 2-8: IEUA Total Water Demands.

- 2020-2045 values: The sum of imported water and recycled water demands, from IEUA's 2020 UWMP, Table 2-4: Total Water Use (Potable and Non-Potable).

Reported Water Use Efficiency:

- Baseline (2010) value: No water use efficiency value is estimated to establish a conservative baseline.

- 2015 value: From IEUA's 2015 UWMP, Table 3-1. Only the 2015 value for WUE was selected.

- 2020 value: The volume of savings over the lifetime of water use efficiency measures implemented during FY 19/20, as reported in IEUA's Annual UWE FY19/20 report and detailed in Section 8.8 of IEUA's 2020 UWMP.

- 2025-2045 values: Projected water use efficiency savings, from IEUA's 2020 UWMP, Table 7-2.

The Service Area Water Demands without Water Use Efficiency Accounted For is the sum of the two volumes above for each year.

G.5 Calculation of Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1(c)(1) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table G-2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in Table G-2 represent efforts to improve regional self-reliance for the IEUA service area, focused only on the supplies IEUA manages, which are water use efficiency and water recycling. Supporting narratives and documentation for the all the data shown in the table are provided below:

Water Use Efficiency

The water use efficiency information shown in Table G-2 is taken directly from Table G-1. It is now reflected as a supply contributing to regional self-reliance.

Water Recycling

The water recycling values shown in Table G-2 are the recycled water supplies to meet the recycled water portion of the projected "service area water demands with water use efficiency accounted for" shown in Table G-1. These values come from IEUA's 2010 UWMP Table 3-15, IEUA's 2015 UWMP Table 2-8, and IEUA's 2020 UWMP Table 2-4. A description on these water supplies can be found in Section 5.4 – Current Recycled Water Uses in IEUA's 2020 UWMP.

The results shown in Table G-2 demonstrate that IEUA is improving its regional self-reliance, since the volume of water supplies contributing to regional self-reliance are projected to increase over time. In the near term (2025), the expected outcome for normal water year regional self-reliance increases by over 25,000 AF from the 2010 baseline; this represents an increase of about 10 percent of 2025 normal water year demands. In the long term (2045), normal water year regional self-reliance is expected to increase by more than 50,000 AF from the 2010 baseline.

G.6 Calculation of Reliance on Water Supplies from the Delta Watershed

WR P1(c)(1) requires that water suppliers report the expected outcomes for measurable reductions in supplies from the Delta watershed either as an amount or as a percentage. This analysis provides both calculations.

Although IEUA is currently a SWP-exclusive MWD member agency, it is infeasible to individually account for the independent impact on the Delta. IEUA participates, through MWD, in various water supply investment and demand management programs that reduce reliance on the Delta. Reliance on water supplies from the Delta are taken from MWD's Reduced Delta Reliance assessment (MWD 2020 UWMP, Appendix 11).

Regional reliance on supplies from the Delta watershed are expected to decrease by 314 TAF over the 2010 baseline, a decrease of about 5.2% of 2045 demands. Increased regional self-reliance primarily comes from water use efficiency, conjunctive use projects, water recycling, and local/regional water supply and storage projects. The water supply accounting completed by MWD does not include any supplies from potential future covered actions.

G.7 Infeasibility of Accounting Supplies from the Delta Watershed for Metropolitan’s Member Agencies and their Customers

Metropolitan’s service area, as a whole, reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies, and regional and local demand management measures. Metropolitan’s member agencies coordinate reliance on the Delta through their membership in Metropolitan, a regional cooperative providing wholesale water service to its 26 member agencies. Accordingly, regional reliance on the Delta can only be measured regionally—not by individual Metropolitan member agencies and not by the customers of those member agencies.

Metropolitan’s member agencies, and those agencies’ customers, indirectly reduce reliance on the Delta through their collective efforts as a cooperative. Metropolitan’s member agencies do not control the amount of Delta water they receive from Metropolitan. Metropolitan manages a statewide integrated conveyance system consisting of its participation in the State Water Project (SWP), its Colorado River Aqueduct (CRA) including Colorado River water resources, programs and water exchanges, and its regional storage portfolio. Along with the SWP, CRA, storage programs, and Metropolitan’s conveyance and distribution facilities, demand management programs increase the future reliability of water resources for the region. In addition, demand management programs provide system-wide benefits by decreasing the demand for imported water, which helps to decrease the burden on Metropolitan’s infrastructure and reduce system costs, and free up conveyance capacity to the benefit of all member agencies.

Metropolitan’s costs are funded almost entirely from its service area, with the exception of grants and other assistance from government programs. Most of Metropolitan’s revenues are collected directly from its member agencies. Properties within Metropolitan’s service area pay a property tax that currently provides approximately 8 percent of the fiscal year 2021 annual budgeted revenues. The rest of Metropolitan’s costs are funded through rates and charges paid by Metropolitan’s member agencies for the wholesale services it provides to them. Thus, Metropolitan’s member agencies fund nearly all operations Metropolitan undertakes to reduce reliance on the Delta, including Colorado River Programs, storage facilities, Local Resources Programs and Conservation Programs within Metropolitan’s service area.

Because of the integrated nature of Metropolitan’s systems and operations, and the collective nature of Metropolitan’s regional efforts, it is infeasible to quantify each of Metropolitan member agencies’ individual reliance on the Delta. It is infeasible to attempt to segregate an entity and a system that were designed to work as an integrated regional cooperative.

In addition to the member agencies funding Metropolitan’s regional efforts, they also invest in their own local programs to reduce their reliance on any imported water. Moreover, the customers of those member agencies may also invest in their own local programs to reduce water demand. However, to the extent those efforts result in reduction of demands on Metropolitan, that reduction may not equate to a like reduction of reliance on the Delta. Demands on Metropolitan are not commensurate with demands on the Delta because most of Metropolitan member agencies receive blended resources from Metropolitan as determined by Metropolitan—not the individual member agency—and for most member agencies, the blend varies from month-to-month and year-to-year due to hydrology, operational constraints, use of storage and other factors.

The accounting of regional investments that contribute to reduced reliance on supplies from the Delta watershed is straightforward to calculate and report at the regional aggregate level. However, any similar accounting is infeasible for the individual member agencies or their customers. As described above, the region (through Metropolitan) makes significant investments in projects, programs and other resources that reduce reliance on the Delta. In fact, all of Metropolitan's investments in Colorado River supplies, groundwater and surface storage, local resources development and demand management measures that reduce reliance on the Delta are collectively funded by revenues generated from the member agencies through rates and charges.

Metropolitan's revenues cannot be matched to the demands or supply production history of an individual agency, or consistently across the agencies within the service area. Each project or program funded by the region has a different online date, useful life, incentive rate and structure, and production schedule. It is infeasible to account for all these things over the life of each project or program and provide a nexus to each member agency's contributions to Metropolitan's revenue stream over time. Accounting at the regional level allows for the incorporation of the local supplies and water use efficiency programs done by member agencies and their customers through both the regional programs and through their own specific local programs. As shown above, despite the infeasibility of accounting reduced Delta reliance below the regional level, Metropolitan's member agencies and their customers have together made substantial contributions to the region's reduced reliance.

Colorado River Programs

As a regional cooperative of member agencies, Metropolitan invests in programs to ensure the continued reliability and sustainability of Colorado River supplies. Metropolitan was established to obtain an allotment of Colorado River water, and its first mission was to construct and operate the CRA. The CRA consists of five pumping plants, 450 miles of high voltage power lines, one electric substation, four regulating reservoirs, and 242 miles of aqueducts, siphons, canals, conduits and pipelines terminating at Lake Mathews in Riverside County. Metropolitan owns, operates, and manages the CRA. Metropolitan is responsible for operating, maintaining, rehabilitating, and repairing the CRA, and is responsible for obtaining and scheduling energy resources adequate to power pumps at the CRA's five pumping stations.

Colorado River supplies include Metropolitan's basic Colorado River apportionment, along with supplies that result from existing and committed programs, including supplies from the Imperial Irrigation District (IID)-Metropolitan Conservation Program, the implementation of the Quantification Settlement Agreement (QSA) and related agreements, and the exchange agreement with San Diego County Water Authority (SDCWA). The QSA established the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. Since the QSA, additional programs have been implemented to increase Metropolitan's CRA supplies. These include the PVID Land Management, Crop Rotation, and Water Supply Program, as well as the Lower Colorado River Water Supply Project. The 2007 Interim Guidelines provided for the coordinated operation of Lake Powell and Lake Mead, as well as the Intentionally Created Surplus (ICS) program that allows Metropolitan to store water in Lake Mead.

IEUA has emergency service connections to the MWD's Upper Feeder, which includes CRA supplies. However, these connections are not currently utilized due to water quality concerns.

Storage Investments/Facilities

Surface and groundwater storage are critical elements of Southern California's water resources strategy and help Metropolitan reduce its reliance on the Delta. Because California experiences dramatic swings in weather and hydrology, storage is important to regulate those swings and mitigate possible supply shortages. Surface and groundwater storage provide a means of storing water during normal and wet years for later use during dry years, when imported supplies are limited. The Metropolitan system, for purposes of meeting demands during times of shortage, regulating system flows, and ensuring system reliability in the event of a system outage, provides over 1,000,000 acre-feet of system storage capacity. Diamond Valley Lake provides 810,000 acre-feet of that storage capacity, effectively doubling Southern California's previous surface water storage capacity. Other existing imported water storage available to the region consists of Metropolitan's raw water reservoirs, a share of the SWP's raw water reservoirs in and near the service area, and the portion of the groundwater basins used for conjunctive-use storage.

Since the early twentieth century, DWR and Metropolitan have constructed surface water reservoirs to meet emergency, drought/seasonal, and regulatory water needs for Southern California. These reservoirs include Pyramid Lake, Castaic Lake, Elderberry Forebay, Silverwood Lake, Lake Perris, Lake Skinner, Lake Mathews, Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, Orange County Reservoir, and Metropolitan's Diamond Valley Lake (DVL). Some reservoirs such as Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, and Orange County Reservoir, which have a total combined capacity of about 3,500 AF, are used solely for regulating purposes. The total gross storage capacity for the larger remaining reservoirs is 1,757,600 AF. However, not all of the gross storage capacity is available to Metropolitan; dead storage and storage allocated to others reduce the amount of storage that is available to Metropolitan to 1,665,200 AF.

Conjunctive use of the aquifers offers another important source of dry year supplies. Unused storage in Southern California groundwater basins can be used to optimize imported water supplies, and the development of groundwater storage projects allows effective management and regulation of the region's major imported supplies from the Colorado River and SWP. Over the years, Metropolitan has implemented conjunctive use through various programs in the service area; the following table lists the groundwater conjunctive use programs that have been developed in the region.

MWD Table 1: Metropolitan Groundwater Conjunctive Use Programs

Program	Metropolitan Agreement Partners	Program Term	Max Storage AF	Dry-Year Yield AF/Yr
Long Beach Conjunctive Use Storage Project (Central Basin)	Long Beach	June 2002-2027	13,000	4,300
Foothill Area Groundwater Storage Program (Monkhill/ Raymond Basin)	Foothill MWD	February 2003-2028	9,000	3,000
Orange County Groundwater Conjunctive Use Program	MWDOC OCWD	June 2003-2028	66,000+	22,000
Chino Basin Conjunctive Use Programs	IEUA TVMWD Watermaster	June 2003-2028	100,000	33,000
Live Oak Basin Conjunctive Use Project (Six Basins)	TVMWD City of La Verne	October 2002-2027	3,000	1,000
City of Compton Conjunctive Use Project (Central Basin)	Compton	February 2005-2030	2,289	763
Long Beach Conjunctive Use Program Expansion in Lakewood (Central Basin)	Long Beach	July 2005-2030	3,600	1,200
Upper Claremont Basin Groundwater Storage Program (Six Basins)	TVMWD	Sept. 2005- 2030	3,000	1,000
Elsinore Basin Conjunctive Use Storage Program	Western MWD Elsinore Valley MWD	May 2008- 2033	12,000	4,000
TOTAL			**211,889**	**70,263**

Metropolitan Demand Management Programs

Demand management costs are Metropolitan's expenditures for funding local water resource development programs and water conservation programs. These Demand Management Programs incentivize the development of local water supplies and the conservation of water to reduce the need to import water to deliver to Metropolitan's member agencies. These programs are implemented below the delivery points between Metropolitan's and its member agencies' distribution systems and, as such, do not add any water to Metropolitan's supplies. Rather, the effect of these downstream programs is to produce a local supply of water for the local agencies and to reduce demands by member agencies for water imported through Metropolitan's system. The following discussions outline how Metropolitan funds local resources and conservation programs for the benefit of all of its member agencies and the entire Metropolitan service area. Notably, the history of demand management by Metropolitan's member agencies and the local agencies that purchase water from Metropolitan's members has spanned more than four decades. The significant history of the programs is another reason it would be difficult to attempt to assign a portion of such funding to any one individual member agency.

Section 1: Local Resources Programs

In 1982, Metropolitan began providing financial incentives to its member agencies to develop new local supplies to assist in meeting the region's water needs. Because of Metropolitan's regional distribution system, these programs benefit all member agencies regardless of project location because they help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan's infrastructure, reduce system costs and free up conveyance capacity to the benefit of all the agencies that rely on water from Metropolitan.

For example, the Groundwater Replenishment System (GWRS) operated by the Orange County Water District is the world's largest water purification system for indirect potable reuse. It was funded, in part, by Metropolitan's member agencies through the Local Resources Program. Annually, the GWRS produces approximately 103,000 acre-feet of reliable, locally controlled, drought-proof supply of high-quality water to recharge the Orange County Groundwater Basin and protect it from seawater intrusion. The GWRS is a premier example of a regional project that significantly reduced the need to utilize imported water for groundwater replenishment in Metropolitan's service area, increasing regional and local supply reliability and reducing the region's reliance on imported supplies, including supplies from the State Water Project.

Metropolitan's local resource programs have evolved through the years to better assist Metropolitan's member agencies in increasing local supply production. The following is a description and history of the local supply incentive programs.

Local Projects Program

In 1982, Metropolitan initiated the Local Projects Program (LPP), which provided funding to member agencies to facilitate the development of recycled water projects. Under this approach, Metropolitan contributed a negotiated up-front funding amount to help finance project capital costs. Participating member agencies were obligated to reimburse Metropolitan over time. In 1986, the LPP was revised, changing the up-front funding approach to an incentive-based approach. Metropolitan contributed an amount equal to the avoided State Water Project pumping costs for each acre-foot of recycled water delivered to end-use consumers. This funding incentive was based on the premise that local projects resulted in the reduction of water imported from the Delta and the associated pumping cost. The incentive amount varied from year to year depending on the actual variable power cost paid for State Water Project imports. In 1990, Metropolitan's Board increased the LPP contribution to a fixed rate of $154 per acre-foot, which was calculated based on Metropolitan's avoided capital and operational costs to convey, treat, and distribute water, and included considerations of reliability and service area demands.

Groundwater Recovery Program

The drought of the early 1990s sparked the need to develop additional local water resources, aside from recycled water, to meet regional demand and increase regional water supply reliability. In 1991, Metropolitan conducted the Brackish Groundwater Reclamation Study which determined that large amounts of degraded groundwater in the region were not being utilized. Subsequently, the Groundwater Recovery Program (GRP) was established to assist the recovery of otherwise unusable groundwater degraded by minerals and other contaminants, provide access to the storage assets of the degraded groundwater, and maintain the quality of groundwater resources by reducing the spread of degraded plumes.

Local Resources Program

In 1995, Metropolitan's Board adopted the Local Resources Program (LRP), which combined the LPP and GRP into one program. The Board allowed for existing LPP agreements with a fixed incentive rate to convert to the sliding scale up to $250 per acre-foot, similar to GRP incentive terms. Those agreements that were converted to LRP are known as "LRP Conversions."

Competitive Local Projects Program

In 1998, the Competitive Local Resources Program (Competitive Program) was established. The Competitive Program encouraged the development of recycled water and recovered groundwater through a process that emphasized cost-efficiency to Metropolitan, timing new production according to regional need while minimizing program administration cost. Under the Competitive Program, agencies requested an incentive rate up to $250 per acre-foot of production over 25 years under a Request for Proposals (RFP) for the development of up to 53,000 acre-feet per year of new water recycling and groundwater recovery projects. In 2003, a second RFP was issued for the development of an additional 65,000 acre-feet of new recycled water and recovered groundwater projects through the LRP.

Seawater Desalination Program

Metropolitan established the Seawater Desalination Program (SDP) in 2001 to provide financial incentives to member agencies for the development of seawater desalination projects. In 2014, seawater desalination projects became eligible for funding under the LRP, and the SDP was ended.

2007 Local Resources Program

In 2006, a task force comprised of member agency representatives was formed to identify and recommend program improvements to the LRP. As a result of the task force process, the 2007 LRP was established with a goal of 174,000 acre-feet per year of additional local water resource development. The new program allowed for an open application process and eliminated the previous competitive process. This program offered sliding scale incentives of up to $250 per acre-foot, calculated annually based on a member agency's actual local resource project costs exceeding Metropolitan's prevailing water rate.

2014 Local Resources Program

A series of workgroup meetings with member agencies was held to identify the reasons why there was a lack of new LRP applications coming into the program. The main constraint identified by the member agencies was that the $250 per acre-foot was not providing enough of an incentive for developing new projects due to higher construction costs to meet water quality requirements and to develop the infrastructure to reach end-use consumers located further from treatment plants. As a result, in 2014, the Board authorized an increase in the maximum incentive amount, provided alternative payment structures, included onsite retrofit costs and reimbursable services as part of the LRP, and added eligibility for seawater desalination projects. The current LRP incentive payment options are structured as follows:

- Option 1 – Sliding scale incentive up to $340/AF for a 25-year agreement term
- Option 2 – Sliding scale incentive up to $475/AF for a 15-year agreement term
- Option 3 – Fixed incentive up to $305/AF for a 25-year agreement term

On-site Retrofit Programs

In 2014, Metropolitan's Board also approved the On-site Retrofit Pilot Program which provided financial incentives to public or private entities toward the cost of small-scale improvements to their existing irrigation and industrial systems to allow connection to existing recycled water pipelines. The On-site Retrofit Pilot Program helped reduce recycled water retrofit costs to the end-use consumer which is a key constraint that limited recycled water LRP projects from reaching full production capacity. The program incentive was equal to the actual eligible costs of the on-site retrofit, or $975 per acre-foot of up-front cost, which equates to $195 per acre-foot for an estimated five years of water savings ($195/AF x 5 years) multiplied by the average annual water use in previous three years, whichever is less. The Pilot Program lasted two years and was successful in meeting its goal of accelerating the use of recycled water.

In 2016, Metropolitan's Board authorized the On-site Retrofit Program (ORP), with an additional budget of $10 million. This program encompassed lessons learned from the Pilot Program and feedback from member agencies to make the program more streamlined and improve its efficiency. As of fiscal year 2019/20, the ORP has successfully converted 440 sites, increasing the use of recycled water by 12,691 acre-feet per year.

Stormwater Pilot Programs

In 2019, Metropolitan's Board authorized both the Stormwater for Direct Use Pilot Program and a Stormwater for Recharge Pilot Program to study the feasibility of reusing stormwater to help meet regional demands in Southern California. These pilot programs are intended to encourage the development, monitoring, and study of new and existing stormwater projects by providing financial incentives for their construction/retrofit and monitoring/reporting costs. These pilot programs will help evaluate the potential benefits delivered by stormwater capture projects and provide a basis for potential future funding approaches. Metropolitan's Board authorized a total of $12.5 million for the stormwater pilot programs ($5 million for the District Use Pilot and $7.5 million for the Recharge Pilot).

Current Status and Results of Metropolitan's Local Resource Programs

Today, nearly one-half of the total recycled water and groundwater recovery production in the region has been developed with an incentive from one or more of Metropolitan's local resource programs. During fiscal year 2020, Metropolitan provided about $13 million for production of 71,000 acre-feet of recycled water for non-potable and indirect potable uses. Metropolitan provided about $4 million to support projects that produced about 50,000 acre-feet of recovered groundwater for municipal use. Since 1982, Metropolitan has invested $680 million to fund 85 recycled water projects and 27 groundwater recovery projects that have produced a cumulative total of about 4 million acre-feet.

<u>Conservation Programs</u>

Metropolitan's regional conservation programs and approaches have a long history. Decades ago, Metropolitan recognized that demand management at the consumer level would be an important part of balancing regional supplies and demands. Water conservation efforts were seen as a way to reduce the need for imported supplies and offset the need to transport or store additional water into or within the Metropolitan service area. The actual conservation of water takes place at the retail consumer level. Regional conservation approaches have proven to be effective at reaching retail consumers throughout Metropolitan's service area and successfully implementing water saving devices, programs and practices. Through the pooling of funding by Metropolitan's member agencies, Metropolitan is able to engage in regional campaigns with wide-reaching impact. Regional investments in demand management programs, of which conservation is a key part along with local supply programs, benefit all member agencies regardless of project location. These programs help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan's infrastructure, reduce system costs, and free up conveyance capacity to the benefit of all member agencies.

Incentive-Based Conservation Programs

Conservation Credits Program

In 1988, Metropolitan's Board approved the Water Conservation Credits Program (Credits Program). The Credits Program is similar in concept to the Local Projects Program (LPP). The purpose of the Credits Program is to encourage local water agencies to implement effective water conservation projects through the use of financial incentives. The Credits Program provides financial assistance for water conservation projects that reduce demands on Metropolitan's imported water supplies and require Metropolitan's assistance to be financially feasible.

Initially, the Credits Program provided 50 percent of a member agency's program cost, up to a maximum of $75 per acre-foot of estimated water savings. The $75 Base Conservation Rate was established based Metropolitan's avoided cost of pumping SWP supplies. The Base Conservation Rate has been revisited by Metropolitan's Board and revised twice since 1988, from $75 to $154 per acre-foot in 1990 and from $154 to $195 per acre-foot in 2005.

In fiscal year 2020 Metropolitan processed more than 30,400 rebate applications totaling $18.9 million.

Member Agency Administered Program

Some member agencies also have unique programs within their service areas that provide local rebates that may differ from Metropolitan's regional program. Metropolitan continues to support these local efforts through a member agency administered funding program that adheres to the same funding guidelines as the Credits Program. The Member Agency Administered Program allows member agencies to receive funding for local conservation efforts that supplement, but do not duplicate, the rebates offered through Metropolitan's regional rebate program.

Water Savings Incentive Program

There are numerous commercial entities and industries within Metropolitan's service area that pursue unique savings opportunities that do not fall within the general rebate programs that Metropolitan provides. In 2012, Metropolitan designed the Water Savings Incentive Program (WSIP) to target these unique commercial and industrial projects. In addition to rebates for devices, under this program, Metropolitan provides financial incentives to businesses and industries that created their own custom water efficiency projects. Qualifying custom projects can receive funding for permanent water efficiency changes that result in reduced potable demand.

Non-Incentive Conservation Programs

In addition to its incentive-based conservation programs, Metropolitan also undertakes additional efforts throughout its service area that help achieve water savings without the use of rebates. Metropolitan's non-incentive conservation efforts include:

- residential and professional water efficient landscape training classes
- water audits for large landscapes
- research, development and studies of new water saving technologies
- advertising and outreach campaigns
- community outreach and education programs
- advocacy for legislation, codes, and standards that lead to increased water savings

Current Status and Results of Metropolitan's Conservation Programs

Since 1990, Metropolitan has invested $824 million in conservation rebates that have resulted in a cumulative savings of 3.27 million acre-feet of water. These investments include $450 million in turf removal and other rebates during the last drought which resulted in 175 million square feet of lawn turf removed. During fiscal year 2020, 1.06 million acre-feet of water is estimated to have been conserved. This annual total includes Metropolitan's Conservation Credits Program; code-based conservation achieved through Metropolitan-sponsored legislation; building plumbing codes and ordinances; reduced consumption resulting from changes in water pricing; and pre-1990 device retrofits.

Infeasibility of Accounting Regional Investments in Reduced Reliance Below the Regional Level

The accounting of regional investments that contribute to reduced reliance on supplies from the Delta watershed is straightforward to calculate and report at the regional aggregate level. However, any similar accounting is infeasible for the individual member agencies or their customers. As described above, the region (through Metropolitan) makes significant investments in projects, programs and other resources that reduce reliance on the Delta. In fact, all of Metropolitan's investments in Colorado River supplies, groundwater and surface storage, local resources development and demand management measures that reduce reliance on the Delta are collectively funded by revenues generated from the member agencies through rates and charges.

Metropolitan's revenues cannot be matched to the demands or supply production history of an individual agency, or consistently across the agencies within the service area. Each project or program funded by the region has a different online date, useful life, incentive rate and structure, and production schedule. It is infeasible to account for all these things over the life of each project or program and provide a nexus to each member agency's contributions to Metropolitan's revenue stream over time. Accounting at the regional level allows for the incorporation of the local supplies and water use efficiency programs done by member agencies and their customers through both the regional programs and through their own specific local programs. As shown above, despite the infeasibility of accounting reduced Delta reliance below the regional level, Metropolitan's member agencies and their customers have together made substantial contributions to the region's reduced reliance.

G.8 2015 UWMP Appendix P

The information contained in this Appendix G is also intended to be a new Appendix P attached to IEUA's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). IEUA provided notice of the availability of the draft 2020 UWMP (including this Appendix G which will also be a new Appendix P to its 2015 UWMP) and WSCP and the public hearing to consider adoption of both plans and the addendum to the 2015 UWMP in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The notice of availability of the documents was sent to IEUA's member agencies, as well as cities and counties in IEUA service area. In addition, a public notice advertising the public hearing in English was published in the Inland Valley Daily Bulletin. The notification in English language newspapers was published on 17 May and 24 May 2021. Copies of: (1) the notification letter sent to the member agencies, cities and counties in IEUA service area, and (2) the notice published in the newspapers are included in the 2020 UWMP Appendix E.

Thus, this Appendix G to IEUA's 2020 UWMP, which was adopted with IEUA's 2020 UWMP, will also be recognized and treated as Appendix P to IEUA's 2015 UWMP. IEUA held the public hearing for the draft 2020 UWMP, draft Appendix G as an addendum to the 2015 UWMP, and draft WSCP on June 16, 2021, at the Board of Directors meeting, held online due to COVID-19 concerns. On June 16, IEUA's Board determined that the 2020 UWMP and the WSCP accurately represent the water resources plan for IEUA's service area. IEUA's Board determined that Appendix G to the 2020 UWMP and Appendix P to the 2015 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003), which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolution No. 2021-06-10, the Board adopted the 2020 UWMP, Appendix G as an addendum to the 2015 UWMP, and the WSCP and authorized their submittal to the State of California. Copies of Resolution No. 2021-06-10 is included in the 2020 UWMP Appendix D.

Table G-1: Calculation of IEUA Service Area Water Demands Without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For*	79,440	92,325	96,934	113,280	117,752	121,438	126,072	126,664
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline	-	1,975	3,292	9,788	11,984	17,257	22,570	27,802
Service Area Water Demands without Water Use Efficiency Accounted For	79,440	94,300	100,226	123,068	129,736	138,695	148,642	154,466

*Demands include imported and recycled water, as found in 2020 UWMP Table 4-3W

Table G-2: Calculation of IEUA Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Use Efficiency	-	1,975	3,292	9,788	11,984	17,257	22,570	27,802
Water Recycling	24,506	33,419	30,495	40,495	42,697	44,122	46,504	46,844
Stormwater Capture and Use	-	-	-	-	-	-	-	-
Advanced Water Technologies	-	-	-	-	-	-	-	-
Conjunctive Use Projects	-	-	-	-	-	-	-	-
Local and Regional Water Supply and Storage Projects	-	-	-	-	-	-	-	-
Other Programs and Projects the Contribute to Regional Self-Reliance	-	-	-	-	-	-	-	-
Water Supplies Contributing to Regional Self-Reliance	24,506	35,394	33,787	50,283	54,681	61,379	69,074	74,646

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	79,440	94,300	100,226	123,068	129,736	138,695	148,642	154,466

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies Contributing to Regional Self-Reliance	24,506	35,394	33,787	50,283	54,681	61,379	69,074	74,646
Change in Water Supplies Contributing to Regional Self-Reliance		10,888	9,281	25,777	30,175	36,873	44,568	50,140

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	30.8%	37.5%	33.7%	40.9%	42.1%	44.3%	46.5%	48.3%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		6.7%	2.9%	10.0%	11.3%	13.4%	15.6%	17.5%

Table G-3: Calculation of MWD Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
CVP/SWP Contract Supplies	1,472,000	1,029,000	984,000	1,133,000	1,130,000	1,128,000	1,126,000	1,126,000
Delta/Delta Tributary Diversions								
Transfers and Exchanges	20,000	44,000	91,000	58,000	52,000	52,000	52,000	52,000
Other Water Supplies from the Delta Watershed								
Total Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,182,000	1,180,000	1,178,000	1,178,000

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	5,032,000	5,156,000	5,261,000	5,374,000

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,182,000	1,180,000	1,178,000	1,178,000
Change in Water Supplies from the Delta Watershed		(419,000)	(417,000)	(301,000)	(310,000)	(312,000)	(314,000)	(314,000)

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies from the Delta Watershed	27.2%	19.5%	20.6%	24.2%	23.5%	22.9%	22.4%	21.9%
Change in Percent of Water Supplies from the Delta Watershed		-7.6%	-6.6%	-3.0%	-3.7%	-4.3%	-4.8%	-5.2%

APPENDIX C

COMPLETED PLAN CHECKLIST

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Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Chapter 1	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Chapter 1 Lay Description
x	x	Chapter 1	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Beginning of each Chapter
x	x	Section 2.2	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.2
x	x	Section 2.6	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.6
x	x	Section 2.6.2	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.6.2
x		Section 2.6, Section 6.1	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	Not applicable
	x	Section 2.6	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.6
x	x	Section 3.1	Describe the water supplier service area.	System Description	Section 3.1
x	x	Section 3.3	Describe the climate of the service area of the supplier.	System Description	Section 3.3
x	x	Section 3.4	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4
x	x	Section 3.4.2	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.4.2
x	x	Sections 3.4 and 5.4	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4
x	x	Section 3.5	Describe the land uses within the service area.	System Description	Section 3.5
x	x	Section 4.2	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2
x	x	Section 4.2.4	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Not applicable
x	x	Section 4.2.6	In projected water use, include estimates of water savings from adopted codes, plans and other policies or laws.	System Water Use	Section 4.2.6
x	x	Section 4.2.6	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 4.2.6
x	optional	Section 4.3.2.4	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Not applicable
x	optional	Section 4.4	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Not applicable
x	x	Section 4.5	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 4.5
x		Chapter 5	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Not applicable
x		Chapter 5	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Not applicable
	x	Section 5.1	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1

Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x		Section 5.2	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Not applicable
x		Section 5.5	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Not applicable
x		Section 5.5 and Appendix E	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Not applicable
x	x	Sections 6.1 and 6.2	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Sections 6.1, 6.2, 7.1, and 7.2
x	x	Sections 6.1	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change.*	System Supplies	Section 6.1
x	x	Section 6.1	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6.1
x	x	Section 6.1.1	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.1.1
x	x	Section 6.2.8	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 6.2.8
x	x	Section 6.2	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2
x	x	Section 6.2.2	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2
x	x	Section 6.2.2	Describe the groundwater basin.	System Supplies	Section 6.2.2
x	x	Section 6.2.2	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2
x	x	Section 6.2.2.1	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Not applicable
x	x	Section 6.2.2.4	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.2
x	x	Section 6.2.2	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 6.2.2
x	x	Section 6.2.7	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6.2.7
x	x	Section 6.2.5	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.6	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.2.6
x	x	Section 6.2.5	Describe the wastewater collection and treatment systems in the supplier's service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.8, Section 6.3.7	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Sections 6.2.8 and 6.2.9

Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 6.4 and Appendix O	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 6.4
x	x	Section 7.2	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.2
x	x	Section 7.2.4	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.2.4
x	x	Section 7.3	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.3
x	x	Chapter 8	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8
x	x	Chapter 8	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Chapter 8
x	x	Section 8.10	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Section 8.10
x	x	Section 8.2	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Section 8.2
x	x	Section 8.2	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Section 8.2
x	x	Section 8.3	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Section 8.3
x	x	Section 8.3	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Section 8.3
x	x	Section 8.4	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Section 8.4.2
x	x	Section 8.4	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4.1
x	x	Section 8.4	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4.3
x	x	Section 8.4	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Section 8.4.4
x	x	Section 8.4	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Section 8.4.7
x	x	Section 8.4.6	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Section 8.4.6
x	x	Section 8.5	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Section 8.5

Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 8.5 and 8.6	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Section 8.5
x		Section 8.6	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Not applicable
x		Section 8.7	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Not applicable
x	x	Section 8.7	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Section 8.7
x	x	Section 8.7	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Section 8.7
x	x	Section 8.8	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8
x	x	Section 8.8	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8
x		Section 8.8	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	Section 8.8
x		Section 8.9	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Section 8.9
x		Section 8.11	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Not applicable
x	x	Sections 8.12 and 10.4	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Sections 8.12 and 10.4
x	x	Section 8.12	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Section 8.12
	x	Sections 9.1 and 9.3	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3
x		Sections 9.2 and 9.3	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Not applicable
x		Chapter 10	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Not applicable
x	x	Section 10.2.1	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 10.2.1
x	x	Section 10.4	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Section 10.4
x	x	Sections 10.2.2, 10.3, and 10.5	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Sections 10.2, 10.3, and 10.5
x	x	Section 10.2.2	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Section 10.2.2
x	x	Section 10.3.2	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.2
x	x	Section 10.4	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4.3
x	x	Section 10.4	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4
x	x	Sections 10.4.1 and 10.4.2	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2
x	x	Section 10.5	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5

Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 10.5	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5
x	x	Section 10.6	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	Section 10.6
x	x	Section 10.7.2	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	Section 10.7.2

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APPENDIX D

60 – DAY NOTIFICATION LETTERS
AND PUBLIC HEARING NOTIFICATIONS

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60-DAY NOTIFICATION LETTERS

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WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. Leonard X. Hernandez
Chief Executive Officer
County of San Bernardino
385 North Arrowhead Avenue
San Bernardino, CA 92415

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Hernandez:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

As an urban water supplier, the Water Facilities Authority is required pursuant to Section 10620(d)(3) of the California Water Code to coordinate with water management agencies, relevant public agencies, and other water suppliers regarding the preparation of the UWMP. Pursuant to Section 10621(b) of the California Water Code, the Water Facilities Authority will be reviewing the UWMP and will make amendments or changes, as appropriate. The Water Facilities Authority invites you to submit comments in anticipation of the development of our 2020 UWMP Update. Please provide written comments within the next 30 days to the Water Facilities Authority.

For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. Scott Burton
General Manager
Municipal Utilities Company
City of Ontario
1425 South Bon View Avenue
Ontario, CA 91761

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. ~~Burton~~ Scott:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY
T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. Matt Ballantyne
City Manager
City of Chino
13220 Central Avenue
Chino, CA 91710

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. ~~Ballantyne~~ MATT:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. Benjamin Montgomery
City Manager
City of Chino Hills
14000 City Center Drive
Chino Hills, CA 91709

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Montgomery:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. John Bosler
General Manager
Cucamonga Valley Water District
10440 Ashford Street
Rancho Cucamonga, CA 91730

SUBJECT: 2020 Urban Water Management Plan Update

Dear ~~Mr. Bosler~~: JOHN

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Dr. Justin Scott-Cole
General Manager
Monte Vista Water District
10575 Central Avenue
Montclair, CA 91763

SUBJECT: 2020 Urban Water Management Plan Update

Dear Dr. ~~Scott-Cole~~ JUSTIN:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. Brian Lee
General Manager
San Antonio Water Company
139 North Euclid Avenue
Upland, CA 91786

SUBJECT: 2020 Urban Water Management Plan Update

Dear ~~Mr. Lee~~ BRIAN:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES
A U T H O R I T Y

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Ms. Rosemary Hoerning
City Manager
City of Upland
460 North Euclid Avenue
Upland, CA 91786

SUBJECT: 2020 Urban Water Management Plan Update

Dear Ms. ~~Hoerning~~: ROSEMARY

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES
AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. Josh Swift
General Manager
Fontana Water Company
15966 Arrow Route
Fontana, CA 92335

SUBJECT: 2020 Urban Water Management Plan Update

Dear ~~Mr. Swift~~: Josh

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. Samuel Martinez
Executive Officer
Local Agency Formation Commission
1170 West Third Street, Unit 150
San Bernardino, CA 92415-0490

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Martinez:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. Peter Kavounas
General Manager
Chino Basin Watermaster
9641 San Bernardino Road
Rancho Cucamonga, CA 91730

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. ~~Kavounas~~ Peter:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Mr. Shivaji Deshmukh
General Manager
Inland Empire Utilities Agency
P.O. Box 9020
Chino Hills, CA 91709

SUBJECT: 2020 Urban Water Management Plan Update

SHIVAJI

Dear Mr. Deshmukh:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

November 10, 2020

Ms. Elizabeth Skrzat
Executive Director
Chino Basin Water Conservation District
4594 San Bernardino Street
Montclair, CA 91763

SUBJECT: 2020 Urban Water Management Plan Update

Dear ~~Ms. Skrzat~~ ELIZABETH:

The Water Facilities Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Water Facilities Authority is currently in the process of preparing the 2020 UWMP Update.

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For additional information and/or further clarification, please feel free to contact me at 909.981.9454, extension 12 or tlcatlin@wfajpa.org.

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

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PUBLIC HEARING NOTIFICATIONS

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T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Ms. Elizabeth Skrzat
Executive Director
Chino Basin Water Conservation District
4594 San Bernardino Street
Montclair, CA 91763

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Ms. Skrzat:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

The 2020 Urban Water Management Plan and Water Shortage Contingency Plan were prepared pursuant to the "Urban Water Management Planning Act" and the California Water Code. The California Department of Water Resources requires every urban water supplier to prepare and adopt an Urban Water Management Plan, including the Water Shortage Contingency Plan, and periodically update the Urban Water Management Plan at least once every five years, in years ending in six and one.

Information regarding WFA's PUBLIC HEARING follows:

Date:	**June 17, 2021**
Time:	**7:30 AM**
Place:	Remote video conference via **Zoom (Meeting ID: 916 2511 9632; Passcode: 547375)**

Additionally, the meeting link will be posted on the WFA's website in the Board of Directors Special Meeting Agenda by June 3, 2021 at the following address: http://www.wfajpa.org/#Board_Agendas_&_Minutes .

WFA invites all interested entities to attend and present their comments. A copy of the draft 2020 Urban Water Management Plan, Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum will be available at WFA's website (http://www.wfajpa.org/#Regulatory_Reports) and its main office. **Please provide written comments by 5 PM on June 15, 2021** delivered to the Water Facilities Authority at the address listed above or by email to tlcatlin@wfajpa.org .

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Peter Kavounas
General Manager
Chino Basin Watermaster
9641 San Bernardino Road
Rancho Cucamonga, CA 91730

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Matt Ballantyne
City Manager
City of Chino
13220 Central Avenue
Chino, CA 91710

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Ballantyne:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

The 2020 Urban Water Management Plan and Water Shortage Contingency Plan were prepared pursuant to the "Urban Water Management Planning Act" and the California Water Code. The California Department of Water Resources requires every urban water supplier to prepare and adopt an Urban Water Management Plan, including the Water Shortage Contingency Plan, and periodically update the Urban Water Management Plan at least once every five years, in years ending in six and one.

Information regarding WFA's PUBLIC HEARING follows:

Date:	**June 17, 2021**
Time:	**7:30 AM**
Place:	Remote video conference via **Zoom (Meeting ID: 916 2511 9632; Passcode: 547375)**

Additionally, the meeting link will be posted on the WFA's website in the Board of Directors Special Meeting Agenda by June 3, 2021 at the following address: http://www.wfajpa.org/#Board_Agendas_&_Minutes .

WFA invites all interested entities to attend and present their comments. A copy of the draft 2020 Urban Water Management Plan, Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum will be available at WFA's website (http://www.wfajpa.org/#Regulatory_Reports) and its main office. **Please provide written comments by 5 PM on June 15, 2021** delivered to the Water Facilities Authority at the address listed above or by email to tlcatlin@wfajpa.org .

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Benjamin Montgomery
City Manager
City of Chino Hills
14000 City Center Drive
Chino Hills, CA 91709

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Montgomery:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. John Bosler
General Manager
Cucamonga Valley Water District
10440 Ashford Street
Rancho Cucamonga, CA 91730

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Bosler:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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WFA invites all interested entities to attend and present their comments. A copy of the draft 2020 Urban Water Management Plan, Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum will be available at WFA's website (http://www.wfajpa.org/#Regulatory_Reports) and its main office. **Please provide written comments by 5 PM on June 15, 2021** delivered to the Water Facilities Authority at the address listed above or by email to tlcatlin@wfajpa.org .

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Josh Swift
General Manager
Fontana Water Company
15966 Arrow Route
Fontana, CA 92335

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Swift:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Shivaji Deshmukh
General Manager
Inland Empire Utilities Agency
P.O. Box 9020
Chino Hills, CA 91709

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Deshmukh:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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WFA invites all interested entities to attend and present their comments. A copy of the draft 2020 Urban Water Management Plan, Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum will be available at WFA's website (http://www.wfajpa.org/#Regulatory_Reports) and its main office. **Please provide written comments by 5 PM on June 15, 2021** delivered to the Water Facilities Authority at the address listed above or by email to tlcatlin@wfajpa.org .

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Samuel Martinez
Executive Officer
Local Agency Formation Commission
1170 West Third Street, Unit 150
San Bernardino, CA 92415-0490

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Martinez:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Dr. Justin Scott-Cole
General Manager
Monte Vista Water District
10575 Central Avenue
Montclair, CA 91763

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Dr. Scott-Cole:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Scott Burton, General Manager
Municipal Utilities Company
City of Ontario
1425 South Bon View Avenue
Ontario, CA 91761

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Burton:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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WFA invites all interested entities to attend and present their comments. A copy of the draft 2020 Urban Water Management Plan, Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum will be available at WFA's website (http://www.wfajpa.org/#Regulatory_Reports) and its main office. **Please provide written comments by 5 PM on June 15, 2021** delivered to the Water Facilities Authority at the address listed above or by email to tlcatlin@wfajpa.org .

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Brian Lee
General Manager
San Antonio Water Company
139 North Euclid Avenue
Upland, CA 91786

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Lee:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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WFA invites all interested entities to attend and present their comments. A copy of the draft 2020 Urban Water Management Plan, Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum will be available at WFA's website (http://www.wfajpa.org/#Regulatory_Reports) and its main office. **Please provide written comments by 5 PM on June 15, 2021** delivered to the Water Facilities Authority at the address listed above or by email to tlcatlin@wfajpa.org .

Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Leonard X. Hernandez
Chief Executive Officer
County of San Bernardino
385 North Arrowhead Avenue
San Bernardino, CA 92415

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Hernandez:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

May 24, 2021

Mr. Stephen Parker
Acting City Manager
City of Upland
460 North Euclid Avenue
Upland, CA 91786

SUBJECT: **Notice of Public Hearing for**
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Parker:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

WATER FACILITIES AUTHORITY

T. 909.981.9454 | F. 909.981.6760
1775 North Benson Avenue, Upland, CA 91784
www.wfajpa.org

June 9, 2021

Mr. Edward C. Starr
City Manager
City Hall
5111 Benito Street
Montclair, CA 91763

SUBJECT: Notice of Public Hearing for
2020 Urban Water Management Plan
2020 Water Shortage Contingency Plan
2015 Urban Water Management Plan Addendum

Dear Mr. Starr:

The Water Facilities Authority (WFA) will hold a PUBLIC HEARING on **June 17, 2021** for the purposes of adopting its 2020 Urban Water Management Plan, its Water Shortage Contingency Plan and 2015 Urban Water Management Plan Addendum. WFA's 2020 Urban Water Management Plan incorporates WFA's Water Shortage Contingency Plan.

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Sincerely,

Terry Catlin
General Manager

Cc: Stan Chen, Stetson Engineers

LEGAL NOTICE PUBLICATION

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WATER FACILITIES AUTHORITY

PUBLIC HEARING NOTICE

2020 Urban Water Management Plan, 2020 Water Shortage Contingency Plan, Addendum to 2015 Urban Water Management Plan

Notice is hereby given that on JUNE 17, 2021, at 7:30 AM, in a virtual location via Zoom with Meeting ID: 916 2511 9632 and Passcode: 547375 (Join Zoom Meeting: https://zoom.us/j/91625119632?pwd=aWF3ZVJGeGxXVmlZdVFCOXlDaU5rZz09 or call 669.900.6833), the Board of Directors will conduct public hearings to receive public comments and consider adoption of a Draft 2020 Urban Water Management Plan (UWMP), Draft Water Shortage Contingency Plan (WSCP), and Draft Addendum to Water Facilities Authority's 2015 UWMP. Due to the COVID-19 State of Emergency and pursuant to the Brown Act waiver provided under the Governor's Executive Order, the meeting will be held virtually via Zoom, and it is anticipated that there will be no physical location from which members of the public may participate. Members of the public may listen and provide comments using the meeting access information supplied in this notice. Following the public hearing, the Board of Directors may adopt the 2020 UWMP, WSCP, and 2015 UWMP Addendum with recommended modifications as a result of public input.

A copy of the Draft 2020 UWMP, Draft WSCP, and Draft 2015 UWMP Addendum can be accessed at the main office of the Water Facilities Authority, 1775 North Benson Avenue, Upland, CA 91784 or at its website, http://www.wfajpa.org/#Regulatory_Reports.

If you have any questions regarding Water Facilities Authority's 2020 UWMP, WSCP, 2015 UWMP Addendum, or the public hearing, please contact Terry Catlin at 909.981.9454, x12 or tlcatlin@wfajpa.org. Written comments may be delivered at the above-mentioned address or submitted to tlcatlin@wfajpa.org by June 15, 2021.

Dates: June 3, 2021 & June 10, 2021

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APPENDIX E

SAN BERNARDINO COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

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SAN BERNARDINO COUNTY

MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

FEMA Approved: July 13, 2017

San Bernardino County Unincorporated Area
San Bernardino County Fire Protection District
San Bernardino County Flood Control District
San Bernardino County Special Districts Department

This document was supported by HSGP Grant No. 2015-0078 awarded by the U.S. Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA). Points of view, opinions, findings, and conclusions expressed in this document are those of the authors and do not necessarily represent the official position of policies of FEMA or DHS. DHS/FEMA reserves a royalty-free, non-exclusive, and irrevocable license to reproduce, publish, and use these materials and to authorize others to do so.

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COUNTY OF SAN BERNARDINO - Hazard Mitigation Plan Update

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RESOLUTION NO. 2017-_____

A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ADOPTING THE SAN BERNARDINO COUNTY UNINCORPORATED AREA MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN DATED MARCH 2017, AND AUTHORIZING FUTURE NON-SUBSTANTIVE AMENDMENTS TO THE PLAN

On Tuesday, ____________, 2017, on motion of Supervisor ________________, duly seconded by Supervisor ____________ and carried, the following resolution is adopted by the Board of Supervisors of San Bernardino County, State of California.

WHEREAS, the preservation of life and property is an inherent responsibility of local, state and federal government, including the County of San Bernardino, and the San Bernardino County Office of Emergency Services, to prepare a local Multi-Jurisdictional Hazard Mitigation Plan (HMP) for the unincorporated area of San Bernardino County to define hazard mitigation measures to reduce or eliminate loss of life and/or property; and

WHEREAS, this HMP represents a comprehensive description of the County's commitment to reducing, preventing or eliminating potential impacts of disasters caused by natural hazards; and

WHEREAS, the HMP is a Federal requirement under the Disaster Mitigation Act of 2000 for the County to be eligible to apply for federal funds for disaster recovery and mitigation assistance; and

WHEREAS, the HMP established a coordinated effort to support mitigation activities, identifies measures to combat natural hazards within our County; and

WHEREAS, the HMP is an extension of the State of California Multi-Hazard Mitigation Plan, and will be reviewed periodically and revised as necessary to meet changing conditions; and

WHEREAS, the Board of Supervisors agrees to adopt this HMP and urges all officials, employees, public and private organizations, and citizens, individually and collectively, to do their share in furthering the preparation of hazard mitigation within the County of San Bernardino;

NOW, THEREFORE, BE IT RESOLVED THAT:

The Board of Supervisors of the County of San Bernardino, a public entity established under the laws of the State of California, hereby authorizes this HMP to be adopted, that the San Bernardino County Fire Protection District Office of Emergency Services Division Manager is hereby authorized to implement future non-substantive amendments, recommended by the Federal Emergency Management Agency upon their review, to the HMP, that a copy of the Board of Supervisors' approved San Bernardino County Unincorporated Area Hazard Mitigation Plan be forwarded to the Federal Emergency Management Agency and CalOES, that once approved the HMP will be considered to be incorporated into the County's General Plan, and this plan become effective immediately.

PASSED AND ADOPTED by the Board of Supervisors of the County of San Bernardino, State of California, by the following vote:

AYES: SUPERVISORS:

NOES: SUPERVISORS:

ABSENT: SUPERVISORS:

* * * * *

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

I, **LAURA H. WELCH,** Clerk of the Board of Supervisors of the County of San Bernardino, State of California, hereby certify the foregoing to be a full, true and correct copy of the record of the action taken by the Board of Supervisors, by vote of the members present, as the same appears in the Official Minutes of said Board at its meeting of ____________, 2017.

LAURA H. WELCH
Clerk of the Board of Supervisors

By ___________________________
Deputy

RESOLUTION NO. 2017-_____

A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT, STATE OF CALIFORNIA, ADOPTING THE SAN BERNARDINO COUNTY UNINCORPORATED AREA MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN DATED MARCH 2017, AND AUTHORIZING FUTURE NON-SUBSTANTIVE AMENDMENTS TO THE PLAN

On Tuesday, ____________, 2017, on motion of Supervisor ___________, duly seconded by Supervisor ________________ and carried, the following resolution is adopted by the Board of Supervisors of the San Bernardino County Flood Control District, State of California.

WHEREAS, the preservation of life and property is an inherent responsibility of local, state and federal government, including the County of San Bernardino, and the San Bernardino County Office of Emergency Services, to prepare a local Multi-Jurisdictional Hazard Mitigation Plan (HMP) for the unincorporated area of San Bernardino County to define hazard mitigation measures to reduce or eliminate loss of life and/or property; and

WHEREAS, this HMP represents a comprehensive description of the County's commitment to reducing, preventing or eliminating potential impacts of disasters caused by natural hazards; and

WHEREAS, the HMP is a Federal requirement under the Disaster Mitigation Act of 2000 for the County to be eligible to apply for federal funds for disaster recovery and mitigation assistance; and

WHEREAS, the HMP established a coordinated effort to support mitigation activities, identifies measures to combat natural hazards within our County; and

WHEREAS, the HMP is an extension of the State of California Multi-Hazard Mitigation Plan, and will be reviewed periodically and revised as necessary to meet changing conditions; and

WHEREAS, the Board of Supervisors agrees to adopt this HMP and urges all officials, employees, public and private organizations, and citizens, individually and collectively, to do their share in furthering the preparation of hazard mitigation within the County of San Bernardino

NOW, THEREFORE, BE IT RESOLVED THAT:

The Board of Supervisors of the San Bernardino County Flood Control District, a public entity established under the laws of the State of California, hereby authorizes this HMP to be adopted, that the San Bernardino County Fire Protection District Office of Emergency Services Division Manager is hereby authorized to implement future non-substantive amendments, recommended by the Federal Emergency Management Agency upon their review, to the HMP, that a copy of the Board of Supervisors' approved San Bernardino County Unincorporated Area Hazard Mitigation Plan be forwarded to the Federal Emergency Management Agency and the CalOES, that once

approved the HMP will be considered to be incorporated into the County's General Plan, and this plan become effective immediately.

PASSED AND ADOPTED by the Board of Supervisors of the San Bernardino County Flood Control District, State of California, by the following vote:

AYES: SUPERVISORS:

NOES: SUPERVISORS:

ABSENT: SUPERVISORS:

* * * * *

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

I, **LAURA H. WELCH,** Clerk of the Board of Supervisors of the San Bernardino County Flood Control District, State of California, hereby certify the foregoing to be a full, true and correct copy of the record of the action taken by the Board of Supervisors, by vote of the members present, as the same appears in the Official Minutes of said Board at its meeting of _____________, 2017.

LAURA H. WELCH
Clerk

By ___________________________
Deputy

RESOLUTION NO. 2017-

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE BOARD GOVERNED COUNTY SERVICE AREAS ADOPTING THE SAN BERNARDINO COUNTY UNINCORPORATED AREA MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN DATED MARCH 2017, AND AUTHORIZING FUTURE NON-SUBSTANTIVE AMENDMENTS TO THE PLAN

On Tuesday, , 2017, on motion of Director , duly seconded by Director and carried, the following resolution is adopted by the Board of Directors of the Board Governed County Service Areas and their Zones.

WHEREAS, the preservation of life and property is an inherent responsibility of local, state and federal government, including the County of San Bernardino, and the San Bernardino County Office of Emergency Services, to prepare a local Multi-Jurisdictional Hazard Mitigation Plan (HMP) for the unincorporated area of San Bernardino County to define hazard mitigation measures to reduce or eliminate loss of life and/or property; and

WHEREAS, this HMP represents a comprehensive description of the County's commitment to reducing, preventing or eliminating potential impacts of disasters caused by natural hazards; and

WHEREAS, the HMP is a Federal requirement under the Disaster Mitigation Act of 2000 for the County to be eligible to apply for federal funds for disaster recovery and mitigation assistance; and

WHEREAS, the HMP established a coordinated effort to support mitigation activities, identifies measures to combat natural hazards within our County; and

WHEREAS, the HMP is an extension of the State of California Multi-Hazard Mitigation Plan, and will be reviewed periodically and revised as necessary to meet changing conditions; and

WHEREAS, the Board of Directors agrees to adopt this HMP and urges all officials, employees, public and private organizations, and citizens, individually and collectively, to do their share in furthering the preparation of hazard mitigation within the County of San Bernardino;

NOW, THEREFORE, BE IT RESOLVED THAT:

The Board of Directors of the Board Governed County Service Areas and their Zones, a public entity established under the laws of the State of California, hereby authorizes this HMP to be adopted, that the San Bernardino County Fire Protection District Office of Emergency Services Division Manager is hereby authorized to implement future non-substantive amendments, recommended by the Federal Emergency Management Agency upon their review, to the HMP, that a copy of the Board of Directors' approved San Bernardino County Unincorporated Area Hazard Mitigation Plan be forwarded to the Federal Emergency Management Agency and CalOES, that

once approved the HMP will be considered to be incorporated into the County's General Plan, and this plan become effective immediately.

PASSED AND ADOPTED by the Board of Directors of the Board Governed County Service Areas and their Zones by the following vote:

AYES: DIRECTORS:

NOES: DIRECTORS:

ABSENT: DIRECTORS:

* * * * *

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

I, **LAURA H. WELCH,** Secretary of Board of Directors of the Board Governed County Service Areas and their Zones, hereby certify the foregoing to be a full, true and correct copy of the record of the action taken by the Board of Directors, by vote of the members present, as the same appears in the Official Minutes of said Board at its meeting of Tuesday, , 2017.

LAURA H. WELCH
Secretary

By ___________________________
Deputy

RESOLUTION NO. 2017-

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE SAN BERNARDINO COUNTY FIRE PROTECTION DISTRICT ADOPTING THE SAN BERNARDINO COUNTY UNINCORPORATED AREA MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN DATED MARCH 2017, AND AUTHORIZING FUTURE NON-SUBSTANTIVE AMENDMENTS TO THE PLAN

On Tuesday, , 2017, on motion of Director , duly seconded by Director and carried, the following resolution is adopted by the Board of Directors of San Bernardino County Fire Protection District.

WHEREAS, the preservation of life and property is an inherent responsibility of local, state and federal government, including the County of San Bernardino, and the San Bernardino County Office of Emergency Services, to prepare a local Multi-Jurisdictional Hazard Mitigation Plan (HMP) for the unincorporated area of San Bernardino County to define hazard mitigation measures to reduce or eliminate loss of life and/or property; and

WHEREAS, this HMP represents a comprehensive description of the County's commitment to reducing, preventing or eliminating potential impacts of disasters caused by natural hazards; and

WHEREAS, the HMP is a Federal requirement under the Disaster Mitigation Act of 2000 for the County to be eligible to apply for federal funds for disaster recovery and mitigation assistance; and

WHEREAS, the HMP established a coordinated effort to support mitigation activities, identifies measures to combat natural hazards within our County; and

WHEREAS, the HMP is an extension of the State of California Multi-Hazard Mitigation Plan, and will be reviewed periodically and revised as necessary to meet changing conditions; and

WHEREAS, the Board of Directors agrees to adopt this HMP and urges all officials, employees, public and private organizations, and citizens, individually and collectively, to do their share in furthering the preparation of hazard mitigation within the County of San Bernardino;

NOW, THEREFORE, BE IT RESOLVED THAT:

The Board of Directors of the San Bernardino County Fire Protection District, a public entity established under the laws of the State of California, hereby authorizes this HMP to be adopted, that the San Bernardino County Fire Protection District Office of Emergency Services Division Manager is hereby authorized to implement future non-substantive amendments, recommended by the Federal Emergency Management Agency upon their review, to the HMP, that a copy of the Board of Directors' approved San Bernardino County Unincorporated Area Hazard Mitigation Plan be forwarded to the Federal Emergency Management Agency and CalOES, that once approved

the HMP will be considered to be incorporated into the County's General Plan, and this plan become effective immediately.

PASSED AND ADOPTED by the Board of Directors of the San Bernardino County Fire Protection District by the following vote:

AYES: DIRECTORS:

NOES: DIRECTORS:

ABSENT: DIRECTORS:

* * * * *

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

I, **LAURA H. WELCH,** Secretary of Board of Directors of the San Bernardino County Fire Protection District, hereby certify the foregoing to be a full, true and correct copy of the record of the action taken by the Board of Directors, by vote of the members present, as the same appears in the Official Minutes of said Board at its meeting of Tuesday, , 2017.

LAURA H. WELCH
Secretary

By ___________________________
Deputy

Section 1. Introduction

The Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update is a “living document” that should be reviewed, monitored, and updated to reflect changing conditions and new information. As required, the MJHMP must be updated every five (5) years to remain in compliance with regulations and Federal mitigation grant conditions. In that spirit, this MJHMP is an update of the San Bernardino County Unincorporated Area MJHMP approved by FEMA on October 11, 2011. This MJHMP presents updated information regarding hazards being faced by the County, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and those Board-governed Special Districts administered by the San Bernardino County Special Districts Department.

These Board-Governed Special Districts were formed by the Board of Supervisors to provide a specific service for a specific area of San Bernardino County. Additionally, these Special Districts are treated as an all-inclusive County Organization, not as separate or independent entities. Each Special District is governed cooperatively by the San Bernardino County Board of Supervisors acting as the Board of Supervisors for each of the individual districts.

The County of San Bernardino is governed by five (5) Supervisors; one for each supervisorial district who collectively make up the County Board of Supervisors. The Board of Supervisors is responsible for the County department and agencies, including Board Governed Special Districts, providing services to the unincorporated area.

The Board of Supervisors acts as the Board of Directors for the County Fire Protection District, the County Flood Control District, and the Special Districts Department as part of their responsibilities as an elected member of the County of San Bernardino Board of Supervisors.

The San Bernardino County Organizational Chart clearly shows the relationships between these Board-governed Special Districts and other County departments as one of equal relationship Departments/Districts. See Figure 1-1.

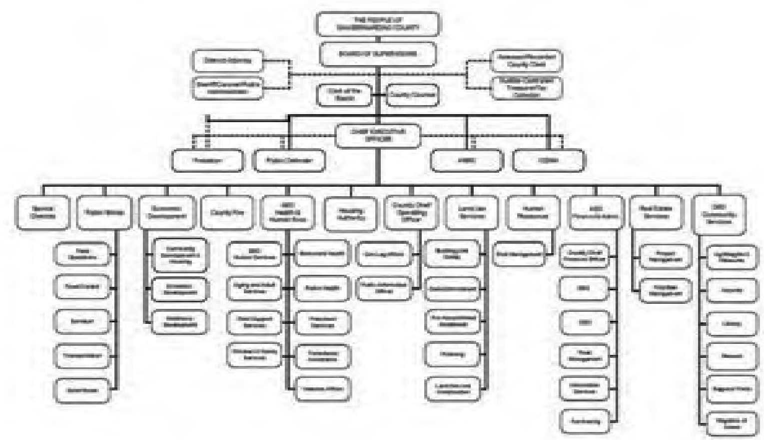

Figure 1-1: Organizational Chart for San Bernardino County

1.1 San Bernardino County Unincorporated Area

The Unincorporated Area of San Bernardino County has a population of 309,759 persons (14.48%) of the entire County Population) and covers 19,233 square miles (95.67% of the entire County land area). There are approximately 61 unincorporated communities within the unincorporated County. San Bernardino County is the largest County in the continental United States. San Bernardino County provides basic services to the residents and citizens of the unincorporated areas. These services include Law Enforcement, Fire Protection, Building and Safety Services, Public Health Services, Library, and Human Services (social services). Five Interstate Highways and four inter-continental railroad lines cross the County, providing vital transportation links from southern California to the remainder of the United States.

1.1.1 San Bernardino County Fire Protection District

San Bernardino County Fire Protection District is a community based all-risk emergency services organization dedicated to the health and well-being of the citizens of San Bernardino County through a balance of regionalized services delivery and accountability to the local community. On July 1, 2008, twenty-seven separate fire districts were merged into one single board governed fire protection district with four regional service zones. The reorganization was not only an administrative advancement but also a significant advancement in operations and delivery of emergency response services.

It has resulted in simplified budgeting and fiscal operations, greater flexibility in the use in the use of department resources and assets and more effective use of day-to-day operations. The reorganization will continue to improve the delivery of fire services and overall operating efficiency.

The San Bernardino County Fire Protection District (County Fire) covers 19,278 square miles, operates 85 fire stations and facilities within 6 Regional Service Zones (Mountain, North Desert, South Desert, High Desert, West Valley and East Valley), and serves 64 unincorporated communities, the City of Grand Terrace, and the Town of Yucca Valley. There are also 6 ambulance enterprise operations that provide service within these Regional Service Zones. In addition, 7 cities are Independent Fire Protection Districts that contract with County Fire: Adelanto, Fontana, Hesperia, Needles, Twentynine Palms, San Bernardino and Victorville. County Fire's executive management is provided by the Fire Chief/County Fire Warden, Deputy Chief, Assistant Chief of Operations as well as Division Managers and Division Chiefs.

County Fire is an all-risk department providing emergency mitigation and management for fire suppression, emergency medical services (paramedic and non-paramedic), ambulance services, HAZMAT response, arson investigation, technical rescue including water borne, flooding and mudslide, winter rescue operations, terrorism and weapons of mass destruction. As part of disaster preparation, response, and mitigation, the department's Office of Emergency Services specifically provides support and assistance to the 24 cities and towns, as well as, all the unincorporated portions of the county. The field functions are supported by a countywide management system that includes organizational business practices, human resources, financial and accounting services, vehicles services and support, and equipment warehousing and distribution. County Fire also provides for the management of community safety services such as: fire prevention, building construction plans and permits, household hazardous waste, Local Oversight Program for hazardous materials, HAZMAT facility inspections, planning and engineering, and public education and outreach.

Figure 1-2: San Bernardino County Fire Protection District

1.1.2 San Bernardino County Flood Control District

1.1.2.1 Description of Major Services

The San Bernardino County Flood Control District (District) was created in 1939 under special state legislation. Since its inception, the District has developed a very extensive system of flood control and water conservation facilities, including dams, conservation basins, debris basins, channels and storm drains. The purpose of these facilities is to intercept and convey flood flows through and away from developed areas of the county, as well as to promote water conservation and improved water quality.

The District covers the entire county, including all of the incorporated cities. The District is divided into six geographic flood zones (in recognition of the different characteristics and flood control needs in various areas).

- Zone 1 encompasses the county's West End, from the Los Angeles and Riverside County lines to West Fontana.
- Zone 2 encompasses the central area of the San Bernardino Valley easterly of Zone 1 to approximately the Santa Ana River and City Creek demarcations.
- Zone 3 covers the east end of San Bernardino valley, east of Zone 2.

- Zone 4 covers the Mojave River valley region, from the San Bernardino Mountains to Silver Lakes.
- Zone 5 primarily includes the San Bernardino Mountains.
- Zone 6 encompasses the remainder of the county not covered by other zones.

The District has also established a countywide administrative zone (Zone 7)

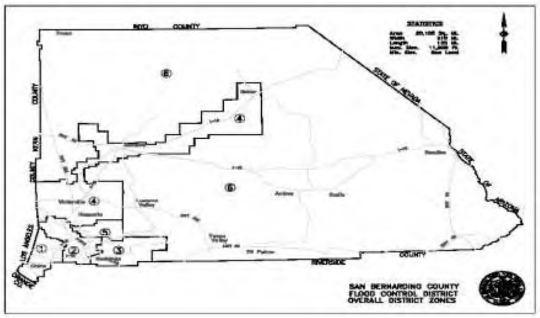

Figure 1-3: Map of San Bernardino County Flood Control District

The District's funding is primarily derived from property taxes, federal and state aid on specific projects, subdivision and permit fees, rents and royalties, and revenue from local water agencies for water spreading services. The District's principal functions are as follows:

- **Flood Protection on Major Streams:** In cooperation with the federal government, the District conducts programs for channel and levee construction, floodwater retention, and debris basin maintenance. Programs or projects are often done in cooperation with the incorporated cities, the U.S. Army Corps of Engineers, and the U.S. Bureau of Reclamation.

- **Water Conservation:** The District operates and maintains water conservation basins and spreading grounds. Water from the local mountains and northern California is spread and percolated into the groundwater basins underlying the county. The District has numerous joint use agreements with water districts allowing use of District facilities for groundwater recharge.

- **Storm Drain Construction:** The District is active in comprehensive storm drain master

planning/construction and cooperates with incorporated cities and other agencies in storm drain projects.

- **Facility Maintenance:** The District has a proactive maintenance program for its facilities. Regular inspections of the storm drains, channels, and basins are made as required by various state and federal agencies.

- **National Pollution Discharge Elimination System (NPDES):** The District is the lead permittee in the San Bernardino valley area-wide NPDES permit with 16 cities as co-permittees. The NPDES program, through the State Water Quality Management Board, regulates storm water quality through very detailed and complex permits, which affect everyone within the Santa Ana River Watershed and is expanding into the high desert area of the Victor Valley under Phase II of the permit.

- **State Water Quality Management Board:** regulates storm water quality through very detailed and complex permits, which affect everyone within the Santa Ana River Watershed and is expanding into the high desert area of the Victor Valley under Phase II of the permit.

- **Flood Operations:** During the flood season, the District maintains telemetry systems for monitoring rainfall and runoff and dispatches storm patrols as dictated by the projected severity of a storm. The District has access to a weather satellite data delivery system to provide state-of-the-art weather information. The system provides advance warning of major storm activity.

- **Flood Area Safety Task Force (FAST):** As a result of the October/November fires of 2003, the FAST organization was created. The District is a key component of this task force, which is meant to respond to the elevated flood risk associated with the aftermath of these devastating fires.

1.1.3 Special Districts Department

The Special Districts Department promotes safe, healthy, enjoyable and dynamic communities by providing essential programs and municipal services that meet the current and future needs of the communities served.

The San Bernardino County Board of Supervisors is the governing body for all Board governed Districts, County Service Areas (CSA), and Improvement Zones. The day-to-day management and administration is done through the Special Districts Department. The County Board of Supervisors and the Special Districts Department depend quite heavily on input from the community. The successful operation of a District, CSA and Improvement Zone is a team effort between County staff and property owners. Where needed, the Board of Supervisors will set up a property owner Advisory Commission or Municipal Advisory Council (MAC) to work with and make recommendations to the Board and County staff.

The formation process begins with a request from property owners and then involves a feasibility study performed by the Special District Department with the assistance of many other County Departments. The final approval of the District, CSA and Improvement Zone is done by the County Board of Supervisors at a public hearing. Depending on the complexity of the issues, the process can take from three (3) months to one (1) year to complete.

There are various forms of financial mechanisms that can be used to fund services such as fees, special taxes, assessments, etc. Prior to a new funding source being implemented, it must receive approval from either the property owners or the registered voters in the area. It is important to understand that all funding is generated through the Districts, CSAs, and Improvement Zones. No County general funds are used or are available.

Special Districts Department is responsible for operating the Board-governed Special Districts within San Bernardino County. There are 102 special districts managed by the Special Districts Department:

Table 1-1: Special Districts Department District Listing

	District Type	Number
1	Special Revenue Districts	11
2	Enterprise Funds (Airport and Refuse)	3
3	Parks Districts	19
4	Road Districts	41
5	Enterprise Funds (Sewer)	9
6	Street Light Districts	11
7	Enterprise Funds (Water)	8
Total Special Districts		102

- **Special Revenue Districts** were created to provide a service to the property owners within the Special Revenue District.
- **Enterprise Funds Districts** derive their funds through fees collected for delivery of a service or good such as water, sewer, refuse or airport fees from the users within the individual District.
- **Parks Districts** derive their funds through property taxes levied on property owners

within the individual Park District.
- **Road Districts** derive their funds through property taxes levied on property owners within the Road District.
- **Street Light Districts** derive their funds through property taxes levied on property owners within the Street Light District.

The two Special Districts listed below were formed differently than the other special districts listed above managed by the Special Districts Department. These two districts were formed with a Board of Directors. (San Bernardino County Board of Supervisors) and are not independently elected. All governance actions are by the elected members of the Board of Supervisors acting as the Board of Directors for the Recreation and Park District.

Big Bear Valley Recreation and Parks District

Big Bear Valley Recreation and Park District currently maintains 6 developed parks, 2 undeveloped parks, several community buildings including the Big Bear Valley Senior Center, 3 ball fields, and a swim beach. Moonridge Animal Park is administered by the Big Bear Valley Recreation and Park District. The Zoo is open year round for visitors to see alpine species on exhibit. The Zoo receives approximately 99,600 visitors annually.

Bloomington Recreation and Parks District

Bloomington Recreation and Park District maintains two community parks, an equestrian arena, sports fields, and a community center.

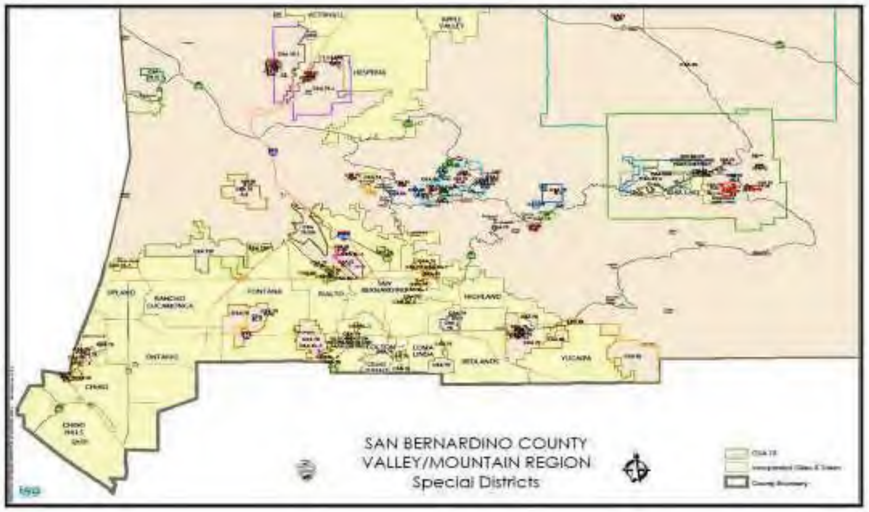

Figure 1-4: Map of Special District Department Districts

Figure 1-5: Special Districts Valley/Mountain Region

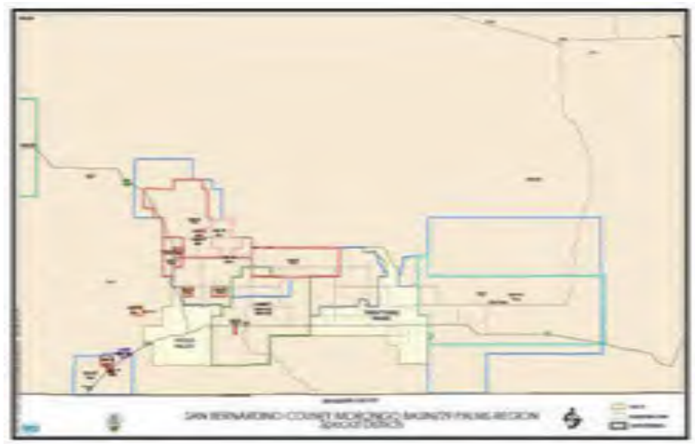

Figure 1-6: Morongo Basin/Twentynine Palms Region

Figure 1-7: Special Districts Victor Valley/Barstow Region

1.2 Purpose of the Plan

The intent of hazard mitigation is to reduce and/or eliminate loss of life and property. Hazard mitigation is defined by FEMA as "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." A "hazard" is defined by FEMA as "any event or condition with the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, environmental damage, business interruption, or other loss."

The purpose of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) is to demonstrate the plan for reducing and/or eliminating risk in the unincorporated area of the County and within areas overseen or managed by the Flood Control District, Fire District and Special Districts Department. The MJHMP process encourages communities within the unincorporated county to develop goals and projects that will reduce risk and build a more disaster resilient community by analyzing potential hazards. By cooperatively and jointly together as a Multi-Jurisdictional Planning team, the partners were able to develop common goals and objectives for mitigation efforts. The individual stakeholders can then take the goals and objectives back to their individual Special Districts for discussion, ranking and project development, and then bring the resulting projects back to the Multi-Jurisdictional Planning Team. The Multi-Jurisdictional Planning Team can then

integrate all projects into the appropriate project listing to be acted upon by the most appropriate managing department or district for the listed projects.

After disasters, repairs and reconstruction are often completed in such a way as to simply restore to pre-disaster conditions. Such efforts expedite a return to normalcy; however, the restoring of things to pre-disaster conditions sometimes result in feeding the disaster cycle; damage, reconstruction, and repeated damage. Mitigation is one of the primary phases of emergency management specifically dedicated to breaking the cycle of damage. Hazard mitigation is distinguished from other disaster management functions by measures that make County development and the natural environment safer and more disaster resilient. Mitigation generally involves alteration of physical environments, significantly reducing risks and vulnerability to hazards by altering the built environment so that life and property losses can be avoided or reduced. Mitigation also makes it easier and less expensive to respond to and recover from disasters.

1.3 Authority

In 2000, FEMA adopted revisions to the Code of Federal Regulations. This revision is known as "Disaster Mitigation Act (DMA)." DMA 2000, Section 322 (a-d) requires that local governments, as a condition of receiving federal disaster mitigation funds, have a Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) that describes the process for assessing hazards, risks and vulnerabilities, identifying and prioritizing mitigation actions, and engaging/soliciting input from the community (public), key stakeholders, and adjacent jurisdictions/agencies.

With an approved (and adopted) MJHMP, the County and participating jurisdictions are eligible for federal disaster mitigation funds/grants (Hazard Mitigation Grant Program, Pre-Disaster Mitigation, and Flood Management Assistance) aimed to reduce and/or eliminate risk.

1.4 What's New

The 2011 San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) contained a detailed description of the planning process, a risk assessment of identified hazards for the San Bernardino County Planning Area and an overall mitigation strategy for reducing the risk and vulnerability from these hazards. Since approval of the plan by FEMA, much progress has been made by San Bernardino County and the participating County Districts on implementation of the mitigation strategy. As part of this 2016 MJHMP Update, a thorough review and update of the 2011 plan was conducted to ensure that this update reflects current community conditions and priorities in order to realign the overall mitigation strategy for the next five-year planning period. This section of the plan includes the following:

- **What's New in the Plan Update** This section provides an overview of the approach to updating the plan and identifies new analyses, data and information included in this Plan Update to reflect current community conditions. This includes a summary of new hazard and risk assessment data as it relates to the San Bernardino Planning Area as well as information on current and future development trends affecting community vulnerability and related issues. The actual updated data, discussions, and associated analyses are contained in their respected sections within this 2016 MJHMP Update.

- **Summary of Significant Changes to Current Conditions and Hazard Mitigation Program Priorities.** This section provides a summary of significant changes in current conditions, changes in vulnerability, and any resulting modifications to the community's mitigation program priorities.
- **2011 Mitigation Strategy Status and Successes.** This section provides a description of the status of mitigation actions from the 2011 plan and also indicates whether a project is no longer relevant or is recommended for inclusion in the updated 2016 mitigation strategy. This section also highlights key mitigation success stories of the County and participating jurisdictions since the 2011 MJHMP.

This What's New section provides documentation of San Bernardino County Planning Area's progress or changes in their risk and vulnerability to hazards and their overall hazard mitigation program. Completion of this 2016 MJHMP Update further provides documentation of the San Bernardino County community's continued commitment and engagement in the mitigation planning process.

1.4.1 Updates to the Current Plan

This MJHMP update involved a comprehensive review and update of each section of the 2011 plan and includes an assessment of the success of the participating County Districts in evaluating, monitoring and implementing the mitigation strategy outlined in the initial plan. Only the information and data still valid from the 2011 plan was carried forward as applicable into this MJHMP update. In fact, based in part on the issuance of new 2011 and 2013 planning guidance, this 2016 plan has been significantly updated and rewritten.

The San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan (2011) focused on integrating the MJHMP with the County General Plan goals and policies as well as incorporating specific flood mitigation projects that were programmed for completion over the five (5) year period. The Plan did not clearly identify mitigation projects the County would focus on for all priority hazards identified in the plan. However, the County has been very active and engaged in implementing and supporting projects and programs designed to reduce and/or eliminate risk in the County. The list of successful projects in this section represents the activities that the County has undertaken and/or supported to reduce the risks from Wildfire, Earthquake, Flood, Drought, Terrorism, and Climate Change.

1.4.2 New Jurisdictional Annexes

Newly refined and reconfigured Jurisdictional Annexes detail the hazard mitigation planning elements specific to the participating jurisdiction to the San Bernardino County MJHMP Update.

The Annexes are not intended to be a standalone document, but appends to and supplements the information contained in the 2016 base plan document. As such, all sections of the base plan, including the planning process and other procedural requirements apply to and were met by the participating jurisdictions. The newly refined Jurisdictional Annexes provide additional information specific to county participating special district or departments, with a focus on providing additional details on the mitigation strategies for the Fire Protection District, Flood Control District and Special Districts Department. The three annexes provide more detail on mitigation strategies, mitigation projects and existing implementation mechanism for each participating jurisdiction.

The 2011 MJHMP included the Big Bear Valley Recreation and Parks District and Bloomington Recreation and Parks District as standalone jurisdictions. For purposes of this 2016 plan update, Big Bear Valley Recreation and Parks District, and Bloomington Recreation and Parks District hazard mitigation planning efforts are included under the supervision of the Special Districts hazard mitigation planning efforts.

1.4.3 New Risk Assessment

As part of its comprehensive review and update of each section of the plan, San Bernardino County and participating jurisdictions recognized that updated data, if available, would enhance the analysis presented in the risk assessment and utilized in the development of the updated mitigation strategy. Highlights of new data used for this Plan Update is identified below in this Section and is also sourced in context within Chapter 4, Risk Assessment. Specific data used is sourced throughout this plan document. This new data and associated analysis provided valuable input for the development of the mitigation strategy presented in Chapter 5 of this plan. A highlight of new information and analyses contained in this plan update includes the following:

- A new assessment of updated hazards affecting the San Bernardino Planning Area was completed resulting in additional hazards added to planning documents the new hazards include climate change, drought and terrorism.
- The drought hazard was expanded to include water shortage impacts to the County, to better align with the State of California Hazard Mitigation Plan and to reflect the significant issues related to drought conditions resulting from the current and ongoing drought within the County and State of California.
- The climate change hazard was added to include to comply and align with the State of California Hazard Mitigation Plan and to reflect recent SB 379 initiatives. Climate change is affecting and will continue to affect the frequency and severity of natural hazard events, a trend that is of concern across the United States.
- An entire rework of the risk assessment for each identified hazard. This included reworking the hazard profile and adding new hazard event occurrences; redoing the entire vulnerability analysis to add items identified below and updating the vulnerability assessment based on more recent hazard data as well as using the most current parcel and assessor data for the existing built environment.

- An update of the flood hazard analysis to include an updated analysis of the 100-year flood, an analysis of the 500-year flood, including the use the new and updated DFIRMs.
- Utilizing updated critical facility GIS mapping for the Planning Area to provide an updated inventory of critical facilities by jurisdiction (including all municipalities) and a GIS analysis of critical facilities vulnerable to hazards with spatial footprints which include: flood, wildfire, and earthquake.
- An enhanced vulnerability assessment which added a GIS analysis of updated future development areas in the Planning Area and specific to each of the mapped hazards.
- Incorporation and analysis of the new 2010 Census data was utilized for this LHMP update. Census data was used in an intersect analysis to determine how much of the population is exposed to flood, wildfire and earthquake hazards.
- Also, as required by current FEMA planning guidance, an analysis of the County's ongoing and continued compliance with the NFIP is included in the Flood Hazard profile.
- Terrorism is now a reoccurring possibility within the United States, due to the terror attack in San Bernardino County in December of 2015, a hazard profile on this matter has been added to this plan.

1.4.4 Successful Wildfire Mitigation Implementation

1.4.4.1 Fire Safe Councils (FSC) Fuel Reduction Program Success

Fire Safe Councils have received and implemented millions of dollars in grant money for fuels reduction and for public education. Of note recently the Arrowhead Communities FSC developed a grant that did fuels reduction but used the existing staff at the County Tree Removal Program rather than pay additional consultants to do the same work. The benefit of this is that the FSC was able to maximize their expenditure and give the contractor a check upon completion of the project. This way 100% of their grant money went directly to the contractor and none went to administrative overhead.

1.4.4.2 Red Cross Grant Fuel Reduction Success

Although this grant was just recently started, the ARC has successfully removed and reduced fuels on several properties. They have also met with County Roads Sign Division and created the correct number of evacuation directional signs. Fifty signs will be posted in the Moon Ridge area of Big Bear Lake in 2010 and 2011. During an emergency, these directional signs will direct people out of a very confusing network of streets.

1.4.4.3 USFS Grants ARRA and Otherwise and Chipping Program Success

San Bernardino County and its Special Districts were successful in obtaining $3 million in American Recovery and Reinvestment Act funding to support ongoing fuel reduction programs and to create new jobs for the recovering economy. The USFS also funded an additional $13 million to carry on after the NRCS projects were closed out.

Project design, contracting and operations are managed by the County's Public Works Department but the priorities are set by local fire chiefs in monthly MAST Operations Meetings. It is the oldest and most significant program for reducing wildfire threat on a mountain wide basis. Table 1-2 shows current and planned fuels reduction Projects for the San Bernardino County Mountain areas.

Table 1-2: Hazardous Tree Removal Project and Fuel Modification Projects

Project Name	Contract No	Funding	Cost	Project Stage
Mojave view	FM179USFS	USFS	$23,840.00	Complete 2013
Strawberry Lodge	n/a	USFS	n/a	Complete 2013
Harich	n/a	USFS	n/a	Complete 2013
Camp Oaks	n/a	USFS	n/a	Complete 2013
Swinson/Arrowbear	n/a	USFS	n/a	Complete 2013
Osito Rancho/Cedar	n/a	USFS*	n/a	Complete 2013
BBV286SP	n/a	USFS	n/a	Complete 2013
BBV287SP	n/a	USFS	n/a	Complete 2013
BBV280SP	n/a	USFS	n/a	Complete 2013
FF288SP	n/a	USFS	n/a	Complete 2013
LA291SP	n/a	USFS	n/a	Complete 2013
RS292SP	n/a	USFS	n/a	Complete 2013
GVL293SP	n/a	USFS	n/a	Complete 2013
AB294SP	n/a	USFS	n/a	Complete 2013
BBV295SP	n/a	USFS	n/a	Complete 2013
Green Briar	FM100ARRA	ARRA**	$88,000.00	Complete 2013
West Hook Creek	n/a	ARRA	$14,700.00	Complete 2013
Silverwood Lake	n/a	ARRA	$21,000.00	Complete 2013
Weesha	n/a	ARRA	n/a	Complete 2013
Erwin Lake	n/a	ARRA	n/a	Complete 2013
Wrightwood	n/a	ARRA	n/a	Complete 2013
Camp Tahquitz	n/a	ARRA	n/a	Complete 2013

Project Name	Contract No	Funding	Cost	Project Stage
West Cajon	n/a	ARRA	n/a	Complete 2013
LA285SP	n/a	ARRA	n/a	Complete 2013
WW290SP	n/a	ARRA	n/a	Complete 2013
CL289SP	n/a	ARRA	n/a	Complete 2013
Rob Roy	n/a	ARRA	n/a	Complete 2013
Santa's Village	n/a	ARRA	n/a	Complete 2013
Saw Pitt II	n/a	ARRA	n/a	Complete 2013
Oak Hills	n/a	ARRA	n/a	Complete 2013
Fawnskin	n/a	ARRA	n/a	Complete 2013
Heaps Peak	n/a	ARRA	n/a	Complete 2013
Houston	n/a	ARRA	n/a	Complete 2013
Calvary	n/a	ARRA	n/a	Complete 2013
WW298SP	n/a	ARRA	n/a	Complete 2013
LG299SP	n/a	ARRA	n/a	Complete 2013
Project Name	**Contract No**	**Funding**	**Cost**	Complete 2013
Waterman Canyon	n/a	ARRA	n/a	Complete 2013
Willow Creek	FM6501AFSC	ACFSC***	$11,900.00	Complete 2013
LA191EVA	EVA191AFSC	ACFSC	n/a	Complete 2013
NorthBay	FM192AFCS	ACFSC	n/a	Complete 2013
LA215EVA	**n/a**	**ACFSC**	**n/a**	**Complete 2013**

** Funded by United States Forest Service*
*** Funder by American Reinvestment and Recovery Act of 2009*
**** Funded by Arrowhead Communities Fire Safe Council*

1.4.4.4 NRCS Fuel Reduction Project Success

San Bernardino County was the recipient of 72 million dollars that were granted from the National Resource Conservation Service (NRCS) to San Bernardino County Fire Protection District to reduce the amount of fuel and the potential for ignitability. In February of 2010, the grant was successfully closed out one month in advance of the target date. The $72,000,000 provided for almost 1,000 projects substantially reducing heavy fuels on tens of thousands of properties at risk across all mountain communities. Within that grant, $6.7million was provided to the USFS to conduct fuel modifications on Federal land and $7.2 million was provided to Cal Trans to remove fuels along evacuation routes. An additional $2 million was forwarded to San Diego to assist them. The activities funded under this program represent the first of their kind to be accomplished by local/state governments with federal grant funding.

To date the Fuel Management Program has removed over 450,000 trees, improving the overall health of the forested areas in the San Bernardino Mountains and reduced the overall fire threat. On several occasions completed projects have resulted in assisting fire suppression efforts and allowing fire to be contained before it threatens a local community, including Deer Lodge Park in Lake Arrowhead and Nob Hill in Running Springs during the Grass Valley and Slide Fires of 2007.

1.4.5 Flood Hazard Mitigation Success

1.4.5.1 2011 General Plan Amendments

A General Plan Amendment to the Safety Element of the County of San Bernardino 2007 General Plan amended the Flood Plain Overlay District, which became effective on March 11, 2010. The Safety Element includes several layers of hazard overlays that are included in the General Plan mapping system to inform the public of potential hazards to development of property within certain areas of the County and to enable the County to mitigate the risks presented to property owners by these hazards. These overlays include potential flood hazards. Over the past twenty years, certain federal and state agencies have been in the process of digitizing much of this hazard data. The digitization of this data has allowed for greater accuracy as well as more timely updates. In recognition of the new data from various federal and state agencies, the County updated the Flood Hazard Overlay Maps contained within the Safety Element of the General Plan. The Flood Plain Safety Overlay District is amended to incorporate revised FEMA (Federal Emergency Management Agency) Flood Plain data, modifying 47 detail and seven regional General Plan Quad Maps. The FEMA Digital Flood Insurance Rate Map database was adopted in the General Plan Amendment as released by FEMA as it exists as of February 9, 2010 and will updated in the future for the County, by integrating automatic map updates as new data is published by FEMA.

Below is a list of the updated Flood Plain Safety Overlay District Maps effective March 11, 2010.

Map	Quad Name	Map #	Quad Name	Map	Quad Name
DI16B	Baker	FH12B	Telegraph Peak	FH21	Devore
EH07	Hinkley	FH13B	Cajon	FH22	San Bernardino N.
EH14	Wild Crossing	FH14B	Silverwood Lake	FH23	Harrison Mtn.
EH15	Hodge	/FJ B	S Portion of County	FH28	Guasti
EH16	Barstow SE	FH11B	Mt. San Antonio	FH29	Fontana
EH22	Helendale	CK/DK	NE Portion of County	FH30	San Bernardino S.
EH29	Adelanto	EH/FH	SW Portion of County	FH31	Redlands
EH30	Victorville	EI/FI B	S Portion of County	FH32	Yucaipa
EH31	Apple Valley N.	EK/FK B	SW Portion of County	FI09B	Fawnskin
EI01B	Nebo	FH06B	Hesperia	FI10B	Big Bear City
EI02B	Yermo	FH07B	Apple Valley S.	FI17B	Big Bear Lake

Map	Quad Name	Map #	Quad Name	Map	Quad Name
EI03B	Harvard Hill	CH/DH -	NW Portion of County	FI18B	Moonridge
EI04B	Manix	CI/DI B	N Portion of County	FH15 -	Lake Arrowhead
EI09B	Daggett	FH03B	Mescal Creek	FH19 -	Mt. Baldy
EK03	Needles NW	FH04B	Phelan	FH20 -	Cucamonga Peak
EK11	Needles SW	FI30B	Joshua Tree S.	FI23B	Sunfair
EK12	Needles	FI32B	Queen Mountain	FI25B	Forest Falls
EK20	**Whale Mountain**	**FI28B**	**Morongo Valley**		

Completed Flood Control Projects with Mitigation Characteristics

Table 1-3: Completed Flood Control Projects

Project Number	Completion Date	Total Cost	Total Funding
F02527	2016	$392,885	$392,885
F00282	2016	$4,100,000	$4,100,000
1-	2010	$7,770,000	$7,700,000
F01761	2016	$4,000,000	$4,000,000
F02234	2016	$1,100,000	$1,100,000
F01767	2014	$3,700,000	$3,700,000
F01389-	2008	$1,300,000	$1,300,000
F01545	2009	$1,500,000	$1,500,000
F01566-	2010	$3,300,000	$3,300,000

1.4.5.2 F02527 29TH Street Basin Levee Certification Restoration Project - Completed

Ensure that the surrounding residential and commercial areas will not be re-mapped as floodplain areas.
Status: Completed
Completion Date: March 2016
Local Priority: High
Total Cost: $392,885
Funding Description: From Flood Control District Budget through Property Tax
Project Selected for: Public safety: history of flood damage at this location
Hazard Mitigated: Potential flooding
Resources to Implement: High

Cost to Implement: High
Time to Implement: High

1.4.5.3 F00282 Alabama at City Creek - Completed

Construct RCB and channel improvements to increase capacity and minimize the possibility of road closures and flood damage.
Status: Completed
Completion Date: January 2016
Local Priority: High
Total Cost: $4.1 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public safety & convenience
Hazard Mitigated: Flooding, flood damage, road closures and road damage
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Medium

1.4.5.1 F02234 Wilson Creek - Completed

Status: Completed June, 2016
Local Priority: Low
Total Cost: $1.1 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Yucaipa
Project Selected for: public safety and infrastructure protection
Hazard Mitigated: attenuation of high velocities (50 fps); slope protection
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

1.4.5.2 F01767 Lytle Cajon – Completed

Replacement of damaged concrete invert
Status: completed
Completion Date: 2014
Local Priority: High
Total Cost: $3.7million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and to prevent additional channel damage
Hazard Mitigated: Additional damage to invert and walls; potential flooding and washouts of nearby area
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

1.4.5.3 F01761 Kitchen Wash – Completed

To intercept flows upstream of Rimrock Road to capture headwaters and re-route them to the Mojave River
Status: In preliminary design process
Completion Date: Estimated 2017/2018
Local Priority: Low
Total Cost: $4.0 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public safety; protection of commercial center
Hazard Mitigated: local flooding, road damage
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

1.4.5.4 Successful "Finalization" of Drainage Feasibility Study Report

The final Drainage Feasibility Study has been completed to evaluate the continuing landslide hazard within Rimforest and the role of concentrated storm runoff in propagating slope failure. The village of Rimforest has eroding cliff-side property and bluff retreat in the Southern part of the village.

This problem is primarily caused by storm runoff from either rainstorms or snowmelt after winter storms. The runoff flows to the south side of Rimforest and is discharged over the cliff at two principal locations. This study report evaluated a number of options to re-direct the majority of the runoff to other discharge locations for the purpose of reducing and mostly eliminating the cliff-side erosion. Two options presented the study appear to be feasible if new conventional storm drain systems are installed. One of the options is now included as potential future mitigation action presented in Section 6 of this plan.

1.4.6 Geologic Hazard Mitigation Success

1.4.6.1 Successful Geologic Hazard Prevention General Plan Amendments

Twenty two overlay maps were completed as part of the 2007 General Plan Amendment which became effective on March 11th, 2010. For more information on the overlay maps, see Section 6.2.2.3.

1.4.6.2 Amendment to Title 6 County Code to Adopt by Reference the 2010 Editions of the California Building Standards Codes

An amendment to Title 6 of the County of San Bernardino Code to adopt by reference the 2010 Editions of the California Building Standards Codes went before the Board of Supervisors on November 2, 2010 and was continued for a second reading on November 16, 2010 and approved unanimously. The amendment became effective on January 1, 2011.

The County of San Bernardino amendment to Title 6 of the County Code to adopt by reference the 2010 Editions of the California Building Standards Codes repealed the current chapters of Division 3 of Title 6 that reflect the 1994/1995 editions of the California Building Standards Codes and adopt the 2010 editions of these codes by reference.

The California Building Standards Commission approved the California Building Standards Code (Code) for a statewide effective date of January 1, 2011 and requires this Code apply in all parts of the state. This Code consists of the California Building, Residential, Plumbing, Mechanical, Electrical, Energy, Historical Buildings, Existing Building (Unreinforced Masonry) and the Green Building Standards Codes. Since this 2010 Edition was adopted by local ordinance, the prior editions of this code will be repealed and the most recent editions of the codes with applicable amendments requiring express findings and certain appendices necessary for the health and safety of the citizens of this County will be in effect within the unincorporated areas of San Bernardino County. The benefit of adopting this Code is that it provides consistency and clarification for the building community as well as building inspectors and plans examiners. State law (Health & Safety Code 18941.5 and 17958.7) requires the local government make express findings in order to amend building standards and the amendments must be necessary due to local climatic, geological, or topographical conditions.

Those amendments and findings are included in the County's ordinance and were filed with the California Building Standards Commission.

The recommended modifications not requiring express findings are administrative or procedural in nature and concern the local implementation issues that are not covered by building standards.

An example of this type of modification is to the California Residential Code, Section R105.3.1.1 which requires the Board of Appeals to confirm substantial valuations in the flood plain. The traditional purpose of the Board of Appeals has been reserved for a contested decision of the Building Official, and it is felt that it should remain as such.

With respect to grading and excavation regulations found in Appendix J of the 2010 State published code, the 2001 California Building Code dealt with grading with more clarity in regards to what activities require a permit and set forth rules to ensure large grading projects are scrutinized in greater detail than smaller projects by requiring more reporting and inspection of such work. The grading chapter in the 2001 Code has been trusted and in use in its primary form for years. The 2010 Appendix J grading chapter needs substantial amendment and modification to address all grading issues and is not recommended for adoption in its present form. The Board adopted the 2001 Appendix Chapter 33 regulations as part of this proposed ordinance. Relocation permit requirements have been moved to a new section of the Code, and it retains specific standards for relocation procedures in details not found in the 2010 State-published code. Clarification of the types of buildings affected by the new regulations has also been made.

Administrative changes to the 2010 California Existing Building Code (Part 10 of Title 24) were approved to outline the procedures required to set allowable time limits for the retrofit and repair of unreinforced masonry buildings. Staff is also recommending that authorization be given to the Building and Safety Division of the Land Use Services Department to issue Administrative Citations as an alternative means of enforcement of the County Code provisions.

Express findings are made for changes to the California Plumbing Code, Appendix K regarding the soil conditions that exist in this county. These changes are supported by the Environmental Health Division. These express findings are iterated in the ordinance and will be filed with the Building Standards Commission as required by law in order to become effective.

1.5 Community Profile

1.5.1 Physical Setting

The County is bounded by the states of Arizona and Nevada on the east, Inyo County on the north, Kern and Los Angeles Counties on the west, and Orange and Riverside Counties on the south.

San Bernardino County covers 20,102 square miles and is geographically the largest county in the continental United States. The States of Hawaii, Connecticut, Delaware, and Rhode Island and the District of Columbia could all fit inside the County boundary at the same time. The unincorporated area of San Bernardino County covers approximately 19,848 square miles; this is 98.7% of the entire County.

The remaining 1.3% of acreage (254 square miles) is under the jurisdiction of incorporated cities or towns. Figure 7 displays the unincorporated area and the cities/towns. The cities/towns on the map are concentrated in the south/west portion of the county and are color-coded.

San Bernardino County is characterized by three (3) distinct geographic areas: Valley, Mountains, and Desert: the Valley Region contains the majority of the county's incorporated areas and is the most populous region; the

Mountain Region is primarily comprised of public lands owned and managed by federal and state agencies; and, the Desert Region is the largest region (over 93% of the county's land area) and includes parts of the Mojave Desert.4 Aside from open or undeveloped land, the largest land use in the county is for military purposes.

The mountains stretch across the south end of the county. The mountain elevations range from 2,000 feet along the foothills to the 11,502-foot summit of Mount San Gorgonio, the highest peak in Southern California. Figure 8 displays the terrain/topographic features throughout San Bernardino County.

The San Bernardino Mountains feature four (4) large lakes (Big Bear Lake, Silverwood Lake, Lake Arrowhead, and Lake Gregory), and many smaller lakes. The majority of the lakes are the headwaters of the Santa Ana River and the Mojave River.

The Santa Ana River originates in the San Bernardino Mountains and flows southwest to the ocean. The Santa Ana Watershed includes streams flowing south from the San Gabriel Mountains and streams flowing north and west from the San Jacinto Mountains in Riverside County.

The desert area contains low mountains, valleys, and dry lakebeds. The elevations within the valley range of the County is from about 500 feet on the valley floor to 1,700 feet in Live Oak Canyon, and to about 5,400 feet in the hills in Yucaipa. The desert area is an assemblage of mountain ranges interspersed with long, broad valleys that often contain dry lakes. Many of these mountains rise from 1,000 to 4,000 feet above the valleys. Due to the persistent winds that blow throughout the year, large portions of the desert surface have been modified into a mosaic of pebbles and stones known as desert pavement.

A major physical resource of the desert area is the Mojave River, a critical water source for many of its residents. Among the few rivers that both flow north and do not empty into an ocean, the Mojave River travels north and east away from its watershed in the San Bernardino Mountains. The major part of it is over 100-mile length is marked by a dry riverbed that only on occasion reveals the water within it. Except in exceedingly wet years, the Mojave River ends its flow at Soda Dry Lake near Baker. The Colorado River, at the California and Arizona border, borders the County on the east. Streams in the eastern areas of the County area flow into the Colorado River which eventually ends at the Gulf of California.

The densely urban southern part of the County is at the headwaters of the Santa Ana River with its tributaries crossing the valley floor. With the construction of the Seven Oaks Dam the main river source has been controlled. However, Mill Creek, City Creek, Lytle Creek, and Cajon Creek still have the potential to flood areas of the valley if levees fail. A similar potential occurs with the high desert portion of the County with the Mojave River, which is controlled by the Mojave River Falls Dam that flows north from the San Bernardino Mountains to the city of Barstow. The San Antonio Dam on the southwest side of the county provides more than 100-year flood protection to the west end of the San Bernardino Valley. The Colorado River is on the eastern border of the County. The dams along the river have controlled the flow but bank erosion and damage to roads in the area have been experienced during periods of high water.

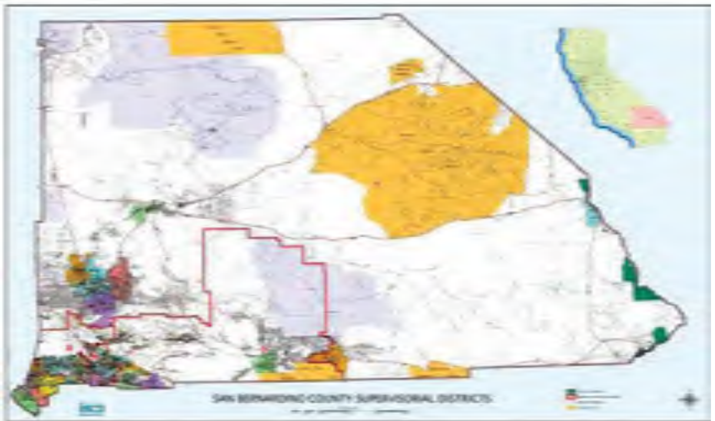

Figure 1-8: Unincorporated and Corporate Areas in San Bernardino County

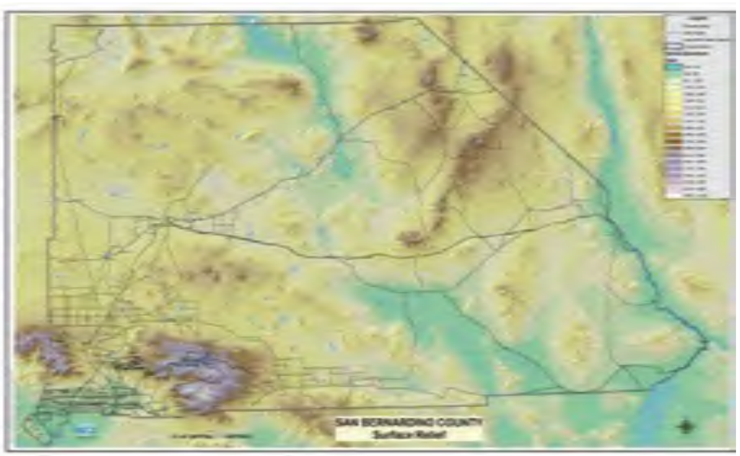

Figure 1-9: Topographic Features in San Bernardino County

1.5.2 History

Paleo-Indian sites dating from c. 10,000 BC show that the San Bernardino County area has been inhabited for at least 12,000 years. Artifacts in the Calico area suggest much earlier human occupation, but this has not been confirmed. In the past three thousand years, various Indian tribes flourished in the area: the Gabrielenos occupied the West Valley; the Serranos lived in the foothills of the San Bernardino Mountains; the Vanyumes lived along the Mojave River; the Mohave lived along the Colorado River; and the Chemehuevi occupied the Mojave Desert.

The first European explorers to enter the area were Pedro Fages, Military Commander of California, in 1772 and Fr. Francisco Garces, a missionary priest, in 1774. On May 20, 1810, Franciscan missionary Francisco Dumatz, of the San Gabriel Mission, led his company into a valley. In observance of the feast day of St. Bernardine of Siena, Dumatz named the valley San Bernardino. This name was later given to the nearby mountain range, and later the city and county.

In 1842 the Lugo family was granted the Rancho San Bernardino, a holding of 37,700 acres encompassing the entire San Bernardino Valley. Captain Jefferson Hunt, of the Mormon Battalion, led a group of settlers into San Bernardino and founded a Mormon Colony. In 1851 the Mormon Colony purchased the Rancho from the Lugo family.

In 1850 California was admitted into the United States. On April 26, 1853, San Bernardino County was created from parts of Los Angeles, San Diego, and Mariposa Counties. In 1854 the City of San Bernardino was incorporated as the county seat.
In 1857, three orange trees were set out on a farm in Old San Bernardino. By 1882 a rail car load of oranges and lemons grown in the East Valley was shipped to Denver, Colorado. As early as the 1840s, vineyards were planted in the Cucamonga area and in the 1870 census; San Bernardino County was credited with producing 48,720 gallons of wine.

In 1860, gold was discovered in Holcomb and Bear Valleys in the San Bernardino Mountains, and placer mining began in Lytle Creek. Silver was being mined at Ivanpah in 1870, and the rich silver mines of the Calico district were developed in the 1880s. Borax was first discovered in 1761 at Searles Dry Lake near Trona, and transported out by twelve-, eighteen- or twenty-mule team wagons.

As a county, San Bernardino has been uniquely endowed with rich mineral deposits. Large deposits of gold have been mined at Stedman and Vanderbilt, with smaller but still important deposits at Alvord, Oro Grande, Old Dad Mountain, Dale and Nantan, Calico, Ivanpah, Waterman and Providence were the largest silver deposits, with lesser, but important deposits in the Mescal Mountains and at the Death Valley Mine. The most important copper mines are the Copper World and the Bagdad Chase (known usually for its gold production).

Except for a brief period after World War I when silver prices were high, low metal prices and inflation put a damper on mining in the 1920s. However, with the Great Depression of the 1930's and an increase in the price of gold by nearly $15 an ounce, many small operators reactivated old mines. The region around Barstow, Vanderbilt, Stedman, and Dale were the principal centers of mining activity until World War II.

During World War II, iron was extracted from the Vulcan Mine in the Providence Mountains, and the Bagdad Chase Mine remained active. Since the war, there has been sporadic mining of gold, silver, and tungsten in the county. A major new mine opened during the 1950s, the Mountain Pass rare earth mine. Recently, exploration has outlined potential large tonnage molybdenum properties in the New York and Ord Mountains, copper in the Cooper Basin area of the Whipple Mountains and gold in the Clark Mountains.

After World War II, the citrus industry slowly declined. However, dairies relocating out of Los Angeles County settled in the Chino Valley area, creating a robust dairy industry in San Bernardino County.

Elsewhere in the Valley region, suburbs grew as moderate priced housing developments were built. By the late 1980's, the county had grown into bedroom communities and warehousing for southern California.

1.5.3 Climate

The valleys between mountain ranges experience very high temperatures, while the adjacent mountains often experience much cooler temperatures, particularly at their summits. Rainfall and humidity are low. The annual average precipitation for the area is approximately 30 inches. The differences in elevation and topography are in part responsible for variations in temperature and precipitation from the Valley and Desert areas.

Winter temperatures in some areas of the Desert range near zero, the cold often compounded by the wind-chill factor. In the summer, temperatures can reach as high as 134°F in the lower elevations and along the Colorado River area. Temperatures in the San Bernardino valley area range from an average high of 80ºF and an average low of 53ºF. The record high for the area is 117ºF and the record low is 17ºF. The annual average rainfall for the area is 15.6 inches. During the fall and winter months, strong "Santa Ana" winds blow across the area.

The mountains experience a four-season climate. Temperatures in the Mountain area range from an average high of 62ºF and an average low of 36ºF. The record high for the area is 106ºF and the record low is -25ºF. With the possible exception of some of the higher elevations in the mountains, precipitation throughout the Desert area is less than four inches per year, usually of short duration and high intensity. The resulting flash floods rapidly modify the terrain that is exposed to the erosive surface runoff. Unusually heavy or persistent rains often result in the temporary filling of a number of dry lakes until the surface water evaporates or infiltrates the soil. Persistent winds blow throughout the year

1.5.4 Demographics

The total population of San Bernardino County is approximately 2,139,570 people *(State of California, Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2016, with 2010 Census Benchmark. Sacramento, California, May 2016)*. Most of the County's population is in the valley areas located in the south west portion of the County. The County's population has grown by 4.13%, 84,835 people, since 2011 (population in 2011 was 2,054,735 people).

The population of the unincorporated area of the County in 2011 was 294,753 people. In 2016, the population is 309,759; an increase of 14,976 persons (or 1.05%) *(State of California, Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2016, with 2010 Census Benchmark. Sacramento, California, May 2016)*

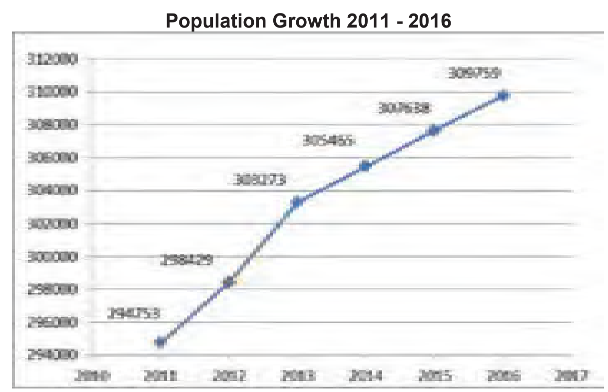

Figure 1-10: San Bernardino County Unincorporated Area Population Changes 2011 - 2016

Source: California Department of Finance E-4

Ethnic composition includes Hispanics (48%) who form the largest share of the County's population, followed by Whites (34%). Blacks (9%) and Asians (5%) form a relatively lower share of the total population. It should be noted that the Hispanic population is growing at the fastest rate among all ethnic groups. From 2000 to 2010, the Hispanic population increased by 44%. This trend is consistent with that of the neighboring counties of Riverside and Orange, where the

Latino population grew by 63% and 24%, respectively. During this period, the Asian population grew by 38%, whereas the Black population grew by 15%. The population of Whites declined in all the six counties in Southern California; San Bernardino County experienced a decline of 7% in its White population. Changes in Ethnicity are from the California Department of Finance, Demographics Unit.

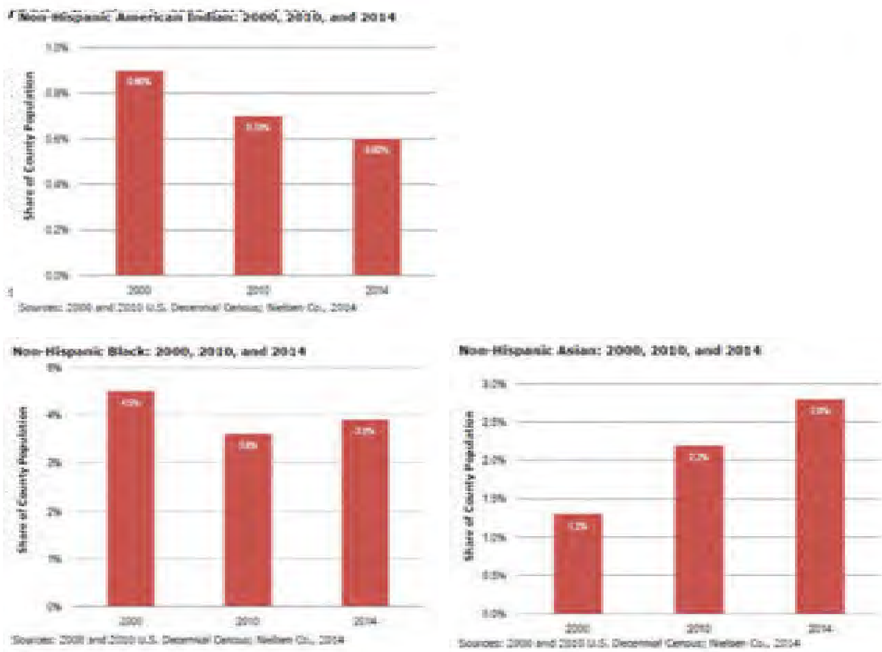

Figure 1-11: San Bernardino County Unincorporated Area 2014 Population by Ethnicity

1.5.5 Existing Land Use

The County has adopted a “one-map approach.” The “one-map approach” permits the use of a single map showing both General Plan land use designations and zoning classifications. The one-map approach assures that there will always be land use consistency between the County's General Plan and its Zoning Code.

There are 18 land use zoning districts that apply only to privately owned lands in the County and not to the lands controlled by other jurisdictions. Lands that are controlled by other jurisdictions, including lands controlled by federal and state agencies as well as incorporated cities, are mapped to identify the public agencies that control them. The 18 land use zoning districts are as follows:

- Resource Conservation (RC)
- Agriculture (AG)
- Rural Living (RL),
- Single Residential (RS),
- Multiple Residential (RM),
- Office Commercial (CO),
- Neighborhood Commercial (CN),
- Rural Commercial (CR),
- Highway Commercial (CH),
- General Commercial (CG),
- Service Commercial (CS),
- Community Industrial (IC),
- Regional Industrial (IR),
- Institutional (IN),
- Special Development (SD),
- Floodway (FW),
- Specific Plan (SP), and
- Open Space (OS).

Resource Conservation (RC) comprises the majority (55.98 percent) of the designated land uses in the County. This land use designation covers over 1 million acres, or about 1,500 square miles of land. Most of the land within this designation is publicly owned (federal and state) and includes national parks, military bases, conservation areas, and lands owned by other federal and state agencies. The County has designated approximately 681,500 acres or 1,065 square miles (37.92 percent) for residential uses. Out of this, about 587,535 acres (32.76 percent of total unincorporated area) are designated Rural Living, 67,691 acres are designated Single Residential, while 4,986 acres are designated Multiple Residential.

Commercial land use zoning districts (Office Commercial, Neighborhood Commercial, Rural Commercial, Highway Commercial, General Commercial, and Service Commercial) occupy a total of 12,177 acres or 0.68 percent of the total unincorporated area. Industrial land use zoning districts (including Community Industrial and Regional Industrial) occupy 21,834 acres or 1.21

percent of the total unincorporated area. Other land use designations include Agriculture occupying 41,793 acres (2.32 percent), Institutional occupying 8,567.51 acres (0.48 percent), Floodway occupying 20,281 acres (1.13 percent), and Specific Plan occupying 4,861.37 acres (0.27 percent).

Because of the size of the County, the San Bernardino County General Plan divides the county into 8 quadrants (Figure 1-12). The "one-map approach" allows the quadrant maps to be used for many different planning and development purposes. Figure 1-13 presents the Land Use Zoning for each quadrant. The Land Use Zoning identifies the type of construction and growth that exists or may occurs in area.

County designated Land Use Zoning Districts do not apply to Federal, State, or incorporated owned property.

The County's General Plan can be found at: http://countywideplan.com/home/about/

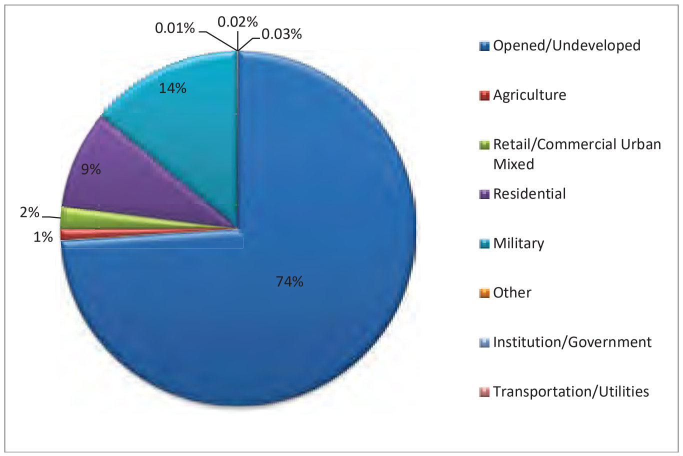

Figure 1-12: San Bernardino County Land Use

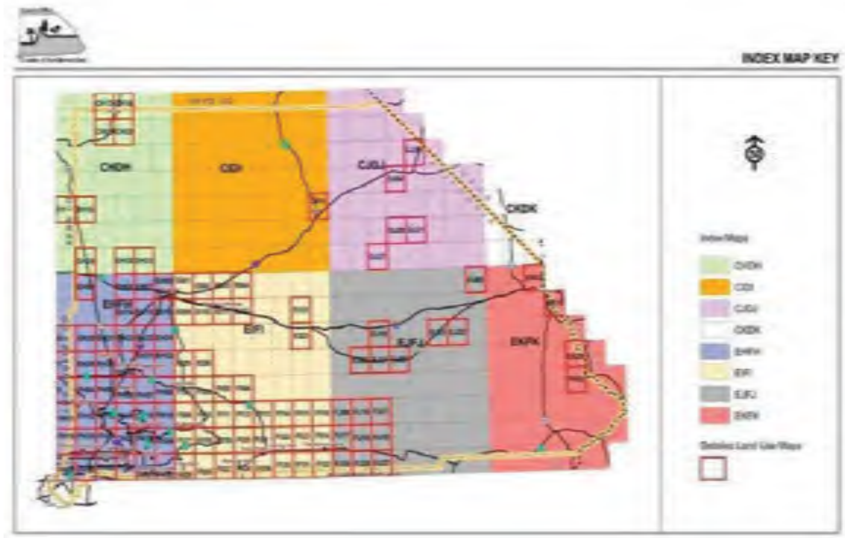

Figure 1-13: San Bernardino County Land Use Map

1.5.6 Development Trends

No major developments occurred in the unincorporated area of the county since the 2010 MJHMP was adopted. The limited development that did occur was scattered throughout the unincorporated area; with no one area being singled out. All development was in accordance with the pre-designated Land Use Zones development zones and complied with all Fire, Flood, and Seismic codes of the County and State at the time of development. This includes commercial, industrial, and residential developments.

The County is optimistic about the potential for future development. The High Desert area of San Bernardino County is one of the best places in the world for solar energy development because of its high altitude, the number of sunny days each year and existing power infrastructure.

- Many large solar energy projects are being proposed in California's desert area on federal Bureau of Land Management (BLM) land. BLM has received right-of-way requests encompassing more than 300,000 acres for the development of approximately 34 large solar thermal power plants totaling approximately 24,000 megawatts. This number of projects has not yet reached the stage of an Application for Certification (AFC) with the California Energy Commission.
- California's electric utility companies are required to use renewable energy to produce 20 percent of their power by 2010 and 33 percent by 2020. A main source of renewable power will be solar energy. Within the County of San Bernardino a Hybrid Power Project has been approved in the Victor Valley area. As of August 2010, three large Solar Projects to be placed in the County are in review by the California Energy Commission.

Once built, these projects will not impact the area to a great extent. Minimal staffing is required to operate these facilities and their very nature places them in remote locations of the County.

Additionally, with the completion of the Alameda Corridor and the emergence of the Ports of Los Angeles and Long Beach as the largest ports in the U.S., shipping trans-Pacific goods from the booming Asian economies, San Bernardino County has evolved as the logistics and distribution hub for the 20 million resident Southern California market and into the rest of the nation. As the international economy recovers amidst tightening land availability for warehousing and transit, San Bernardino County is better positioned than other areas in the region to harness the opportunity to become an even more important logistics hub.

The County has also started development of a bullet train. The bullet train will connect Victorville, CA and Las Vegas NV generally following the I-15 corridor (NOTE: There are discussions of additional bullet trains connecting San Bernardino with Los Angeles and San Diego and San Bernardino County and San Francisco/Sacramento).

While all of these development trends may not be recognized over the next 5 years, all future development that will take place is planned to occur in accordance with the General Plan Land Use Zones and will consider all potential hazards identified within this plan. Additionally, all development will be in compliance with all Fire, Flood, and Seismic codes of the County and State at the time of development.

COUNTY OF SAN BERNARDINO - Hazard Mitigation Plan Update

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Section 2. Plan Adoption

2.1 Adoption by Local Governing Body

The San Bernardino County Board of Supervisors created “districts” to provide a specific service to an area / population of San Bernardino County. These Districts are Board Governed in that the Board of Supervisors has direct control and legislative oversight of the Districts. The Board of Supervisors acts on behalf of each District whenever governance items are necessary. The participating jurisdictions listed in this plan are separate legal entities from the County of San Bernardino. For tax/revenue purposes the Board of Supervisors, acting as the Board of Directors for each participating jurisdiction or “District”, will be adopting the Multi-Jurisdictional Hazard Mitigation Plan on behalf of each District. The Districts are not independent from San Bernardino County but are controlled and administered as any other County Department is administered.

This plan represents mitigation efforts for the unincorporated portions of the County and the efforts of three jurisdictions participating in this Multi-Jurisdictional Hazard Mitigation planning effort. The participating jurisdictional special districts include:

San Bernardino County Fire District
San Bernardino County Flood Control District
San Bernardino County Special Districts Department

San Bernardino County Board of Supervisors is responsible for the review, approval, and adoption of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update for the unincorporated area of San Bernardino County, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and for the County’s Board Governed Special Districts Department. It is also the intent of the San Bernardino County Board of Supervisors to take appropriate actions to incorporate the MJHMP update into the San Bernardino County General Plan.

2.2 Promulgation Authority

The Promulgator Authority for the adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the unincorporated area of San Bernardino County, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and for the County’s Board Governed Special Districts Department and incorporation of the MJHMP into the San Bernardino County General Plan is:

- Chairman Robert A. Lovingood First District
- Janice Rutherford Second District Supervisor
- James Ramos Third District Supervisor
- Vice Chairman Curt Hagman Fourth District Supervisor
- Josie Gonzales Fifth District Supervisor

The Point of Contact for information regarding this MJHMP is:

Michael Antonucci, Emergency Services Manager
San Bernardino County Fire
Office of Emergency Services
1743 Miro Way
Rialto, CA 92376
(909) 356-3998

Section 3. Planning Process

3.1 Preparing the Plan

Multi-Jurisdictional Hazard Mitigation Planning is a process State, Tribal, and local governments use to identify risks and vulnerabilities associated with natural disasters, and to develop long-term strategies for protecting people and property from future hazard events.

Planning creates a way to solicit and consider input from diverse interests. Involving stakeholders is essential to building community-wide support for the plan. In addition to emergency managers, the planning process involves other government agencies (e.g., zoning, floodplain management, public works, community, and economic development), businesses, civic groups, environmental groups, and schools.

To assist with the updating of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), a Multi-Jurisdictional Planning Team (Planning Team) was established. The Planning Team was the lynchpin for all activities to update the MJHMP. The Planning Team was established to define and identify the strategies, goals, activities, and development of the MJHMP. The Planning Team represents a comprehensive team of subject matter experts from a range of areas that the team felt was affected by the plan or could provide great benefit to the team. Members of the Planning Team were drawn from San Bernardino County Departments, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and the San Bernardino County Special Districts Department.

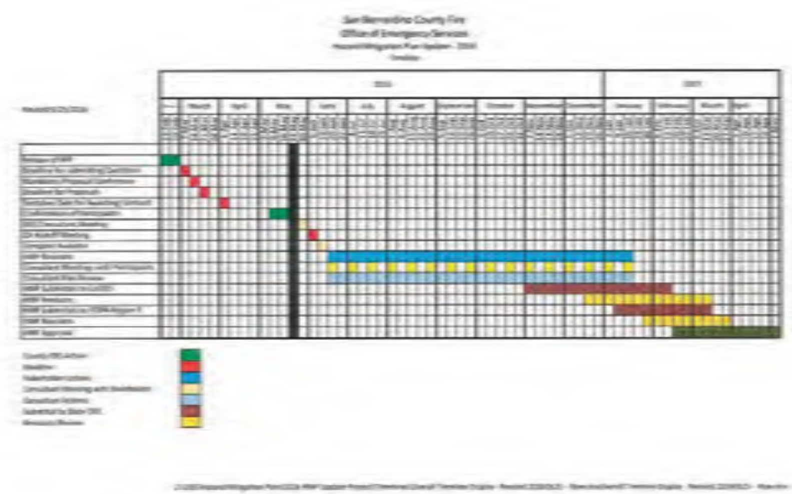
The Multi-Jurisdictional Planning Team members worked together to jointly determine and rank the risks facing the six participating agencies, develop goals and objectives to mitigate the risks, and identify which of the participating jurisdictions would be most appropriate for leading any particular project area identified by the Multi-Jurisdictional Planning Team. The individual Planning Team members then returned to their respective Special Districts where discussions were held, input sought, and potential projects developed and ranked for each of the Planning Team identified risks and projects relevant to the Special District. The Planning Team members then returned to the Multi-Jurisdictional Planning Team and provided the Planning Team with their vetted, prioritized list of potential projects and budgets to include in the Multi-Jurisdictional Hazard Mitigation Plan. These projects and budgets were integrated into the Multi-Jurisdictional Hazard Mitigation Plan. Upon approval, each participating jurisdiction would then be able to apply for grant funding for their prioritized projects without interference from another participating jurisdiction as funding became available.

The Planning Team was led by a representative from the San Bernardino County Fire Protection District-Office of Emergency Service. This representative took on the responsibilities of a Project Manager and facilitated and coordinated activates.

The Project Manager also represented the Unincorporated County at the San Bernardino County Operational Area (OA) Stakeholder meetings. San Bernardino County OES led the effort to coordinate Stakeholder in the Operational Area update their local MJHMP. This effort included: proving technical support, establishing a platform to encourage the exchange of ideas, and help coordination among neighboring stakeholders. The Project Manager was responsible for attending these meetings and incorporating the material into their planning process. One of the resource materials provided through the OA Stakeholder meetings was a suggested Table of Contents (TOC) the purpose of the TOC was to ensure all aspect of the MJHMP requirements were being met and could be found in similar sections in each of the Stakeholders updated MJHMPs.

This sample TOC was reviewed by the Planning Team and incorporated into the unincorporated county's MJHMP update efforts. Using the TOC, the Planning Team decided to conduct a section by section; page by page review of the 2016 MJHMP. To assist with this effort, a proposed project timeline was developed. The proposed Project Timeline illustrates the windows when each section of the 2016 MJHMP will be reviewed and the section revised.

Table 3-1: Proposed Project Timeline



Based on the TOC, the Planning Team divided the update process into seven (7) phases; one for each section of the TOC. This approach allowed for a much focused review of the material and provided an organized method to introduce new or updated material. The Project Manager led the discussion, solicited comments, took notes, and incorporated results in the MJHMP. Additionally, the Project Manager collected and summarized material provide by Planning Team members. During the Planning Team meetings some members were assigned tasks or action items which were to be completed prior to the next meeting.

Staff assigned to the MJHMP Update reviewed the 2016 MJHMP and provided comments referencing updated information such as current population statistics, new HAZUS-MH MR3 analysis of floods and earthquakes, and provide suggestions for updating the MJHMP. The Planning Team then reviewed the update information and validated/identified Goals, Objectives, and Projects. This step included discussion of how the projects would be prioritized.

3.1.1 Project Prioritization Involved Comprehensive Consideration of Criteria/Factors

While there is not a standard process followed by each of San Bernardino County Departments, and Districts; they all considered social, technological, administrative, political, legal, economic, and environmental factors. The County and each district participated on the Planning Team, and then took the risks, goals, objectives and projects back to their respective jurisdiction for discussion and vetting. After vetting, the individual Planning Team members returned to the Multi-Jurisdictional Planning Team where the individual materials were combined into a single Multi-Jurisdictional Hazard Mitigation Plan. This Multi-Jurisdictional effort resulted in goals, objectives and projects for all participants being listed under the appropriate hazard sections and not by individual participants. This reflects the overall County philosophy of allowing the department/district with the most expertise to suggest and/or manage a project that may affect another participant who does not have expertise in the hazard.

3.1.2 Planning Team

Much of the Planning Team is composed of representatives who were part of the development of the 2010 Unincorporated Area County MJHMP. This provided added value to the team in that they were familiar with the process and provided continuity in the updating of the 2010 MJHMP.

The Planning Team is comprised of representatives from San Bernardino County Departments, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and the San Bernardino County Special Districts Department who specialize in mitigation type activities/planning.

The Planning Team members represented select aspects of the community and were thought of as liaisons to the greater community. Each Planning Team member was responsible for communicating the direction and status of the planning effort to their outside members and in return they are expected to bring to the team outside perspectives. Additionally, the individual Planning Team members acted as liaisons for their respective Special Districts and were responsible for ensuring that the Special Districts provide appropriate input from their respective internal planning processes. Potential projects/budget meetings were held where alternative mitigation actions were discussed and potential mitigation projects were developed and prioritized along with budget development for the individual participating Special Districts and Departments. Additional prioritization after budgets were developed to ensure proper Benefit Cost Analysis (BCA) techniques were applied.

Representation was present on the Multi-Jurisdictional Planning Team from various County Departments and the three participating jurisdictional departments. Planning Team included representatives from all the participating San Bernardino County Special Districts and Departments. See Table 3-2 and Table 3-3.

Table 3-2: Multi-Jurisdictional Planning Team

Multi-Jurisdictional Planning Team Members	Title / Role
Unincorporated County	
Suzanne Peterson	*Countywide Plan Coordinator / Land Use Services / Mitigation Review*
Jerry Blum	*Countywide Plan Coordinator /*
Brent Rolf	*County GIS / Hazus Data Coordinator / Information Services*
Frank Jordan	*Land Use Services / Mitigation Review*
Jim Sowers	*Building and Safety / Risk Assessment Review and Mitigation Action Plan Development*
Patricia Cole	*Economic Development Agency / Implementation and Funding Review*
Carl Alban	*Architecture and Engineering Department*
John Amrhein	*Sherriff's Corner Department Rep. / Mitigation Action Review*
Mazin Kasey	*Public Works Dept. /Transportation Division*
Art Rivera	*Solid Waste Management Division*
Norma Spencer	*Superintendent of Schools*
Fire Protection District	
Michael Antonucci	*OES Director / MJHMP Plan Representative*
Cindy Serrano,	*Project Manager for Planning Process*
Miles Wagner	*Emergency Services Officer, GIS Representative and Stakeholder Coordination.*
David Davis	*Emergency Services Officer / Fire District Representative and Technical Writer*
Mary Barnett	*Technical Writer / Plan Update and Edits*

Multi-Jurisdictional Planning Team Members	Title / Role
Cheryl Nagy	Emergency Services Officer
Carrie Cruz	Emergency Services Officer
Elli Maldonado	Elli Maldonado – Office Assistant
Michael Horton	Michael Horton – Fire Marshal
Flood Control District	
Kevin Blakeslee, Deputy Director – Flood Control	Deputy Director – Flood Control
Kenneth Eke, Chief, Flood Control Planning/ Water Resources Division	Chief, Flood Control Planning/ Water Resources Division
Michael Fam	Flood Control Planning
Mona Sadek	Flood Control Planning
Marjorie Schrage	Flood Control Planning
Special Districts Department	
Jeff Rigney	Special Districts Dept. Director
Steve Samaras	Special Districts Dept. Acting Deputy Director
Erin Opliger	Big Bear Valley Recreation and Parks District Rep.
Erin Opliger	Bloomington Recreation and Parks District Rep.

Table 3-3: Stakeholder List

Stakeholder Members	Name	Title / Role
Municipal Partners		
City of Barstow	Jamie Williams	Fire Chief
City of San Bernardino	Eric Fyvie	Sergeant
City of Chino	Chris Wolff	Administrative Services Manager
City of Chino Hills	Bonnie Michaels	Emergency Services Analyst
City of Colton	Shannon Kendall	Emergency Services Coordinator
City of Fontana	Cheryl Nagy/ Mary	Emergency Services Officer
City of Grand Terrace	Haide Aguirre	Management Analyst
City of Hesperia	Rachel Molina	Public Information Officer
City of Loma Linda	Shannon Kendall	Emergency Services Coordinator
City of Montclair	Angelic Bird	Emergency Services Coordinator
City of Ontario	Raymond Cheung	New Emergency Manager
City of Rancho Cucamonga	Breanna Medina/ Denise School	Emergency Manager
City of Redlands	Fay Glass/ Wanda Viser	Emergency Operations Manager

Stakeholder Members	Name	Title / Role
City of Rialto	Art Podeska	Battalion Chief
City of Upland	Angelic Bird	Emergency Services Coordinator
City of Victorville	Dana Wellborn	Emergency Services Manager
Town of Apple Valley	Joseph Ramos	Emergency Services Officer
Town of Yucca Valley	Jessica Rice	Management Analyst
School District Partners		
Apple Valley Unified School District	Janet Gould	Director, Risk Management
Chino Valley Unified School District	Dr. Grace Park	Assistant Superintendent
San Bernardino County Superintendent of Schools	Norma Spencer	Risk Management Analyst
Snowline Joint Unified School District	Robert Chacon	Director of Risk Management
Special District Partners		
Inland Empire Utilities Agency District Headquarters	Claudia Neighbors/ Tony Arellano	Safety Officer
Newberry Community Services District	Stephen Miller	Fire Chief- Barstow Fire Protection District
Omnitrans	Mark Crosby	Security and Emergency Preparedness Coordinator
Santa Ana Watershed Project Authority	Richard Haller/ Carlos Quintero	Exec. Manager of Engineering and Operations
Water District Partners		
Crestline Village Water District	Larrie Ann Davis	Office Manager
Cucamonga Valley Water District	Rosanna Ammari / Maria Kennedy	Maria Kennedy Consultant Representative
East Valley Water District	Cecilia Contreras / Gary Sturdivan	Administrative Assistant
Monte Vista Water District	Jonathon Dizon	Engineering Technician
San Bernardino Valley Municipal Water District	Dan Borrell/ Brent Adair	Project manager- Construction
Twenty-nine Palms Water District	Gary Sturdivan	Consultant Rep.
Yucaipa Valley Water District	John Hull	Public Works Management
CERT Teams		
Wrightwood		CERT Citizens
Phelan/Pinion Hills		CERT Citizens
Angelus Oaks		CERT Citizens
Big Bear Valley		CERT Citizens
Helendale		CERT Citizens
Lucerne Valley		CERT Citizens
Lytle Creek		CERT Citizens
Mill Creek Canyon		CERT Citizens

Stakeholder Members	Name	Title / Role
Morongo Basin		*CERT Citizens*
Mountain		*CERT Citizens*
Oak Hills		*CERT Citizens*
Rosena Ranch		*CERT Citizens*
San Antonio Heights		*CERT Citizens*
Silver Valley		*CERT Citizens*
Public Representatives		
-	*Destiny Davis*	*Interested Citizen*
-	*John Ferdon*	*Interested Citizen*
Other Partner Agencies		
San Manuel Band of Mission Indians	*Michael Russ*	*Disaster Services Manager*
Arrowhead Regional Medical Center	*Weston Scott Smith*	*Emergency Preparedness*
United States Forest Service	*Marc Stamer*	*San Bernardino National Forest and Angeles National Forest Rep.*
Wrightwood Fire Safe Council	*John Aziz*	*Fire Safe Council*
Rim of the World Mountain Mutual Aid Association	*Aaron Scullin*	*President*

There were a series of meetings held with the Planning Team. Each meeting had a primary focus and provided an opportunity to discuss updates and exchange ideas. Below is a list of the Planning Team meetings:

Table 3-4: Planning Team Meetings

Date	Activity
February 4, 2016	In person meeting to discuss revisions and additions to the Planning Process, Risk Assessment, Community Capability Assessment, Mitigation Strategies, Plan Maintenance, Fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion into the plan.
June 23, 2016	Organizational Meeting for County Unincorporated Area Planning team. Planning Team members were introduced to the project and assigned to review 2016 MJHMP and update risks and mitigation projects as needed.
July 19,2016	Conference Call with participants to discuss revisions and additions to the Planning Process, risk Assessment, Community capability Assessment, Mitigation Strategies, Plan maintenance, fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion into the plan.
August 4, 2010	In person meeting to discuss revisions and additions to the Planning Process, risk Assessment, Community capability Assessment, Mitigation Strategies, Plan maintenance, fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion into the plan
August 30, 2016	In person meeting to discuss revisions and additions to the Planning Process, risk Assessment, Community Capability Assessment, Mitigation Strategies, Plan Maintenance, Fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion in the plan.
September 14, 2016	In Person meeting of the Morongo Basin COAD Community Organizations Active in Disaster. Hazard Mitigations Plan Discussion and outreach for public input on the update of the Hazard Mitigation Plan, and contact information given to the public.
September 20, 2016	In person meeting to discuss changes suggestions with the Fire Safe Council for the following communities: Wrightwood, Phelan, Pinion hills, West Cajon Valley, and Baldy Mesa. The first item on the agenda was the discussion of the LHMP update and explained how to review the current HMP and instructions were given on who and how to contact OES and about 79 persons of the public were present
September 21, 2016	Rim of the World Mountains Mutual Aid Association in Person meeting to discuss Planning Team Goals and Objectives, and any public concerns and contact information was given and it was the first item on the agenda for the meeting. And continuing fire fuel thinning programs (MAST) and Bark Beetle tree removal.
September 24, 2016	In Person meeting of CERT Training on Terrorism, The hazard Mitigation Plan was brought up and discussed and contact information given to the public, a few topics and subjects were brought up.

3.2 Coordination with Other External Jurisdictions, Agencies and Organizations

3.2.1 Internal Coordination

Because of the size and geographical location of Unincorporated County area, there are many jurisdictions, agencies, and organizations that are affected by or have influence on the county and the mitigation planning process. As part of the planning process, the Planning Team, and particularly the Project Manager, took great efforts to engage and include as many members as possible. These members were drawn from San Bernardino County Departments, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and the San Bernardino County Special Districts Department.

One of the first efforts that were made was when the Planning Team was being established. The Planning Team members gave special considerations as to what they thought needed to be in the MJHMP and attempted to identify a person who could representative that area. This consideration went beyond the county departments.

As mentioned above, in addition to being required to participate in the Planning Team meetings, the Planning Team members were also required to liaison with other groups including their own department/districts planning and project staff and with cooperating agencies to provide updates on the project and to bring to the team the different perspectives and comments. The Planning Team conducted a very extensive outreach effort.

This was done mostly through leveraging of existing meetings and efforts. In this liaison role, the Planning Team members coordinated with CalFire; the United States Forest Service, San Bernardino National Forest and Angeles National Forest; Natural Resource Conservation Service, Special Districts, and the 24 cities and towns within the County. This allowed for the Planning Team to capture a larger perspective; while keeping the Planning Team at a manageable level. The information was then brought back to the Multi-Jurisdictional Planning Team by the individual Planning Team members. At these meeting, potential cooperative projects were discussed, categorized, and prioritized for inclusion in the Multi-Jurisdictional Hazard Mitigation Plan.

As previously mentioned, the Unincorporated County and special districts were also active members of the San Bernardino OA Stakeholder Group meetings. These meetings provided an opportunity to coordinate with all cities/towns and special districts in the county. Through this venue, the Planning Team and the Project Manager reached out to adjacent jurisdictions and associated special districts to ensure that their efforts and findings were not in conflict. Stakeholder Meetings include the primary, alternate, and any consultants for all the participating jurisdictions.

As part of this effort, an OA Stakeholder Web Portal was developed to assist the jurisdictions update their MJHMPs, and encouraged sharing information, resources, and ideas necessary to complete the update process. Meetings, attended by the County Project Manager, were both in person and by conference call; many including a webinar. The Project Manager then brought the materials and discussions held at these meetings back to the Planning Team for review and action wherever applicable to the MJHMP effort. Participating Stakeholders are listed in Annex 5. A list of the OA Stakeholder Meetings is listed below:

- September 21, 2016
  Stakeholders Conference Call/Webinar at OES Headquarters
  1:30 p.m. to 2:30 p.m.

  8 participants in MJHMP Update Project Portal Rollout participated in the Conference Call and Webinar to introduce MJHMP Update Portal. Portal has public and stakeholder sections. During this conference call participants were shown the portal and walked through the log-in process to access the stakeholders' side of the website. Also discussed having weekly and some occasions office calls to update plan progress and needs for information.

- September 28, 2016
  Production team conference call OES Headquarters
  1:30 p.m. to 2:30 p.m.

  This meeting presented the website updates, progress chart and needs from other stakeholder departments to provide data such as proposed, in progress and completed hazard mitigating projects. The MJHMP Resource material was also reviewed. The tentative schedule of Production group meetings was reviewed.

- October 5, 2016
  Production Group Conference Call
  1:30 p.m. to 2:30 a.m.

  Stakeholders discussed MJHMP progress of the MJHMP updates. Revised timelines for updates were presented. New Reference Materials now available on the Web Portal were presented. Questions from the participants were discussed and answered.

- October 12, 2016
  Production team conference call
  OES Headquarters
  1:30 p.m. to 2:30 p.m.

  This meeting presented the website updates, progress chart and needs from other stakeholder departments to provide data such as proposed, in progress and completed hazard mitigating projects. The MJHMP Resource material was also reviewed. The tentative schedule of Production group meetings was reviewed.

- October 19, 2016
  OES Headquarters
  1:30 p.m. to 2:30 p.m.

  This meeting presented the website updates, progress chart and needs from other stakeholder departments to provide data such as proposed, in progress and completed hazard mitigating projects. The MJHMP Resource material was also reviewed. The tentative schedule of Production group meetings was reviewed.

- October 26, CISN
  Project Management Team Meeting
  San Bernardino County Government Center Community Room,
  10:00 a.m. to 12:00 a.m.

  This meeting was with 12 county members and any public to go over changes in the general plan and updates the County Hazard Mitigation plan with current and proposed and approved projects as well as code updates and ordinance changes and draft safety proposals.

- October 26, 2016
  Entire project Teams representatives via in person or video and voice call in
  Video Conference Call
  2 p.m. to 4 p.m.

  All project team stakeholder representatives discussed progress of the MJHMP updates. And timelines were discussed. Questions from the participants were discussed and answered. Also a live meeting in conjunction with Land Use representatives and Fire also consultant staff. 32 in attendance and 108 called in or video linked. Internal and External groups

3.2.2 External Coordination

The unincorporated county also had representation on the OA Working Group team. The Working Group is a small group of OA Stakeholders with experience in developing Multi-Jurisdictional Hazard Mitigation Plans. Members are drawn from the 24 cities/towns, 33 special districts, and the County. The goal of the Working Group is to vet the direction and material being provided to the larger Stakeholder Group such as crosswalk, Web Portal, use of maps, and a method to prioritize and rank the existing and any new hazards. The Working Group also discusses problems and solutions that arise during the MJHMP update process. Meetings were either in person or by conference call.

- June 23, 2016
  Stakeholders Meeting
  San Bernardino Unified School District Community Room, San Bernardino, CA
  2:00 p.m. to 4:00 p.m.

  54 Participants representing 24 cities/towns, 30 special districts, and the unincorporated area of participated. This Stakeholders Meeting introduced the Web Portal and the process to develop a current MJHMP from the 2010 MJHMP. Timelines were presented as well as templates for use in updating the project. Copies of the 2010 MJHMP for the jurisdictions were made available on the Web Portal to use as a starting point in the update process.

- August 30, 2016
  Stakeholders Meeting at OES Headquarters 1:30 p.m. to 2:30 p.m.

  In person meeting to discuss revisions and additions to the Planning Process, risk Assessment, Community capability Assessment, Mitigation Strategies, Plan maintenance, fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion in the plan.

- October 26, 2016
  Entire project Teams representatives via in person, video or voice call in
  Video Conference Call
  2 p.m. to 4 p.m.

  All project team stakeholder representatives discussed progress of the MJHMP updates. Timelines were discussed.
  Questions from the participants were discussed and answered. Also a live meeting in conjunction with Land Use representatives and Fire also consultant staff. 32 in attendance and 108 called in or video linked.

3.3 Public Involvement/Outreach

Public involvement was solicited throughout the process. Since the 2016 MJHMP approval, the County and its special districts have taken several steps to educate the public on the hazards facing the county and had several public forums where mitigation projects were discussed and identified. At all events, public opinion and comments are solicited.

The Planning Team also considered the possibility of including public members on the Planning Team. However, because of the vast size of the county and the volume of possibilities, it was determined that having the Planning Team members liaison with the public would better serve and capture the public interest.

During this process, the County and Special Districts also used several platforms to reach out and inform the public of the MJHMP update. Wherever possible, a joint effort was made by the Planning Team members to include discussion for each participating jurisdictions hazards, goals, and objectives. These joint meetings of the Special Districts and County resulted in joint leverage of the planning effort and a resulting joint benefit of goals/objectives, and project development for the MJHMP development. Public Involvement consisted of meetings for County Departments or Special Districts which gave the public the direct opportunity to comment on the County Unincorporated Area MJHMP, meetings of County Department or Special District advisory committees where hazard specific information and possible projects were discussed, updates on the County website, press releases regarding the MJHMP, and public hearing regarding the MJHMP. All participants collectively supported the following public outreach meetings. Below is a summary list of the public outreach:

3.3.1 Public Meetings

- Wrightwood Fire Safe Council
  Wrightwood Museum, Wrightwood, CA
  July 19, 2016
  7:00 p.m. to 9:00 p.m.

17 community members and 7 Wrightwood Fire Safe Council members attended. A demonstration of Thermo-Gel and various application methods was demonstrated by a private vendor.

Reports of activities were given by the Angeles National Forest and the San Bernardino National Forest.
San Bernardino County Fire Protection District Office of Emergency Services presented a PowerPoint presentation on the effort to update the MJHMP for the unincorporated area of the County. A copy of this PowerPoint is in Annex 9 of the MJHMP.

- Rim of the World Mutual Aid Association
  100 W. Meadow Lane, Big Bear City, CA
  August 21, 2016
  6:00 p.m. to 7:30 a.m.

  24 representatives of local agencies, special districts, utilities, and the public in the Big Bear Valley attended the meeting. The City of Big Bear Lake and the Big Bear City CSD reported on the status of their MJHMP Update efforts. Both are proceeding with the goal of submitting the plan following the Group 1 timelines. Both agencies made presentations to their residents explaining the MJHMP Update Process, public involvement, and timelines.

  San Bernardino County Fire Protection District Office of Emergency Services presented a PowerPoint presentation on the effort to update the MJHMP for the unincorporated area of the County.

- Morongo Basin COAD Community Organizations Active in Disasters
  September 14, 2016
  10:00 a.m. to 12:00 p.m.

  This was a public meeting to discuss volunteers in disasters and the Local Hazard Mitigation Plan and the future of volunteer organizations in active disasters in the areas of Morongo and the entire county of San Bernardino County.

- Wrightwood Fire Safe Council
  Wrightwood Elementary School, Wrightwood, Ca
  September 20, 2016

  Community meeting of the fire safe council for the communities of Wrightwood, Pinion Hills, Phelan, West Cajon Valley, Baldy mesa the meeting covered topics of Emergency Alert System and notifications, repopulation and evacuation pans as well as the Local Hazard Mitigation Plan Update

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- Rim of the World Mountain Mutual Aid Association
  September 21, 2016

  Rim of the World Mountains Mutual Aid Association in Person meeting to discuss Planning Team Goals and Objectives, and any public concerns and contact information was given and it was the first item on the agenda for the meeting; continuing on with fire fuel thinning programs (MAST) and Bark Beetle tree removal.

- CERT Terrorism Meeting/Training
  Victoria Gardens Community Center Rancho Cucamonga, CA
  September 24, 2016
  8:00 a.m. to 4:00 p.m.

  This was a CERT Symposium on Terrorism that covered the December 2nd Terror Attack and mass shooting incidents and how to react. An Active Shooter Awareness Course and discussion on the Local Hazard Mitigation Plan Update and Counter Terrorism Awareness courses were all presented to 100 CERT Members and public attendees.

3.3.2 Ready SB County Preparedness App Message/Web Postings

An App message was sent out to alert the public about the hazard mitigation process. The message was sent to over 15,000 people via the SB County Preparedness Mobile App and it is attached to the San Bernardino County Fire Website https://sbcfire.org as referenced in Annex 6. Ready SB County Preparedness Mobile App can be used on either an Android or iPhone. This app provides multiple resources for our residents that will assist them in preparing for a disaster and enhancing the recovery process. Protect yourself and your loved ones before, during and after a disaster.

In addition to hazard mitigation plan updates the public can get the Latest News from SBCounty.gov, CalTrans, National Weather Service, and San Bernardino County Fire Office of Emergency Services. This app provides the public with emergency supply kit lists, grocery lists and checklists tailored to an individual. The public can access and update preparedness plans as needed. Learn all you need to plan for and respond to natural disasters, terrorism and pandemic flu in San Bernardino County.

3.3.3 CERT Teams

The Press Release and Executive Summary were forwarded to the CERT Team leaders for those CERT Teams located in the unincorporated County area. The Team Leaders forwarded the MJHMP Press Release and Executive summary to their team members with the request for comments on the MJHMP. The fourteen (14) CERT Teams within the unincorporated County include:

Angelus Oaks CERT	Big Bear Valley CERT	Helendale CERT
Lucerne Valley CERT	Lytle Creek CERT	Mill Creek Canyon CERT
Morongo Basin CERT	Mountain CERT	Oak Hills CERT
Phelan/Pinon Hills CERT	Rosena Beach CERT	San Antonio Heights CERT
Silver Valley CERT	Wrightwood CERT	

3.3.4 Public Hearing Process (to be completed upon FEMA Approval)

Once FEMA "approval pending adoption" notification is received, the Board of Supervisors reviewed, approved, and adopted the Unincorporated Area Multi-Jurisdictional Hazard Mitigation Plan for the County and its Special Districts at the Public Hearing meeting **(date to be determined)**. The Board of Supervisors issued a Letter of Promulgation and Resolution denoting approval of the Multi-Jurisdictional Hazard Mitigation Plan for the County and its special Districts.

Prior to the Public Adoption Hearing Date (date to be determined), the Plan will be posted on the San Bernardino County website as part of the Agenda for the meeting. The Agenda with all attachments is posted the Wednesday prior to the hearing date as a public review requirement. Members of the public were invited to review and make comments at the meeting on (date to be determined). The Multi-Jurisdictional Hazard Mitigation Plan for the County and its Special Districts was on the Board of Supervisors agenda for review and adoption at their regularly scheduled meeting on (date to be determined).Residents of the County were requested to make comments or request information on the Multi-Jurisdictional Hazard Mitigation Plan during the regularly scheduled meeting. After the public had an opportunity to review and comment on the Plan the Board of Supervisors took action on the Board Agenda items.

3.4 Planning Process

As discussed, the planning process followed FEMA How to guides which includes; organizing resources, conducting the risk assessment, developing a capabilities assessment, developing a mitigation strategy and providing implementation measures for continued mitigation success, The Risk Assessment process includes four (4) basic step; 1) hazard identification and screening; 2) hazard profiling; 3) hazard exposure; and, 4) hazard vulnerability. The Project Manager, working with the Planning Team, facilitated discussions around these steps.
The first step in this process was to identify all natural hazards present in the community. The Planning Team started with the 2010 MJHMP and augmented as necessary. This augmentation

considered both adding and removing of hazards to develop a list of potential natural hazards in the community. The Planning Team utilized several sources to ensure they were considering all potential hazards. Material reviewed included the following: 2010 San Bernardino County Operational Area MJHMP, State of California MJHMP, FEMA "How-to Guides," and several surround community MJHMPs. After the list of potential hazards in the community is generated, the hazards were screened. For a full listing of documents see Section 5.1.1

3.4.1 Hazard Screening

The intent of screening hazards is to help prioritize which hazard creates the greatest concern in the community. In 2010, the MJHMP process used Critical Priority Risk Index (CPRI) software to evaluate hazards. In 2016 an alternative approach was implemented. The Planning Team agreed to utilize a non-numerical ranking system for the MJHMP update process. This process consists of generating a qualitative ranking (High, Medium, or Low) rating for: 1) probability; and, 2) impact from each hazard. To further assist with the process, the following definition of "High", "Medium", and "Low" probability and impacts are being provided (NOTE: these definitions we utilized in the 2010 MJHMP process):

Probability
High-Highly Likely/Likely
Medium-Possible
Low-Unlikely
Impact
High-Catastrophic/Critical
Medium-Limited
Low-Negligible

The hazards were then placed into a matrix with the appropriate/corresponding box/cell. The table below is an example of how the process will capture the results.

		Impact		
		High	Medium	Low
Probability	High			
	Medium			
	Low			

After all hazards had been analyzed, the Planning Team then determined which Probability and Impact category (i.e., High Impact; High Probability, Medium Impact) the community will focus on over the next five (5) years. An example of how the hazards may be prioritized is below (Red equaling high priority):

		Impact		
		High	Medium	Low
Probability	High			
	Medium			
	Low			

After identifying the "higher" priority hazards in the community, each of the "high" priority hazards were profiled. The hazard profiling include the incorporation of all new information, material, and reports to better help the Planning Team and the community understand the hazard.

Additionally, for each of the profiled hazards, the Planning Team then analyzed the community's exposure to each hazard (inventory of assets) and the potential impact under scenario events. The Planning Team used HAZUS and hazards intersect analyses recently completed within San Bernardino County to produce this information. See Section 4 for more information.

3.4.2 Set Goals

Goal setting was approached by the Planning Team as a two layered process. The first layer involved the stakeholders acting together as the Planning Team. The second layer involved the individual Special Districts working internally to coordinate those goals identified by the Planning Team with the goals identified internally by the Special Districts. The Planning Team validated and identified new Goals and Objectives for the MJHMP update in 2016. The Planning Team reviewed the hazard exposure and scenario impacts developed during the Risk Assessment portion of the process. With a firm understanding of the risk the community is potentially facing, the Planning Team then re-evaluated the 2010 Multi-Jurisdictional Hazard Mitigation Plan Goals and Objectives; assessed their status and effectiveness in meeting the 2010 Mitigation Measures and identified new Goals and Objectives.

As part of this process, the Planning Team also reviewed the County's General Plan, the State of California MJHMP, Floodplain Management Plans, Task Force After Action, and/or documents, and adjacent local jurisdiction MJHMPs to ensure the Goals and Objectives were comprehensive and compatible with those outlined in this plan.

3.4.3 Review and Propose Mitigation Measures

After the Goals and Objectives were established, the Planning Team then turned to identifying projects under each Goal and Objective that could be implemented to help reduce and/or eliminate the impacts from the priority hazards. As part of this process, the Planning Team reviewed the projects in the 2010 MJHMP to determine which are completed, which are ongoing, and which were deferred. For projects that were not completed the Planning Team validated whether or not the project was necessary.

With a firm understanding of past accomplishments and a good understanding of the potential exposure and scenario impacts from the Risk Assessment section, the Planning Team then started to identify projects that will help reduce and/or eliminate the risk for the high priority hazards. Again, a two-layer approach was used. The Planning Team as a whole identified common projects. These common projects were then coordinated internally by the Special Districts and the County to develop a common list of projects. After a list of all possible projects has been identified, the Planning Team then went through the process of prioritizing the projects.

To assist with this effort the Planning Team adopted the STAPLEE methodology. STAPLEE stands for:

- Social - The public must support the overall implementation strategy and specific mitigation actions. Therefore, the projects will have to be evaluated in terms of community acceptance.
- Technology - It is important to determine if the proposed action is technically feasible, will help to reduce losses in the long term, and has minimal secondary impacts. Determine whether the alternative action is a whole or partial solution, or not a solution at all.
- Administrative - Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to determine if the jurisdiction/special district has the personnel and administrative capabilities necessary to implement the action or whether outside help will be needed
- Political - Understanding how your current community and State political leadership feel's about issues related to the environment, economic development, safety, and emergency management. This will provide valuable insight into the level of political support you may have for the mitigation activities and programs. Proposed mitigation objectives sometimes fail because of a lack of political acceptability.
- Legal - Without the appropriate legal authority, the action cannot lawfully be undertaken. When considering this criterion, determine whether your jurisdiction has the legal authority at the State, or local level to implement the action, or whether the jurisdiction must pass new laws or regulations. Each level of government operates under a specific source of delegated authority. As a general rule, most local governments operate under enabling legislation that gives them the power to engage in different activities. Identify the unit of government undertaking the mitigation action, and include an analysis of the interrelationships between local, regional, State, and Federal governments. Legal authority is likely to have a significant role later in the process when your State, or community will

have to determine how mitigation activities can best be carried out, and to what extent mitigation policies and programs can be enforced.

- Economic - Every local government experiences budget constraints at one time or another. Cost effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented than mitigation actions requiring general obligation bonds or other instruments that would incur long-term debt to a community. Local communities with tight budgets or budget shortfalls may be more willing to undertake a mitigation initiative if it can be funded, at least in part, by outside sources. "Big ticket" mitigation actions, such as large-scale acquisitions and relocation, are often considered for implementation in a post-disaster scenario when additional Federal and State funding for mitigation is available.
- Environmental - Impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities and the many statutory considerations, such as NEPA, to keep in mind when using Federal funds. The Planning Team needed to evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets such as threatened and endangered species, wetlands, and other protected natural resources.

In addition to the STAPLEE methodology, the Planning Team incorporated other criteria/factor questions into the process to help engage and solicit input from members. Examples of these criteria/factor questions are:

- Does the Action:
  - o Solve the problem?
  - o Address Vulnerability Assessment?
  - o Reduce the exposure or vulnerability to the highest priority hazard?
  - o Address multiple hazards?
  - o Address more than one (1) Goal/Objective?
  - o Benefits equal or exceed costs?

- Can the Action:
  - o Be implemented with existing funds?
  - o Be implemented by existing state or federal grant programs?
  - o Be completed within the 5-year life cycle of the LMJHMP?
  - o Be implemented with currently available technologies?

- Will the Action:
  - o Be accepted by the community?
  - o Be supported by community leaders?
  - o Adversely impact segments of the population or neighborhoods?
  - o Require a change in local ordinances or zoning laws?
  - o Result in legal action such as a lawsuit?
  - o Positively or negatively impact the environment?
  - o Comply with all local, state, and federal environmental laws and regulations?

- Is there:
  - o Sufficient staffing to undertake the project?
  - o Existing authority to undertake the project?

After going through the above mentioned process for each project, the Planning Team identified higher priority projects.

3.4.4 Draft the Multi-Jurisdictional Hazard Mitigation Plan

The Multi-Jurisdictional Hazard Mitigation Plan Update was drafted by the Project Manager, based on input and comments provided by the Planning Team. As indicated previously, the Planning Team used the 2010 MJHMP as a starting point but revised it to reflect updated information). The 2016 MJHMP format and is similar to the 2010 plan with slight heading changes and differences in content. In addition to the heading changes and improved risk assessment information, the Planning Team also uses the FEMA Guidance and materials provided by the consultant hired to coordinate the Operational Area MJHMP and Stakeholder groups. This material aided in the Planning Team's understanding of the level of detail and type of information that is excepting in each section.

This process started with the Special Districts and County providing information to the Planning Team through their liaison on the planning team. After the Planning Team ranked and prioritized the materials, the liaisons returned to their respective Special Districts to vet the Planning Team's work. The Planning Team then worked together with the vetted materials to produce the draft MJHMP. As mentioned earlier, each section was reviewed and updated as necessary. While some Planning Team members are responsible for the updating select sections, all members are responsible for reviewing and commenting on the entire MJHMP. The Planning Team Project Manager was responsible for version control and distribution of the final MJHMP for review.

Once the MJHMP update was drafted, the Planning Team provided opportunities for the public to review and comment on the plan. After the public comment period was closed, the Planning Team finalized the plan and forwarded to Cal EMA and FEMA for approval.

3.4.5 Adopt the Plan

The San Bernardino County Board of Supervisors created each of the Special Districts to provide a specific service to a particular area/population of San Bernardino County. These Special Districts are Board Governed in that the Board of Supervisors has direct control and legislative oversight of the Special Districts. The Board of Supervisors takes action on behalf of each Special District whenever governance items are necessary. As the Five special districts are separate legal entities from the County of San Bernardino for tax/revenue purposes the Board of supervisors, acting as the Board of Directors for each Special District, will be adopting the Multi-

Jurisdictional Hazard Mitigation Plan on behalf of each Special District. The Special Districts are not independent from San Bernardino County but are controlled and administered as any other County Department is administered. In order to comply with legal requirement for each of the five Special Districts, separate resolutions are required. Copies of these resolutions are attached at the front of this MJHMP.

San Bernardino County Board of Supervisors is responsible for the review, approval, and adoption of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update for the unincorporated area of San Bernardino County, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, the Big Bear Valley Recreation and Park District, Bloomington Recreation and Park District and for the County's board governed Special Districts Department. It is also the intent of the San Bernardino County Board of Supervisors to take appropriate actions to incorporate the MJHMP update into the San Bernardino County General Plan.

After Cal EMA and FEMA have approved the HMP update, it will be adopted by the San Bernardino County Board of Supervisors. Currently, the adoption process is scheduled for **(date to be determined)**. The item will be part of the consent calendar subject to a public hearing if necessary. The HMP will be listed on the agenda with the plan being made available electronically to the general public for at least three (3) business days prior to the Board of Supervisor's meeting date. Any member of the public can make comments on the Plan during the meeting prior to any action by the Board of Supervisors.

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Section 4. Risk Assessment

The goal of mitigation is to reduce and/or eliminate the future impacts of a hazard including property damage, disruption to local and regional economies, and the amount of public and private funds spent to assist with recovery. However, mitigation should be based on an assessment of the risk.

This Risk Assessment Section evaluates the potential loss from a hazard event by assessing the vulnerability of buildings, infrastructure, and people. It identifies the characteristics and potential consequences of hazards, how much of the unincorporated areas of the County could be affected by a hazard, and the impact on unincorporated County area assets. The Risk Assessment approach consists of three (3) components:

- ***Hazard Identification*** – *Identification and screening of hazards (Section 4.1)*
- ***Hazard Profiles*** – *Review of historic occurrences and assessment of the potential for future events (Section 4.2)*
- ***Vulnerability Assessment*** – *Determination of potential losses or impacts to buildings, infrastructure and population (Section 4.3)*

4.1 Hazard Identification

4.1.1 Hazard Screening Criteria

Per FEMA Guidance, the first step in developing the Risk Assessment is identifying the hazards. The County's HMP Planning Team reviewed a number of previously prepared hazard mitigation plans and other relevant documents to determine the universe of natural hazards that have the potential to affect the County and the nearby region. Table 4-1 provides a crosswalk of hazards identified in the 2010 San Bernardino County Multijurisdictional Hazard Mitigation Plan Update, the County of San Bernardino 2007 General Plan Safety Element, Single Jurisdictional Plans and the 2013 CA State Hazard Mitigation Plan. Seventeen different hazards were identified based on a thorough document review. The crosswalk was used to develop a preliminary hazards list providing a framework for County HMP Planning Team members to evaluate which hazards were truly relevant to the County and which ones are not. For example, volcanic activity was considered to be of little relevance to the County, while earthquake, flooding, and wildfire were indicated in almost all hazard documentation.

Table 4-1: Document Review Crosswalk

Hazards	2010 San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan	County of San Bernardino 2007 General Plan Safety Element	Single Jurisdictional Plans	2013 CA State Hazard Mitigation Plan
Climate Change				■
Dam Inundation			■	■
Drought			■	■
Earthquake/ Geologic Hazards	■	■	■	■
Extreme Heat				■
Extreme Cold				■
Flood	■	■	■	■
Hazardous Waste		■	■	■
High Winds/ Straight Line Winds		■	■	
Hail				
Infestation				
Lightning				
Terrorism			■	■
Tornado				
Volcanic Activity		■		■
Wildfire	■	■	■	■
Winter Storm (Heavy Snowfall)				■

In addition to a document review, previous hazard occurrences were used to identify hazards for this hazard mitigation plan. Previous hazard occurrences provide a historical view of hazards that have affected the County in the past, and thus provide a window into the potential hazards that can affect the County in the future. Information about federal and state disaster declarations in San Bernardino County (declarations are declared by County) was compiled from FEMA and Cal EMA's databases, as shown in Table 4-2. Though not a complete snapshot of hazard incidences in the County (since not all hazard events are federally or state declared), Table 4-2 provided the County HMP Planning Team with solidified accounts of the types and extent of disasters that have affected the County dating back to 1965 when flooding affected entire regions of San Bernardino County. As indicated in Table 4-2 large regional incidents have affected San Bernardino County, including the California Wildfires of 1999. Most recently, disasters for terrorist attacks (2015), flood (2011) and severe storms (2010) were declared in San Bernardino County. The disaster declarations in Table 4-2 provide a baseline for consideration in the hazard prioritization process.

Table 4-2: Federal, State and County Declared Disasters

Disaster Number	Declaration Date	Disaster Type	Incident Type	Title
Federal Declarations				
Major Disaster Declarations				
1952	1/26/2011	DR	Flood	Severe Winter Storms, Flooding, and Debris and Mud Flows
1884	3/8/2010	DR	Severe Storm(s)	Severe Winter Storms, Flooding, and Debris and Mud Flows
1731	10/24/2007	DR	Fire	Wildfires, Flooding, Mud Flows, and Debris Flows
1689	3/13/2007	DR	Freezing	Severe Freeze
1585	4/14/2005	DR	Severe Storm(s)	Severe Storms, Flooding, Landslides, and Mud and Debris Flows
1577	2/4/2005	DR	Severe Storm(s)	Severe Storms, Flooding, Debris Flows, and Mudslides
1498	10/27/2003	DR	Fire	Wildfires, Flooding, Mudflow and Debris Flow Directly Related T
1203	2/9/1998	DR	Severe Storm(s)	Severe Winter Storms and Flooding
1046	3/12/1995	DR	Severe Storm(s)	Severe Winter Storms, Flooding Landslides, Mud Flow
1044	1/10/1995	DR	Severe Storm(s)	Severe Winter Storms, Flooding, Landslides, Mud Flows
1005	10/28/1993	DR	Fire	Fires, Mud/Landslides, Flooding, Soil Erosion
979	2/3/1993	DR	Flood	Severe Winter Storm, Mud & Land Slides, & Flooding
947	7/2/1992	DR	Earthquake	Earthquake & Aftershocks
935	2/25/1992	DR	Flood	Rain/Snow/Wind Storms, Flooding, Mudslides
894	2/11/1991	DR	Freezing	Severe Freeze
872	6/30/1990	DR	Fire	Fires
690	9/22/1983	DR	Flood	Flash Flooding
687	7/1/1983	DR	Flood	Flooding
677	2/9/1983	DR	Coastal Storm	Coastal Storms, Floods, Slides & Tornadoes
635	11/27/1980	DR	Fire	Brush & Timber Fires
615	2/21/1980	DR	Flood	Severe Storms, Mudslides & Flooding
547	2/15/1978	DR	Flood	Coastal Storms, Mudslides & Flooding
521	9/21/1976	DR	Flood	Flooding, Tropical Storm Kathleen
295	9/29/1970	DR	Fire	Forest & Brush Fires
253	1/26/1969	DR	Flood	Severe Storms & Flooding
223	1/2/1967	DR	Flood	Severe Storms & Flooding
211	12/7/1965	DR	Flood	Heavy Rains & Flooding
Fire Management Assistance Declarations				
2955	9/2/2011	FM	Fire	Hill Fire
2841	10/4/2009	FM	Fire	Sheep Fire
2836	9/1/2009	FM	Fire	Pendleton Fire
2833	8/31/2009	FM	Fire	Oak Glen Fire
2792	11/15/2008	FM	Fire	Freeway Fire Complex
3279	10/23/2007	EM	Fire	Wildfires
2738	10/22/2007	FM	Fire	Grass Valley Fire
2728	9/15/2007	FM	Fire	Butler 2 Fire
2653	7/12/2006	FM	Fire	Sawtooth Fire Complex

Disaster Number	Declaration Date	Disaster Type	Incident Type	Title
3248	9/13/2005	EM	Hurricane	Hurricane Katrina Evacuation
2503	10/25/2003	FM	Fire	Old Fire
2501	10/23/2003	FM	Fire	Ca-Grand Prix Fire-10-23-2003
2497	9/6/2003	FM	Fire	Ca-Bridge Fire-09-05-2003
2491	8/19/2003	FM	Fire	Ca-Locust Wildfire-08-19-2003
Emergency Declarations				
3140	9/1/1999	EM	Fire	Ca-Wildfires-08/25/1999
CALOES Emergency and Disaster Proclamations/ Executive Orders				
Other Disasters				
2464	9/24/2002	FS	Fire	Williams Fire
2433	6/27/2002	FS	Fire	Louisiana Fire
2425	6/17/2002	FS	Fire	Blue Cut Fire
###	12/18/2015	EM	Terrorist Attack	Mass Shooting
State Declarations				
145	2/14/1963		Severe Storms	California Severe Storms, Heavy Rains, & Flooding
47	12/22/1955		Flood	California Flood
15	2/5/1954		Flood	California Flood & Erosion
County Declarations				
	3/13/1990		Earthquake	Upland Earthquake
	10/31/1988		Fire	Texas Fire (Watershed Damage)
	9/3/1987		Fire	Wildland Fires
	7/13/1984		Weather	Unstable Weather Conditions (City of Big Bear Lake, CSD, Co. Flood Control, Victor Valley Waste Water Authority, Juniper Riviera County Water District)
	9/29/1979		Gasoline Shortage	Gasoline Shortage Emergency
	6/28/1979		Water Shortage	Water Shortage (Lake Gregory)
	7/22/1960		Fire	Major and Widespread Fires

4.1.2 Hazard Prioritization

The Planning Team determined that the County and its Special Districts should focus over the next five (5) years on hazards that fell within the HIGH and MEDIUM "Probability" and "Impact" categories. While all the hazards present a potential problem in the County, the Planning Team felt that if they were able to reduce or eliminate the risk from these hazards, it would provide a greater service to the people within the jurisdiction. Table 4-3 illustrates how the final prioritization of the hazard; the "Green" colored box represents the highest priority hazards; and the "White" colored boxes represent lower (second and third tier) priority hazards.

		Impact		
		High	Medium	Low
Probability	High	Wildfire Flood Earthquake/ Geologic Hazards	Drought	
	Medium	Terrorism	Climate Change (Extreme Heat and other)	Hail Infestation
	Low		Dam Inundation	Tornado High Winds Winter Storm Lightning Extreme Cold

Table 4-3: Prioritized Hazard Assessment Matrix

4.2 Hazard Profiles

Although the County faces the risk of experiencing many natural and manmade hazards, this section profiles only the County's highest priority natural hazards the unincorporated County areas and Special District areas are expected to experience; earthquake, wildfire, flood, drought, terrorism and climate change. The priority hazards are based on the Calculated Priority Risk Index (CPRI) explained in Section 4.1.2.

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4.3 Earthquake Geologic Hazards

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the earth as the huge plates that form the earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free, causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates.

Ground shaking from earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill and other unstable soil, and trailers and homes not tied to their foundations are at risk because they can be shaken off their mountings during an earthquake. When an earthquake occurs in a populated area, it may cause deaths and injuries and extensive property damage. Earthquakes can strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night. On a yearly basis, 70 to 75 damaging earthquakes occur throughout the world.

4.3.1 Regulatory Environment

The Alquist-Priolo Earthquake Fault Zoning (AP) Act was passed into law following the destructive February 9, 1971 San Fernando earthquake. The AP Act provides a mechanism for reducing losses from surface fault rupture on a statewide basis. The intent of the AP Act is to ensure public safety by prohibiting the siting of most structures for human occupancy across traces of active faults that constitute a potential hazard to structures from surface faulting or fault creep.

The 2013 California Building Standards Code (also known as Title 24) became effective for the County on January 1st, 2014. Title 24 includes CBC Section 3417: Earthquake Evaluation and Design for Retrofit of Existing Buildings which can be viewed at http://www.bsc.ca.gov/codes.aspx

Changes or additions to the seismic provisions come from many different sources, including new research results and documentation of performance in past earthquakes. A primary resource is the National Earthquake Hazard Reduction Program (NEHRP) Recommended Seismic Provisions for New Buildings and Other Structures (FEMA P-750: http://www.fema.gov/media-library/assets/documents/18152). FEMA's companion document Earthquake Resistant Design

Concepts (FEMA P-749: http://www.fema.gov/media-library/assets/documents/21866) provides a nontechnical background explanation.

4.3.2 Past Occurrences

Table 4-4 shows earthquakes greater than Magnitude 4.0 that have been felt within the San Bernardino County area in the last five years.

Table 4-4: Earthquakes: 2010-2015 San Bernardino County

Date	Name
9/14/2011	Calimesa 4.1
1/15/2014	Fontana 4.4
7/5/2014	Running Springs 4.6
3/29/2014	Brea 5.1
7/25/2015	Fontana 4.2
9/16/15	Big Bear Lake 4.0
12/30/2015	Muscoy 4.4
1/6/2016	Banning 4.4

There are hundreds more small (M<4.0) earthquakes that have occurred within San Bernardino County during this same time frame. Those with a magnitude of below 4.0 are not listed.

4.3.3 Location/Geographic Extent

Figure 4-1 shows the locations of major faults in California, including the four (4) major faults in Southern California in relation to San Bernardino County. These faults are the Southern San Andreas, the San Jacinto, the Elsinore, and the Garlock Faults. There are also many smaller faults within San Bernardino County capable of producing significant earthquakes. However, these four faults are considered by the United States Geological Survey (USGS) and the California Geological Survey (CGS) to be the most dangerous in the County. (California Geological Survey Special Publication 42, Interim Revision 2007, "Fault-Rupture Hazard Zones in California" - Alquist-Priolo Earthquake Fault Zoning Act). Other geologic hazards include liquefaction and landslides. Both occur during and after earthquakes.

Figure 4-1: Major California Faults

Liquefaction of the ground occurs when the groundwater table is high and soil conditions are favorable. Liquefaction Susceptibility Zones as mapped by the USGS for the 2008 ShakeOut Scenario1 shows areas of the County susceptible to liquefaction during an earthquake. See Figure 4-2

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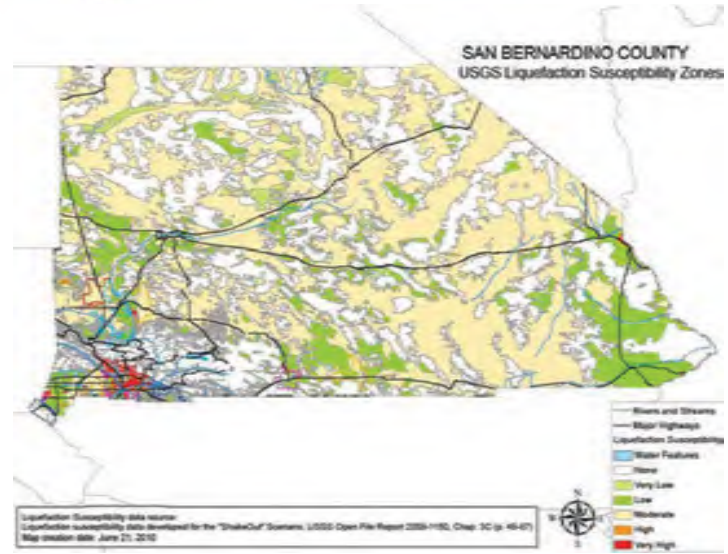

Figure 4-2: USGS Liquefaction Susceptibility Zone

4.3.4 Magnitude/Severity

The MMI Scale measures earthquake intensity as shown in Table 4-5. The MMI Scale has 12 intensity levels. Each level is defined by a group of observable earthquake effects, such as ground shaking and/or damage to infrastructure. Levels I through VI describe what people see and feel during a small to moderate earthquake. Levels VII through XII describe damage to infrastructure during a moderate to catastrophic earthquake.

See Section 4.3.5 to see how magnitude and severity are linked to the probability of earthquake occurrences.

Table 4-5: MMI Scale

Earthquake Magnitude and Intensity		
Magnitude (M_w)	**Intensity (Modified Mercalli Scale)**	**Description**
1.0 – 3.0	I	I. Not felt except by very few people under especially favorable conditions.
3.0 – 3.9	II – III	II. Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
		III. Felt quite noticeably indoors. Many do not recognize it as an earthquake. Standing motorcars may rock slightly.
4.0 – 4.9	IV – V	IV. Felt by many who are indoors; felt by a few outdoors. At night, some awakened. Dishes, windows and doors rattle.
		V. Felt by nearly everyone; many awakened. Some dishes and windows broken; some cracked plaster; unstable objects overturned.
5.0 – 5.9	VI – VII	VI. Felt by everyone; many frightened and run outdoors. Some heavy furniture moved; some fallen plaster or damaged chimneys.
		VII. Most people alarmed and run outside. Damage negligible in well-constructed buildings; considerable damage in poorly constructed buildings.
6.0 – 6.9	VII – IX	VIII. Damage slight in special designed structures; considerable in ordinary buildings; great in poorly built structures. Heavy furniture overturned. Chimneys, monuments, etc. may topple.
		IX. Damage considerable in specially designed structures. Buildings shift from foundations and collapse. Ground cracked. Underground pipes broken.
7.0 and Higher	VIII and Higher	X. Some well-built wooden structures destroyed. Most masonry structures destroyed. Ground badly cracked. Landslides on steep slopes.
		XI. Few, if any, masonry structures remain standing. Railroad rails bent; bridges destroyed. Broad fissure in ground.
		XII. Virtually total destruction. Waves seen on ground. Objects thrown into the air.

4.3.5 Frequency and Probability of Occurrence

Several of the major Southern California faults have a high probability of experiencing a Magnitude 6.7 or greater earthquake within the next 30 years (Figure 4-2); 59% probability of a M6.7 or greater on the Southern San Andreas Fault, 31% probability on the San Jacinto Fault, and 11% probability on the Elsinore Fault. These probabilities were determined by the USGS and CGS in a 2008 study (2007 Working Group on California Earthquake Probabilities, 2008, The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2): U.S. Geological Survey Open-File Report 2007-1437 and California Geological Survey Special Report 203 http://pubs.usgs.gov/of/2007/1437/).

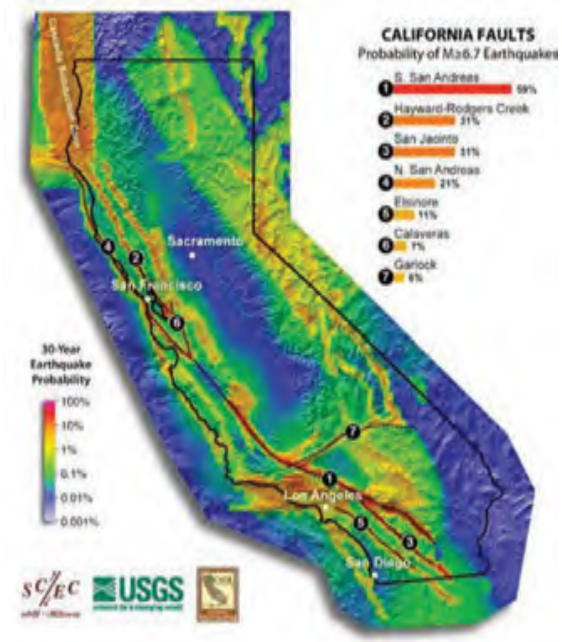

Figure 4-3: California Faults Probability of ≥ M 6.7 Earthquake

As shown in Figure 4-3 the probability of an earthquake with a Magnitude 6.7 or greater occurring somewhere in Southern California within the next 30 years is estimated to be 97% (2007 Working Group on California Earthquake Probabilities, 2008). As can be seen in the table, earthquake probabilities in Southern California are higher than those for Northern California.

Figure 4-4: California Area Earthquake Probabilities by Magnitude

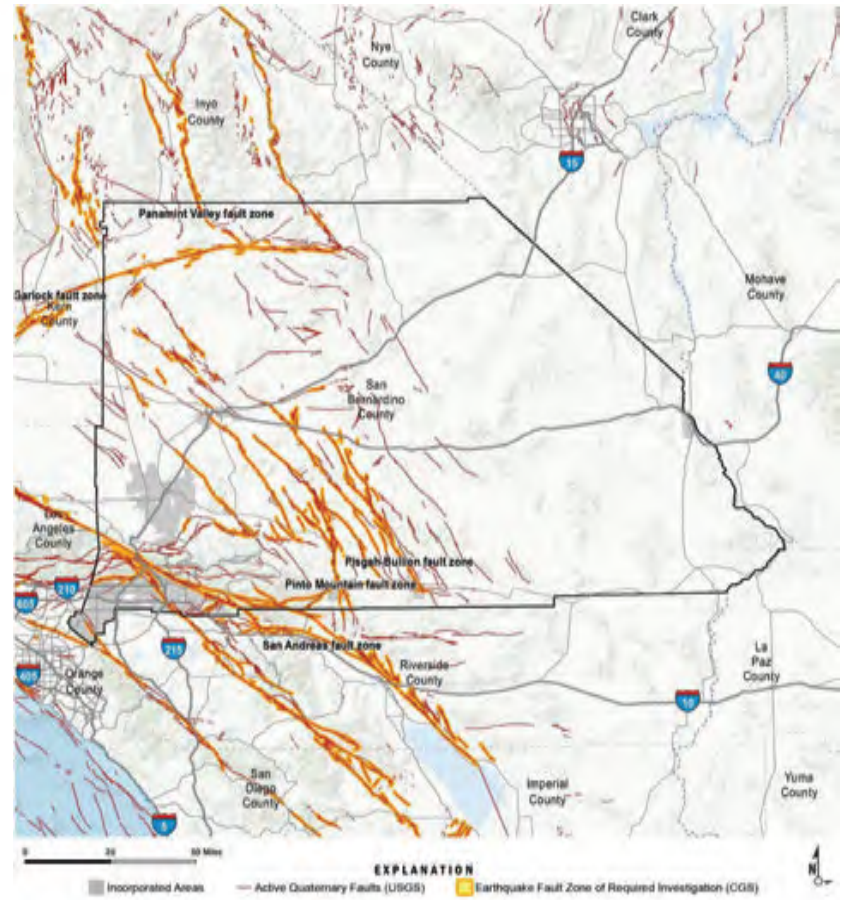

Figure 4-5: Earthquake Fault Zone

4.4 Wildfire

Wildfires present a significant potential for disaster in the County, a region of relatively high temperatures, low humidity, and low precipitation during the summer. This long summer season is followed by a fall season that is famous for high velocity, very dry winds that come out of the desert. The Santa Ana winds very consistently arrive from the middle of October to the end of November. In and of themselves, these weather patterns would be of little significance without the un-naturally dense forest and the dense undergrowth that has been allowed to grow unabated for the last several decades. Compounding the vegetative growth that has occurred is the unchecked development of substantial housing and businesses in mountain communities. This urbanized growth has required parallel growth and sophistication in the fire service that responds to wildfires in the wild land urban interface. With immediate responses to initial fire starts, the vast majority of fires are successfully extinguished in short order. In doing so, this eliminates nature's way of thinning the forest through smaller fires.

Another factor that is a potential for disaster is the number of dead trees in the mountain region. Due to the over densification of the forest combined with drought conditions during the past ten years, trees in the local mountains have become weakened, creating a perfect environment for Bark Beetles to proliferate from 2003 to 2008. Combine these severe burning conditions with people or lightning and the stage is set for the occurrence of large, destructive wildfires. In addition, the forested areas of the County are not only the most popular, with the most visitors in the Nation, but are also the most populated in residences and businesses in the Nation as well. The final element in this catastrophe waiting to happen is that because of the steep mountain terrain, there are only five routes in and out for almost 60,000 residents. On a holiday weekend though, this population can dramatically increase by 50,000 to 100,000 people as weekend vacationers.

4.4.1 Regulatory Environment

4.4.1.1 State

Wildfire State Responsibility Area (SRA) Fire Safe Regulations outline basic wildland fire protection standards for local jurisdictions. SRA Fire Safe Regulations (if policed) can decrease the risk of wildfire events in the wildland interface. SRA Fire Safe Regulations do not supersede local regulations, which equal or exceed minimum state regulations. The State statute for wildfire protection is Public Resources Code, Section 4290. Requirements in the code include information on the following (CA Fire Alliance):

- Road Standards for Fire Equipment Access
- Standards for Signs Identifying Streets, Roads and Buildings
- Minimum Private Water Supply Reserves for Emergency Fire Use
- Fuel Breaks and Greenbelts

4.4.1.2 Local

4.4.1.2.1 Fire Hazard Abatement Program

In an effort to reduce the threat of wild fires, the San Bernardino County Fire Hazard Abatement (FHA) Program enforces the fire hazard requirements outlined in San Bernardino County Code Section 23.0301–23.0319. The primary function of the Fire Hazard Abatement Program is to reduce the risk of fires within communities by pro-actively establishing defensible space and reduction/removal of flammable materials on properties.

The Fire Hazard Abatement Program conducts surveys to identify fire hazards throughout the year. Fire hazards are identified and notices to abate the hazard(s) are mailed to property owners. Property owners are given 30 days to abate the violations. Failure to abate may result in citations, penalties, and/or fees for abatement by the County. The Fire Hazard Abatement Program responds to complaints year round in the unincorporated areas and contracting Cities and Fire Districts.

4.4.2 Past Occurrences

Wildfire locations from 1900 – 2016 are shown in Figure 4-6. In the past five years (since the 2010 MJHMP was approved) there have been 13 significant wildland fires within San Bernardino County. These fires are listed in Table 4-7, and several of the more damaging fires are discussed below.

Table 4-6: Wildfire Occurrences 2010-2016

Number	Date	Name	**Acres**
1.	9/5/2011	Hill Fire	1,158
2.	11/5/2012	Devore Fire	335
3.	6/28/2013	Mill Fire	534
4.	8/8/2013	Sharp Fire	243
5.	9/24/2013	Sierra Fire	200
6.	4/30/2014	Etiwanda Fire	2,143
7.	5/13/2014	Rancho Incident	1,548
8.	3/31/2015	River Bottom Fire	185
9.	6/17/2015	Lake Fire	31,359
10.	7/17/2015	North Fire/ Pines Fire	4,250
11.	8/23/2015	Summit Fire	555
12.	8/7/2016	Pilot Fire	8,110
13.	8/16/2016	Blue Cut Fire	36,274
			86,894

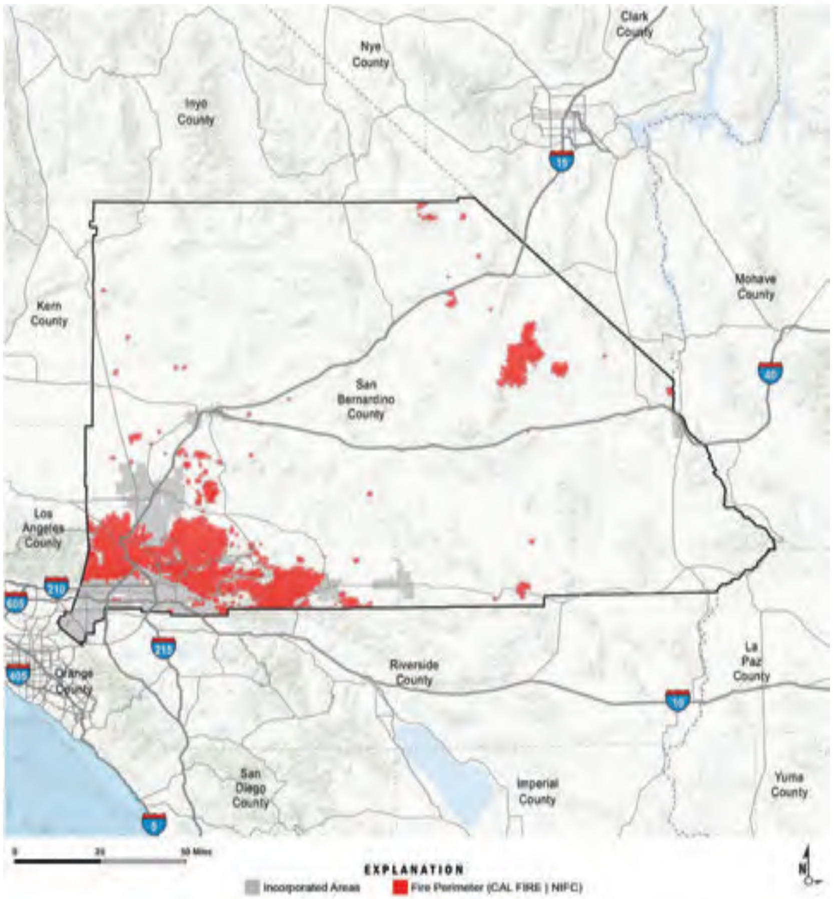

Figure 4-6: Wildfire History 1900 – 2016 (CalFire and USFS Data 2010)

The 2016 Blue Cut Fire was a reminder that wildfires are a significant threat to lives and property in the unincorporated San Bernardino County area. The Blue Cut Fire burned 36,274 acres, destroying an estimated 105 single family residences and 216 outbuildings. In addition, 3 single family residences and 5 other structures were damaged.

In 2015 The Lake Fire burned 31,359 acres and was the cause of 6 minor firefighter injuries and 1 residence and 3 outbuildings were destroyed.

North Fire/Pines Fire in 2015 burned a total of 4,250 acres, destroying 7 homes, 16 outbuildings and 44 vehicles in the community of Baldy Mesa. No injuries were reported.

The Blue Cut Fire, Lake Fire, and North Fire/ Pines Fire all occurred in the County's mapped Very High Fire Severity Zone. Mitigation efforts have reduced but not eliminated the threat from wildfire. The strong fall winds that are capable of creating firestorms cannot be controlled. Drought cannot be controlled. Fuels reduction programs reduce the potential spread of fire, upgraded Building Codes make structures more fire resistant, and public education prepares residents for wildfires. However, the threat of wildfire remains. The continuing goal is to reduce the threat from wildfire wherever possible.

4.4.3 Location/Geographic Extent

Using information from the California Department of Forestry (CAL FIRE) Figure 4-8, illustrates the areas at risk to a wildfire event. The areas with the highest risk of wildfire are the in the southwestern portions of County in the mountainous region.

Figure 4-7 illustrates vegetation mortality due to bark beetle infestation, drought, and other factors in San Bernardino County. These conditions create extreme fire hazards.

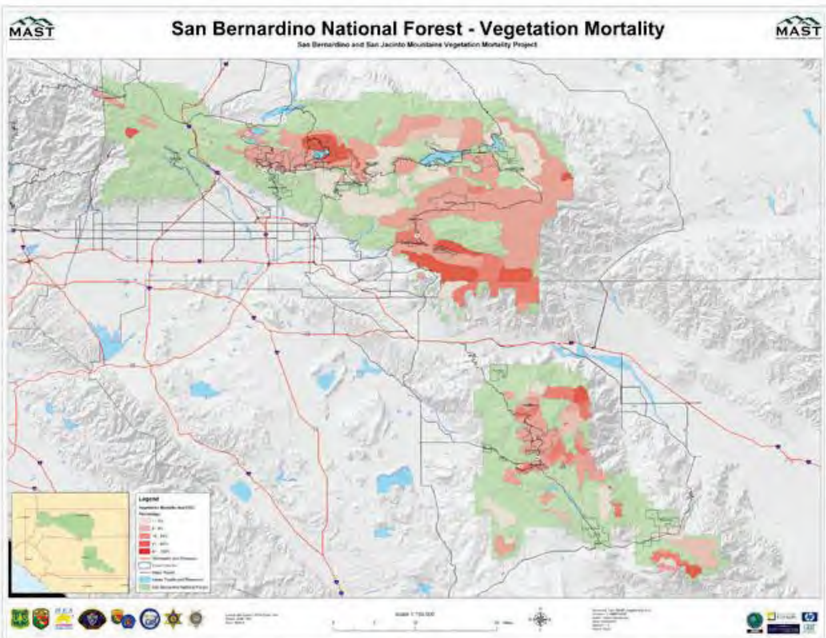

Figure 4-7: San Bernardino National Forest – Vegetation Mortality

4.4.4 Magnitude/Severity

Fire Severity Zones are used in determining additional protective measures required when building new structures or remodeling older structures within the particular zone. Additional measures must be taken on the property around a structure in the higher ranked fire Severity Zones.

CAL FIRE adopted Fire Hazard Severity Zone maps for LRA in June 2008. The Fire Severity Zones for County identifies areas of Very High, High, and Moderate fire hazard severity throughout the County and are mapped in Figure 4-8.

Fire Severity Zones are used in determining additional protective measures required when building new structures or remodeling older structures within the particular zone. Additional measures must be taken on the property around a structure in the higher ranked fire Severity Zones.

Fire hazard mapping is a way to measure the physical fire behavior to predict the damage a fire is likely to cause. Fire hazard measurement includes vegetative fuels, probability of speed at which a wildfire moves the amount of heat the fire produces, and most importantly, the burning fire brands that the fire sends ahead of the flaming front.

The model used to develop the information in accounts for topography, especially the steepness of the slopes (fires burn faster as they burn up-slope.). Weather (temperature, humidity, and wind) also has a significant influence on fire behavior. The areas depicted as moderate and high in are of particular concern and potential fire risk in these are constantly increasing as human development, and the wildland urban interface areas expand.

4.4.5 Frequency/Probability of Future Occurrences

In San Bernardino County, wildfire season commences in the summer when temperatures are high, humidity is low, and conditions remain dry. The season continues into the fall, when the County experiences high velocity, very dry winds coming out of the desert. A statewide drought beginning in 2011 has caused the state to be the driest it's been since record keeping began back in 1895 (California 2016). This has caused extremely dry conditions in unincorporated areas of the County creating plentiful fuel sources for wildfires.

USGS LANDFIRE (Landscape Fire and Resource Management Planning Tools), is a shared program between the wildland fire management programs of the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior, providing landscape scale geo-spatial products to support cross-boundary planning, management, and operations. Historical fire regimes, intervals, and vegetation conditions are mapped using the Vegetation Dynamics Development Tool (VDDT). This USGS data supports fire and landscape management planning goals in the National Cohesive Wildland Fire Management Strategy, the Federal Wildland Fire Management Policy, and the Healthy Forests Restoration Act.

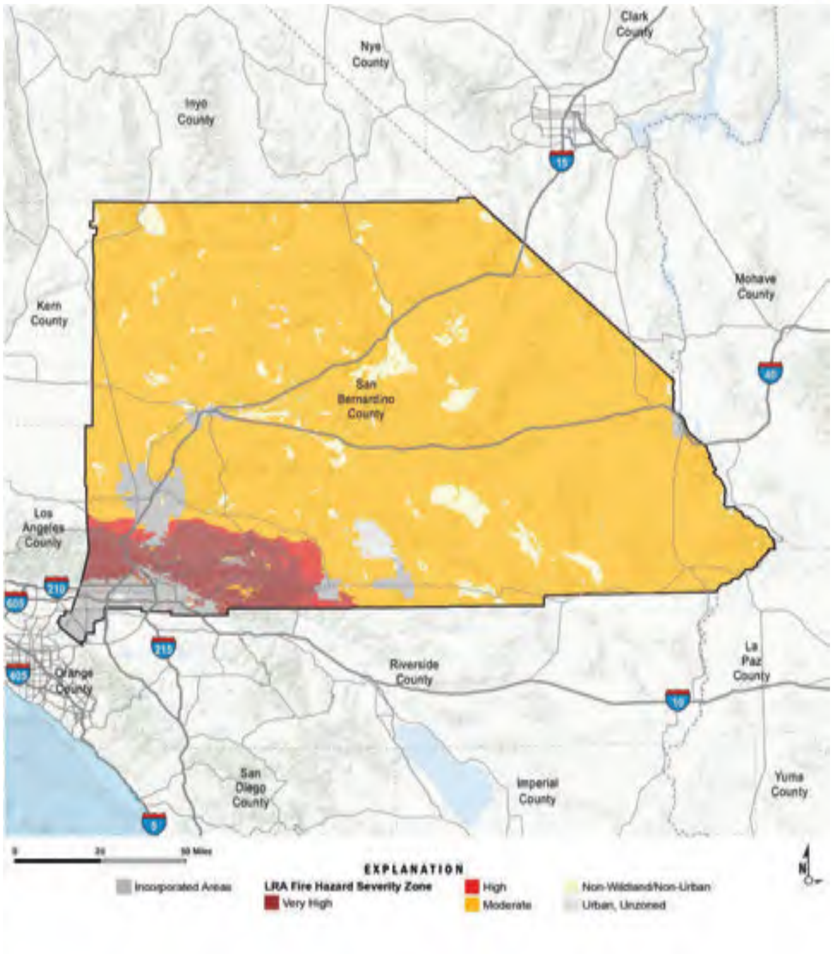

Figure 4-8: Fire Hazard Severity Zone

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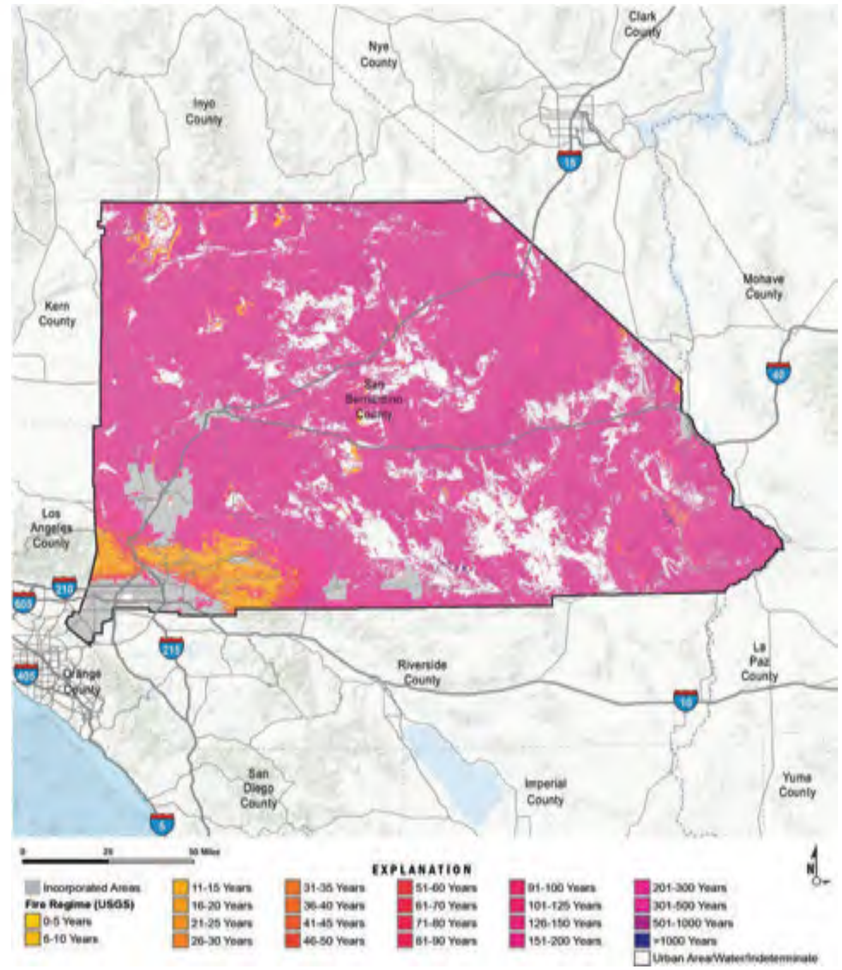

Figure 4-9: USGS Mean Fire Return Interval Map

As part of the USGS Landfire data sets, the Mean Fire Return Interval (MFRI) layer quantifies the average period between fires under the presumed historical fire regime. MFRI is intended to describe one component of historical fire regime characteristics in the context of the broader historical time period represented by the LANDFIRE Biophysical Settings (BPS) layer and BPS Model documentation.

MFRI is derived from the vegetation and disturbance dynamics model VDDT (Vegetation Dynamics Development Tool) (LF_1.0.0 CONUS only used the vegetation and disturbance dynamics model LANDSUM). This layer is created by linking the BpS Group attribute in the BpS layer with the Refresh Model Tracker (RMT) data and assigning the MFRI attribute. This geospatial product should display a reasonable approximation of MFRI, as documented in the RMT. See Figure 4-9 for predicted fire return interval for the jurisdictional area.

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4.5 Flood

Floods are the second most common and widespread of all natural disasters faced by the County and its Special Districts. Most communities in the United States have experienced some kind of flooding during or after spring rains, heavy thunderstorms, winter snow thaws, or summer thunderstorms.

A flood, as defined by the National Flood Insurance Program is: "A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is the policyholder's property) from:

- Overflow of inland or tidal waters, or
- Unusual and rapid accumulation or runoff of surface waters from any source, or
- Mudflow, or
- Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels."

Floods can be slow or fast rising but generally develop over a period of hours or days. Mitigation includes any activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies. Investing in mitigation measures now, such as: engaging in floodplain management activities, constructing barriers such as levees, and purchasing flood insurance will help reduce the amount of structural damage to structures and financial loss from building and crop damage should a flood or flash flood occur.

The standard for flooding is the 1% annual chance flood, commonly called the 100-year flood, the benchmark used by the Federal Emergency Management Agency (FEMA) to establish a standard of flood control in communities throughout the country. The 1% annual chance flood is also referred to as the base flood.

The 1% annual chance flood is the flood that has a 1% chance of being equaled or exceeded in any given year and it could occur more than once in a relatively short period of time. By comparison, the 10% flood (10-year flood) means that there is a 10% chance for a flood of its size to occur in any given year.

4.5.1 Regulatory Environmental

4.5.1.1 County of San Bernardino 2007 Development Code and Zoning Ordinances

One of the purposes of this Development Code is to create a comprehensive and stable pattern of land uses upon which to plan drainage/flood control and other public facilities and utilities. The follow chapters of the development code address floodways, flood control and development near such:

Chapter 82.14 Flood Plain Safety (FP) Overlay
Chapter 85.07 Flood Hazard Development Review
Chapter 86.04 Flood Plain Management Administrator

The County has also adopted Zoning Ordinances that are not part of the County Code but are part of the General Plan. These ordinances regulate land use; map the official land use and hazard overlay districts to include safety hazard and environmental protection areas.

4.5.1.2 National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. As a participating member of the NFIP, San Bernardino County is dedicated to protecting homes with more than 1,000 policies currently in force. Like most communities participating in NFIP, FEMA has prepared a detailed Flood Insurance Study (FIS) for areas of San Bernardino County. The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance of flood (the 100-year flood) and the 0.2-percent annual chance of flood (the 500-year flood). Base flood elevations and the boundaries of the 100 and 500 year floodplains are shown on the Flood Insurance Rate Maps (FIRM). More information on location and geographic extent of the FIRMs are provided in this section.
The County of San Bernardino entered the regular phase of the NFIP on September 09, 1978; in 2016 the County Floodplain Administrator is Marlene Mioyshi. As a participant in the NFIP, San Bernardino County is dedicated to regulating development in the FEMA regulated floodplain areas in accordance with NFIP criteria. Before a permit to build in a floodplain area is issued, San Bernardino County ensures that two basic criteria are met:

- All new buildings and developments undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain developments must not aggravate existing flood problems or increase damage to other properties.

Structures permitted or built in the County/City before the NFIP regulatory requirements were incorporated into the San Bernardino County ordinances (before the effective date of the San Bernardino County FIRM) are called “pre-FIRM” structures. For the San Bernardino County, pre-FIRM structures are those permitted or built before September 09, 1978

Extensive FEMA NFIP databases are used to track claims for every participating community including San Bernardino County. NFIP insurance data provided by FEMA indicates that as of September 02, 2016, there were 1,772 policies in San Bernardino County, resulting in $403,874,500 of insurance in force; this amounts to $1,758,534 in total premiums. Of the 1,772 policies, only 1,070 are for structures located within the 1% annual chance flood zones, while the remaining 701 policies are for structures located outside of the FEMA identified floodplain.

Based on this analysis of insurance coverage, San Bernardino County has significant assets at risk to the 100-year flood. Of the 3,426 improved parcels within the 100-year floodplain, only 1,070 of those parcels maintain flood insurance[1]. That means approximately 2,356 improved parcels are without flood insurance in high risk areas according to FEMA. This condition could exist for a number of different reasons. Ground floor elevations are one foot above the 100-year floodplain and home owners and business that wish not to purchase floodplain insurance (non-federally backed loans, home with no mortgage, homes that are "grandfathered" into the NFIP). The 2,356 uninsured structures located in mapped floodplain areas are especially vulnerable.

Currently, San Bernardino County contains 12 Repetitive Loss (RL) properties under their jurisdictional umbrella. The total dollar amount of claims paid to date by the NFIP is $2,606,098. San Bernardino County also contains zero (0) Severe Repetitive Loss (SRL) structure.

Most of the RL properties that have experienced flooding are in the High Desert and Mountain areas of San Bernardino County are due to debris flow in localized areas. Every loss claim is seasonal in nature as all loss claims have been in December, January or February. Some mitigation on these properties has been conducted and San Bernardino County is currently tracking mitigation actions through standardized forms as required by FEMA.

NOTE: A property does not have to be currently carrying a flood insurance policy to be considered a RL or SRL property. Often homes in communities are not carrying flood insurance but are still on the community's repetitive loss list. The "repetitive loss" designation follows a property from owner to owner; from insurance policy to no insurance policy, and even after the property has been mitigated. Having an insurance policy and making claims that fall into the repetitive loss criteria will put a property on the RL list. Even after the policy on a property has lapsed or been terminated, the property will remain on San Bernardino County RL list.

NOTE: The Privacy Act of 1974 (5 U.S.C. 522a) restricts the release of certain types of data to the public. Flood insurance policy and claims data are included in the list of restricted information. FEMA can only release such data to state and local governments, and only if the data are used for floodplain management, mitigation, or research purposes. Therefore, this plan does not identify the repetitive loss properties or include claims data for any individual property.
For more information on California Regulation and the NFIP, please see California's Department of Water Resources Quick Guide here: http://www.water.ca.gov/floodmgmt/lrafmo/fmb/docs/CAQG-screen.pdf

4.5.2 Past Occurrences

Severe weather events leading to flooding are listed in Table 4-7; several major events are discussed below.

[1] An improved property owner may not carry flood insurance for a number of reasons; not everyone is required to carry flood insurance. Structures carrying federally-backed mortgages that are in a SFHA are required to carry flood insurance in the County of San Bernardino. Owners who have completed the terms of the mortgage or who purchased their property outright may not choose to carry flood insurance and instead bear the costs of recovery on their own.

Table 4-7: Severe Weather Events 2010-Present

Date	Type
1/18/2010	January 2010 Winter Storms
12/17/2010	Highland Flooding Incident
8/25/2013	Flooding- Remnants of Tropical Storm Ivo
11/21/2013	Winter Storms
2/28/2014	Winter Storm
8/3/2014	Thunderstorms, heavy rain, flash flooding, mudslides
7/6/2015	Flash flooding resulting from Lake Fire
7/30/2015	Severe Thunderstorms
1/6/2016	Strong rain, flooding and mudslides
8/22/16	Flash flooding from storm system

4.5.3 Location/Geographic Extent

Table 4-8 shows the number of acres and square miles that lie in flood hazard areas within the County. Figure 4-10 provides flood hazard data for San Bernardino County as mapped in FEMA's National Flood Hazard Layer for California (April, 2010). Mapped areas include areas subject to inundation by the 1% Annual Chance Flood (also referred to as the 100-year flood), and areas subject to inundation in the 0.2% Annual Chance Flood (500-year flood).

Table 4-8: San Bernardino County Flood Hazard Area

Flood Hazard Type	Sum of Acres	Sum of Square Miles
100-Year Flood	65,209	101.89
100-Year, Floodway	13,968	21.83
500-Year Flood	13,838	21.62
500-Year, Protected by Levee	4,336	7
Total	**97,351**	**152.11**

Table 4-9 shows a land use compatibility chart for 100 year flood plains.

Figure 4-10: Flood Hazard Severity Zone Map

Table 4-9: Land Use Compatibility Chart for 100 Year Flood Plains (General Plan Table S-1)

Land Uses	Compatibility in 100-Year Floodplains
Critical Nuclear related systems; explosives or hazardous materials/ manufacturing, handling or storage; hospitals and other emergency medical facilities.	Restricted
Essential Police, fire and communications systems; Emergency Operations Centers (EOC's); electric power inter-tie systems; power plants; utility substations; sewage treatment plants; water-works; local gas and electric distribution lines; aqueducts; major pipelines; major highways, bridges and tunnels; ambulance services; public assembly sites with 300 or more capacity; schools.	Restricted
High Occupancy Multi-family residential of 20 or more units; major commercial including large shopping centers; office buildings; large hotels; health care clinics and convalescent homes; heavy industry; gas stations.	Generally Incompatible
Normal-Low Risk Single-family and two-family residential; multi-family of less than 20 units; small scale commercial; small hotels, motels; light industry; warehousing.	Generally Incompatible

Restricted unless alternative sites are not available or feasible and it is demonstrated that, although mitigation may be difficult, hazards will be adequately mitigated. Generally Incompatible Restricted unless site investigation demonstrates that site is suitable or that hazards will be adequately mitigated.

4.5.4 Magnitude/Severity

4.5.4.1 Flash Flooding

Flash flooding tends to occur in the summer and early fall because of the monsoon rains and is typified by increased humidity and high summer temperatures.

The desert area contains many mountain ranges that are steep and experience summer thunder storms causing flash floods in many dry washes on the desert floor. The water collects in dry lake beds throughout the desert area.

Environmental permit processing has delayed or prohibited work in the washes to provide flow lines to many bridges on county highways. Many highways do not have bridges but convey water across the road with dip crossings. Flash flooding cause's road and bridge wash outs and erosion of earthen channels and basins when they occur near these facilities.

Cities and towns often experience street closures for several days due to sediment transport and road damage. Because of the sheet flow character of the desert, many private properties experience erosion and sediment deposits. The urban valley also can experience flash flooding in its narrow canyons and within the many unimproved creeks and interim channels feeding the Santa Ana River. The valley floor in many areas is very flat so even minor rain events can produce flooding of roads and private property. In coordination with local jurisdictions, the County of San Bernardino Flood Control District has prepared Master Drainage plans for many cities and towns to provide a plan for reducing flooding due to minor storms. Maps can be found on the County's Department of Public Works website here: http://cms.sbcounty.gov/dpw/FloodControl/Planning/MPD.aspx

However, local resources are not sufficient to cover the cost of the construction of the drainage systems. The densely populated (75% of the county population) urban valley region contains the headwaters of the Santa Ana River. The San Gabriel and San Bernardino Mountains border the North side of the valley are steep reaching 5,000 feet with alluvial fans which are developed and densely populated.

4.5.5 Frequency/Probability of Future Occurrences

The Flood Insurance Rate Map (FIRM) not only identifies the flood hazard zones for insurance and floodplain management purposes, but also provides a statement of probability of future occurrence.

A 500-year flood has a 0.2-percent chance of occurring in any given year; a 100-year flood has a 1-percent chance, a 50-year flood has a 2-percent chance, and a 10-year flood has a 10-percent chance of occurrence. Although the recurrence interval represents the long-term average period between floods of specific magnitude, significant floods could occur at shorter intervals or even within the same year. The FIRM maps typically identify components of the 500-year and 100-year floodplains

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4.6 Drought

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. Drought severity depends on numerous factors, including duration, intensity, and geographic extent, as well as regional water supply demands by humans and vegetation. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity.

Drought originates from a deficiency of precipitation over an extended period, usually one or more seasons. Drought can result in a water shortage for some activity, group, or environmental sector. Drought is a complex natural hazard, which is reflected in the following four definitions commonly used to describe it:

- Agricultural – drought is defined principally in terms of naturally occurring soil moisture deficiencies relative to water demands of plant life, usually arid crops.
- Hydrological – drought is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- Meteorological – drought is defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Socioeconomic – drought associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall. It may also be called a water management drought.

Although climate is a primary contributor to hydrological drought, other factors such as changes in land use (e.g., deforestation), land degradation, and the construction of dams all affect the hydrological characteristics of the basin. Since regions are interconnected by hydrologic systems, the impact of meteorological drought may extend well beyond the borders of the precipitation-deficient area. Similarly, changes in land use upstream may alter hydrologic characteristics such as infiltration and runoff rates, resulting in more variable streamflow and a higher incidence of hydrologic drought downstream. Land use change is one of the ways human actions alter the frequency of water shortage even when no change in the frequency of meteorological drought has been observed.

4.6.1 Regulatory Environment

The County and participating jurisdictions have a number of regulatory requirements and documents to address planning for drought in the County. This includes Watershed Water Quality Management Plans (WQMP) for San Bernardino County and the Mojave and Santa Ana Watersheds. On June 21st, 2013, the Executive Officer approved the revised Technical Guidance Document for Water Quality Management Plan (TGD-WQMP).

The 1972 Federal Water Pollution Control Act, also known as the Clean Water Act (CWA) provides the basis for the protection of all inland surface waters, estuaries, and coastal waters. California's Porter-Cologne Water Quality Control Act of 1970 established the Regional Water Quality Control Board as the agency responsible for implementing the CWA and Porter-Cologne requirements in the Santa Ana Watershed.

In 2006, California State lawmakers adopted AB 1881. This provided guidelines and timelines for the revision of the State's Model Water Efficient Landscape Ordinance (MWELO) and mandated that every city, county or other agency within the State adopt MWELO or be in compliance with it through their own ordinance by January 2010. On January 1, 2010 the San Bernardino County Water Efficient Landscape Ordinance was implemented. It can be obtained on the county website.

4.6.1.1 Watershed Water Quality Management Plan

San Bernardino County's WQMP draft was written in 2013 and final approval was given on June 21, 2013.

4.6.1.2 Technical Guidance Document for Water Quality Management Plan (TGD-WQMP)

Approved on June 21, 2013, this document provides direction to project proponents on the regulatory requirements applicable to a private or public development activity, including public works transportation projects, from project conception to completion.

4.6.2 Past Occurrences

- The 2013 California State MHMP states that from 1950 to 2012, there has been eight-drought State Emergency Proclamations in California. Specifically for San Bernardino County, there have been six drought events since 1896. Previous occurrences of drought are described as follows:

- **1975 to 1977:** California experienced the two driest years (1976 and 1977) in the State's history in 1976 and 1977. The drought was declared an Emergency (FEMA-EM-3023) on January 20, 1977. Total crop damages statewide totaled $2.67 billion dollars for both years ($888.5 million in 1976 and $1.8 billion in 1977).

- **2006 to 2009:** A California State-declared three-year drought of below-average rainfall, low snowmelt runoff, and the largest court-ordered water restricting in state's history. The dry conditions damaged crops, deteriorated water quality, and caused extreme wildfire danger. Approximately $300 million in agricultural revenue loss, and a potential $3 billion in economic losses over time.

- **2012 to 2016:** San Bernardino County first declared a local drought emergency in 2014. As of May 23rd, 2016, San Bernardino County and the City of Rancho Cucamonga had both submitted local Emergency Proclamations. This ongoing drought is the most severe drought in over 100 years. In order to abide by the State Water Resources Control Board's mandatory water reductions, the San Bernardino Municipal Water Department Board of Water Commissioners authorized implementation of Stage IIA of the department's Water Supply Contingency Plan on June 1, 2015. The State Water Board will adjust emergency water conservation regulations through the end of January 2017, in recognition of the differing water supply conditions across the state, and develop proposed emergency water restrictions for 2017 if the drought persists.

Additional information about previous occurrences of droughts in California (in general) can be obtained from the California DWR.

4.6.3 Location/Geographic Extent

Drought can affect the County, region, and the State of California as a whole. The County's primary source of water is imported by the San Bernardino Valley Municipal Water District (http://www.sbvmwd.com/about-us/what-we-do) through participation in the State Water Project (SWP). It is received at the Devil Canyon Power Plant Afterbay. This supply is supplemented by groundwater basins in the County. Drought has no defined geographical boundaries and cannot be depicted in map form. As such, the entire County is subject to drought.

4.6.4 Magnitude/Severity

The magnitude of drought is usually measured in time and the severity of the hydrologic deficit. There are several resources available to evaluate drought status and estimate future expected conditions. The National Integrated Drought Information System (NIDIS) Act of 2006 (Public Law 109-430) prescribes an interagency approach for drought monitoring, forecasting, and early warning. The NIDIS maintains the U.S. Drought Portal (www.drought.gov) which is a web-based

access point to several drought related resources. Resources include the U.S. Drought Monitor (USDM) and the U.S. Seasonal Drought Outlook (USSDO).

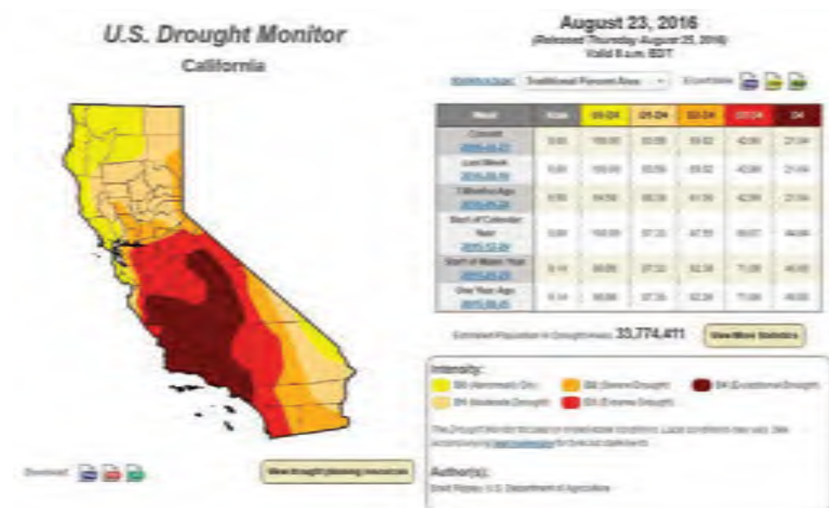

Figure 4-11: US Drought Monitor Map for the State of California on August 23, 2016

The USDM provides a summary of drought conditions across the United States and Puerto Rico and is developed and maintained by the National Drought Mitigation Center (www.drought.unl.edu). USDM includes the U.S. Drought Monitor Map. This map is updated weekly by combining a variety of drought database and indicators, and local expert input into a single composite drought indicator. The map denotes four levels of drought intensity (ranging from D1 - D4) and one level of "abnormal dryness" (D0). In addition, the map depicts areas experiencing agricultural (A) or hydrological (H) drought impacts. These impact indicators help communicate whether short or long-term precipitation deficits are occurring. An example Drought Monitor Map for the State of California for August 23, 2016 is illustrated in Figure 4-11.

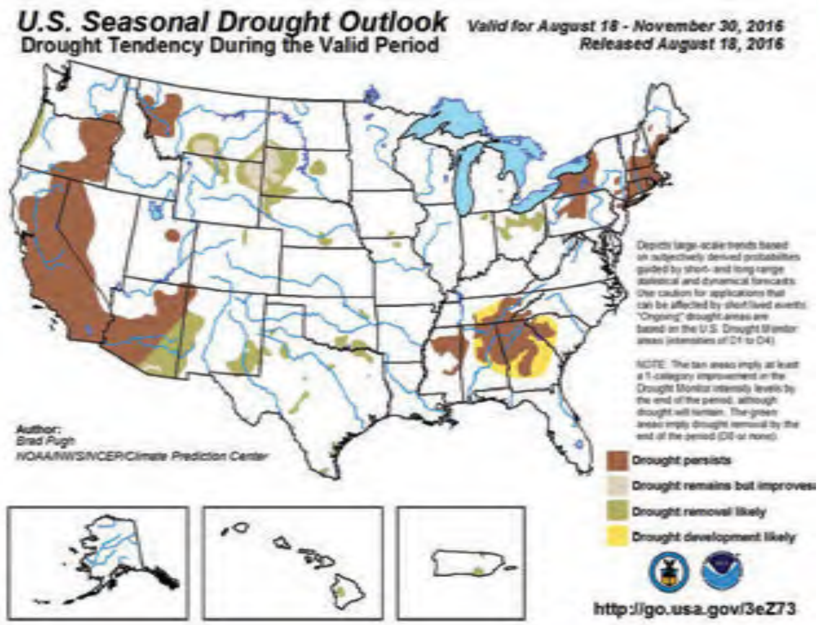

Figure 4-12: USSDO Drought Tendency Map (Valid August 18-November 30, 2016

For western States with mountainous terrain and complex regional microclimates, it is also useful to supplement the PDSI values with other indices such as Surface Water Supply Index and Standardized Precipitation Index (SPI). The Surface Water Supply Index takes snowpack and other unique conditions into account. The National Drought Mitigation Center (NDMC) uses the SPI to identify emerging drought months sooner than the PDSI. It is computed on various time scales to monitor moisture supply conditions. The SPI is the number of standard deviations that precipitation value would deviate from the long-term mean. As shown in Figure 4-13 the 72-month SPI through the end of August 2016 for San Bernardino County is low.

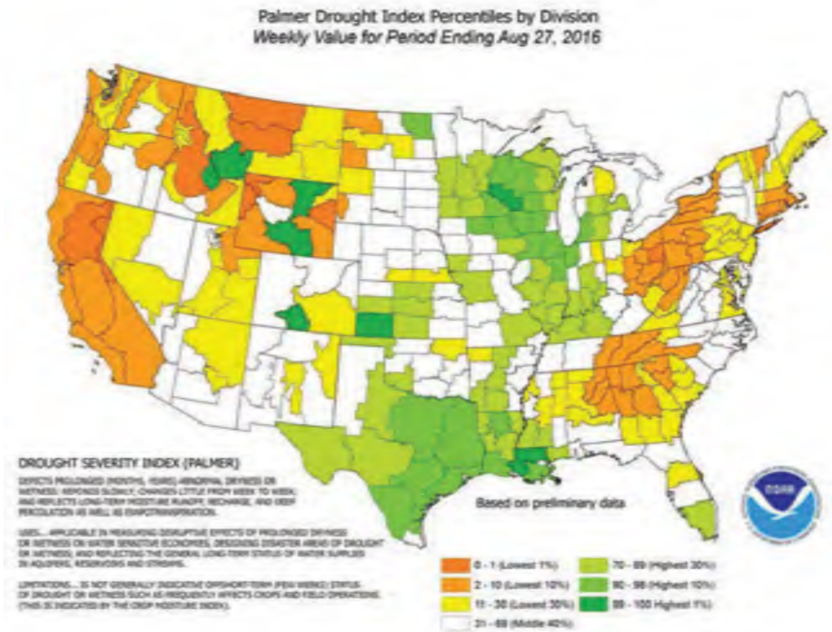

Figure 4-13: Month SPI through the end of August 2016 for San Bernardino County

A number of indices measure how much precipitation for a given period has deviated from historically established norms. The primary indicator for the USDM and USSDO for the western United States is the Palmer Drought Severity Index (PDSI). The PDSI is widely used by the USDA to determine when to grant emergency drought assistance to affected areas. PDSI is a commonly used index that measures the severity of drought for agriculture and water resource management. It is calculated from observed temperature and precipitation values and estimates soil moisture. However, the PDSI is not considered consistent enough to characterize the risk of drought on a nationwide basis (FEMA, 1997) and is not well suited to the dry, mountainous areas in the western U.S.

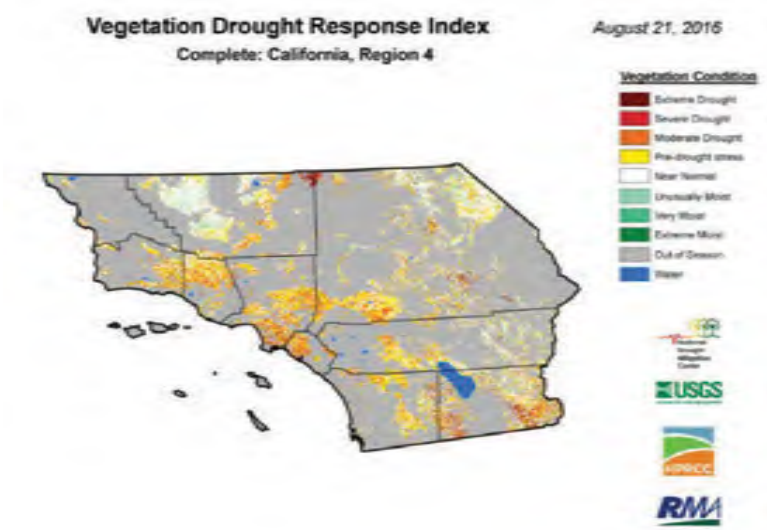

Figure 4-14: Vegetation Drought Response Index – California Region 4 for August 21, 2016

The Vegetation Drought Response Index, or VegDRI, is a bi-weekly depiction of vegetation stress across the contiguous United States. VegDRI is a fine resolution (1-km^2) index based on remote sensing data, and incorporates climate and biophysical data to determine the cause of vegetation stress. Development of the VegDRI map and associated products is a joint effort by the National Drought Mitigation Center (NDMC), the U.S. Geological Survey's (USGS) National Center for Earth Resources Observation and Science (EROS), and the High Plains Regional Climate Center (HPRCC). Figure 4-14 illustrates the VegDRI results for Southern California for August 21, 2016.

4.6.5 Frequency/Probability of Future Occurrences

Currently there is no data on the probability of drought that would be comparable to the USGS effort on earthquakes in the region, or how 100-year flood maps are created.

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4.7 Terrorism

This section was added due to the December 2, 2015 terror attack in San Bernardino County. There is no single, universally accepted definition of terrorism; however, FEMA defines "terrorism" as intentional, criminal, malicious acts. FEMA document 386-7 refers to terrorism specifically as the use of Weapons of Mass Destruction (WMD), including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; and "cyberterrorism."

FEMA developed the Integrated Emergency Management System (IEMS) using an all-hazards approach. While the IEMS was established as an "all-hazard" approach, responding to the threat of terrorism (referred to as counterterrorism) came to be viewed as the responsibility of law enforcement, defense, and intelligence agencies. Furthermore, defensive efforts to protect people and facilities from terrorism (referred to as antiterrorism) were generally limited to the government sector, the military, and some industrial interests.

While the term "mitigation" refers generally to activities that reduce loss of life and property by eliminating or reducing the effects of disasters, in the terrorism context it is often interpreted to include a wide variety of preparedness and response actions. For the purposes of this document, the traditional meaning will be assumed; that mitigation refers to specific actions that can be taken to reduce loss of life and property from manmade hazards by "modifying the built environment" or antiterrorism to reduce the risk and potential consequences of these hazards.

4.7.1 Antiterrorism Regulatory Environment

Adopted on February 9, 2012 and updated on October 1, 2013, United Facilities Criteria (UFC) 4-010-01 defines the United States Department of Defense's (DoD) minimum antiterrorism standards for both new and existing buildings. The document applies to DoD buildings, National Guard buildings, visitor centers and museums, visitor control facilities and expeditionary structures. Historic preservation compliance for implementation of anti-terrorism standards, philosophy, design strategies and assumptions are all taken into account. Site planning, structural design, architectural design, and electrical and mechanical design are discussed in detail in Appendix B.
https://www.fema.gov/news-release/2004/01/13/dhs-announces-new-building-science-guidelines-enhance-terrorism-resistance

4.7.2 Counterterrorism Regulatory Environment

After the 12/2/15 mass shooting, two full time positions with a regional FBI-led terrorist task force (FBI's Joint Terrorism Task Force) were created. These task force officers have the clearance to conduct terrorism investigations in the County. The Task Force includes partners from Homeland Security Investigations (HSI), the San Bernardino Police Department, the San Bernardino County Sheriff's Department, the Riverside County Sheriff's Department, the Ontario Police Department, the Riverside Police Department, the Corona Police Department and the Chino Police Department. For more information regarding the positions, contact the San Bernardino Police Department at (909) 384-5742. Read more here: http://www.pe.com/articles/task-789539-force-san.html

The State of California Department of Justice's Anti-terrorism program works with federal, state and local law enforcement agencies to detect, investigate, prosecute, dismantle, prevent and respond to domestic and international terrorist activities. Read more here: https://oag.ca.gov/bi/atp

The State of California Bureau of Security and Investigative Services' Power to Arrest Course includes a Weapons of Mass Destruction (WMD) & Terrorism Awareness section. Read More Here: http://www.bsis.ca.gov/about_us/laws/bsis_regulations.pdf

4.7.3 Past Occurrences

There have been two terrorist attacks recorded in San Bernardino County. Table 4-10 describes both attacks.
Source: https://www.start.umd.edu/gtd/search/Results.aspx?search=san+bernardino&sa.x=0&sa.y=0&sa=Search

Table 4-10: Terrorist Attacks in San Bernardino County

Date	Perpetrator Group	Fatalities	Injured	Target Type
3/16/1970	White Extremists	0	1	Government (General)
12/2/2015	Unaffiliated Individuals	16	17	Government (General)

The state of California has experienced 574 terrorist attacks from 1970-2011 (Integrated United States Security Database (IUSSD): Data on the Terrorist Attacks in the United States Homeland, 1970-2011 2012). Figure 4-17 shows the types of terrorist attacks in the state of California from 1970 to the present.

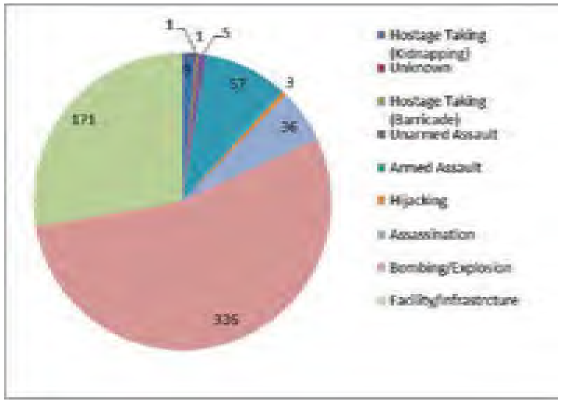
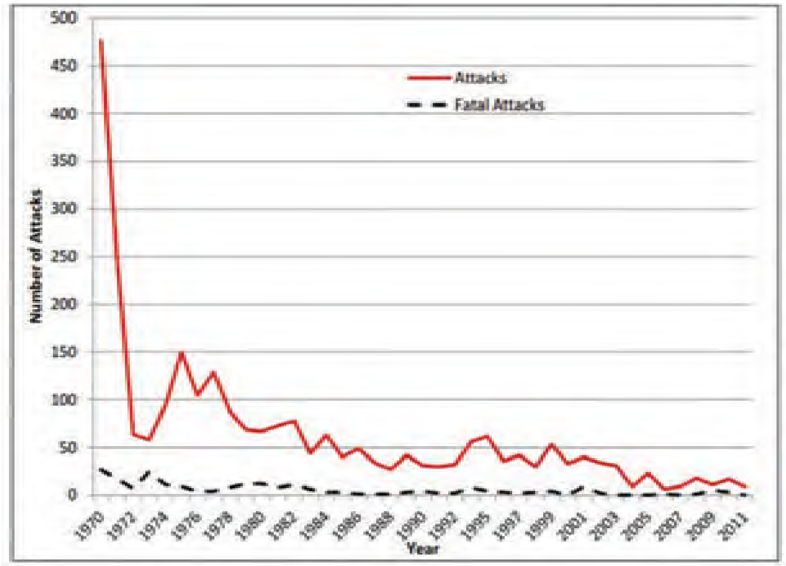


Figure 4-15: Types of Terrorist Attacks in California from 1970-Present

As seen in Figure 4-15 since 1970, the number of terrorist attacks in the United States has steadily decreased. According to http://www.heritage.org most terrorist attacks on America happen outside our nation's borders. The number of international terrorist attacks against the United States from 1970-2011 is shown in Figure 4-16 and Figure 4-17.



Note: There were 2,608 total attacks and 226 fatal attacks between 1970 and 2011.

Figure 4-16: Total and Fatal Terrorist Attacks in the United States by Year

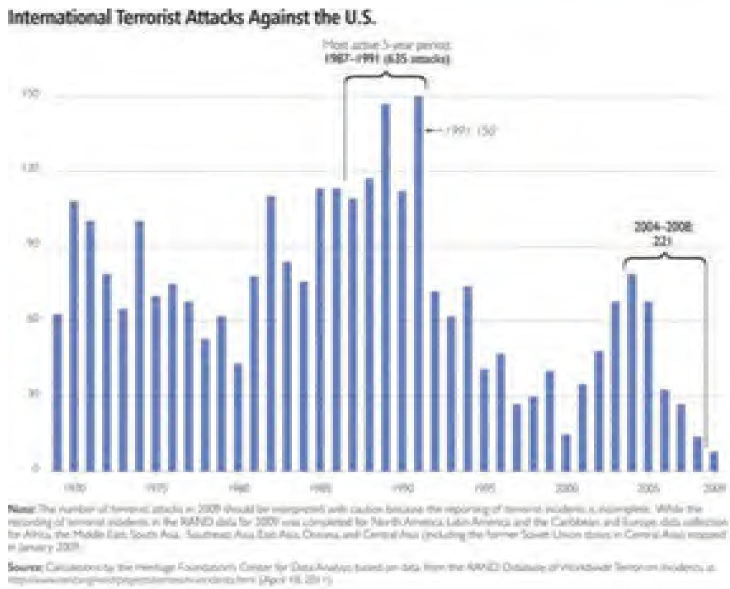


Figure 4-17: International Terrorist Attacks Against the United States

4.7.4 Location/Geographic Extent

Unlike natural hazards, which often follow patterns and can be forecasted, manmade hazards such as acts of terrorism are much more unpredictable. Terrorists have the ability to choose targets and tactics and can often adjust conditions to achieve their objective. Terrorist attacks are often in a more specific location rather than a widespread, more predictable area such as a flood plain. As demonstrated in the 12/2/15 mass shooting, “homegrown terrorists” (self-radicalizing and pulls off their attacks without any help or communication with people in other countries) are even harder to detect and predict.

Translating most manmade hazard profiles into meaningful geospatial information is difficult at best. Instead, the planning team will use an asset-specific approach, identifying potentially at-risk critical facilities and systems in the community. Once a comprehensive list of assets has been developed, it will be prioritized so that the community’s efforts can be directed to protect the most

important assets first. Then, beginning with the highest priority assets, the vulnerabilities of each facility or system to each type of hazard will be assessed (FEMA 2003).

4.7.5 Magnitude/Severity

As previously discussed, predicting terrorist attacks cannot be done with the same level of accuracy as predicting a natural hazard and its potential impacts on the community. However, we can learn from past terrorist incidents. Table 4-11 profiles 10 different types of terrorist attacks and technological hazards.

Table 4-11: Event Profiles for Terrorism and Technological Hazards

Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
Conventional Bomb/ Improvised Explosive Device	Detonation of explosive device on or near target; delivery via person, vehicle, or projectile.	Instantaneous; additional "secondary devices" may be used, lengthening the time duration of the hazard until the attack site is determined to be clear	Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc.	Overpressure at a given standoff is inversely proportional to the cube of the distance from the blast; thus, each additional increment of standoff provides progressively more protection. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers/shielding; poor construction; and ease of concealment of device
Chemical Agent *	Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/ containers; or munitions.	Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists.	Contamination can be carried out of the initial target area by persons, vehicles, water and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated.	Air temperature can affect evaporation of aerosols. Ground temperature affects evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents but

Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
				can spread contamination. Wind can disperse vapors but also cause target area to be dynamic. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects.
Arson/ Incendiary Attack	Initiation of fire or explosion on or near target via direct contact or remotely via projectile.	Generally minutes to hours.	Extent of damage is determined by type and quantity of device/ accelerant and materials present at or near target. Effects generally static other than cascading consequences, incremental structural failure, etc.	Mitigation factors include built-in fire detection and protection systems and fire-resistive construction techniques. Inadequate security can allow easy access to target, easy concealment of an incendiary device and undetected initiation of a fire. Non-compliance with fire and building codes as well as failure to maintain existing fire protection systems can substantially increase the effectiveness of a fire weapon.
Armed Attack	Tactical assault or sniping from remote location.	Generally minutes to days.	Varies based upon the perpetrators' intent and capabilities	Inadequate security can allow easy access to target, easy concealment of weapons and undetected initiation of an attack.
Biological Agent *	Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line	Biological agents may pose viable threats for hours to years depending on the agent and the	Depending on the agent used and the effectiveness with which it is deployed, contamination can	Altitude of release above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to

Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
	sources such as munitions, covert deposits and moving sprayers.	conditions in which it exists	be spread via wind and water. Infection can be spread via human or animal vectors.	moderate wind will disperse agents but higher winds can break up aerosol clouds; the micro-meteorological effects of building and terrain can influence aerosolization and travel of agents.
Cyberterrorism	Electronic attack using one computer system against another.	Minutes to days	Generally no direct effects on built environment.	Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.
Agriterrorism	Direct, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock.	Days to months	Varies by type of incident. Food contamination events may be limited to discrete distribution sites, whereas pests and diseases may spread widely. Generally no effects on built environment.	Inadequate security can facilitate adulteration of food and introduction of pests and disease agents to crops and livestock.
Radiological Agent **	Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point or line sources such as munitions, covert deposits and moving sprayers.	Contaminants may remain hazardous for seconds to years depending on material used.	Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior of radioactive contaminants may be dynamic.	Duration of exposure, distance from source of radiation, and the amount of shielding between source and target determine exposure to radiation.
Nuclear Bomb **	Detonation of nuclear device underground, at the surface, in the air or at high altitude.	Light/heat flash and blast/shock wave last for seconds; nuclear radiation and fallout hazards can persist for years. Electromagnetic pulse from a high altitude detonation lasts for seconds and affects only	Initial light, heat and blast effects of a subsurface, ground or air burst are static and are determined by the device's characteristics and employment; fallout of radioactive contaminants may	Harmful effects of radiation can be reduced by minimizing the time of exposure. Light, heat and blast energy decrease logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by

Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
		unprotected electronic systems.	be dynamic, depending on meteorological conditions.	absorbing and/or deflecting radiation and radioactive contaminants.
Hazardous Material Release (fixed facility or transportation)	Solid, liquid and/or gaseous contaminants may be released from fixed or mobile containers.	Hours to days	Chemicals may be corrosive or otherwise damaging over time. Explosion and/or fire may be subsequent. Contamination may be carried out of the incident area by persons, vehicles, water and wind.	As with chemical weapons, weather conditions will directly affect how the hazard develops. The micro-meteorological effects of building and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. Non-compliance with fire and building codes as well as failure to maintain existing fire protection and containment features can substantially increase the damage from a hazardous materials release.

* Source: Jane's Chem-Bio Handbook
** Source: FEMA, Radiological Emergency Management Independent Study Course

4.7.6 Frequency/Probability of Future Occurrences

We can usually forecast the type, frequency and location of a natural hazard thanks to the laws of physics and nature. However, when dealing with manmade hazards such as terrorism, we are often dealing with functions of the human mind-malevolence, incompetence, carelessness and other behaviors. These actions cannot be predicted with any accuracy; therefore, there is the potential for an act of terrorism to occur anywhere, at any time.

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4.8 Climate Change

Climate change refers to any distinct change in measures of climate lasting for a long period of time, more specifically major changes in temperature, rainfall, snow, or wind patterns. Climate change may be limited to a specific region, or may occur across the whole Earth. Climate change may result from:

- Natural factors (e.g., changes in the Sun's energy or slow changes in the Earth's orbit around the Sun);
- Natural processes within the climate system (e.g., changes in ocean circulation); and
- Human activities that change the atmosphere's make-up (e.g., burning fossil fuels) and the land surface (e.g., cutting down forests, planting trees, building developments in cities and suburbs, etc.).

The effects of climate change are varied: warmer and more varied weather patterns, melting ice caps, and poor air quality, for example. As a result, climate change impacts a number of natural hazards.

The 2013 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

4.8.1 Regulatory Environment

California's response to climate change is directed by Legislation and Regulations and by other Mandates such as executive orders.

4.8.1.1 The Sustainable Communities and Climate Protection Act of 2008

The Sustainable Communities and Climate Protection Act of 2008 (Sustainable Communities Act, SB 375, Chapter 728, Statutes of 2008) looks to reduce GHG emissions through coordinated transportation and land use planning with the goal of more sustainable communities. Regional targets are established for GHG emissions reductions from passenger vehicle use by the sustainable communities strategy (SCS) established by each metropolitan planning organization (MPO). The SCS is an integral part of the regional transportation plan (RTP) and contains land use, housing, and transportation strategies to meet GHG reductions targets. In San Bernardino County, the South Coast Air Quality Management District facilitates compliance with the federal Clean Air Act and implements the state's air quality program.

The Office of Planning and Research's General Plan Guidelines and SB 375 builds upon Assembly Bill 162 (flood protection) and Senate Bill 1241 (fire protection) and supports Safeguarding California implementation.

SB 375 also supports Assembly Bill 2140 which requires that a City/County General Plan contains a safety element in addition to a Hazard Mitigation Plan. AB 2140 also requires a vulnerability assessment, adaptation goals, policies and objectives, and a set of feasible implementation measures.

4.8.1.2 California Adaptation Planning Guide (APG)

The State of California has been taking action to address climate change for over 20 years, focusing on both greenhouse gas emissions reduction and adaptation. The California Adaptation Planning Guide (APG) continues the state's effort by providing guidance and support for communities addressing the unavoidable consequences of climate change.

Based on upon specific factors, 11 Climate impact regions were identified. Some of the regions were based on specific factors particularly relevant to the region. As illustrated in Figure 4-18 San Bernardino County is located in the Desert Region.

The Desert is a heavily urbanized inland region (4.3+ million people) made up of sprawling suburban development in the west near the South Coast region and vast stretches of open, largely federally owned desert land to the east. Prominent cities within the desert portion include Palm Springs (44,500+) and El Centro (42,500+). The region's character is defined largely by the San Gabriel Mountains, San Gorgonio Mountains, San Jacinto Mountains, and smaller inland mountains reaching through the desert to the Colorado River, which borders the region on the east. Communities in the Desert region should consider evaluating the following climate change impacts:

- Reduced water supply
- Increased temperature
- Reduced precipitation
- Diminished snowpack
- Wildfire risk
- Public health and social vulnerability
- Stress on special-status species

Figure 4-18: Climate Impact Regions

4.8.2 Past Occurrences

Climate change has never been directly responsible for any declared disasters. Past flooding, wildfire, levee failure, and drought disasters may have been exacerbated by climate change, but it is impossible to make direct connections to individual disasters. In addition, unlike earthquake and floods that occur over a finite time period, climate change is an on-going hazard the effects of which some are already experiencing. Other effects may not be seriously experienced for decades, or may be avoided altogether by mitigation actions taken today.

4.8.3 Location/Geographic Extent

The effects of climate change are not limited by geographical borders. San Bernardino County, the State of California, the United States, and the rest of the world are all at risk to climate change. As such, the entire County is at risk to the effects of climate change.

Figure 4-19 and Figure 4-20 provide Cal Adapt[2] modeled decadal July high temperature averages for 2010 and 2090. These figures provide current decade-long July temperature averages and possible annual high heating trends for the remaining portion of the century. The data presented in the figures represent a “projection” of potential future climate scenarios, they are not predictions. These figures illustrate how the climate may change based on a variety of different potential social and economic factors. The visualizations are comprised of average values from Coupled Climate model 2.1 (GFDL), Community Climate System Model Version 3 (CCSM3), Coupled Global Climate Model Version 3 (CNRM) and Parallel Climate Model 1 (PCM1). During the next few decades, scenarios project average temperature to rise between 1° and 2.3°F; however, the projected temperature increases begin to diverge at mid-century so that, by the end of the century, the temperature increases projected in the higher emissions scenario (A2) are approximately twice as high as those projected in the lower emissions scenario (B1). Customizable maps can be viewed at http://cal-adapt.org/temperature/decadal/

[2] Cal-Adapt has been funded to provide access to data and information that has been produced by the State's scientific and research community. The data available in this site offer a view of how climate change might affect California at the local level.

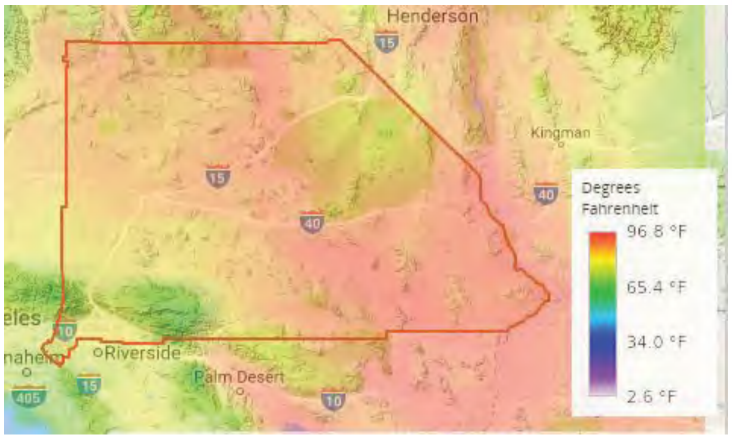


Figure 4-19: July Decadal Average High Temperature Map; 2010

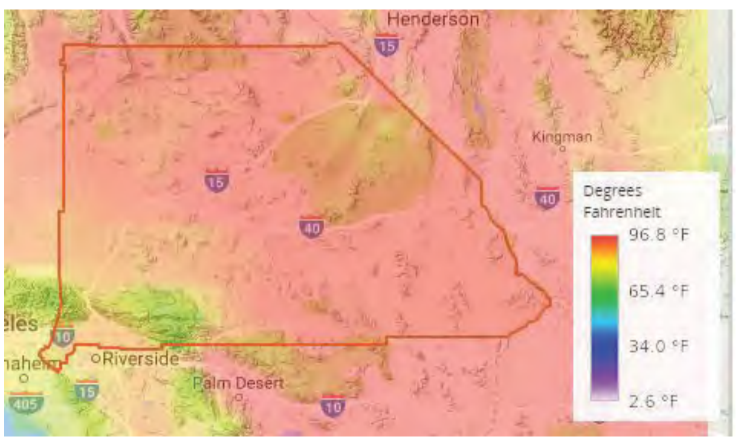


Figure 4-20: July Decadal Average High Temperature Map; 2090

4.8.4 Magnitude/Severity

The California Climate Adaptation Strategy (CAS), citing a California Energy Commission study, states that "over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined." This study shows that California is getting warmer, leading to an increased frequency, magnitude, and duration of heat waves. These factors may lead to increased mortality from excessive heat, as shown in Figure 4-21: California Historical and Projected Temperature Increases 1961 to 2099

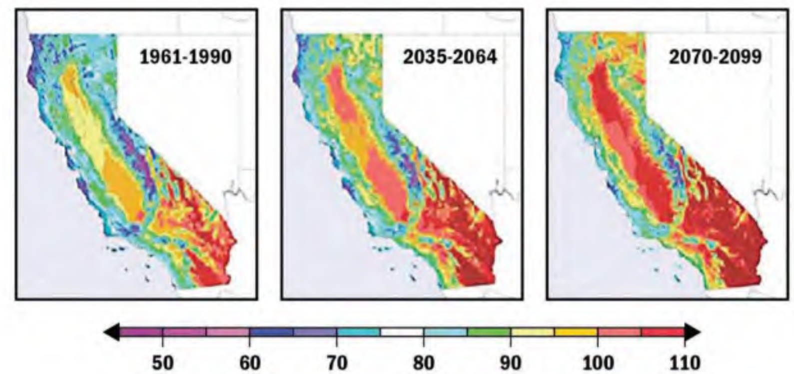


Figure 4-21: California Historical and Projected Temperature increases 1961-2099

Source: Dan Cayan; California Climate Adaptation Strategy

4.8.5 Frequency/Probability of Future Occurrences

According to the ABAG 2010 Local Hazard Mitigation Plan (LHMP), climate change is one of the few natural hazards where the probability of occurrence is influenced by human action. In addition, unlike earthquake and floods that occur over a finite time period, climate change is an on-going hazard.

The 2009 Climate Adaptation Strategy (CAS) delineated how climate change may impact and exacerbate natural hazards in the future, including wildfires, extreme heat, floods, drought, and levee failure:

Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in San Bernardino County and the rest of California, which are likely to increase the risk of mortality and morbidity due to heat-related illness and exacerbation of existing chronic health conditions. Those most at risk and vulnerable to climate-related illness are the elderly, individuals with chronic conditions such as heart and lung disease, diabetes, and mental illnesses, infants, the socially or economically disadvantaged, and those who work outdoors.

- Higher temperatures will melt the Sierra snowpack earlier and drive the snowline higher, resulting in less snowpack to supply water to California users.
- Droughts are likely to become more frequent and persistent in the 21st century.
- Intense rainfall events, periodically ones with larger than historical runoff, will continue to affect California with more frequent and/or more extensive flooding.
- Storms and snowmelt may coincide and produce higher winter runoff from the landward side, while accelerating sea-level rise will produce higher storm surges during coastal storms. Together, these changes will increase the probability of levee and dam failures in the Sacramento-San Joaquin Delta.
- Warmer weather, reduced snowpack, and earlier snowmelt can be expected to increase wildfire through fuel hazards and ignition risks. These changes can also increase plant moisture stress and insect populations, both of which affect forest health and reduce forest resilience to wildfires. An increase in wildfire intensity and extent will increase public safety risks, property damage, fire suppression and emergency response costs to government, watershed and water quality impacts, vegetation conversions and habitat fragmentation.

4.8.6 El Niño Effect

El Niño is defined as an abnormal weather pattern that is caused by the warming of the Pacific Ocean near the equator, off the coast of South America. This occurs when the normal trade winds weaken (or even reverse), which lets the warm water that is usually found in the western Pacific flow instead towards the east. This warm water displaces the cooler water that is normally found near the surface of the eastern Pacific, setting off atmospheric changes that affect weather patterns in many parts of the world.

As a result of the predicted El Niño in 2015 the following meetings were held during the months of January – December 2015:

El Niño Awareness Program

- **January - December 2015**

- **October 28, 2015** (Two meetings) two separate meetings one with the Public with 200 High Desert residents attending, the other meeting was at the same location of the Victor Ville City Council Chambers of 80 operators
- **November 9, 2015** South Desert Meeting at the Town of Yucca Valley Community Center, with 50 Operators and 235 general public ,residents
- **November 12, 2015** 2:30pm-4:30pm Valley Cooperators Meeting, City of Rancho Cucamonga, Victoria Gardens, 90 Operators and 2nd Meeting at the same location held at 530pm-730pm meeting with 205 public and residents
- **November 16, 2015** Public Meeting at Upland city Hal l for San Antonio heights, Mt. Baldy and local residents 110 Public and Residents in attendance .
- **November 23, 2015** Wrightwood Community Center, 80 Operators and 330 Public and Residents
- **November 24, 2015** City of Yucaipa 40 operators at Yucaipa City Hall
- **December, 2015** 5000 English pamphlets and 5000 Spanish pamphlets distributed Winter Weather Workshop meetings (discuss long term weather models and predictions as far as estimated rain fall anticipated. and Extreme Heat Program meetings (stakeholder and Red Cross and SCE and other responders/operators meetings on anticipated overly hot days and local assistance plans. program in place by OES.

4.8.7 Extreme Weather

The Extreme Weather – Excessive Heat Standard Operating Guidelines (SOG) were developed in response to the potential for Excessive Heat and heat related Power Outage events in San Bernardino County. The following objectives and activities have been established to prevent the harmful effects of excessive heat on at-risk populations and the potential for life-threatening repercussions of power outages during excessive heat events.

The Extreme Weather – Excessive Heat SOG describe the County operations during heat related emergencies and provide guidance for local jurisdictions in their preparation for heat emergencies and other related activities.

The information included in this document is “situation” and/or “incident” driven and subject to revision by the Extreme Weather Committee as conditions warrant. Notifications are information dependent and modification of the activities in these guidelines may be required in response to changing conditions, situations and/or inaccurate weather predictions.
The Extreme Weather – Excessive Heat Standard Operating Guidelines (SOG) were developed through the collaborative efforts of the “Extreme Weather Committee”. The committee consists of

representatives from key County Departments and private sector partners who have a shared interest, responsibility and/or expertise in the County's preparation for an Excessive Heat event. It is designed to protect all of the County's population especially the most vulnerable populations.

For the last ten years the annual Winter Weather Workshop and Meeting brings together San Bernardino County Fire Office of Emergency Services with The San Bernardino County Special Districts key stakeholders and first responders as well as weather experts. The annual meeting is an accumulation of meetings with NOAA and other Meteorological experts on the possible winter weather outlook and forecast including possible precipitation levels and wide ranging forecasts.

The meeting includes discussions on possible plans of actions and response to flooding emergencies and or snow or white out events and the other possibility of continuing long duration droughts.

4.9 Other Hazards

As mentioned earlier, lower priority hazards are addressed at a lesser level of detail due to their relatively fewer impacts, as identified in the preceding hazard assessment section. The lower priority hazards for the unincorporated area are:

- Severe Thunderstorm
- Infestation
- Drought
- High Winds/Straight Line Winds
- Lightning
- Extreme Heat
- Hail
- Tornado

Although not part of the MJHMP, the remaining hazards are a part of the San Bernardino County 2007 General Plan and are addressed in the County Building Codes and Ordinance.

The information in this section provides an explicit representation of what a community stands to lose in a disaster. This is useful for county officials and other decision makers who will need to balance the costs of mitigation against the potential harm to citizens and damage to property. It provides comparable measurements of community natural hazard exposure and assists in determining which hazards and/or what parts of San Bernardino County to focus on making resilient to disaster first. Based upon possible assets at risk, hazard mitigation resources can be directed where need be, in-part, by a vulnerability assessment and information found in hazard profiles presented in Section 4.8.

4.10 Vulnerability Assessment

The information in this section provides an explicit representation of what a community stands to lose in a disaster. This is useful for county officials and other decision makers who will need to balance the costs of mitigation against the potential harm to citizens and damage to property. It provides comparable measurements of community natural hazard exposure[3] and assists in determining which hazards and/or what parts of San Bernardino County to focus on making resilient to disaster first. Based upon possible assets at risk, hazard mitigation resources can be directed where need be, in-part, by a vulnerability assessment and information found in hazard profiles presented in Section 4.2.

The vulnerability assessment is developed by providing the hazard mitigation analysts with quantitative and qualitative information for each hazard identified by the HMP Planning Team Through an exposure analysis, quantitative data is developed for each hazard. An exposure analysis provides quantities of people and assets at risk to particular hazards. Qualitative data has been developed and presented in this section for hazards without measurable data. Qualitative data provides information beyond quantities of people and assets at risk, but rather a description of how the hazard could affect a region like San Bernardino County.

Note: The hazard exposure analysis has been developed with best available data and follows methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses.

Note: There are other intangible losses that could result from a natural hazard event, such as losses of historic or cultural integrity or damage to the environment that are difficult to quantify. Other costs, including response and recovery costs, are often unrecoverable and are not addressed in this document.

4.10.1 Methodology

A vulnerability assessment was conducted for each of the identified priority hazards. Geospatial data is essential in determining population and assets exposed to particular hazards. Geospatial analysis can be conducted if a natural hazard has a particular spatial footprint that can be overlaid against the locations of people and assets. In San Bernardino County, wildfire, flood, earthquake, and landslides have known geographic extents and corresponding spatial information about each hazard.

Several sources of data are necessary to conduct a vulnerability analysis. Figure 4-22provides an exhibit of the data inputs and outputs used to create the vulnerability analysis results presented in this section. U.S. Census data is the primary source in determining natural hazard exposure to residents. Census data has been used to determine the population at risk, which is generally referred to as population exposure. Population exposure is provided for wildfire, flooding, earthquakes and landslides as potential hazards later in this section.

[3] Elements at risk; Risk inventory; Exposure encompasses all elements, processes, and subjects that might be affected by a hazardous event. Consequently, exposure is the presence of social, economic, environmental or cultural assets in areas that may be impacted by a hazard.

Together with the U.S. Census data, asset data was used to provide a snapshot of how City assets are affected by natural hazards. For purposes of this vulnerability analysis, asset data includes parcels and critical infrastructure within the San Bernardino County boundaries. Critical infrastructure is described as assets that are essential for people and a community to function. Critical infrastructure includes such as utilities, San Bernardino County owned facilities, bridges, schools, and other community facilities that provide essential services to residents.

Critical facilities data was developed from a variety of sources including San Bernardino County owned and maintained data, state and federal government datasets, and private industry datasets. A critical infrastructure spatial database was developed to translate critical facilities information into georeferenced[4] points. Critical facility points are intersected with the spatial hazard layers to develop a list of "at risk" critical facilities. The San Bernardino County critical facilities that intersect with natural hazards are referred to as facilities with hazard "exposure". Exposure results are presented later in this section.

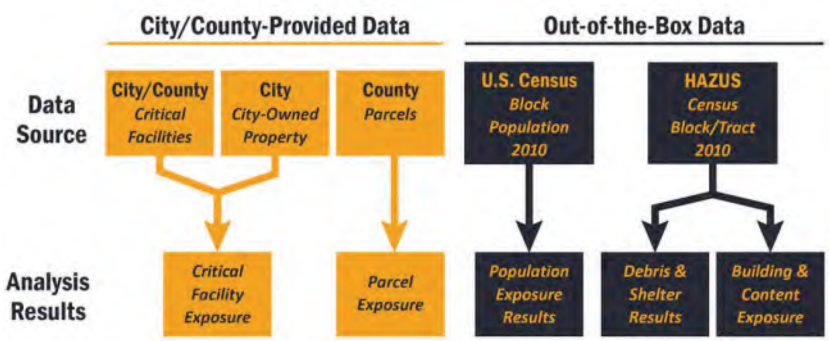


Figure 4-22: Data Source and Methodology

Lastly, FEMA's Hazus-MH MR5 (Hazus) software was implemented to conduct detailed loss estimation for flood and earthquake. Hazus is a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. HAZUS uses Geographic Information Systems (GIS) technology to estimate physical, economic, and social impacts of disasters. For purposes of this planning effort, Hazus was used to graphically illustrate the limits of identified high-risk locations due to possible earthquakes and floods.

[4] To georeference something means to define its existence in physical space. That is, establishing its location in terms of map projections or coordinate systems. The term is used both when establishing the relation between raster or vector images and coordinates, and when determining the spatial location of other geographical features.

The vulnerability and potential impacts from priority hazards that do not have specific mapped areas nor the data to support additional vulnerability analyses are discussed in more general terms in alphabetical order following the discussion on wildfire, flooding and earthquake hazards.

4.10.2 Hazus MH Inputs

FEMA's loss estimation software, Hazus MH, was used to analyze the San Bernardino County building risk to flood and earthquake hazards. Hazus contains a database of economic, demographic, building stock, transportation facilities, local geology, and other information that can be used for several steps in the risk assessment process. Hazus software operates on structure square footage, structure replacement, and content replacement costs aggregated to the census block and tract levels depending on type of hazard analysis. The following table provides value data for building categories at the census block and census tract levels. Census block and census tracts are used to provide input information for the Hazus analysis presented in this report.

The project team used the San Bernardino County Essential Facilities Risk Assessment (SBEFRA) project and incorporated the newly updated DFIRM data into HAZUS to assess potential losses in the mapped 100-year (with and without levee protection) and 500-year flood zones.

Note: The Hazus software utilizes different census level information inputs to develop loss estimates depending on the hazard module. The flood module uses census block information while the earthquake module uses census track information. It is important to understand the total values of each as estimated damage to the community is presented on a percent of total value basis.

Table 4-12: Hazus Flood Census Block Input Values

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (%)	Content Replacement Cost ($000)	Content Replacement Cost (%)	Total Value ($000)	Total Value (%)
Agricultural	$ 70,841	0.3%	$ 70,841	0.3%	$ 141,682	1%
Commercial	$ 1,208,163	4.4%	$ 1,231,690	4.5%	$ 2,439,853	9%
Education	$ 120,017	0.4%	$ 127,161	0.5%	$ 247,178	1%
Governmental	$ 34,216	0.1%	$ 43,192	0.2%	$ 77,408	0%
Industrial	$ 452,710	1.6%	$ 610,063	2.2%	$ 1,062,773	4%
Religion	$ 176,012	0.6%	$ 176,012	0.6%	$ 352,024	1%
Residential	$ 15,483,634	56.2%	$ 7,744,650	28.1%	$ 23,228,284	84%
Total	**$ 17,545,593**	**64%**	**$ 10,003,609**	**36%**	**$ 27,549,202**	**100 %**

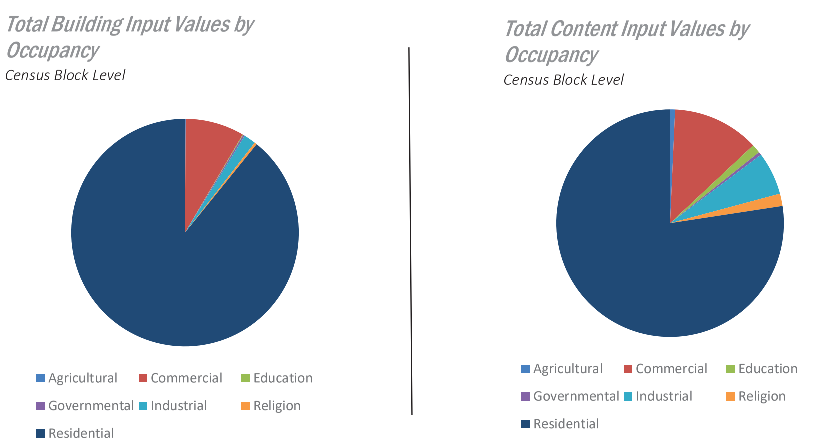


Figure 4-23: Census Block Building and Content Exposure Values

Table 4-13: Hazus Earthquake Census Tract Input Values

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (%)	Content Replacement Cost ($000)	Content Replacement Cost (%)	Total Value ($000)	Total Value (%)
Agricultural	$ 264,949	50.0%	$ 264,949	50.0%	$ 529,898	1%
Commercial	$ 11,056,871	48.5%	$ 11,756,479	51.5%	$ 22,813,350	9%
Education	$ 819,946	48.4%	$ 874,703	51.6%	$ 1,694,649	1%
Governmental	$ 265,933	45.6%	$ 316,930	54.4%	$ 582,863	0%
Industrial	$ 3,733,265	41.4%	$ 5,276,431	58.6%	$ 9,009,696	4%
Religion	$ 958,122	50.0%	$ 958,122	50.0%	$ 1,916,244	1%
Residential	$ 84,302,884	66.7%	$ 42,159,954	33.3%	$ 126,462,838	84%
Total	**$ 101,401,970**	**62%**	**$ 61,607,568**	**38%**	**$ 163,009,538**	**100 %**

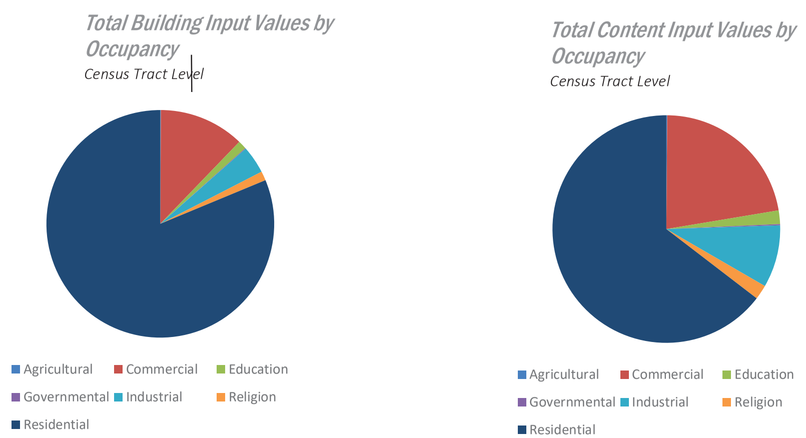


Figure 4-24: Census Tract Building and Content Exposure Values

4.11 Population and Assets

To describe vulnerability for each hazard, it is important to understand the “total” population and “total” assets at risk. The exposure for each hazard described in this section will refer to the percent of total population or percent of total assets. This provides the possible significance or vulnerability to people and assets for the natural hazard event and the estimated damage and losses expected during a “worst case scenario” event for each hazard. Sections below provide a description of the total population, critical facilities, and parcel exposure inputs.

Table 4-12 and Table 4-13 provide an estimate of the number and size of buildings in the County’s unincorporated areas and its Special Districts, as well as the replacement value of the buildings and their contents. The table provides information by occupancy class (e.g., residential, commercial, etc.), as well as by construction type (e.g., concrete, wood frame, etc.).

4.11.1 Population

To develop hazard-specific vulnerability assessments, population near natural hazard risks should be determined to understand the total “at risk” population. We can understand how geographically defined hazards may affect San Bernardino County by analyzing the extent of the hazard in relation to the location of population. For purposes of the vulnerability assessment approximately 292,152 (100 %) of the San Bernardino County’s population is exposed to one or more hazards within or near the County of San Bernardino boundaries. Each natural hazard scenario affects the San Bernardino County residents differently depending on the location of the hazard and the population density of where the hazard could occur. Vulnerability assessment sections presented later in this section summarize the population exposure for each natural hazard.

4.11.1.1 Vulnerable Populations

The severity of a disaster depends on both the physical nature of the extreme event and the socioeconomic nature of the populations affected by the event. Important socioeconomic factors tend to influence disaster severity. A core concept in a vulnerability analysis is that different people, even within the same region, have a different vulnerability to natural hazards.

4.11.1.2 Income and Housing Condition

Income or wealth is one of the most important factors in natural hazard vulnerability. This economic factor affects vulnerability of low income populations in several ways. Lower income populations are less able to afford housing and other infrastructure that can withstand extreme events. Low income populations are less able to purchase resources needed for disaster response and are less likely to have insurance policies that can contribute to recovery efforts. Lower income elderly populations are less likely to have access to medical care due to financial hardship. Because of these and other factors, when disaster strikes, low income residences are far more likely to be injured or left without food and shelter during and after natural disasters.

Figure 4-25 shows the median household income distribution for the County of San Bernardino in 2012. The “median” is the value that divides the distribution of household income into two equal parts (e.g., the middle). The average median household income in the County of San Bernardino between 2010 and 2014 was $54,100, in the United States during the same period the median house household income was $51,759.

4.11.1.3 Age

Children and the elderly tend to be more vulnerable during an extreme natural disaster. They have less physical strength to survive disasters and are often more susceptible to certain diseases. The elderly often also have declining vision and hearing and often miss reports of upcoming natural hazard events. Children, especially young children, have the inability to provide for themselves. In many cases, both children and the elderly depend on others to care for them during day to day life.

Finally, both children and the elderly have fewer financial resources and are frequently dependent on others for survival. In order for these populations to remain resilient before and after a natural hazard event, it may be necessary to augment city residents with resources provided by the City, state and federal emergency management agencies and organizations. See Figure 4-26 and Figure 4-27 for location of vulnerable population by age within the County of San Bernardino.

Figure 4-25: Median Household Income Distribution Maps

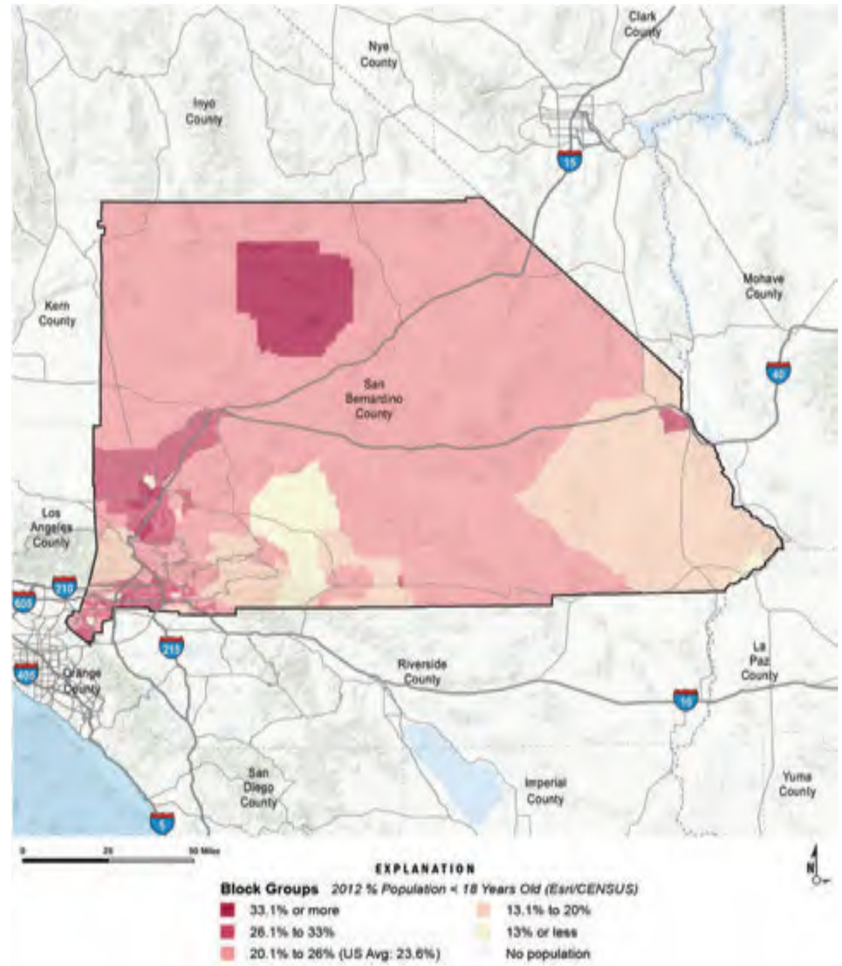


Figure 4-26: Population Under Age 18

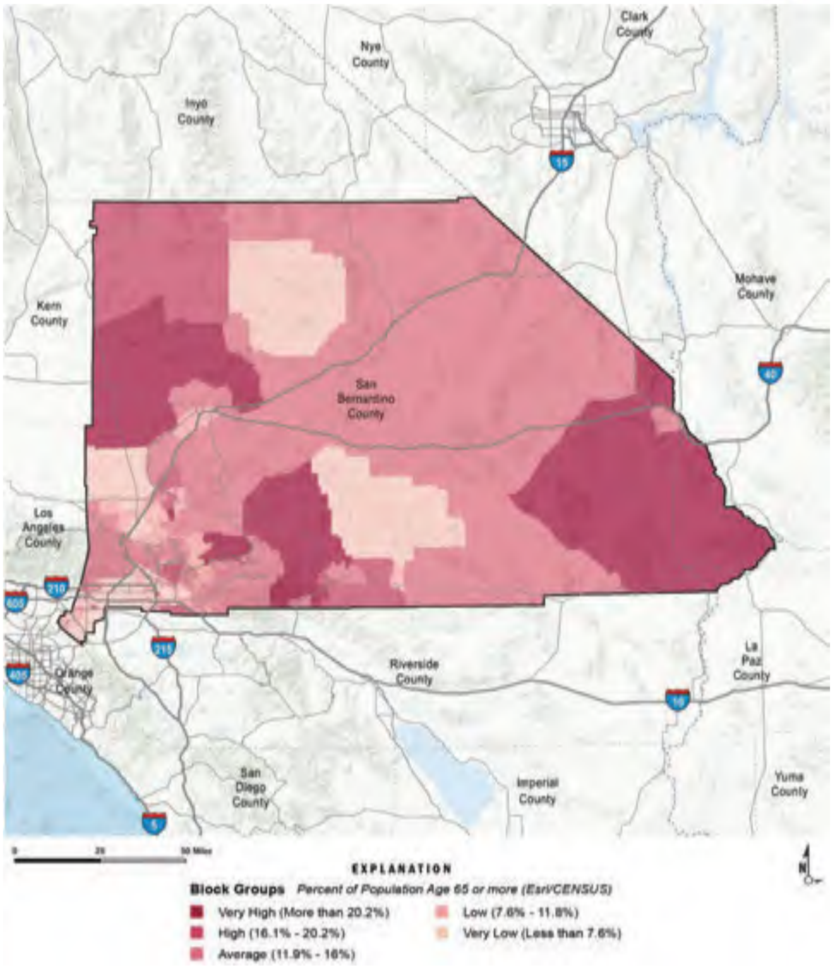


Figure 4-27: Population Over Age 65

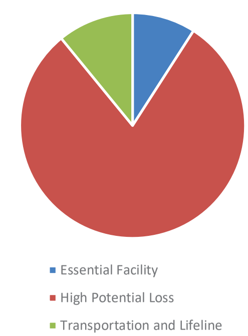
4.11.1.4 Critical Facility List

As stated in the San Bernardino County Emergency Operations Plan (EOP), the San Bernardino County Sheriff's Department (Sheriff) is the lead County agency in identifying critical infrastructure in the County and its Special Districts. A Sheriff's Department Working Group was established to identify Critical Facilities throughout San Bernardino County. Due to Homeland Security and issues related to terrorism, this list is not included in the MJHMP, but is available through the Sheriff's Department.

The Sheriff's Department maintains a Critical Infrastructure Database listing the site name, location, critical level, threat level, site type, and contact information. This database was created for the 2010 MJHMP and has been updated regularly by the Intelligence Division. The Sheriff's Intelligence Division has created Emergency Response Folders (Folders) on each of the locations. The Folders contain site-specific information needed by emergency personnel to respond to any type of emergency. The Folders contain floor plans, photographs, entry/exit points, utility locations, ingress and egress locations, known hazardous materials on site, and emergency contact information for the responsible persons of the site. The Sheriff's Department maintains control and transport of this information to an Incident Command Post/Department Operations Center/Emergency Operations Center when needed.

Table 4-14: Critical Facility Points

Infrastructure Type	Feature Count
Essential Facility	**268**
EOC	2
Fire Station	99
Hospital	9
Police Station	28
School	130
High Potential Loss	**1,155**
Child Care Center	91
Child Residential Care - 24 hour	2
Foster Family Agency	2
Adult Residential Care	52
Home Care Organization	2
Elder Residential Care	35
Communication Facility	40
Dam	24
Waste Water Facility	2



Infrastructure Type	Feature Count
HAZMAT	51
EPA FRS Facility	731
FCC ASR	107
Electric Power Facility	6
Natural Gas Facility	7
Potable Water Facility	3
Transportation and Lifeline	**636**
Airport	34
Runway	36
Bus Facility	2
Highway Bridge	553
Railway Bridge	11
Grand Total	**2,059**

Table 4-15: Linear Utilities

Infrastructure Type	Total Linear Mileage
Transportation and Lifeline	**16,992**
Railway	**719**
Roads	**16,273**
Interstate Highway	587
State / County Highway	1,259
Primary Highway	308
Local Road, Major	2,928
Local Road	6,530
Other Minor Road	4,031
Vehicular Trail	543
Cul-de-Sac / Traffic Circle	11
Ramp	68
Service Road	8
Grand Total	**16,992**

4.11.1.5 Utility Agencies

The utilities and transportation infrastructure is another significant concern for the County and its Special Districts. Various laws, ordinances, regulations, standards, and guidelines have been established to ensure proper and thorough mitigation measures to decrease the effects of hazards.

The following are two of the major utility agencies:

Southern California Edison (SCE) has undertaken an all-hazards approach to planning for an emergency event. SCE has developed an Emergency Response and Recovery Plan to provide a safe and reliable electric service. SCE also has a long-standing relationship with the County and is an active member of several local, state, and federal organizations. According to SCE they have acted to mitigate the impacts of hazards on their electrical system.

Southwest Gas Corporation (SWG) has also coordinated with the County, maintains a natural gas high-pressure system within the County, and consists of approximately 100 miles of underground pipelines. The system also includes some above ground facilities. The total replacement cost for the entire system is approximately $40,000,000. Southwest Gas conducts annual training for the first responders within their service territories to teach the proper methods of responding to and working with natural gas leaks. Staff from SWG serves on local emergency management committees within their service territory.

4.12 Hazard Specific Vulnerabilities

This section summarizes the possible impacts and quantifies, where data permits, the County's vulnerability to each of the priority hazards identified in the hazard profiles earlier in this section.

An estimate of the vulnerability of the County to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, geographic extent, and damage and casualty potential. It is categorized into the following classifications:

Low: Minimal potential impact the occurrence and potential cost of damage to life and property is minimal.

Medium: Moderate potential impact this ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.

High: Widespread potential impact this ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.

Extremely High: Very widespread with catastrophic impact.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be inventoried and their values tabulated. Other information can be collected in regard to the hazard area, such as the location of critical community facilities, historic structures, and valued natural resources. Together, this information conveys the vulnerability of that area to a hazard.

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4.13 Earthquake

Major Impacts from earthquakes are primarily the probable number of casualties and damage to infrastructure occurring from ground movement along a particular fault (USGS, 2016). The degree of infrastructure damage depends on the magnitude, focal depth, distance from fault, duration of shaking, type of surface deposits, presence of high groundwater, topography, and the design, type, and quality of infrastructure construction.

To analyze the risk to San Bernardino County residents, the Great Shakeout scenario was chosen modeled by the California Integrated Seismic Network (CISN). The 2016 Great Southern California ShakeOut was based on a potential magnitude 7.8 Earthquake on the southern San Andreas Fault approximately 5,000 times larger than the magnitude 5.4 earthquake that shook southern California on July 29, 2008. Such an earthquake will cause unprecedented damage to Southern California greatly dwarfing the massive damage that occurred in Northridge's 6.7-magnitude earthquake in 1994. The hazard foot print for this scenario was used to develop exposure results for population, critical facilities, and single family residential parcel values. FEMA Hazus analyses was used to conducted loss estimation for both scenarios and include building and content loss estimation results based on peak ground acceleration, peak ground velocity, and peak spectral acceleration modeled for the 7.8 earthquake on the San Andreas Fault.

4.13.1 Population at Risk

According to the 2010 US Census, the population of jurisdiction is 297,425. Though rural residential construction is not particularly vulnerable to earthquakes, the chosen earthquake scenarios will directly or indirectly expose the entire population of San Bernardino County to ground shaking. Depending on the time of day (the population differs based on employment opportunities) and exact location of the modeled epicenter, the earthquake scenarios could be experienced differently. Figure 4-28 exhibit the population totals in each modeled earthquake severity zone. Population location is based upon information taken during the 2010 U.S. Census.

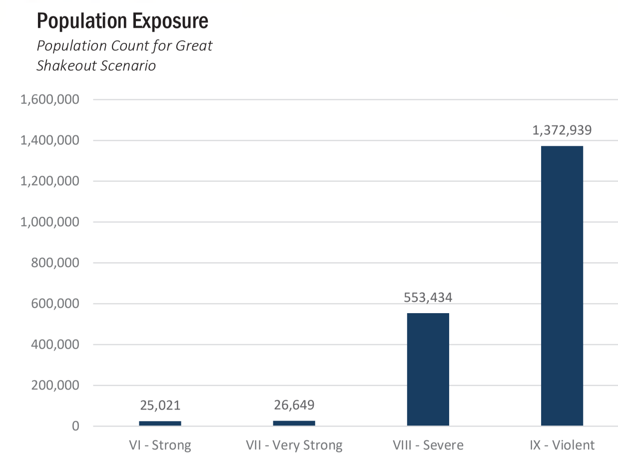

Figure 4-28: Population Exposure to the Great Shakeout EQ Shake Severity Zone

4.13.2 Improved Parcel Value at Risk

The County's parcel layer was used as the basis for the inventory of improved residential parcels. GIS was used to create centroids, or points, to represent the center of each parcel polygon this is assumed to be the location of the structure for analysis purposes. The centroids were then overlaid with the shake severity zones to determine the at-risk structures. Only improved parcels greater than $20,000 were analyzed. The analysis indicates residential parcels the chosen scenario will experience similar, but different shaking patterns. The type and year of construction will greatly influence damage for structures subject to similar shaking. Table 4-16 shows the count of at-risk structures and their associated improvement and land exposure values.

Table 4-16: Improved Parcel Value Exposure from Southern California Great ShakeOut

Shake Severity Zone	Improved Parcel Count	Improvement Value Exposure ($000)	Land Value Exposure ($000)	Total Exposure ($000)
IV - Light	1,099	$ 181,952	$ 64,548	$ 246,499
V - Moderate	4,382	$ 485,082	$ 215,875	$ 700,956

Shake Severity Zone	Improved Parcel Count	Improvement Value Exposure ($000)	Land Value Exposure ($000)	Total Exposure ($000)
VI - Strong	1,340	$ 142,763	$ 63,941	$ 206,704
VII - Very Strong	7,669	$ 824,794	$ 206,725	$ 1,031,519
VIII - Severe	46,889	$ 8,741,904	$ 3,039,484	$ 11,781,388
IX - Violent	46,974	$ 9,068,446	$ 3,591,379	$ 12,659,825
Grand Total	**108,353**	**$ 19,444,940**	**$ 7,181,951**	**$ 26,626,891**

4.13.3 Critical Facilities with Damage Potential

Earthquakes pose numerous risks to critical facilities and infrastructure. Seismic risks, or losses, that are likely to result from exposure to seismic hazards include:

- Casualties (fatalities and injuries).
- Utility outages.
- Economic losses for repair and replacement of critical facilities, roads, buildings, etc.
- Indirect economic losses such as income lost during downtime resulting from damage to private property or public infrastructure.

Roads or railroads that are blocked or damaged can prevent access throughout the area and can isolate residents and emergency service providers needing to reach vulnerable populations or to make repairs.

Linear utilities and transportation routes are vulnerable to rupture and damage during and after a significant earthquake event. The cascading impact of a single failure can have affects across multiple systems and utility sectors. Degrading infrastructure systems and future large earthquakes with epicenters near critical regional infrastructure could result in system outages that last weeks for the most reliable systems, and multiple months for others.
Table 4-17provides an inventory of critical facility locations (points only) with earthquake exposure to the Great Shakeout Scenario. The building codes have been amended to include provisions for seismic safety at various bench marks years. Depending on "year built", each critical facility presented in the tables may have varying damage potential.

Table 4-17: Critical Facilities with Earthquake Risk Southern California Great ShakeOut

Infrastructure Type	Violent Shake Zone (IX)	Severe Shake Zone (VIII)	Very Strong (VII)	Strong Shake Zone (VI)	Feature Count
Essential Facility	3	12	80	122	217
EOC	-	-	2	-	2
Fire Station	3	7	31	34	75
Hospital	-	-	9	-	9
Police Station	-	-	3	24	27
School	-	5	35	64	104
High Potential Loss	31	56	213	484	784
Child Care Center	1	3	25	56	85
Child Residential Care – 24 hour	-	-	-	2	2
Foster Family Agency	-	-	-	2	2
Adult Residential Care	2	5	10	34	51
Home Care Organization	-	-	1	1	2
Elder Residential Care	-	1	9	25	35
Communication Facility	1	9	9	8	27
Dam	1	-	11	4	16
Electric Power Facility	1	-	-	-	1
Natural Gas Facility	2	-	-	-	2
Waste Water Facility	-	2	-	-	2
HAZMAT	-	-	6	16	22
EPA FRS Facility	21	27	115	307	470
FCC ASR	2	9	27	29	67
Transportation and Lifeline	16	20	41	131	208
Airport	5	5	8	-	18
Runway	5	6	7	1	19
Bus Facility	-	-	1	-	1
Highway Bridge	6	8	24	124	162
Railway Bridge	-	1	1	6	8
Grand Total	**50**	**88**	**334**	**737**	**1,209**

HazMat Fixed Facilities
Although earthquakes are low probability events, they produce hazardous materials (HazMat) threats at very high levels when they do occur. Depending on the year built and construction of each facility containing HazMat, earthquake initiated hazardous material releases (EIHR) potential will vary. HazMat contained within masonry or concrete structures built before certain benchmark years reflecting code improvements may be of particular vulnerability.

Transportation
Earthquake events can significantly impact bridges which often provide the only access to some neighborhoods. Since soft soil regions generally follow floodplain boundaries, bridges that cross water courses are considered vulnerable. Since most of the San Bernardino County bridges provide access across water courses, most are at least somewhat vulnerable to earthquakes. Key factors in the degree of vulnerability are the bridge's age and type of construction which indicate the standards to which the bridge was built. Special attention will be paid to the multiple bridges that cross interstates. Interstates would serve as major emergency response and evacuation routes.

Utilities

Linear utilities and transportation infrastructure would likely suffer considerable damage in the event of an earthquake. Due to the amount of infrastructure and sensitivity of utility data, linear utilities are difficult to analyze without further investigation of individual system components. Table 4-18 provides the best available linear data and it should be assumed that these systems are exposed to breakage and failure.

Table 4-18: Lifeline with Earthquake Risk Southern California Great ShakeOut

Facility Type	Strong	Very Strong	Severe	Violent	Total Mileage
Transportation and Lifeline	1,324	1,951	2,796	2,624	8,697
Railway	47	22	22	99	191
Roads	1,277	1,929	2,774	2,525	8,506
Interstate Highway	22	7	-	48	77
State / County Highway	57	90	263	233	644
Primary Highway	34	15	19	27	95
Local Road, Major	102	207	625	792	1,726
Local Road	540	1,153	1,728	1,128	4,550
Other Minor Road	494	423	109	96	1,122
Vehicular Trail	25	32	26	178	261
Cul-de-Sac / Traffic Circle	-	1	2	2	5
Ramp	2	1	2	20	25
Service Road	-	-	-	1	1
Grand Total	**1,324**	**1,951**	**2,796**	**2,624**	**8,695**

4.13.4 Loss Estimation Results

The Hazus Level 2 analysis was used to assess the risk from and vulnerability to earthquake shaking within San Bernardino County. Hazus buildings data is aggregated to the census tract level for earthquake models, known as the general building stock (GBS), which has a level of accuracy acceptable for planning purposes. Where possible the GBS was enhanced using GIS data from the county as described previously. The following sections describe risk to and vulnerability of the GBS within the San Bernardino County Hazus calculates losses to structures from earthquake shaking by considering the amount of ground displacement and type of structure. The software estimates the percentage of damage to structures and their contents by applying established building fragility curves. Damage estimates are then translated to estimated dollar losses.
For each Great ShakeOut Scenario ground shaking data (shakemaps) were acquired from CISN and imported into Hazus. The shakemap data consist of peak ground velocity, peak

ground acceleration, peak spectral acceleration at 0.3 seconds, and peak spectral acceleration at 1.0 seconds. The earthquake module operates on census tracts that often include population and structures in the incorporated cities and the unincorporated area within a single tract. Due to this fact the results include census tracts that have a substantial portion of land within the incorporated area (loss estimates for some tracts will include structures in incorporated cities).

The results are summarized in Table 4-17 for the Great ShakeOut Scenario. It is important to understand that the Hazus earthquake module uses the census tract as its enumeration unit rather than the more detailed census block. The loss estimation values for earthquakes are much higher than those of the flooding and dam failure due to this fact. The portions of incorporated areas included within boundary census tracts elevate the values due to the inclusion of additional GBS. Though the difference between census tracts and census blocks are extremely disparate, the most important summary information is the percent of loss estimation against the total value.

Residential building and content loss estimation from the Great ShakeOut Scenario is *$9.3* billion dollars and 57 percent of the total value of the residential buildings. In Great ShakeOut Scenario, residential damage will be the greatest. While there are several limitations to the FEMA Hazus model, it does allow for potential loss estimation. It is important to remember that the replacement costs are well below actual market values, thus, the actual value of assets at risk may be significantly higher than those included herein.

Table 4-19: Estimated Building and Content Loss Great ShakeOut Scenario Earthquake

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (% of Total Value)	Content Replacement Cost ($000)	Content Replacement Cost (% of Total Value)	Total Estimated Loss ($000)	Total Loss Estimation (% of Total Value)
Agricultural	$ 51,431	9.7%	$ 17,215.68	3.2%	$ 68,646.80	13.0%
Commercial	$ 3,286,331	14.4%	$ 1,110,422.84	4.9%	$ 4,396,754.29	19.3%
Educational	$ 175,987	10.4%	$ 56,822.89	3.4%	$ 232,810.20	13.7%
Government	$ 53,348	9.2%	$ 20,298.84	3.5	$ 73,647.28	12.6%
Industrial	$ 1,179,339	13.1%	$ 590,913.81	6.6%	$ 1,770,253.41	19.6%
Religious	$ 243,891	12.7%	$ 80,862.72	4.2%	$ 324,754.33	16.9%
Residential	$ 7,841,645	6.2%	$ 1,525,181.65	1.2%	$ 9,366,826.84	7.4%
Grand Total	**$ 12,831,972**	**7.9%**	**$ 3,401,718.42**	**2.1%**	**$ 16,233,693.14**	**10.0%**

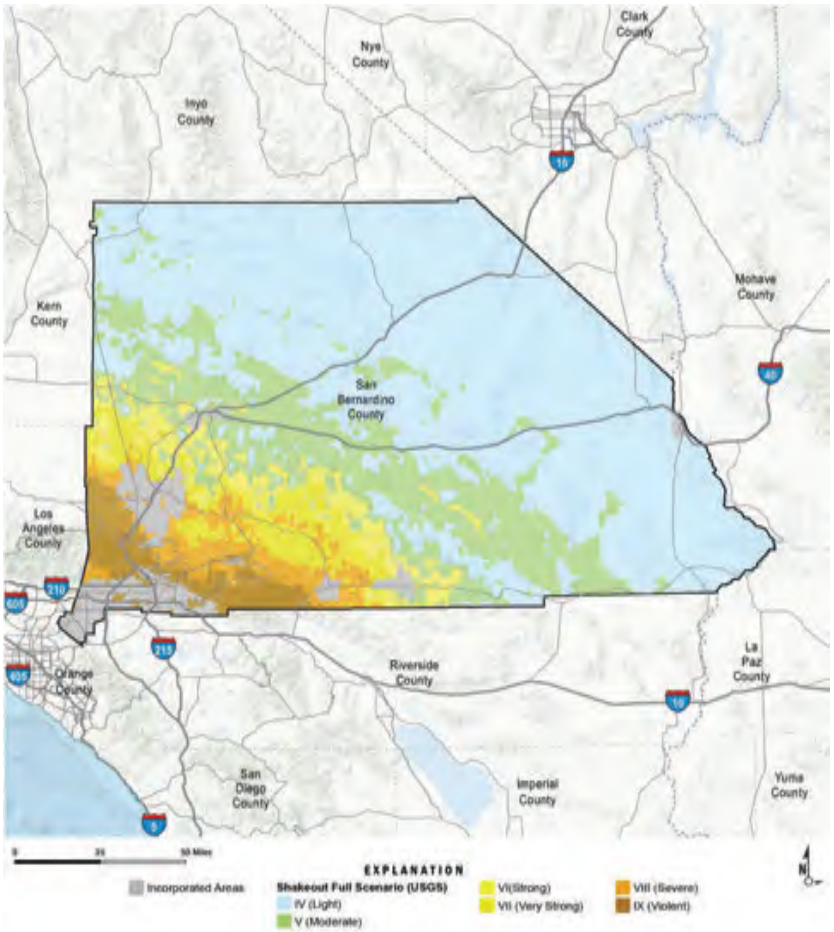

Figure 4-29: Great Shakeout Scenario MMI Classes

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4.14 Wildfire

Risk to the County of San Bernardino from wildfire is of significant concern. High fuel loads in the hills, along with geographical and topographical features, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and sometimes catastrophic fires. During the May to October fire season the dry vegetation and hot and sometimes windy weather, combined with continued growth in the WUI areas, results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become large and out-of-control.

Potential losses from wildfire include human life, structures and other improvements, natural and cultural resources, quality and quantity of water supplies, cropland, timber, and recreational opportunities. Short and long-term economic losses could also result due to loss of business and other economic drivers associated with San Bernardino County summer season activities. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

Generally, there are three major factors that sustain wildfires and predict a given area's potential vulnerability to burn. These factors are fuel, topography, and weather.

- Fuel – Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and volume. Fuel sources are diverse and include everything from dead tree leaves, twigs, and branches, to dead standing trees, live trees, brush, and cured grasses. Manmade structures are also considered a fuel source, such as homes and other associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Fuel is the only factor that is under human control. Development in the mountain region currently possesses the highest vulnerability to wildfire.

- The residents of this region are also considered to be the most vulnerable due to their age and income levels. This area is comprised of lower income (that is, lower than the US median income) homes as well as a higher than average amount of residents under age 18 and an average amount of residents 65 or older.
- Topography – An area's terrain and slope affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.

- Weather – Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out fuels that feed wildfires, creating a situation where fuel will ignite more readily and burn more intensely. Thus, during periods of drought the threat of wildfire increases. Wind is the most treacherous weather factor. The greater the wind, the faster a fire can spread and the more intense it can be. Wind shifts, in addition to wind speed, can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. As part of a weather system, lightning also ignites wildfires, often in difficult to reach terrain for firefighters.

Factors contributing to the high, widespread wildfire risk in San Bernardino County include:

- Narrow and often one-lane and/or dead-end roads complicating evacuation and emergency response.
- Nature and frequency of ignitions; and increasing population density leading to more ignitions.
- Slope of the foothills;
- Residential development along the foothills;

4.14.1 Population at Risk

Wildfire risk is of greatest concern to populations residing in the moderate, high, and very high wildfire hazard zones. The San Bernardino County census block data was used to estimate populations within the hazard zones. There are a significant number of people living within the WUI described in the wildfire profiles. More than 34,000 residents in the unincorporated county live within areas considered very high fire hazard and more than 63,000 residents live within a very high hazard

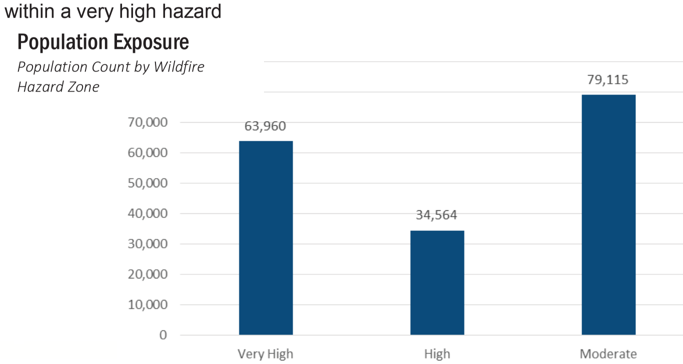

Figure 4-30: Population at Risk from Wildfire Hazards

4.14.2 Improved Parcel Value at Risk

The County's parcel layer was used as the basis for the inventory of improved residential parcels. In some cases, a parcel will be within in multiple fire threat zones. GIS was used to create centroids, or points, to represent the center of each parcel polygon – this is assumed to be the location of the structure for analysis purposes. The centroids were then overlaid with the fire threat layer to determine the risk for each structure. The fire threat zone in which the centroid was located was assigned to the entire parcel. This methodology assumed that every parcel with a square footage value greater than zero was developed in some way. Only improved parcels were analyzed. Table 4-20 exhibits portions of San Bernardino County that have significant assets at risk to wildfire in the Moderate, High and Very High fire severity zones.

Table 4-20: Residential Buildings and Content at Risk from Wildfire

Fire Hazard Severity Hazard Zone	Improved Parcel Count	Improvement Value Exposure ($000)	Land Value Exposure ($000)	Total Exposure ($000)
Very High	43,794	$ 8,602,590	$ 3,075,148	$ 11,677,739
High	11,512	$ 1,822,731	$ 551,160	$ 2,373,892
Moderate	25,477	$ 3,221,982	$ 950,044	$ 4,172,026
Non-Wildland/Non-Urban	621	$ 573,866	$ 294,283	$ 868,148
Urban Un-zoned	26,974	$ 5,223,286	$ 2,310,932	$ 7,534,219
Grand Total	**108,378**	**$ 19,444,456**	**$ 7,181,567**	**$ 26,626,023**

Note:
1-The table above does not display loss estimation results; the table exhibits total value at risk based upon the hazard overlay and San Bernardino County Assessor data.
2- Parcel information is for all county parcels with greater than $20,000 in assessed parcel improvement value only. The San Bernardino County Assessor's roles only provide spatial information on assessed improvement and land values.

4.14.3 Critical Facilities at Risk

Critical facilities data were overlain with fire hazard severity zone data to determine the type and number of facilities within each risk classification. Tables 4-21 and 4-22 list the critical facilities in the High and Very High wildfire hazard zones for San Bernardino County.

Table 4-21: Critical Facilities at Risk from Wildfire

Infrastructure Type	High	Very High	Feature Count
Essential Facility	11	105	116
EOC	2	0	2
Fire Station	4	45	49
Hospital	0	5	5
Police Station	0	24	24
School	5	31	36
High Potential Loss	72	177	249
Child Care Center	3	29	32
Child Residential Care - 24 hour	1	0	1
Foster Family Agency	0	0	0
Adult Residential Care	11	4	15
Home Care Organization	0	0	0
Elder Residential Care	8	5	13
Communication Facility	2	13	15
Dam	0	14	14
Electric Power Facility	0	0	0
Natural Gas Facility	0	0	0
Potable Water Facility	0	0	0
Waste Water Facility	0	0	0
HAZMAT	0	2	2
EPA FRS Facility	37	83	120
FCC ASR	10	27	37
Transportation and Lifeline	10	103	113
Airport	1	0	1
Runway	1	0	1
Bus Facility	1	0	1
Highway Bridge	7	101	108
Railway Bridge	0	2	2
Grand Total	**93**	**385**	**478**

Table 4-22: Lifelines with Wildfire Risk

Facility Type	High	Very High	Total Mileage
Transportation and Lifeline	819	1,906	2,725
Railway	19	47	66
Roads	800	1,859	2,659
Interstate Highway	4	37	41
State / County Highway	33	226	259
Primary Highway	17	13	30
Local Road, Major	311	521	832
Local Road	389	806	1,195
Other Minor Road	34	56	91
Vehicular Trail	10	184	195
Cul-de-Sac / Traffic Circle	1	2	3
Ramp	2	12	13
Service Road	0	1	1
Grand Total	**819**	**1,906**	**2,725**

4.14.4 Loss Estimation Results

Wildland fire cost impacts of damage done to land and structures and also to critical infrastructure

It is impossible to estimate the possible cost in dollars to replace and pay for actual firefighting as the damage costs that incur from wildland fires varies so greatly. One of the varied costs is the replacement and repair of structures and remediate of the damaged properties. Then the rebuilding costs and replacing of the structures with laws requiring new buildings to meet new criteria as a result of state laws that may require more stringent building and construction practices far greater than the original building of the said structure. Also the estimate of damages to critical infrastructures such as power lines and delivery systems as it is difficult the collateral loses to businesses and individuals losing power for and unknown time. Also damages to railroads and bridges also to road way, freeways as it is impossible to gauge the actual lose amounts from commerce being impeded.

Many of the County's landfills, transfer stations, and closed disposal sites are situated in areas subject to wildfires. In 2003, the Old Fire burned through three separate sites and caused major damage at the Heaps Peak Transfer Station when the fire burned through the office building and Transfer Station site.

None of this takes into account the costs of labor and retardants, vehicle damages and fuel and wear and tear as well as equipment expended and used and or damaged. Along with replace any safety gear or injuries to any persons working to mitigate the wildland fire

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4.15 Flooding

The County has experienced severe and widespread flooding throughout its history. Several major drainage basins have the potential to subject residents and structures to a high risk of flooding. In addition, the cumulative increase in impervious surfaces has increased problems related to surface run- off. While complete avoidance or protection through control facilities is not practical, considerable improvement can be made through structural and non-structural methods.

The County currently utilizes land use zoning districts to prohibit habitable structures in floodways as defined by the federal requirements necessary to participate in the National Flood Insurance Program. The consistent adoption of overlays is needed to require special review, conditions, and the prohibition of some uses in floodplain areas (areas subject to 100-year floods), including dry lakes. In addition, there are land use policies and development standards that can be implemented, including reduction of impervious surfaces; increase of percolation, infiltration, and recharge; and the control of urban run-off. There is a need for the County to identify all areas of flood and drainage hazards, especially in the Desert Region where mapping is sparse, as well as areas with a heavy concentration of debris or the potential for dam inundation. Flood hazards are more comprehensively discussed in the Safety Background Report.

The vulnerable areas are addressed in the County's General Plan. See Sections 5 and 6 for additional information. San Bernardino County has seven (7) properties listed in the Repetitive Loss and Severe Repetitive Loss properties. All of the properties are single-family residences. The properties are located in:

- Barstow – 2 properties (1999 and 2005)
- Crestline (1980 and 1982)
- Forest Falls (1995 and 1999)
- Lake Arrowhead (1998 and 2005)
- Lytle Creek (1998 and 2005)
- Sugarloaf (1993 and 1995)

These properties were damaged during unusual storms and/or immediately after a wildfire in the area and are isolated properties in widely scattered areas of the County. The properties were not damaged during the 2009 or 2010 winter storm events. Property addresses are not listed to comply with privacy laws.

The areas are now covered by the County General Plan and County Ordinance. These are in compliance with the National Flood Insurance Program.

4.15.1 Population at Risk

Of greatest concern in the event of a flood is the potential for loss of life. Using 2012 population data aggregated by census blocks, an estimate was made of the population exposed to the 100 and 500-year floodplain. To account for census blocks that were partially within the floodplain, a weighted average was employed to calculate the proportion of the population within the floodplain. The results of the population overlay are shown in Figure 4-31. More than 9,500 residents live near or within the 100-year floodplain and approximately 13,346 county residents live within the 500-year floodplain. Approximately 18,816 county residents live within areas protected by levees.

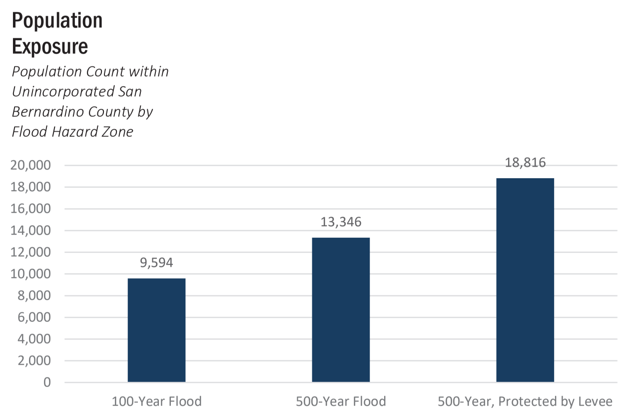

Figure 4-31: Population Exposed to NFIP Flood Zones

4.15.2 Residential Parcel Value with Flood Risk

The County's parcel layer was used as the basis for the inventory of improved residential parcels within the FEMA NFIP flood zones. In some cases, a parcel will be within in multiple flood zones. GIS was used to create centroids, or points, to represent the center of each parcel polygon – this is assumed to be the location of the structure for analysis purposes. The centroids were then overlaid with the floodplain layer to determine the flood risk for each structure. The flood zone in which the centroid was located was assigned to the entire parcel. This methodology assumed that every parcel with a square footage value greater than zero was developed in some way. Only improved parcels greater than $20,000 were analyzed.

Table 4-23 shows the count of at-risk parcels and their improvement and land exposure values.

Table 4-23: Parcels Exposed to NFIP Flood Zones

Flood Hazard Zone	Improved Parcel Count	Improvement Value Exposure ($000)	Land Value Exposure ($000)	Total Exposure ($000)
100-Year Flood	3,426	$ 518,483	$ 368,058	$ 886,541
500-Year Flood	3,397	$ 833,287	$ 338,728	$ 1,172,014
500-Year, Protected by Levee	4,608	$ 1,327,942	$ 527,317	$ 1,855,259
Grand Total	11,431	$ 2,679,711	$ 1,234,103	$ 3,913,814

While there are several limitations to this methodology, it does allow for potential loss estimation. It should be noted that the analysis may include structures in the floodplain that are elevated at or above the level of the base flood elevation, which will most likely decrease potential flood damage to these structures. Also, it is important to remember that the County Assessor's values are well below actual market values; thus, the actual value of assets at risk may be significantly higher than those included herein.

4.15.3 Critical Facilities Exposure

Critical facilities data were overlain with flood hazard data to determine the type and number of facilities within the 100- and 500-year floodplain. Flooding poses numerous risks to critical facilities and infrastructure:

- Roads or railroads that are blocked or damaged can prevent access throughout the area and can isolate residents and emergency service providers needing to reach vulnerable populations or to make repairs.
- Bridges washed out or blocked by floods or debris from floods also can cause isolation.
- Creek or river floodwaters can back up drainage systems causing localized flooding.
- Floodwaters can get into drinking water supplies causing contamination.
- Sewer systems can be backed up causing waste to spill into homes, neighborhoods, rivers, and streams.
- Underground utilities can also be damaged.

Tables 4-24 and 4-25 provide an inventory of critical facilities in the floodplain for San Bernardino County and it provides the location of lifelines relative to the floodplain in the areas of the San Bernardino County. With a total of 810 essential facilities, high potential losses, and transportation and lifeline structures located in either the 100 or 500-year flood zone, the impact to the community could be devastating if these critical facilities were damaged or destroyed during a flood event.

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Table 4-24: Critical Facility Exposed to NFIP Flood Zones

Infrastructure Type	100 Year Flood Zone	500 Year Flood Zone	500 Year Flood Zone, Protected by Levee	Feature Count
Essential Facility	21	114	5	140
EOC	0	1	0	1
Fire Station	4	27	2	33
Hospital	0	4	0	4
Police Station	2	23	0	25
School	15	59	3	77
High Potential Loss	52	458	52	562
Child Care Center	13	57	3	73
Child Residential Care - 24 hour	0	2	0	2
Foster Family Agency	0	2	0	2
Adult Residential Care	0	37	3	40
Home Care Organization	0	2	0	2
Elder Residential Care	0	24	8	32
Communication Facility	0	7	0	7
Dam	2	3	0	5
Waste Water Facility	1	0	0	1
HAZMAT	0	16	1	17
EPA FRS Facility	33	286	35	354
FCC ASR	3	22	2	27
Transportation and Lifeline	26	77	5	108
Airport	2	5	0	7
Runway	2	5	0	7
Bus Facility	1	1	0	2
Highway Bridge	20	65	5	90
Railway Bridge	1	1	0	2
Grand Total	**99**	**649**	**62**	**810**

Table 4-25: Lifelines Exposure to NFIP Flood Zones

Facility Type	100 Year	500 Year Flood Zone	500 Year Flood Zone, Protected by Levee	Total Mileage
Transportation and Lifeline	204	1,952	69	2,225
Railway	9	44	6	59
Roads	195	1,908	63	2,166
Interstate Highway	1	34	1	36
State / County Highway	20	189	9	218
Primary Highway	7	20	-	28

Facility Type	100 Year	500 Year Flood Zone	500 Year Flood Zone, Protected by Levee	Total Mileage
Local Road, Major	32	377	38	447
Local Road	115	1,168	13	1,295
Other Minor Road	18	86	2	107
Vehicular Trail	2	15	-	17
Cul-de-Sac / Traffic Circle	0	1	-	1
Ramp	0	18	0	19
Grand Total	**204**	**1,952**	**69**	**2,225**

4.15.4 Loss Estimation Results

The Hazus analysis was used to assess the risk from and vulnerability to flooding within San Bernardino County. Hazus buildings data is aggregated to the census block level, known as the general building stock (GBS), which has a level of accuracy acceptable for hazard mitigation planning purposes. The following sections describe risk to and vulnerability of the GBS within the San Bernardino County mapped regulatory floodplain. The total value of exposed buildings and content within the San Bernardino planning area was generated using Hazus and is previously summarized.

Hazus calculates losses to structures from flooding by considering the depth of flooding and type of structure. Using historical flood insurance claim data, the software estimates the percentage of damage to structures and their contents by applying established depth-damage curves. Damage estimates are then translated to estimated dollar losses. The results are summarized in Tables 4-26 and 4-27 and Figure 4-32. While there are several limitations to the FEMA Hazus model, it does allow for potential loss estimation. It should be noted that the analysis may include structures in the floodplain that are elevated at or above the level of the base flood elevation, which will likely mitigate flood damage. Also, it is important to remember that the replacement costs are well below actual market values, thus, the actual value of assets at risk may be significantly higher than those included herein.

Table 4-26: Flood Loss Estimation (Based on Depth) in NFIP Flood Zones

Flood Hazard Zone	Building Loss ($000)	Building Loss (% of Total Value)	Content Loss ($000)	Content Loss (% of Total Value)	Total Estimated Loss ($000)	Total Estimated (% of Total Value)
100-Year	$ 34,749.00	0.1%	$ 24,858.00	0.1%	$ 59,849.00	0.2%
500-Year	$ 218,454.00	0.8%	$ 173,304.00	0.6%	$ 396,336.00	1.4%

Table 4-27: 100 Year Flood Los Estimation (Based on Depth) in NFIP Flood Zones by Occupancy Type

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (% of Total Value)	Content Replacement Cost ($000)	Content Replacement Cost (% of Total Value)	Total Estimated Loss ($000)	Total Loss Estimation (% of Total Value)
Agriculture	$ 147.00	0.10%	$ 246.00	0.17%	$ 427.00	0.30%
Commercial	$ 1,874.00	0.08%	$ 4,458.00	0.18%	$ 6,463.00	0.26%
Education	$ 46.00	0.02%	$ 271.00	0.11%	$ 319.00	0.13%
Government	$ 56.00	0.07%	$ 304.00	0.39%	$ 370.00	0.48%
Industrial	$ 201.00	0.02%	$ 389.00	0.04%	$ 624.00	0.06%
Religious/Non-Profit	$ 326.00	0.09%	$ 1,946.00	0.55%	$ 2,279.00	0.65%
Residential	$ 32,099.00	0.14%	$ 17,244.00	0.07%	$ 49,367.00	0.21%
Grand Total	**$ 34,749**	**0.13%**	**$ 24,858**	**0.09%**	**$ 59,849**	**0.22%**

100 YR Flood Hazard

Estimated Content Loss by Occupancy Type

100 YR Flood Hazard

Estimated Building Loss by Occupancy Type

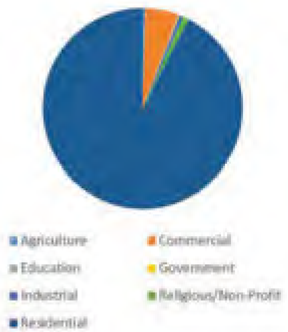
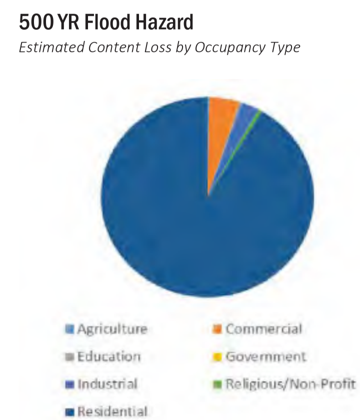


Figure 4-32: Total Building and Content Loss by Occupancy Type for 100 Year Flood

Table 4-28: 500 Year Flood Loss Estimation (Based on Depth) In NFIP Flood Zones by Occupancy Type

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (% of Total Value)	Content Replacement Cost ($000)	Content Replacement Cost (% of Total Value)	Total Estimated Loss ($000)	Total Loss Estimation (% of Total Value)
Agriculture	$ 674.00	0.48%	$ 981.00	0.69%	$ 1,781.00	1.26%
Commercial	$ 10,080.00	0.41%	$ 27,640.00	1.13%	$ 39,179.00	1.61%
Education	$ 720.00	0.29%	$ 3,563.00	1.44%	$ 4,355.00	1.76%
Government	$ -	0.00%	$ 2.00	0.00%	$ 9.00	0.01%
Industrial	$ 6,036.00	0.57%	$ 13,975.00	1.31%	$ 22,438.00	2.11%
Religious/Non-Profit	$ 1,210.00	0.34%	$ 6,070.00	1.72%	$ 7,332.00	2.08%
Residential	$ 199,734.00	0.86%	$ 121,073.00	0.52%	$321,242.00	1.38%
Grand Total	**$ 218,454**	**0.79%**	**$ 173,304**	**0.63%**	**$ 396,336**	**1.44%**



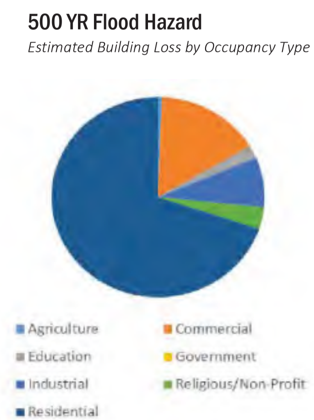


Figure 4-33: Total Building and Content Loss by Occupancy Type for 500 Year Flood

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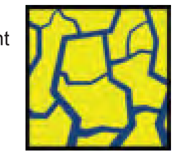
4.16 Drought



Drought should not be viewed as merely a physical phenomenon or natural event. Its impacts on society result from the interplay between a natural event (less precipitation than expected resulting from natural climatic variability) and the demand people place on water supply.

Due to the lack of defined geographical boundaries, the vulnerability assessment for drought differs from other natural hazards. The impacts of drought can be categorized as economic, environmental, or social. Many economic impacts occur in agriculture and related sectors, including forestry and fisheries, because of the reliance of these sectors on surface and subsurface water supplies. In addition to obvious losses in yields in crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. Droughts also bring increased problems with insects and diseases to forests and reduce growth. The incidence of forest and range fires increases substantially during extended droughts, which in turn places human and wildlife populations, buildings, infrastructure and critical facilities, at higher levels of risk.

Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Reduced income for farmers has a ripple effect. Retailers and others who provide goods and services to farmers face reduced business. This leads to unemployment, increased credit risk for financial institutions, capital shortfalls and loss of tax revenue for local, state and federal government. Less discretionary income affects the recreation and tourism industries. Prices for food, energy and other products increase as supplies are reduced. In some cases, local shortages of certain goods result in the need to import these goods from outside the stricken region.

4.16.1 Loss Estimation Results

No standardized methodology exists for estimating losses due to drought. Drought does not generally have a direct impact on critical and non-critical facilities and building stock. Instead, drought vulnerability is primarily measured by its potential impact to sectors of the County's economy and natural resources. In San Bernardino County some of the potential impacts to the economy include the following:

- Reduced agricultural and livestock production;
- Loss of timber from increased wildfires;
- Decreased municipal and industrial water supply;
- Loss of recreation/tourism; and
- Decreased wildlife and wildlife habitat.

4.16.2 Statewide Mandatory Water Reductions

Recognizing persistent, yet less severe, drought conditions throughout California, on May 18, 2016 the State Water Resources Control Board adopted an emergency water conservation regulation requiring locally developed conservation standards based upon each water supplier's specific circumstances. It replaces the prior percentage reduction-based water conservation standard. In San Bernardino County, each water wholesaler (Mojave Water Agency) was required to calculate the supply of water for the next three years, considering drought conditions persist. Each water supply retailer subsequently self-certified the expected demand on water resources, determining whether or not there is sufficient supply to meet demand. Our Department certified that there is sufficient water supply to meet the demand over the next three years; however due to ongoing drought conditions in the region, water conservation efforts should continue. The County has developed a watering schedule, watering hour restrictions and additional end user watering restrictions which can be viewed here: http://www.specialdistricts.org/index.aspx?page=548

4.17 Terrorism

Translating most manmade hazard profiles into meaningful geospatial information is difficult at best. Instead, the planning team will use an asset-specific approach. Population, facilities, systems and assets will be prioritized and assessed in this vulnerability assessment.

Special consideration should be given to areas with high density and those containing vulnerable populations (young, old, and those whose primary language is not English).

Facilities at high risk may include gathering places, critical facilities/ transportation and lifelines and utilities.

4.17.1 Population at Risk

Since terrorism can happen anytime, anywhere, 100% of the population is vulnerable to terrorism. In particular, people with access and functional needs, the elderly and the very young are especially vulnerable because they often rely heavily on others in their daily lives. Persons with English as a second language are also vulnerable as they may not receive warnings or notifications related to an incident in their primary language.

4.17.2 Critical Facilities Exposure

Critical facilities may include essential facilities (such as hospitals, police and fire stations, evacuation centers, etc.), transportation systems, lifeline utility systems, high potential loss facilities (such as nuclear power plants, dams and military installations, etc.), and hazardous material facilities.

Gathering facilities should also receive special attention. Places of mass gathering not only present terrorists with potential opportunities for mass casualties, symbolism and high impact media coverage, they pose a broad range of security challenges for their owners and operators. The National Counter Terrorism Committee has noted that places of mass gathering have been specifically identified by religious and political extremists as attractive targets.

Places of mass gathering incorporate a diverse range of facilities including, but not limited to, sporting venues, shopping and business precincts, tourism/entertainment venues/attractions, hotels and convention centers, major events and public transport hubs. This also includes significant one off events.

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4.18 Climate Change

The vulnerability assessment for climate change is different from other natural hazards discussed in this HMP due to the lack of defined geographical boundaries. This section provides a summary of San Bernardino County's vulnerability to climate change.

The most serious threats to the public health of Californians will stem primarily from the higher frequency of extreme conditions, principally more frequent, more intense, and longer heat waves. A heat wave is defined as 5 or more consecutive extreme heat days. An increase in heat waves may increase the risk of directly related conditions such as heat stroke and dehydration.

In the desert areas of the County, the Extreme Heat Day Threshold temperatures are around 110°F and in the mountainous regions it is in the mid 80's. According to the Cal-Adapt Extreme Heat Tool, the number of extreme heat days (a day in April through October where the maximum temperature (Tmax) exceeds the 98th historical percentile of maximum temperatures based on daily temperature data between 1961 and 1990) will continue to increase rapidly from the present day to 2090.

Projections by Scripps Institution of Oceanography show little change in total annual precipitation in San Bernardino County. However, even modest changes would have a significant impact because California ecosystems are conditioned to historical precipitation levels and water resources are nearly fully utilized. The Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. In the mountainous areas of the County, it is projected that the decadal average of snowpack will continue to decrease until 2090. As shown in Figure 4-34 the sharpest decreases in snowpack are projected to begin around 2030. The area projected to be burnt by wildfire toward the end of the century will not increase substantially in the County. The most change will be experienced in the mountainous regions.

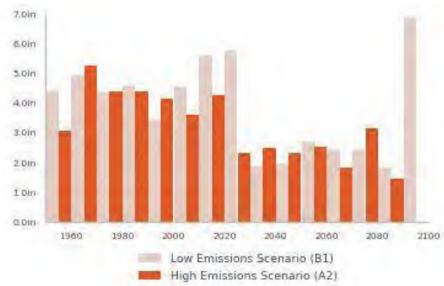

Figure 4-34: Decadal Snowpack Averages 1960-2090

Source: cal-adapt.org/snowpack/decadal

4.18.1 Population at Risk

Vulnerable populations should receive special attention when assessing the community's vulnerability to climate change. For example, care and sheltering during extreme heat conditions must be provided for vulnerable populations such as the elderly. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. According to the National Weather Service (NWS), among natural hazards, only the cold of winter—not lightning, hurricanes, tornados, floods, or earthquakes—takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died.

Section 5. Community Capability Assessment

5.1 Existing Plans, Policies and Programs

San Bernardino County is encouraging all departments, special districts, and agencies to share reports and common information. This sharing and exchanging of ideas has led to more coordinated efforts and better planning. The driving document in the County of San Bernardino is the County's General Plan. The County General Plan provides the foundation on which all development and future programs are built upon.

5.1.1 San Bernardino County General Plan

The State of California recommends that the General Plan is updated every 10-20 years; depending mostly on whether or not the plan is meeting the community's needs. The San Bernardino County General Plan was last updated and adopted in 2007. There are seven (7) mandatory elements in a General Plan:

- Circulation Element,
- Conservation Element,
- Housing Element,
- Land Use Element,
- Noise Element,
- Open Space Element, and
- Safety Element.

However, there are several optional elements. The County of San Bernardino General Plan includes an optional element, the Economic Development Element.

The Land Use Element of the General Plan establishes 18 land use zoning districts that apply only to lands governed by the County; not for lands controlled by other jurisdictions or lands controlled by federal and state government (see Section 1.3.5, page 8 for a listing of the 18 Land Use districts in the Land Use Element). The Land Use Element also describes land use compatibility for the primary three (3) hazards: Geologic; Flood; and, Wildfire. Because of these commonalities between the General Plan and the MJHMP, the county Board of Supervisors has adopted the MJHMP as part of the County's General Plan.

5.1.2 Regulations, Code, Policies and Ordinances

The following titles of the San Bernardino County Code include regulations and ordinances on the following issues and topics related to hazard mitigation:

Table 5-1: County Development Code Hazard Crosswalk

Hazard	Plan/Program/ Regulation	Description
Multi-Hazard	**Title 2**	Emergency Services Uniform Fire Code and related miscellaneous fire regulations Police Regulations and Public Protection
Multi-Hazard	**Title 3**	Emergency Medical Services Domestic Water Sources and Systems Hazardous Materials and Toxics Control Waste Management
Multi-Hazard	**Title 6**	California Building Code California Electrical Code California Plumbing Code California Mechanical Code
Multi-Hazard	**Title 7**	Airport Rules and Regulations
Multi-Hazard	**Title 8**	Development Code includes regulations relative to Land Use, Development Standards, Safety Standards, and Environmental Protection.
Multi-Hazard	**Zoning Ordinances**	The County has also adopted Zoning Ordinances that are not part of the County Code but are part of the General Plan. These ordinances regulate land use; map the official land use and hazard overlay districts to include safety hazard and environmental protection areas.

5.1.3 Local Programs for Mitigation Implementation

The information in Table 5-2 is used to construct mitigation actions aligned with existing planning and regulatory capabilities of the County. Planning and regulatory tools typically used by local jurisdictions to implement hazard mitigation activities are building codes, zoning regulations, floodplain management policies, and other County programs or planning documents.

Table 5-2: Planning and Regulatory Mitigation Capabilities Summary

Hazard	Plan/Program/ Regulation	Responsible Agency	Comments
Multi-Hazard	Mountain Mutual Aid	Fire District	Mountain Mutual Aid is an operational group of emergency responders. It is comprised of all of the agencies and volunteer relief groups that would be and have been involved in any and all disasters on the mountain. It is of note to that their main and most frequent call to service is in response to a wildfire. They meet monthly and maintain themselves in a constant state of readiness.
Wildfire	Forest Care	Cal Fire	Forest Care is a program dedicated to creating a healthier forest. This program provides foresters to assess individual properties for thinning the vegetation and then provides 75% of the funding to do so. Funding originates at the Federal level but is passed through Cal Fire and it employs Cal Fire Foresters as well as staff from the National Forest Association

5.1.3.1 Public Education and Alert Programs

Table 5-3: Public Education and Alert Programs

Hazard	Program	Responsible Agency	Comments
Multi-Hazard	MAST	Multiple	Mountain Area Safety Taskforce (MAST) has a substantial public education component. All agencies participate with the goal to have no one on the mountain uneducated about creating a thinner forest which is a more fire safe forest. For more information on MAST, see Annex A Section A.6 Fire Protection District Mitigation Project .
Multi-Hazard	CERT	Fire District	The Community Emergency Response Team (CERT) Program educates people about disaster preparedness and trains them in basic response

Hazard	Program	Responsible Agency	Comments
			skills. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Multi-Hazard	Listos	Fire District	Listos, which means "ready" in Spanish, is a twelve-hour disaster preparedness course created specifically for the Spanish-speaking community and is delivered entirely in Spanish. The program is intended to be adaptable, flexible and culturally relevant. This means participants are encouraged to involve the entire family and accommodations are made for young children. San Bernardino County Fire, Office of Emergency Services currently partners with the Cities of Fontana and Rialto to bring Listos to their communities
Multi-Hazard	California Disaster Corps	Fire District	The Disaster Corps is a first-in-the-nation effort to professionalize, standardize and coordinate highly trained disaster volunteers statewide. This program initiative was built collaboratively in partnership with California Volunteers from the ground up through public-private partnerships and with a wide range of subject matter experts. See Annex A Section A.6 Fire Protection District Mitigation Project .
Multi-Hazard	TENS	Fire District	Telephone Emergency Notification Systems (TENS) During an emergency, public safety can be a direct function of the speed and accuracy of the dissemination of information. This is particularly important during emergencies that require evacuations. To that end the Board of Supervisors dedicated General Fund money in 2003 to the implementation of an automated phone dialing system that calls telephones in specific geographic areas of concern. All areas of San Bernardino County have all been preprogrammed so that during an emergency, the specific target group can be notified as quickly as possible.

Hazard	Program	Responsible Agency	Comments
Multi-Hazard	ECS	Fire District	The Emergency Communications Service (ECS) is a volunteer group providing front-line communications, technical and logistical support to the San Bernardino County Fire Department and Office of Emergency Services. Their primary mission is to support County Fire, County Government and other local agencies in time of disaster. In addition, ECS has provided telecommunications and event support to other County departments including Public Health, Behavioral Health, Public Works, Pre-School Services, Sheriff's Search and Rescue and other County Departments.
Multi-Hazard	AM Radio	Fire District	Community Based AM Radio Transmitters The Fire Safe Councils discovered the existence of very inexpensive but very effective community based AM radio transmitters. The transmitters are very effective for providing information and updates to a community that is either preparing for a community emergency or just had one. As a delivery modality they are extremely reliable because in most all emergencies the AM radio in your car is likely to be operational particularly when the electricity is out in your house.
Multi-Hazard	IPAWS	Fire District	During an emergency, alert and warning officials need to provide the public with life-saving information quickly. The Integrated Public Alert and Warning System (IPAWS) is a modernization and integration of the nation's alert and warning infrastructure and will save time when time matters most, protecting life and property. Federal, State, Territorial, Tribal, and local alerting authorities can use IPAWS and integrate local systems that use Common Alerting Protocol (CAP) standards with the IPAWS infrastructure. IPAWS provides public safety officials with an effective way to alert and warn the public about serious emergencies using the Emergency Alert System (EAS), Wireless Emergency Alerts (WEA), the

Hazard	Program	Responsible Agency	Comments
			National Oceanic and Atmospheric Administration (NOAA) Weather Radio, and other public alerting systems from a single interface.

5.1.3.2 Wildfire Mitigation Programs

San Bernardino County has one of the most comprehensive set of programs to mitigate the potential for catastrophic wildfires in the Nation. There is no other jurisdiction that has the comprehensive, multi-agency cooperation and coordination as is found in San Bernardino County. See Annex A Section A.6 Fire Protection District Mitigation Project to see how the Fire Protection District will implement the following programs:

Table 5-4: Wildfire Mitigation Programs

Hazard	Program	Responsible Agency	Comments
Wildfire	MAST	Multiple	The mission of the MAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for protection from wildfire. For more information on MAST, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Community Based Fuels Reduction program	Fire District	This program is designed to create community based fuel modification programs across the mountain communities. For more information see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Cal Fire	Cal Fire	Cal Fire provides programs to increase fire safety in high fire hazard severity zones. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	County Fire Hazard Abatement	Fire District	Fire Hazard Abatement works to reduce the potential for an individual's property to be the source of fire and structural ignitability. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .

Hazard	Program	Responsible Agency	Comments
Wildfire	Contractor Certification	City of Big Bear Lake Fire Department	This program trains and certifies landscape contractors to provide a qualified workforce to conduct fuels reduction activities on individual properties. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Southern California Edison (SCE)	Southern California Edison (SCE)	SCE removes dead trees near power lines to reduce fire hazards. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Wood Shake Roof Replacemen t	County	This code requires that all Wood Shake Roofs in the Fire Safety Overlay, as defined in the Development Code, ongoing effort.
Wildfire	Inland Empire Fire Safe Alliance	Inland Empire Fire Safe Alliance	The Alliance was created to act as a forum for all Fire Safe Councils in San Bernardino County. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Community Wildfire Protection Plans (CWPP)	Fire District	CWPPs are designed to provide a means for a community to have input into and actively participate in the planning, strategy, goals, and objectives of creating a fire safe community. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Organized Group Volunteer Activities	Fire District	There are several volunteer citizen groups throughout the County that are capable of providing significant resources that are not provided by traditional governmental agency services. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .

5.1.3.3 Earthquake/Geologic Mitigation Programs

San Bernardino County's seismic mitigation programs focus on two areas that have historically resulted in the greatest amount of damage and life loss from major earthquakes in California.

5.1.3.3.1 Bridge Retrofit Program

Caltrans inspects County and City bridges yearly every 2 years for structural sufficiency (which applies to earthquake) and functional obsolescence (which applies to floods). Caltrans provides reports that include recommended repairs or replacement. The County and Cities make the repairs and/or apply for bridge replacement funds thru the Federal Highway Bridge Program (HBR). Currently the County has 5 funded HBR replacements due to structural deficiencies:

- Dola Ditch, (out for bid to construct)
- Lanzit Ditch, (out for bid to construct)
- Garnett at Mill Creek (under construction)
- Yermo Rd at Manix Wash.(waiting for SCAG approval for additional funds to move forward with the Design & Environmental)
- Baker Blvd west of SR127. (waiting for HBP fund for Design & Environmental)
- National Trails Hwy at Kalmia Bridge (waiting for HBP funds)
- National Trails HWY @ Adena Ditch (Received HBP funds for design phase)
- Bridge Management (consultant on board that has prioritized all timber bridges on National Trails Highway and DPW is submitting groups of bridges for funding over a ten year period)

The design and environmental work has been started for Rock Springs Road (functionally obsolete bridge) using DPW funds, waiting for HBP funds for R/W phase.

The County has completed the construction of the Alabama Street at Plunge Creek bridge replacement using Federal Emergency Relief funds.

5.1.3.3.2 Unreinforced Masonry Building Program

In the 1990's, the County of San Bernardino compiled a master list of suspected Unreinforced Masonry Buildings within the unincorporated areas. Since that time, several sites have been incorporated and therefore, are now removed from County jurisdiction. In addition, several appear to have been demolished or retrofitted since the 1990's. The Land Use Services Department's Building and Safety Division is currently in the process of re-evaluating the URM list. Re-evaluation will include a field visit to each site photographing structures and verifying the occurrence of unreinforced masonry. This process is scheduled to be completed by the end of the 2010.The program would be an inspection program and maintenance and inspections as warranted.

There are no large publically utilized URM structures currently on the list. These types of structures are typically restricted to the incorporated areas of the County. There are only twenty-two (22) structures remaining on the list.

5.1.3.3.3 Geologic Hazard Mapping

The Seismic Hazards Mapping Act (Public Resources Code, Chapter 7.8 Section 2690-2699.6) directs the Department of Conservation, California Geological Survey (CGS) to identify and map areas prone to liquefaction, earthquake-induced landslides and amplified ground shaking. Although the San Bernardino area has a full spectrum of geologic hazards, CGS does not have adequate funding to complete the hazard mapping within the County.

5.1.3.4 Flood Mitigation Programs

The flood mitigation projects are programs that were established by San Bernardino County Flood Control District to protect life and property. These projects are typically designed to convey 1% annual chance or greater storm flows in order to mitigate danger to life and property, and critical infrastructure consisting of existing, new and future structures. Also, these projects include revisions to local land use and building codes where analysis or experience shows the need for code revisions or amendments to meet previously unidentified circumstances.

Hazard	Program	Responsible Agency	Comments
Flood	Flood Area Safety Taskforce(FAST)	Flood Control District	The FAST Organization stresses liaison with the communities, provides for community education and information, and places emphases on Community and city partnerships. For more information on FAST, see Annex B Section B.6 Flood Project Prioritization and Implementation.
Flood	Alluvial Fan Task Force	Alluvial Fan Task Force	The Task Force reviews the state of knowledge regarding alluvial fan floodplains, determine future research needs, and, if appropriate, develop recommendations relating to alluvial fan floodplain management, with an emphasis on alluvial fan floodplains that are being considered for development. For more information, see Annex B Section B.6 Flood Project Prioritization and Implementation.
Flood	StormReady	Flood Control District	San Bernardino County is a StormReady County. For more information, see Annex B Section B.6 Flood Project Prioritization and Implementation.

5.1.3.5 Climate Change Programs

5.1.3.5.1 Extreme Heat, Extreme Cold Programs

This document is a contingency plan supporting the San Bernardino County Emergency Operations Plan (EOP).

Excessive Cold events are commonplace in San Bernardino County and most often warrant monitoring activities only. These Standard Operating Guidelines provide GUIDANCE based on the most likely scenario, and can be expanded to meet the parameters of a "disaster" scenario if necessary.

The Extreme Weather – Excessive Cold Standard Operating Guidelines (SOG) were developed in response to the potential for Excessive Cold and cold related Power Outage events in San Bernardino County. The following objectives and activities are to prevent the harmful effects of excessive cold on at-risk populations and the potential for life-threatening repercussions of power outages during excessive cold events.

The information included in this plan is "situation" and/or "incident" driven and subject to revision by the Extreme Weather Committee as conditions warrant. Notifications are information dependent and modification of the activities in these guidelines may be required in response to changing conditions, situations and/or inaccurate weather predictions

5.1.3.5.2 San Bernardino County Fire Office of Emergency Services Heat Plan

This document is a contingency plan supporting the San Bernardino County Emergency Operations Plan (EOP). The Extreme Weather – Excessive Heat Standard Operating Guidelines (SOG) were developed in response to the potential for Excessive Heat and heat related Power Outage events in San Bernardino County. The following objectives and activities have been established to prevent the harmful effects of excessive heat on at-risk populations and the potential for life-threatening repercussions of power outages during excessive heat events. The Extreme Weather – Excessive Heat SOG describe the County operations during heat related emergencies and provide guidance for local jurisdictions in their preparation for heat emergencies and other related activities. The information included in this plan is "situation" and/or "incident" driven and subject to revision by the Extreme Weather Committee as conditions warrant. Notifications are information dependent and modification of the activities in these guidelines may be required in response to changing conditions, situations and/or inaccurate weather predictions.

5.2 Fiscal Resources

The 2016-17 recommended budgets of $5.4 Billion are balanced and consistent with policy and direction received from the Board of Supervisors. The 2016-17 Recommended Budgets address the following key issues:

- Ongoing funding for neglected raises for County employees
- Ongoing funding for maintenance of County roads
- Continues investment in facilities, infrastructure and operating systems.
- Ongoing funding of mental health and medical services for County residents.
- Maintains fiscal responsibility through contributions to the reserves of $62.8 million.

The budget represents the County General Fund and County restricted general funds .It also presents capitol project funds, special revenue funds, enterprise funds, internal service funds and permanent funds for all entities in the 2016-17 Recommended Budget including the County Board Governed County Service Areas, San Bernardino County Fire Protection District, San Bernardino County Flood Control District. Other agencies presented in the budget include County Industrial Development Authority, Inland Counties Emergency Medical Agency and the recently added Housing Authority of the County of San Bernardino. The total requirements for these funds in the 2016-17 are $5.4 billion, which includes amounts budgeted as contingencies or contributions to reserves. Excluding these amounts, total projected expenditures for the 2016-17 are $5.3 billion. The General fund Requirements total $2.9 billion and are funded by countywide discretionary revenues (primary property taxes), departmental revenues and other funding sources of the General Fund, of this $2.9 billion, only $558.3 million is truly discretionary.

5.2.1 The Budget in Brief

This budget book collectively presents the general fund, special revenue funds, capital project funds, internal service funds, and enterprise funds for the county and its Special Districts. The total spending authority for these funds in 2016– 2017 is $5.4 billion. The general fund spending authority totals $5.3 billion and is funded by countywide discretionary, and the beginning fund balance of the General Fund. Of this $2.9 billion, only $558.5 million is truly discretionary.

Table 5-5: Spending Authority for San Bernardino County

	Spending Authority (in Millions)		
	2015-16	2016–2017	Change
General Fund	$ 2,984.3	$ 2,911.1	$ (73.2)
Restricted Funds	49.3	49.7	(.4)
Capital Project Funds	1169.	911.3	(258.4)
Special Revenue Funds	257.6	298.4	40.7
Enterprise Funds	984.9	1001.	16.5
Internal Service Funds	1.6	0.0	(1.6)
	$ 5,692.0	**$ 5,420.0**	**272.0**

There is a $73.2 million net decrease in General Fund requirements due to a $106.1 million reduction in contributions to General Fund reserves, as the Board of Supervisors approved an increase to multiple County General Fund operational groups' requirements are increasing by $32.9 million. There are Law and Justice ($12.5 million). The Human Services Operational Group is anticipating increased State and Federal funding that will support Department of Behavioral Health services, including inpatient hospitalization, indigent hospital care, general mental health services, and services for children, youth, and families .The County is also continuing to allocate additional resources to meet the growing need for augmented health and mental health correctional services associated with Public Safety Realignment.

The net reduction of $258.4 Million is Special Revenue Funds is associated with the County's shift in 2015-16 from budgeting contingencies to instead placing unallocated resources in reserves. This technical change resulted in a large one-time contribution to reserves in 2015-16 that is not required in 2016-17. This reduction in contributions to reserves totaling $289.6 million is offset by increased operational costs of $31.2 million. This is due to increases within the Department of Behavioral Health's Mental Health Services Act (MHSA) budget unit and the County Fire Protection budget is increasing as a result of the pending annexation of fire prevention and suppression services from the City of San Bernardino (429.6 million) and Twentynine Palms ($1.7 million).

The $40.7 million increase in Capital Project Funds is primarily due to the planned construction of two Department of Behavioral funded Crisis Stabilization Centers and four Crisis Residential Treatment Centers totaling $36.5 million. This will enable Community Crisis Response Team (CCRT) clinics throughout the County to be expanded to provide 24 hour services and to respond to request by law enforcement for support during the night hours.

Enterprise Funds requirements are increasing a net $16.5 million. Notably, the Housing Authority of the County of San Bernardino has been added to the budget book and is contributing to the overall increase in Enterprise Fund requirements, including additional assumed payments for Housing Assistance and increased Capital Expenditures.

Table 5-6: 2015-2017 Staffing Budget

	Budgeted Staffing		
	2015–2016	2016–2017	Change
General Fund	14,332	14,425	93
Other Funds	6,375	6,508	133
Special Districts and Other Agencies	1402	15601	159
Total:	**22,109**	**36,534**	**385**

5.2.2 Budget Highlights (2016 – 2017)

Create and Maintain and Grow Jobs and Economic Value in the County

- The Real Estate Services Department of Project Management Division (formerly Architecture and Engineering) Capital improvement budget includes 355 active projects with total requirements of $295.2 million, including $128.2 million in new projects funded with $57.7 million of Discretionary General Funding includes an ongoing base budget of $12.0 million for maintenance and non-major Capital Improvement Plan (CIP) projects ,and $45.7 million for construction and major CIP projects .These major projects include $26.4 million for the 800 Megahertz Upgrade Project ,$12.2 million for various Sheriff's facility improvements ,$8.0 million for the County Buildings Acquisition and Retrofit Project including the upgrade of the County Government Center parking lots and grounds ,and $7.6 million for a variety of other projects.

Improve County Government Operations

- Enterprise Financial Management System: Implementation of the new system began in May 2016 with the first phase (out of two phases) continuing into 2016-17 at an estimated cost of $7.1 million. The total cost for the financial system is estimated to be $25.0 million and will streamline business processes and provide better management information.

- Public Health will continue its efforts to achieve and maintain National Accreditation, through the Public Health Accreditation Board (PHAB). Accreditation ensures the Department's continued focus on quality and performance improvement, transparency and accountability to all stakeholders, and the capacity to deliver core Public Health functions. The department will be submitting the required application to PHAB in December 2016.

- The County Library continues its plans to enhance service by replacing outdated computer hardware and software. Funding has been included in the Library's material's budget, which adds high demand items to the collection, including an expanded digital book collection.
- Land Use Services, in conjunction with Public Works, Information Services, and other County departments, continues to upgrade to a new enterprise permit solution, Accela. The new system will include a shared database, precise digital maps, and satellite images of land data that are linked to the County's GIS database. It will also provide field staff remote real-time access to the database. This solution will streamline the permitting process, offering the public access to a web portal to manage and monitor applications and permits online.

Operate in a Fiscally-Responsible and Business-like Manner

- The County Museum's budget of $3.8 million demonstrates the County's commitment to support the Museum through a time of transition. The budget includes $1.1 million in one-time Discretionary General Funding which includes bridge funds to support current operations and funding for activities related to re-accreditation. The County Museum continues to implement the consultant study recommendations as approved by the Board of Supervisors, to address organizational and financial challenges.

- The Transitional Assistance Department is in the second of a four year reduction to the State's CalFresh Match Waiver pursuant to the phase-out agreement adopted in the prior year State budget. This wavier allowed the County to draw additional Federal and half of the State funding without increasing the County's Maintenance of Effort. The budget includes the use of $2.5 million of the original $5.0 million general fund reserve that the Board approved in 2014-15 for this phase-out period.

Ensure Development of a Well-Planned, Balanced, and Sustainable County

- The County continues work on a complete overhaul of the County's General Plan, referred to as the Countywide Plan. This Countywide Plan will be a comprehensive web-based system to document land use planning and organizational governance policies. It will be comprised of three basic components: The Policy Plan (a comprehensive general plan); the County Business Plan (a system that will define and guide how the County government operates and manages itself); and the Regional Issues Forum (a web-based resource center containing information regarding shared Countywide issues). Additionally, the County is updating and expanding the community plans. When completed, there will be 27 web-based community plans involving 49 communities.

- A team of County departments will continue to monitor the drought and develop ways to reduce water usage at County facilities to show good stewardship of this valuable resource. The Special Districts Department, in collaboration with other County

departments, will continue to implement water conservation programs/strategies at various County Service Areas and Districts throughout the County.

- The Registrar of Voters budget fluctuates based on the 4-year election cycle, with the Presidential Election being the largest and most costly of the major elections. The Department is transitioning from a one minor and two major election cycles in 2015-16 to a one minor and one major election cycle for 2016-17. The budget includes provisions for the following: November 8, 2016 Presidential General Election (major); December 6, 2016 San Bernardino County Employees' Retirement Association Election (minor); and three anticipated, but unscheduled special elections (minor). The minor elections are 100% reimbursable; however, the November Presidential General Election is only 30% reimbursable and thus requires one-time Discretionary General Funding (Net County Cost) of $3.7 million for the year.

- The Public Works – Transportation budget includes over $35.0 million in major infrastructure projects, funded in part with Discretionary General Funding. Budgeted activities include design, right of way and/or construction for major projects including:
  - o Bridge replacements on: Glen Helen Parkway, Baker Boulevard, Garnet Street, Rock Springs Road, Dola Ditch Bridge, Lanzit Ditch Bridge, Yermo Road and Arrowbear Drive;
  - o New bridge on Shadow Mountain Road;
  - o Widening of Slover Avenue in the Bloomington Area;
  - o Installation of raised pavement markers on National Trails Highway in the Amboy area;
  - o Reconstruction of Institution Road to improve access to the Sheriff facility in San Bernardino;
  - o National Trails Highway Bridges: Bridge management plan for the repair, rehabilitation or replacement of 127 bridges on National Trails Highway and starting the design phase for replacement of 10 bridges:
  - o Rehabilitation and re-profiling at various locations on Needles Highway in the Needles area;
  - o Improvements to alleviate congestion and improve circulation of the interchange on Interstate 10 at Cedar Avenue

- The Public Works – Transportation budget includes $31.5 million worth of pavement improvement projects, funded in part with ongoing Discretionary General Funding, to preserve the County's roadways by investing enough to keep the system from deteriorating further.

- The Public Works – Solid Waste Management Division plans to complete $8.9 million of capital improvement projects, which includes the following:
  - o $2.0 million for resurfacing the entrance and haul roads at the San Timoteo Landfill;
  - o $957,000 for construction of Groundwater Treatment Systems at the closed Lenwood-Hinkley Landfill and Yucaipa Disposal Site;

- $1.5 million for the East Slope Stabilization and Mitigation project at the closed Heaps Peak Disposal Site;
- $1.5 million for construction of Landfill Gas Extraction Systems at the Barstow and Big Bear Landfills which includes $300,000 to bring electrical power to the Barstow Landfill

- The Public Works – Flood Control District (District) budget includes $37.6 million in capital improvement projects. The District anticipates completion of the following projects: Cactus Basin # 3, Wilson Creek Channel, Santa Ana River Flood Wall Repair, and the waterline relocations for Bandicoot Basin and Amethyst Basin. The District also plans to start construction on the following projects: Levee Certification Restoration for Patton Basin, Mojave River Levee, and Sand Creek/Warm Creek Confluence.

- Land Use Services Planning budget includes $150,000 of Discretionary General Funding for the preparation of a Morongo Basin Cultural Plan.

- The Special Districts department's budget includes $45.3 million capital improvement projects including the design and construction of the Big Bear Alpine Zoo relocation, rehabilitation of the Lake Gregory Dam, and construction of Snow Drop Road. Water and sanitation infrastructure projects of $19.2 million include pipeline replacements; water system improvements, and design and construction of a pipeline, a 75,000-gallon water reservoir, and a pump station in CSA 70 W-4 – Pioneertown.

- Community Development & Housing is constructing Phase 2 of the Bloomington Community and Neighborhood Revitalization. A total of 190 multi-generational affordable housing units include 120 family units and 70 senior units and the Bloomington Branch Library. The Bloomington Branch Library and the first phase of housing are completed. The second phase is currently under construction and will be completed by spring 2017.

<u>Provide for the Safety, Health and Social Service Needs of County Residents</u>

- The County is expanding efforts to provide homeless support to County residents through the flowing allocations included in the 2016-17 budget:
  - The Department of Behavioral Health is investing $4.0 million by providing basic needs, case management, outreach services, and additional built and supportive housing opportunities.
  - The Sheriff/Coroner/Public Administrator is continuing to fund the HOPE Program (Homeless Outreach Proactive Enforcement) Team ($620,000), which provides services to the homeless population by connecting them to the appropriate agencies for much needed services that help in the transition from homelessness.
  - The Probation Department has included $3.2 million towards transitional housing for adult offenders requiring Probation Department supervision.

- The Department of Behavioral Health is expanding Mental Health Treatment Services, notable in the following areas:
  - $1.0 million towards staffing Community Crisis Response Team clinics, which will now provide 24 hour services to departmental consumers and respond to requests by law enforcement for support during night hours. The department has also allocated $36.5 million towards the construction of new CCRT clinics throughout the County to expand these services.
  - $8.5 million for the Mental Health Act (MHSA) Comprehensive Children and Family Support Services program to support expanded mental health services for children.
  - $4.3 million for the MHSA Regional Adult Full Service Partnership (FSP) program support expanded mental health services to adults.
  - $1.0 million for the MHSA Forensic Integrated Mental Health Partnership program to expand services to develop peer support and mentoring strategies for individuals who have been released early from County jail or State prison.

- The Sheriff/Coroner/Public Administrator budget included $1.1 million of existing departmental resources for a program authorized by the Board as a pilot on December 15, 2015 (Item No. 72) related to the delivery of law enforcement services to unincorporated areas of the West End including the North Rancho/Etiwanda Preserve and the Mission Corridor, respectively. The program was successful and is now being incorporated as an ongoing service beginning in 2016-17 ,

- The Sheriff/Coroner/Public Administrator budget includes $9.0 million of one-time Discretionary General Funding (Net County Cost) to replace 2 aging and obsolete patrol helicopters: including equipment, travel and training for pilots and mechanics, installation of equipment, and delivery charges. The helicopter replacements will provide newer more reliable aircraft.
- The Public Defender Proposition 47 program will use media resources to reach all potential citizens who have convictions eligible for reclassification to further enhance their ability to rehabilitate within the community.

- County Fire is assuming fire, rescue, Emergency Medical Services (EMS), and prevention responsibilities within the Cities of San Bernardino ($29.6 million) and Twentynine Palms ($1.7 million) as a result of the pending annexations. This continued expansion of a regional approach will provide a more effective and efficient delivery of fire services for County residents.

- Land Use Services Code Enforcement is continuing to pilot various strategic initiatives to address issues with short-term rentals, particularly in the mountain areas. For 2016-17, a pilot program for a short-term rental hotline will be established where the public can report illegal or disruptive activities at short-term rental properties.

- The Information Services Department Telecommunication Services division is in the process of upgrading the County's Regional Public Safety Radio System (800 Mhz Upgrade Project). The project is currently on schedule, with an estimated completion date of 2020-21. The estimated cost of the project is $158.2 million primarily funded with Discretionary General Funding.

- The Department of Aging and Adult Services (DAAS) budget of $8.3 million will supplement programs such as the Elderly Nutrition, Supportive Services, Medicare Improvements for Patients and Providers Act, and Family Caregiver.

- The Arrowhead Regional Medical Center (ARMC) budget includes the addition of 14 positions to strengthen the Sterile Processing division to meet operational needs and ensure compliance with regulatory standards.

- The Department of Children and Family Services is implementing an After Hours Response Center (ARC) in June 2016 to provide optimal customer services to our community partners, children and families. The Center will enhance the departments critical after hour function of responding to child abuse, neglect and exploitation referrals called into the Child and Adult Abuse Hotline (CAAHL).

Pursue County Goals and Objectives by Working with Other Agencies

- ARMC is participating in California's 1115 waiver Renewal (Medi-Cal 2020), working alongside the California Association of Public Hospitals, the State of California, The Centers for Medicare & Medicaid Services, and multiple County departments focusing on improved patient outcomes, efficiencies and access in patient care integrated care models and procuring maximum reimbursement for performance of prescriptive clinical measures. The budget includes $52.5 million in revenues related to the Medicaid Waiver programs.

Focus on Recovery and Resiliency Following the December 2, 2015 Terrorist Attack (SB Strong)

- The County Administrative Office has commenced a countywide effort to document the impact and ongoing response to the December 2, 2015 terrorist attack while pursuing multiple sources of potential cost-reimbursement and to create a historic and best-practices document.

- The County has allocated approximately $10.2 million in funds towards improving security at County facilities. This includes $8.2 million in immediate improvements to facilities, such as expanded security guard services, upgraded security camera and key card access installations, and $2.0 million to conduct a security assessment of all County facilities.

Challenges in Fiscal Year 2016-17 and Beyond

Although the balancing of future costs with projected revenue has improved compared to prior County five year forecasts, broad economic challenges remain. The current economic expansion will be 7 years at the end of June 2016, which is the fourth longest in the history of the United States and cannot be assumed to last indefinitely. In addition, the fiscal uncertainly inherent in the State budget process continues to present a major challenge to the County's fiscal planning efforts.

Economic Challenges

The County's Five Year Financial Forecast covers July 2016 through June 2021 and includes moderate growth of major revenue streams throughout the period. Not included in the forecast are the impacts of a potential recession or the unknown economic impacts of the coming statewide $15 minimum wage.

By the end of the third year of the County's forecast the current economic expansion would match the longest expansion in history. Although the weakness of the current recovery and quantitative easing may have pushed off the next recession temporarily, it would be without precedent for the economy to expand throughout the County's entire five year forecast. In response to these unknown variables, the County has taken the approach of budgeting revenue growth in a conservative fashion over the entire five year forecast rather than assuming greater potential revenue increase in the immediate future with reductions in the later part of the forecast.

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Section 6. Mitigation Strategy

6.1 Mitigation Goals and Objectives

Goals and objectives discussed in this section help describe what actions should occur, using increasingly narrow descriptors. Long-term goals are developed which can be accomplished by objectives. To achieve the stated objectives “mitigation actions” provide specific measurable descriptors on how to accomplish the objective. The goals, objectives, and actions form the basis for the development of a Mitigation Action Strategy and specific mitigation projects to be considered for implementation.

The process consists of 1) setting goals and objectives, 2) considering mitigation alternatives, 3) identifying strategies or “actions”, and 4) developing a prioritized action plan resulting in a mitigation strategy.

The following section provides an overview of the Mitigation Goals and Objectives for profiled hazards, Wildfire, Earthquake, Flood, Drought, Terrorism, and Climate Change for the County Unincorporated Area and the County’s Special Districts. These goals were compiled from various sources including the County of San Bernardino 2007 General Plan. (See Section 3.5 for a detailed description of the process used by the County Planning Team)

6.1.1 All Hazard (AH)

AH GOAL: Increase readiness for all hazards in the unincorporated areas of San Bernardino County.

OBJECTIVE 1: Construct All-Hazard Response Facilities: Construct facilities to increase operational readiness to reduce impacts of natural hazards.

> **AH Action 1.1: Construct Valley Dispatch and Operations Center.** Construct facility and ensure cohesive working and response to any scale emergency and operations in a secure complex

> **AH Action 1.2: Construct Shelter Operations Compound (SHOC).** This shelter concept provides a new one-stop shelter concept. The SHOC combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location.

OBJECTIVE 2: Special District Funding: Continue Special Districts Projects relating to all hazards.

AH Action 2.1: Continue funding and support for Special Districts Projects relating to water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big

Bear Valley Recreation Park District and Bloomington Recreation and Park District for all hazards.

AH Action 2.2: Install Generators at Critical Facilities Retrofit existing buildings and facilities with connectors/ ATS for emergency generators and/or install permanent emergency generators at critical facilities, including wells and booster station locations.

AH Action 2.3: Water Systems Repair Plan Develop a plan for speeding the repair of and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.

AH Action 2.4: Smart Water Meters and SCADA Utilization of SCADA and Smart Water Meters to get real time data on problems with the system and reduce drive time emissions as a result of traditional meter reading.

AH Action 2.5: Provide Employees with Emergency Supplies Provide emergency supplies of food, water, and portable generators for employees at office and field locations.

AH Action 2.6: Annual Tower and Guide Wire Inspections Conduct annual tower and guide wire inspections to mitigate storm/wind/earthquake hazards from knocking out communications.

AH Action 2.7: **Maintain Tower Lighting** Maintain lights on all tower locations.

AH Action 2.8: Designate Emergency Operations Sites Conduct an inventory or list of County Park Facilities and Community Centers to establish a list of pre-designated emergency operations or disaster relief sites. Not all Community Centers are an appropriate size to accommodate large numbers of evacuees and may only serve as command and control centers or distribution centers.

AH Action 2.9: Establish Power Sources for Emergency Operations Sites
Establish small solar energy fields or other forms of renewable power at County Community Centers to
facilitate stand-alone emergency operations for the community.

AH Action 2.10: Connect Water Systems to Generators Connect water systems to generators to ensure delivery even in disaster situations.

AH Action 2.11: Establish a Centralized Communications Network Establish a centralized communications network to monitor channel output for TV Districts and provide emergency information by way of character generator tied to channel transmissions.

AH Action 2.12: Incorporate as appropriate requirements from the State of California's most recent land use regulations regarding the hazard mitigation planning process (Government Code 65302 and 8685.9).

6.1.2 Wildfire (WF)

WF GOAL: Continue to reduce fire hazards in the unincorporated areas of San Bernardino County.

WILDFIRE OBJECTIVE 1: **Mountain Area Safety Taskforce.** Continue the cooperation and coordination of Fire Hazard Mitigation efforts with all stakeholders in the mountain areas of San Bernardino County through participation in MAST.

WF Action 1.1: Continue Mountain Area Safety Taskforce (MAST) funding to support mitigation activity.

WILDFIRE OBJECTIVE 2: Support Mountain Mutual Aid Objectives. Continue development of and continue the mission of mutual aid between the first responders in the County mountain areas through County Mitigation Planning.

WF Action 2.1: Update Mountain Mutual Aid Mapbook to document.

WF Action 2.2: Update Community Structure Protection Plans as necessary.

WILDFIRE OBJECTIVE 3: Community Based Fuels Reduction Program. Continue the community based Fuels Reduction Program through community based programs, both volunteer and government funded.

WF Action 3.1: Implement identified community based fuels reduction projects.

WF Action 3.2: Develop fuels reduction "maintenance program" by obtaining participation from citizens and/or homeowners associations.

WF Action 3.3: Vegetation Removal Clear vegetation from Road District facilities/yards.

WILDFIRE OBJECTIVE 4: Forest Care. Continue providing assistance to homeowners by expanding services to all communities in the Mountain areas of the County.

WF Action 4.1: Increase homeowner assistance services to mountain residents for fuel reduction.

WF Action 4.2: Continue working with Southern California Edison to remove dead trees near power lines.

WILDFIRE OBJECTIVE 5: County Fire Hazard Abatement. Overcome funding shortfalls while improving service delivery.

WF Action 5.1: Inspect every residence in the mountain communities within the next two years to enforce the new Fire Hazard Abatement code that addresses green fuels.

WF Action 5.2: Continue to collaborate with Forest Care, Red, Cross and Cal Fire to overcome increased costs of enforcement.

WILDFIRE OBJECTIVE 6: Decrease Wildfire Hazards at Private Property through the Fire Hazard Abatement Programs

WF Action 6.1: Train and Certify landscape contractors to comply with the new Fire Hazard Abatement Code.

WF Action 6.2: Continue wildfire mitigation efforts under the Wood Shake Roof Replacement Program.

WF Action 6.3: Protect Property in Wilderness Areas Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.

WILDFIRE OBJECTIVE 7: Support Mitigation Strategies in Community Wildfire Protection Plans. Continue to improve CWPP's in cooperation with Cal Fire, the IEFSA and individual Fire Safe Councils.

WF Action 7.1: Modify independent and unique CWPPs into a more common framework making them similar but leaving room to provide specific hazard characteristics and mitigation actions for each community.

WILDFIRE OBJECTIVE 8: Improve Emergency Access. Improve and maintain emergency access for wildfire protection.

WF Action 8.1: Construct Arrowbear Drive Realignment and Widening

WF Action 8.2: Construct Cedar Glen Fire Access Road

WF Action 8.3: Structural Fire Breaks Widening Double the width of external fire breaks on grounds which have structures located in wilderness and or areas prone to wildfires.

WILDFIRE OBJECTIVE 9: Special District Funding: Continue Special Districts Projects relating to wildfire.

WF Action 9.1: Continue funding and support for Special Districts Projects relating to wildfire in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

WF Action 9.2: Emergency Water Supplies Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal. (completed with continuous fresh of supplies and rotation)

6.1.3 Earthquake/Geologic Hazards (EQ)

GOAL: Minimize exposure to structural and contents damage from geologic and seismic conditions. (Complements General Plan, Section VIII, Safety Element (Goal S 7)

EARTHQUAKE OBJECTIVE 1: Educate the public on reducing earthquake risk.

EQ Action 1.1: Improve public education programs and practices to residents for earthquake risk.

EARTHQUAKE OBJECTIVE 2: Protect occupants and structures in proposed developments from high levels of risk caused by rupture of the ground surface during an earthquake (Complements General Plan, Section VIII Safety Element Policy S 7.4).

EQ Action 2.1: Evaluate single family homes for Earthquake hazard when conducting permit applications and plan reviews.

EQ Action 2.2: Seismic Strapping for existing water tanks and future construction.

EQ Action 2.3: Employee Emergency Sheltering Develop a plan for short-term and intermediate-term sheltering of employees.

EARTHQUAKE OBJECTIVE 3: Continue geologic hazard mapping projects to minimize and prevent damage caused by earthquakes and other geologic hazards.

EQ Action 3.1: Identify liquefaction hazard areas outside the currently designated Geologic Hazard Overlay Districts.

EARTHQUAKE OBJECTIVE 4: Protect life and property from risks resulting from gravity-derived and/or earthquake-triggered landslides, expansive soils and/or other poor soil conditions. (Complements General Plan, Section VIII, Safety Element Policy § 7.6)

EQ Action 4.1: Require development on hillsides to minimizes the extent of topographic alteration and erosion, to maintain slope stability, and to reduce the potential for offsite sediment transport (Complements General Plan, Section VIII, Safety Element Policy § 6.1).

EQ Action 4.2: Generator Installation Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.

EARTHQUAKE OBJECTIVE 5: Reduce runoff over the cliffs in the Rimforest neighborhood. (Complements Rimforest Drainage Feasibility Study)

EQ Action 5.1: Divert runoff to Little Bear Creek.

EARTHQUAKE OBJECTIVE 6: Special District Funding: Continue Special Districts Projects relating to earthquake hazards.

EQ Action 6.1: Continue funding and support for Special Districts Projects relating to earthquake hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

6.1.4 Flood (FL)

GOAL: Provide adequate flood protection to minimize hazards and structural damage. (General Plan, Safety Element, Goal S 5)

FLOOD OBJECTIVE 1: National Flood Insurance Program. Participate in the National Flood Insurance Program (NFIP), which provides flood insurance within designated floodplains. (General Plan, Safety Element, Policy S 5)

FL Action 1.1: Update NFIP data and maps with newly identified flood hazard areas in the County, as new information becomes available.

FLOOD OBJECTIVE 2: Alluvial Task Force. Review and analyze the findings and recommendations from the recently released Alluvial Fan Task Force reports, as funding permits.

FL Action 2.1: Determine whether or not additional amendments to development standards or policies are merited, based on the completed analysis.

FLOOD OBJECTIVE 3: Flood Hazard Reduction. Reduce flood hazards through development standards and policies stated in the County of San Bernardino General Plan and County of San Bernardino 2010 Development Code.

FL Action 3.1: Amend the Flood Plain Safety Overlay District through automatic map updates as new data is released and published by FEMA.

FL Action 3.2: Review development plans to ensure compliance with ordinances.

FL Action 3.3: Inspect construction to ensure compliance with approved development plans.

FL Action 3.4: Soil Stabilization on Roadways and Along Roadway Shoulders Soil stabilization on roadway shoulders and dirt roads. This will prevent erosion caused by flood conditions.

FL Action 3.5: Encasing Pipelines Encase water pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.

FLOOD OBJECTIVE 4: Future Flood Mitigation Projects. Improve existing facilities and construct new facilities to mitigate flooding with the County.

FL Action 4.1: In each flood control zone, construct facilities identified in those zones by the Flood Control Advisory Committee. See Flood Control District Annex for a listing of projects.

FLOOD OBJECTIVE 5: Special District Funding: Continue Special Districts Projects relating to flood hazards.

FL Action 6.1: Continue funding and support for Special Districts Projects relating to flood hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

FL Action 6.2: On Call Contractors Employ on call contractors to assist in emergency situations.

6.1.5 Drought (DR)

GOAL: Minimize the effects of drought on the County in all aspects including economically and socially.

DROUGHT OBJECTIVE 1: Educate the public on water conservation methods.

DR Action 1.1: Create a public awareness campaign advising citizens, business owners and farmers on water conservation.

DR Action 1.2: Provide incentives for farmers to grow crops that are less water intensive.

DR Action 1.3: Continue to coordinate with the San Bernardino Valley Water Conservation District to provide Qualified Water Efficient Landscaper (QWEL) training.

DR Action 1.4: Continue to enforce the watering schedule and watering restrictions throughout the County.

DROUGHT OBJECTIVE 2: Protect the quality of the County's watersheds.

DR Action 2.1: Approve the County's Watershed Water Quality Management Plan written in 2013.

DROUGHT OBJECTIVE 3: Special District Funding: Continue Special Districts Projects relating to drought hazards.

DR Action 3.1: Continue funding and support for Special Districts Projects relating to drought hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

6.1.6 Anti-Terrorism (AT)

GOAL: Use antiterrorism strategies to discourage terrorism and protect the people, infrastructure and assets in San Bernardino County from the effects of terrorism.

ANTI-TERRORISM OBJECTIVE 1: Use anti-terrorism design strategies to discourage / prevent acts of terrorism.

AT Action 1.1: Identify and prioritize mitigation activities (anti-terrorism force protection) at critical facilities and gathering places that are vulnerable to terrorist attacks.

ANTI-TERRORISM OBJECTIVE 2: Special District Funding: Continue Special Districts Projects relating to terrorism hazards.

AT Action 2.1: Continue funding and support for Special Districts Projects relating to terrorism hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

6.1.7 Climate Change (CC)

GOAL: Reduce the impacts of climate change on the County and limit human activities that change the atmosphere's makeup.

CLIMATE CHANGE OBJECTIVE 1: Meet greenhouse gas (GHG) reductions targets set forth by the Clean Air Act.

CC Action 1.1: Continue working with the South Coast Air Quality Management District and the Mojave Desert AQMD to meet GHG reductions targets.

CC Action 1.2: Continue implementing the energy conservation and efficiency measures identified in the County of San Bernardino Greenhouse Gas Emissions Reduction Plan. (San Bernardino County Renewable Energy and conservation Element)

CLIMATE CHANGE OBJECTIVE 2: Educate the public on the effects of climate change and reducing our impact.

CC Action 2.1: Encourage carpooling and the use of public/ alternative transportation methods.

CC Action 2.2: Optimize energy efficiency in the built environment and promote the local economic benefits of energy efficiency retrofits. (San Bernardino County Renewable Energy and conservation Element)

CC Action 2.3: Encourage residents and businesses to conserve energy. (San Bernardino County Renewable Energy and conservation Element)

CLIMATE CHANGE OBJECTIVE 3: Special District Funding: Continue Special Districts Projects relating to climate change hazards.

CC Action 3.1: Continue funding and support for Special Districts Projects relating to climate change hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

6.2 Mitigation Strategy

To narrow mitigation alternatives for inclusion, FEMA's six broad categories of mitigation alternatives were used. Each FEMA category is listed below. The HMP Planning Committee developed several mitigation alternatives for implementation under each mitigation category.

- Prevention (PRV)

- Property Protection (PPRO)
- Public Education and Awareness (PE&A)
- Natural Resource Protection (NRP)
- Emergency Services (ES)
- Structural Projects (SP)

Table 6-1 summarizes the mitigation alternatives for categories of projects addressing the hazards in the San Bernardino County Unincorporated Area Multi-Jurisdictional Hazard Mitigation Plan. The Table includes implementation strategies for the wildfire, earthquake/geologic hazards, flood, drought, climate change and terrorism.

Table 6-1: Mitigation Alternative Summary

Action	Lead Agency	Hazard	Funding Source
Prevention (PRV): **Preventative activities are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. This includes the development of additional code requirements to further reduce or eliminate damages from the identified hazards.**	County Land Use Services	All Hazards	General Fund
Natural Resource Protection (NRP): **To locate and protect natural and cultural resources at risk from the identified hazards.**	Fire Protection District / Flood Control District	Wildfire and Flood	General Fund, Grants
Property Protection (PPRO): **Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations.**	Fire Protection District.	Wildfire	General Fund, Grants
Public Education and Awareness (PE&A): **To continue and develop new public education programs targeting the top identified hazards.**	Fire Protection District.	All Hazards	General Fund, Grants

Action	Lead Agency	Hazard	Funding Source
Emergency Services (ES): **Although not typically considered a "mitigation" technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:**	Fire Protections District	All Hazards	General Fund, Special District Funds, Grants
Structure Protection (SP) – Flooding **To continue to identify, fund, and build projects that reduce or eliminate flood hazards in the County.**	Flood Control District	Flooding Hazards	General Fund, Special District Funds, Grants
Structure Protection (SP)– Geological Hazards **To identify unknown hazards and develop additional new and retrofit requirements or programs to reduce or eliminate damage from geological hazards.**	Land Use Services	Geological Hazards	General Fund Grants
Structure Protection (SP) – Wildfire **To further protect structures at risk from wildfire through education, building, and enforcement codes and actions.**	Fire Protections District	Wildfire	General Fund, Special District Funds, Grants

6.2.1 Mitigation Action Plan

This section serves to identify *on-going* actions and projects in the County Unincorporated Area. With the results of the hazard risk assessment finalized, mitigation goal established, and capabilities assessed, the County and participating districts then set out to identify new mitigation actions that would reduce the outlined in the vulnerability assessment.

Not all identified mitigation actions are implementable in the 5-year plan cycle, due to technical feasibility, political acceptance, lack of funding, or other constraints. Once the mitigation actions for each participating jurisdiction were identified, they were evaluated and prioritized (by providing a time frame) to identify the most suitable mitigation actions for each participating jurisdiction to implement.

Cost effectiveness of each measure was a primary consideration when developing mitigation actions. Because mitigation is an investment to reduce future damages, it is important to select measures for which the reduced damages over the life of the measure are likely to be greater than the project cost. For structural projects, the level of cost effectiveness is primarily based on the likelihood of damages occurring in the future, the severity of the damages when they occur, and the level of effectiveness of the selected measure. While detailed analysis was not conducted during the mitigation action development process, these factors were of primary concern when selecting measures. For measures that do not result in a quantifiable reduction of damages, such as public education and outreach, the relationship of the probable future benefits and the cost of each measure was considered when developing the mitigation actions.

Based upon the participating jurisdiction capabilities, Table 6-2 shows primary actions selected for further implementation and development during the next planning cycle. Table 6-2 provides details for each mitigation action with mitigation action descriptions, FEMA mitigation category, responsible party, and timeframe.

Important to Note: See Jurisdictional Annexes for more information on implementation mechanisms and mitigation projects for each participating jurisdiction. If a participating jurisdiction is identified as a primary lead for implementation, the mitigation actions are also contained the corresponding jurisdictional annex.

Table 6-2: Mitigation Action Descriptions

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
ALL Hazard	**AH Action 1.1:** Valley Dispatch and Operations Center.	Update and maintain the operations of the facility and ensure cohesive working and response to any scale emergency and operations in a secure complex	ES	Budgetary Items from County and Federal Grant Funding, EMPG, HMPG, UASI.	Fire Protection District.	1-3 Years	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
ALL Hazard	**AH Action 1.2:** Maintain Shelter Operations Compound (SHOC). This shelter concept provides a new one-stop shelter concept. The SHOC combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location.	After the 2003 Wildland Fires, the County and American Red Cross recognized the need to provide services beyond basic care and short-term sheltering, especially during large fires, floods, and earthquakes The Mass Care & Shelter Plan and Concept of Operations, outlines the framework of a new one-stop shelter concept, Shelter Operations Compound (SHOC). It combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location. Residents can access public information and referral services through the LAC, and then take a short walk to the Non-LAC Unit for communication, postal services, and other private organizations/business at little to no cost. The completion of the Plan in 2012 will help to sync local resources, encourage local self-sufficiency, foster partnership between public and private agencies, and serve as a reference document for the region. By June 2017, the program will have 32 trailers/caches equipped with mass care and shelter supplies, strategically placed throughout the County and ready for rapid deployment. It is expected to serve over 12,000 residents. In addition to enhancing the comfort levels of shelter residents, the program will produce standardized documents and protocols for procuring and maintaining Mass Care and Shelter trailers/caches. These plans and programs will help the County prepare for and mitigate damages from hazards. This is an update and expansion of the plan and done without more grant funds.	ES	To increase Mass Care and Shelter capability of the county, grants from 2008-2009 Homeland Security Grant Program (HSGP) and 2009 Riverside Regional Urban Area Security Initiative (UASI) funded the Mass Care and Shelter Trailer/Cache Program.	Fire Protection District/	1-5 Years	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
All-Hazard	**AH Action 2.1:** Continue funding and support for Special Districts Projects relating to all hazards.	Continue funding and support for Special Districts Projects relating to water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District for all hazards. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
All-Hazard	**AH Action 2.2:** Install Generators at Critical Facilities	Retrofit existing buildings and facilities with connectors/ ATS for emergency generators and/or install permanent emergency generators at critical facilities, including wells and booster station locations.	ES, SP	TBD	Water Systems	TBD	Critical sites are already set up for connection or has a permanently installed generator

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
All-Hazard	**AH Action 2.3:** Water Systems Repair Plan	Develop a plan for speeding the repair of and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.	PRV	SDD WAS	Water Systems	TBD	We have a warehouse and inventory. Add'l inventory would need to be purchased from local wholesaler
All-Hazard	**AH Action 2.4:** Smart Water Meters and SCADA	Utilization of SCADA and Smart Water Meters to get real time data on problems with the system and reduce drive time emissions as a result of traditional meter reading.	PRV	Individual CSAs	Water Systems	Ongoing	Both SCADA and Smart Meters have been installed and continue to be installed
All-Hazard	**AH Action 2.5:** Provide Employees with Emergency Supplies	Provide emergency supplies of food, water, and portable generators for employees at office and field locations.	ES	SDD/WAS	Water Systems	Ongoing	WAS has a stock of emergency food supplies, water, and generators.
All-Hazard	**AH Action 2.6:** Annual Tower and Guide Wire Inspections	Conduct annual tower and guide wire inspections to mitigate storm/wind/earthquake hazards from knocking out communications.	PRV	TBD	TV Districts	7/1/2016-7/1/2017	All Districts
All-Hazard	**AH Action 2.7**: Maintain Tower Lighting	Maintain lights on all tower locations.	SP	TBD	TV Districts	June-17	
All-Hazard	**AH Action 2.8:** Designate Emergency Operations Sites	Conduct an inventory or list of County Park Facilities and Community Centers to establish a list of pre-designated emergency operations or disaster relief sites. Not all Community Centers are an appropriate size to accommodate large numbers of evacuees and may only serve as command and control centers or distribution centers.	PRV	TBD	Park Districts	April-17	All Districts
All-Hazard	**AH Action 2.9:** Establish Power Sources for Emergency Operations Sites	Establish small solar energy fields or other forms of renewable power at County Community Centers to facilitate stand-alone emergency operations for the community.	PRV, SP	TBD	Park Districts	12/1/2016-7/1/2018	Lucerne Valley Joshua Tree
All-Hazard	**AH Action 2.10:** Connect Water Systems to Generators	Connect water systems to generators to ensure delivery even in disaster situations.	PRV, SP	TBD	Park Districts	TBD	
All-Hazard	**AH Action 2.11:** Establish a Centralized Communications Network	Establish a centralized communications network to monitor channel output for TV Districts and provide emergency information by way of character generator tied to channel transmissions.	PRV	TBD	TV Districts	7/1/2017-12/1/2017	All districts
All-Hazard	**AH Action 2.12** Incorporate as appropriate requirements from the State of California's	Government Code 65302.6 requires the following elements to be included in the hazard mitigation plan: (1) An initial earthquake performance evaluation of public facilities that provide essential services, shelter, and critical governmental functions.	PRV, NRP	TBD	Primary: Land Use Services	1-3 years	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
	most recent land use regulations regarding the hazard mitigation planning process (Government Code 65302 and 8685.9).	(2) An inventory of private facilities that are potentially hazardous, including, but not limited to, multiunit, soft story, concrete tilt-up, and concrete frame buildings. (3) A plan to reduce the potential risk from private and governmental facilities in the event of a disaster. Government Code 8685.9 requires that the state share shall not exceed 75 percent of total state eligible costs unless the local agency is located within a city, county, or city and county that has adopted a local hazard mitigation plan as part of the safety element of its general plan. In that situation, the Legislature may provide for a state share of local costs that exceeds 75 percent of total state eligible costs.			Secondary: Fire Protection District/		
All-Hazard	**AH Action 3.1:** Continue funding and support for Special Districts Projects relating to all hazards.	Continue funding and support for Special Districts Projects relating to water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District for all hazards. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Wildfire	**WF Action 1.1** Continue Mountain Area Safety Taskforce (MAST) funding to support mitigation activity.	MAST was formed to mitigate the region wide risk of a catastrophic wildfire due to dead and dying trees in the mountain communities. The mission of the MAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for the protection of property owners, residents, and property subject to the risk of catastrophic wildfire that could occur in San Bernardino County with an initial emphasis on the threat resulting from the Old and Grand Prix fires in 2003. MAST priorities are to continue reducing fire hazards through fuel reduction programs and hazard abatement though enforcement of county ordinances. The Mountain Area Safety Taskforce (MAST) Operations Section meets monthly. MAST Operations Section determines project priorities based on the benefit cost analysis of the projects and the effect of the project on the overall goals of the MAST organization. Goals can change as detailed Benefit Cost Analysis is conducted and CEQA/NEPA reviews are completed.	NRP, PPRO	Seeking additional funding through HMPG.	San Bernardino County Fire Protection District	On-Going	See Implementati on plan on more information on MAST. See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
Wildfire	**WF Action 2.1:** Update Mountain Mutual Aid Map Book to document updated information contained in 2016 HMP.	The Map Book portion of the Community Safety and Structure Protection Plan provides not only a street network of the area but more importantly it provides the locations of strategic and critical resources for fire fighters. These include but are not limited to safe zones, open areas, locations for refuge. They also identify areas within communities that have narrow and steep winding streets and or with limited ingress and egress. The document is handed out to all responding strike teams from out of the area and has proved invaluable in directing and coordinating an effective firefighting response and reduces the potential for life loss and property damage.	ES	Seeking additional funding through HMPG.	San Bernardino County Fire Protection District	On-Going	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 2.2** Update Community Structure Protection Plans as necessary.	This is an on-going action (from the 2011 MJHMP) with the goal to continue development of and continue the mission of mutual aid between first responders in the County mountain areas.	PPRO		Fire Protection District	On-Going	
Wildfire	**WF Action 3.1:** Implement identified community based fuels reduction projects.	The Fuels Reduction Program is designed to create community based fuel modification programs across the mountain communities. These projects are selected specifically to reduce the potential for catastrophic wildfires and the damage that they can do to the communities. Project design, contracting, and operations are managed by the County's Public Works Department with priorities set by local fire chiefs in monthly MAST Operations Meetings. This program is the oldest and most significant for reducing wildfire threat on a mountain wide basis.	PPRO	Current Funding: Seeking additional funding through HMPG.	Primary: San Bernardino Public Works Department Secondary: County Fire Protection District	On-Going	
Wildfire	**WF Action 3.2:** Develop fuels reduction "maintenance program" by obtaining participation from citizens and/or homeowners associations.	To survive a wildfire, property owners need to manage the land surrounding their homes and communities effectively. Removing fuels in the wildland fuel reduction zone beyond the defensible space can reduce the speed and intensity of an oncoming wildfire. But if these areas aren't regularly **maintained**, they lose their effectiveness. Plants grow back, and flammable vegetation needs to be routinely removed and disposed of properly. This guide provides tips on how to create and maintain defensible space and wildland fuels treatments around your property.	PPRO, PE&A	Seeking additional funding through HMPG	Primary: Public Works Secondary: Fire Protection District	On-Going	
Wildfire	**WF Action 4.1** Increase homeowner assistance services to mountain residents for fuel reduction.	This is an ongoing wildfire mitigation action (from the 2011 MJHMP) for the group Forest Care to achieve the goal of providing assistance to homeowners by expanding services to all communities in the Mountain areas of the County. Forest Care is a program dedicated to creating a healthier forest. This program provides foresters to assess individual properties for thinning the vegetation and then provides 75% of the funding to do so.	PPRO, PE&A	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 4.2** Continue working with Southern California Edison (SCE) to remove dead trees near power lines.	A significant number of fires across the State are caused by trees falling into power lines. When the forests in the mountain communities became infested with bark beetles the pine tree die off was unprecedented. Thousands of these dead trees were standing precariously close to power lines. Early in the Bark Beetle Emergency in 2004, Southern California Edison swiftly initiated a program to remove all trees that were dead, dying, and/or diseased that had the potential to fall into any SCE power lines.	PRV, PPRO	As of July of 2010 Southern California Edison (SCE) has spent $179,758,978 to remove dead dying and diseased trees.	San Bernardino County Fire Protection District	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
		The role of Southern California Edison was critical to the success of MAST both operationally and financially. Edison still removes the most difficult trees, the most costly trees; and the ones that are most likely to be the source of ignition for a wild land fire. They are also removing the trees that are immediately threatening homes. They have removed 118,305 trees since the inception of the program in 2004. They also provided reimbursements to people that removed their own trees.					
Wildfire	**WF Action 5.1:** Inspect every residence in the mountain communities throughout the year to enforce the Fire Hazard Abatement code that addresses green fuels.	The Fire Hazard Abatement Program conducts surveys to identify fire hazards throughout the year. Fire hazards are identified and notices to abate the hazard(s) are mailed to property owners. Property owners are given 30 days to abate the violations. Failure to abate may result in citations, penalties, and/or fees for abatement by the County. The Fire Hazard Abatement Program responds to complaints year round in the unincorporated areas and contracting Cities and Fire Districts. The Division completes more than 430,000 inspections, issues more than 45,000 Notices to Abate Fire Hazards, issues over 4,000 citations for non-compliance, and abates the fire hazards on more than 2,000 parcels annually. Within the last 5 years, the Fire Hazard Abatement Division has received even more financial resources that enable them to abate all properties declared a fire hazard.	PRV, PPRO, PE&A	Seeking additional funding through HMPG	Primary: Land Use Services Secondary: Fire Protection District	On-Going	For more information on Contractor Certification, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	**WF Action 5.2:** Continue to collaborate with Forest Care, Red, Cross and Cal Fire to overcome increased costs of enforcement.	This is an on-going action from the 2011 MJHMP with the goal of overcoming funding shortfalls for the County Fire Hazard Abatement Program.	PRV		San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 6.1** Train and Certify landscape contractors to comply with the Fire Hazard Abatement Code.	The City of Big Bear Lake created a program to train and certify landscape contractors to provide a qualified workforce to conduct fuels reduction activities on individual properties. The contractors are trained to comply with the new Fire Hazard Abatement Code that exists both in the City of Big Bear and the County unincorporated area. The City of Big Bear Lake Fire Department conducts the classes for landscapers and handy persons. This provides an incentive for the contractors and provides a level of certification that the homeowner can rely on when they are deciding to hire a landscape contractor to conduct fuels abatement around their home.	PRV, PPRO	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	On-Going

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 6.2:** Continue wildfire mitigation efforts under the Wood Shake Roof Replacement Program.	The County successfully passed an ordinance that requires the replacement of wood shake roofs by 2014. MAST has successfully mapped all of the wood shake roofs in the fire safety overlay and has created a strategy as to which roofs will be selected to participate in the FEMA funded project. This is an on-going project in cooperation with Big Bear Lake Fire Protection District in order to provide more funding for wood shake roof replacements by property owners.	PRV, PPRO, SP		Primary: MAST Secondary: San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 6.3:** Protect Property in Wilderness Areas	Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.	PPRO, PRV, SP	TBD	Sewer Systems	January-17	All sewer pump stations have paving
Wildfire	**WF Action 7.1:** Modify independent and unique CWPPs into a more common framework making them similar but leaving room to provide specific hazard characteristics and mitigation actions for each community.	Community Wildfire Protection Plans are designed to provide a means for a community, usually through the Fire Safe Council, to have input into and actively participate in the planning, strategy, goals, and objectives of creating a fire safe community.	PRV	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	On-Going For more information on CWPP see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	**WF Action 8.1:** Construct Arrowbear Drive Realignment and Widening.	The Arrowbear community off State Highway 18 has limited access to State Highway 138. The existing bridge/spillway and road needs to be realigned and widened to facilitate access by emergency personnel during wildfires and flooding. Mitigation strategy for this is to remove and replace existing bridge/spillway, realign and widen the road.	SP	Seeking grant funding Total Cost: $3,000,000 Approx.	Primary: Public Works Secondary: San Bernardino County Fire Protection District	1-3 Years	
Wildfire	**WF Action 8.2:** Construct Cedar Glen Fire Access Road.	Lack of paved roads inhibits traffic circulation and the ability to enter and exit the area without backtracking during wildfire emergencies. Strategy is to Construct road and drainage improvements to Little Bear Creek Road and Elder Drive.	SP	Seeking grant funding **Total Cost:** $2,500,000	Public Works	1-3 Years	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 8.3:** Structural Fire Breaks Widening	Double the width of external fire breaks on grounds which have structures located in wilderness and or areas prone to wildfires.	SP, PRV	Individual CSAs	Water Systems	7/1/2017-7/19/2019	
Wildfire	**WF Action 9.1:** Continue funding and support for Special Districts Projects relating to wildfire.	Continue funding and support for Special Districts Projects relating to wildfire in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Wildfire	**WF Action 9.2:** Emergency Water Supplies	Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.(completed with continuous fresh of supplies and rotation)	ES	TBD	Roads	TBD	
Earthquake	**EQ Action 1.1:** Improve public education programs and practices to residents for earthquake risk.	Public education and outreach programs are an efficient and cost-effective way to promote meaningful changes within a community. A Program for Public Information (PPI) for earthquake awareness and mitigation could significantly reduce injury and property damage to earthquake. Use a suite of partnerships, activities, and products to educate the public about earthquake science and motivating homeowners to become prepared for earthquakes.	PE&A		Human Resources	5-10 Years	
Earthquake	**EQ Action 2.1:** Evaluate single family homes for Earthquake hazard when conducting permit applications and plan reviews.	82.15.040 Development Standards states that a structure used for human occupancy shall be located 50 feet or farther from any active earthquake fault traces. Lesser setbacks may be applicable in certain situations as determined by an appropriate geologic investigation and approved by the County Geologist or other engineering geologist designated by the Building Official. Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code Section 2621 et seq.) requires the delineation of potential damage areas along known active faults throughout California. It requires local governments to withhold approval of construction permits in those zones until geologic investigation has determined that the site is not threatened by surface displacement from future faulting.	PRV		Land Use Services	TBD	On-Going
Earthquake	**EQ Action 2.2:** Seismic Strapping	Seismic strapping for existing water tanks and future construction.	SP, PRV	CSA 64	Water Systems	7/17/2017-7/1/2019	Ongoing currently
Earthquake	**EQ Action 2.3:** Employee Emergency Sheltering	Develop a plan for short-term and intermediate-term sheltering of employees.	PRV	WAS	Sewer Systems	7/17/2017-7/19/2019	To purchase cots, small portable generators, tents, etc.

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Earthquake	**EQ Action 3.1:** Identify liquefaction hazard areas outside the currently designated Geologic Hazard Overlay Districts.	Supported by General Plan mechanism (General Plan, Section VIII, Safety Element Policy § 7.5; California Building Code §1803.5.11); Seismically- induced lateral spreading, and/or seismically-induced lateral flow, can cause devastating structural damage and a high potential for saturation exists when the groundwater level is within the upper 50 feet of alluvial material.	PRV		Land Use Services	5-10 Years	
Earthquake	**EQ Action 4.1**: Require development on hillsides to minimizes the extent of topographic alteration and erosion, to maintain slope stability, and to reduce the potential for offsite sediment transport (Complements General Plan, Section VIII, Safety Element Policy § 6.1).	This mitigation action is especially important in the San Bernardino and San Gabriel Mountains which have high slope failure / erosion potential. Typical slope mitigation techniques that are used include: Drainage Improvements - Since water is the biggest culprit in failing slopes, drainage improvements should be the first priority. Some drainage improvements may include: ▪ Collect or divert surface water from the problem slope. This may include catch basins, swales, or sealing tension cracks to prevent infiltration. ▪ Collect and remove subsurface water. This may include drains constructed within the subsurface to remove excess seepage, or lower ground water. Some earthwork mitigation techniques are as follows: ▪ Remove the upper soils of the slope to create a flatter slope. ▪ Buttress the slope toe by filling with rock, gravel, or soil. ▪ Benching the slope if each bench is on competent subgrade. ▪ Structural Improvements - Structural improvements include: ▪ Friction Piles ▪ Retaining walls ▪ Geo Grid ▪ Sheet Piles ▪ Rock Bolts ▪ Vegetative Cover Complements General Plan, Section VIII, Safety Element Policy § 7.6 Complements General Plan, Section VIII, Safety Element Policy § 6.1)	PRV	N/A	Land Use Services	On-Going	Provide enhanced information during the development review process to address slope failure concerns.
Earthquake	**EQ Action 4.2:** Generator Installation	Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.	SP, PPRO	TBD	Roads	TBD	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Earthquake	**EQ Action 5.1:** Divert runoff to Little Bear Creek.	To reduce the runoff over the cliff(s) in the Rimforest neighborhood, the runoff must be diverted to another path. This will be accomplished over three phases: • Phase 1: Reduce Runoff Tributary Area by 64%- 50.35 AC • Phase 2: Reduce Runoff Tributary Area by 30%- 23.79 AC • Phase 3: Reduce Runoff Tributary Area by 5%- 3.99 AC	SP, NRP, PRV		Primary: Public Works Secondary: Flood Control District		
Earthquake	**EQ Action 6.1:** Continue funding and support for Special Districts Projects relating to earthquake hazards.	Continue funding and support for Special Districts Projects relating to earthquake hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Flood	**FL Action 1.1:** Update NFIP data and maps with newly identified flood hazard areas in the County, as new information becomes available.	As required by the State of California, National Flood Insurance Program (NFIP) maps published by FEMA must be included in the HMP or General Plan Safety Element. Keeping this information current is an important mitigation action.	PRV, PPRO		San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 2.1:** Determine whether or not additional amendments to development standards or policies are merited, based on the Alluvial Fan Task Force Recommendation.	This is an on-going mitigation action from the 2011 MJHMP.	PRV		Primary: San Bernardino County Flood Control District Secondary: Land Use Services	On-Going	
Flood	**FL Action 3.1:** Amend the Flood Plain Safety Overlay District through automatic map updates as new data is released and published by FEMA.	Current San Bernardino County Hazard Maps can be found at: http://cms.sbcounty.gov/lus/Planning/ZoningOverlayMaps/HazardMaps.aspx.	PRV, NRP		Primary: San Bernardino County Flood Control District Secondary: Land Use Services	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Flood	**FL Action 3.2:** Review development plans to ensure compliance with ordinances.	This is an on-going mitigation action from the 2011 MJHMP in order to reduce the flood hazards through development standards and policies stated in the General Plan and San Bernardino 2077 Development Code.	PRV		Primary: Land Use Services Secondary: San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 3.3:** Inspect construction to ensure compliance with approved development plans.	This is an on-going mitigation action from the 2011 MJHMP in order to reduce the flood hazards through development standards and policies stated in the General Plan and San Bernardino 2077 Development Code.	PRV, PPRO, SP		Primary: Public Works Secondary: Flood Control District	On-Going	
Flood	**FL Action 3.4:** Soil Stabilization on Roadways and Along Roadway Shoulders	Soil stabilization on roadway shoulders and dirt roads. This will prevent erosion caused by flood conditions.	SP, PRV	TBD	Roads	TBD	
Flood	**FL Action 3.5:** Encasing Pipelines	Encase water pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.	SP, PRV	CSA 70 J	Water Systems	7/17/2017-7/1/2027	
Flood	**FL Action 4.1:** In each flood control zone, construct facilities identified in those zones by the Flood Control Advisory Committee. See Flood Control District Annex for a listing of projects.	This is an ongoing mitigation action from the 2011 MJHMP to achieve the goal of improving existing facilities and construct new facilities to mitigate flooding within the County.	SP		Primary: Public Works Secondary: San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 6.1:** Continue funding and support for Special Districts Projects relating to flood hazards.	Continue funding and support for Special Districts Projects relating to flood hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Flood	**FL Action 6.2:** On Call Contractors	Employ on call contractors to assist in emergency situations.	PRV, ES	TBD	Roads	TBD	
Drought	**DR Action 1.1:** Create a public awareness campaign advising citizens, business owners and farmers on water conservation.	Public education and outreach programs are an efficient and cost-effective way to promote meaningful changes within a community. A program to raise awareness on the importance of water conservation could significantly reduce the amount of water used by the public.	PE&A, NRP		Human Resources	TBD	
Drought	**DR Action 1.2:** Provide incentives for farmers to grow crops that are less water intensive.	Farmers use 80% of the State's water. By offering incentives to produce less water intensive foods (such as beets, carrots and potatoes) as opposed to more water intensive foods such as almonds, beef and pork) would make a substantial difference in water consumption.	NRP, PRV,		DAO Community Services?	On-Going	
Drought	**DR Action 1.3:** Continue to coordinate with the San Bernardino Valley Water Conservation District to provide Qualified Water Efficient Landscaper (QWEL) training.	The Qualified Water Efficient Landscaper training presents an affordable proactive local approach to reducing landscape water demand. QWEL provides graduates with knowledge in water efficient and sustainable landscape practices including water management and preservation of other valuable resources.	PE&A		Economic Development Agency?	On-Going	
Drought	**DR Action 1.2:** Approve the County's Watershed Water Quality Management Plan.	The County's Watershed Water Quality Management Plan written in 2013.	PRV, NRP			On-Going	
Drought	**DR Action 1.4:** Continue to enforce the watering schedule and watering restrictions throughout the County.	In response to the State Water Resources Control Board's 2016 emergency water conservation regulation, the County enforces a watering schedule for residential and commercial addresses.	PRV, NRP		Land Use Services	On-Going	
Drought	**DR Action 3.1:** Continue funding and support for Special Districts Projects relating to drought hazards.	Continue funding and support for Special Districts Projects relating to drought hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7	VARIES	VARIES	VARIES	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Anti-Terrorism	**AT Action 1.1:** Identify and prioritize mitigation activities (anti-terrorism force protection) at critical facilities and gathering places that are vulnerable to terrorist attacks.	Critical facilities may include essential facilities (such as hospitals, police and fire stations, evacuation centers, etc.), transportation systems, lifeline utility systems, high potential loss facilities (such as nuclear power plants, dams and military installations, etc.), and hazardous material facilities. Gathering facilities should also receive special attention. Places of mass gathering not only present terrorists with potential opportunities for mass casualties, symbolism and high impact media coverage, they pose a broad range of security challenges for their owners and operators.	PRV, PPRO		Land Use Services	On-Going	
Anti-Terrorism	**AT Action 2.1:** Continue funding and support for Special Districts Projects relating to terrorism hazards.	Continue funding and support for Special Districts Projects relating to terrorism hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Climate Change	**CC Action 1.1:** Continue working with the South Coast Air Quality Management District to meet GHG reductions targets.	The San Bernardino County General Plan Amendment and Greenhouse Gas Reduction Plan addresses the environmental effects specific to the proposed General Plan Amendment, Greenhouse Gas Reduction Plan, and associated Development Code Amendment and can be found here: http://www.sbcounty.gov/Uploads/lus/Countywide/GreenhouseGas/Full-Vol-1.pdf	PRV, NRP		Land Use Services	On-Going	
Climate Change	**CC Action 1.2:** Continue implementing the energy conservation and efficiency measures identified in the County of San Bernardino Greenhouse Gas Emissions Reduction Plan.	According to the San Bernardino County Renewable Energy and conservation Element, San Bernardino County's commercial, institutional and residential communities will continue to grow in the foreseeable future. Access to dependable and affordable energy sources is critical to maintaining and enhancing the quality of life enjoyed by San Bernardino residents and businesses. As energy needs grow, so do the needs to develop new energy sources.	PRV, NRP		Land Use Services	On-Going	
Climate Change	**CC Action 2.1:** Encourage carpooling and the use of public/ alternative transportation methods.	Reduction Measure R2T1 of the County of San Bernardino Greenhouse Gas Emissions Reduction Plan establishes an Employment Based Trip and VMT Reduction Policy. Some features include a compressed work week, car/vanpools, employee bicycle/pedestrian programs, and shuttle/ transit programs.	PE&A, PRV, NRP		Human Resources	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Climate Change	**CC Action 2.2:** Optimize energy efficiency in the built environment and promote the local economic benefits of energy efficiency retrofits. (San Bernardino County Renewable Energy and Conservation Element)	This is an on-going mitigation policy from the San Bernardino County Renewable Energy and Conservation Element.	SP, PE&A, PRV		Public Works	On-Going	
Climate Change	**CC Action 2.3:** Encourage residents and businesses to conserve energy. (San Bernardino County Renewable Energy and conservation Element)	This is an on-going mitigation policy from the San Bernardino County Renewable Energy and Conservation Element.	PE&A, NRP, PRV		Human Resources	On-Going	
Climate Change	**CC Action 3.1:** Continue funding and support for Special Districts Projects relating to climate change hazards.	Continue funding and support for Special Districts Projects relating to climate change hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	

Section 7. Plan Maintenance

7.1 Monitoring Evaluating and Updating the HMP

The San Bernardino County Fire Protection District Office of Emergency Services (OES) is the custodian of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). In the 2010 MJHMP, County of San Bernardino indicated that the MJHMP would be reviewed annually. Although no formal meetings were held, OES reviewed the plan annually and collected new hazard mitigation information and mitigation efforts throughout the county. Additionally, OES referenced/reviewed the MJHMP before submitting grant applications to ensure the project was captured in the plan when applying for all grants to assist their mitigation efforts.

There are three (3) main components to the MJHMP: hazards, projects, and stakeholder involvement (public, as well as, county staff). The County and its Special Districts have focused on these components and over the last 5 years have made steady improvements in all areas. The County and its Special Districts participated and facilitated several meetings and established several tasks forces to help advance the understanding of hazards in the community. This information was shared with other county personnel and the general public. OES believes that this sharing of information leads to a more informed community, thus a more robust MJHMP.

Departments and Special Districts with projects track the status of the projects through the entire life cycle from concept to completion. Projects in progress are tracked to ensure all milestones are met and payments are made in a timely manner. Each year proposed projects are reviewed during budget development every spring and selected projects are submitted for funding to the appropriate funding source. These funding sources include but are not limited to grant funding, General Fund funding, and Special District funding.

Because the MJHMP is a living document that reflects ongoing hazard mitigation activities, the process of monitoring, evaluating, and updating will be critical to the effectiveness of hazard mitigation within the County Unincorporated Area. The County and its Special Districts will hold internal planning meetings to discuss current projects and evaluate newly proposed projects resulting from internal staff meetings and input from the public. The results of these Departmental/Special District meetings will be presented to the Multi-Jurisdictional Planning Team meetings at their annual meetings. To facilitate the Multi-Jurisdictional Hazard Mitigation Planning process, OES is proposing to conduct these annual meeting with the Multi-Jurisdictional County Planning Team where the Team Members will discuss the projects, priorities, and goals in the current plan and from individual Special District meetings and suggest any necessary changes. Results of the annual meeting will be retained and compiled for the 2016 update. The County Planning Team will continue to support focused outreach for county Departments and Districts as well as support Countywide activities.

7.1.1 Plan Adoption

To comply with DMA 2000, the San Bernardino County Board of Supervisors has officially adopted the 2016 San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan. The adoption of the 2016 MJHMP recognizes the County's commitment to reducing the impacts of natural hazards within the County limits. A copy of the 2016 MJHMP adoption resolution is included after the table of contents in this document.

7.1.2 Implementation

The knowledge gained from the MJHMP has helped the county enhance other planning efforts. One of the biggest results from the 2010 MJHMP efforts was the incorporation of the MJHMP into the 2007 General Plan's Safety Element. This merging of plans has help ensure development decisions are considering the most recent hazard information. It is the County's intent to incorporate by reference the updated MJHMP into the County General Plan upon approval from FEMA.

The MJHMP has also led to the strengthening and improvement of several County Ordinances, which are designed to ensure proper fuels reduction was completed in the Severe Fire Hazard Zones. Two new ordinances were passed requiring replacement of wood shake roofs in the Severe Fire Hazard Severity Zones by 2014 and the reduction of live fuel loads around structures in the Very High Fire Hazard zone.

The MJHMP goals and actions will be incorporated into various general operations of government. For example, much of the information from the MJHMP will be included in the County Operational Area Emergency Operation Plan (EOP). As any future County plans are developed, the Multi-Jurisdictional Hazard Mitigation Plan will be a great asset in any plan development efforts. As noted earlier, much of the information contained in this MJHMP is from the County General Plan and is already part of the planning process.

Additional benefit is gained from the County and its Special Districts reviewing existing mitigation projects and development of additional mitigation projects at their internal annual Planning Team meetings. This input includes comments and suggestions from the public as well as from the internal planning process of each County department and District.

7.1.2.1 Implementation through Existing County Mechanisms

7.1.2.1.1 All Hazards

7.1.2.1.2 Amendment to Title 6 County Code

An amendment to Title 6 of the County of San Bernardino Code to adopt by reference the 2010 Editions of the California Building Standards Codes went before the Board of Supervisors on

November 2, 2010 and was continued for a second reading on November 16, 2010 and approved unanimously. The amendment became effective on January 1, 2011.

The County of San Bernardino amendment to Title 6 of the County Code to adopt by reference the 2010 Editions of the California Building Standards Codes repealed the current chapters of Division 3 of Title 6 that reflect the 1994/1995 editions of the California Building Standards Codes and adopt the 2010 editions of these codes by reference.

The California Building Standards Commission approved the California Building Standards Code (Code) for a statewide effective date of January 1, 2011 and requires this Code apply in all parts of the state. This Code consists of the California Building, Residential, Plumbing, Mechanical, Electrical, Energy, Historical Buildings, Existing Building (Unreinforced Masonry) and the Green Building Standards Codes. Since this 2010 Edition was adopted by local ordinance, the prior editions of this code will be repealed and the most recent editions of the codes with applicable amendments requiring express findings and certain appendices necessary for the health and safety of the citizens of this County will be in effect within the unincorporated areas of San Bernardino County. The benefit of adopting this Code is that it provides consistency and clarification for the building community as well as building inspectors and plans examiners. State law (Health & Safety Code 18941.5 and 17958.7) requires the local government make express findings in order to amend building standards and the amendments must be necessary due to local climatic, geological, or topographical conditions.

Those amendments and findings are included in the County's ordinance and were filed with the California Building Standards Commission.

The recommended modifications not requiring express findings are administrative or procedural in nature and concern the local implementation issues that are not covered by building standards.

An example of this type of modification is to the California Residential Code, Section R105.3.1.1 which requires the Board of Appeals to confirm substantial valuations in the flood plain. The traditional purpose of the Board of Appeals has been reserved for a contested decision of the Building Official, and it is felt that it should remain as such.

With respect to grading and excavation regulations found in Appendix J of the 2010 State published code, the 2001 California Building Code dealt with grading with more clarity in regards to what activities require a permit and set forth rules to ensure large grading projects are scrutinized in greater detail than smaller projects by requiring more reporting and inspection of such work. The grading chapter in the 2001 Code has been trusted and in use in its primary form for years. The 2010 Appendix J grading chapter needs substantial amendment and modification to address all grading issues and is not recommended for adoption in its present form. The Board adopted the 2001 Appendix Chapter 33 regulations as part of this proposed ordinance. Relocation permit requirements have been moved to a new section of the Code, and it retains specific standards for relocation procedures in details not found in the 2010 State-published code. Clarification of the types of buildings affected by the new regulations has also been made.

Administrative changes to the 2010 California Existing Building Code (Part 10 of Title 24) were approved to outline the procedures required to set allowable time limits for the retrofit and repair of unreinforced masonry buildings. Staff is also recommending that authorization be given to the Building and Safety Division of the Land Use Services Department to issue Administrative Citations as an alternative means of enforcement of the County Code provisions.

Express findings are made for changes to the California Plumbing Code, Appendix K regarding the soil conditions that exist in this county. These changes are supported by the Environmental Health Division. These express findings are iterated in the ordinance and will be filed with the Building Standards Commission as required by law in order to become effective.

7.1.2.2 Wildfire

7.1.2.2.1 Inland Empire Fire Safe Alliance (IEFSA)

The Inland Empire Fire Safe Alliance (IEFSA) was created to act as a forum for all Fire Safe Councils in San Bernardino County. Some of the benefits are developing a consistent and comprehensive message to citizens about fire safety; coordinating efforts for grant administration, writing, and reporting; a one-stop shop for information, resources and research; and a centralized source for sharing of updates from cooperating governmental agencies. There are approximately 20 Fire Safe Councils active in San Bernardino County.

IEFSA has held bimonthly meetings for over 5 years and have been the focal point for all regional Fire Safe Councils including some from Riverside County. They have also held numerous workshops and seminars regarding fire resistive construction, and materials, BAER reports, CWPPs and grant writing. The IEFSA was the focal point for Fire Safe Councils (FSCs) that were working on completing their CWPPs and created a focus group and a steering committee to accomplish these critical plans. To support public education and involvement,

IEFSA created the web site www.fireinformation.com as well as participated in countless safety fairs and fire wise awareness activities. They also conducted a Public Education Media Exchange where all FSC and Agencies got together to share educational modalities and create common thought and educational threads. They have reached out to thousands of mountain residents in preparing them for wildfires.

7.1.2.2.2 Mountain Area Safety Taskforce (MAST)

MAST was formed to mitigate the region wide risk of a catastrophic wildfire due to dead and dying trees in the mountain communities. The mission of the MAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for the protection of property owners, residents, and property subject to the risk of catastrophic wildfire that could occur in San Bernardino County with an initial emphasis on the threat resulting from the Old and Grand Prix fires in 2003. MAST priorities are to continue reducing fire hazards through fuel reduction programs and hazard abatement though enforcement of county ordinances.

The Mountain Area Safety Taskforce (MAST) Operations Section meets monthly. MAST Operations Section determines project priorities based on the benefit cost analysis of the projects and the effect of the project on the overall goals of the MAST organization.

The MAST Unified Command identified the following objectives as their focus and direction:

- Provide for Community Safety.
- Develop Coordinated Public Information Dissemination Between Cities, County, Special Districts, State, Federal, and Non-Profit Agencies.
- Develop Immediate, Mid-range and Long-range Coordinated Agency Plans.
- Identify and Secure Potential Funding Resources to Provide Protective Measures.
- Document Task Force Activities Including Mission, Goals and Objectives, Policies, Procedures, and Outcomes. Prior to any type of flood threat, the following precautionary measures may be taken by MAST members to reduce the impact of impending fires:
- Review mutual aid agreements
- Define evacuation areas and trigger points
- Review the use of alert and warning systems
- Provide information to the public of fire prone areas and protective measures in progress or planned for those areas
- Educate public on emergency self-help and preparedness
- Develop and maintain emergency notification procedures and checklists

MAST is the central point of coordination for all projects related to the reduction of the potential for catastrophic wildfires. There are numerous participants and all levels of government. MAST partners collaborate to provide multi-agency technical support to ensure project success. Economic impacts are considered and the result has been significant increase in economic activity through thoughtful application of grant funding. MAST has been so successful in the environmental management of projects that all of the local environmental groups including national affiliates are now supporters of MAST fuels projects.

The MAST group includes:

- San Bernardino County Board of Supervisors
- County Administrative Office
- County Public Works-Flood Control/Transportation/Solid Waste

- County Fire Protection District
- County Fire Protection District/Office of Emergency Services (OES)
- County Sheriff's Department
- Southern California Edison
- Bear Valley Electric
- Arrowbear Lake Fire Department
- Big Bear City Fire Protection District
- City of Big Bear Lake Fire Department
- Crest Forest Fire Protection District
- Running Springs Fire Department
- USFS
- San Bernardino National Forest Association
- Forest Care
- Cal Fire
- Caltrans
- California Highway Patrol
- Inland Empire Fire Safe Alliance
- Angelus Oaks Fire Safe Council
- Arrowhead Communities Fire Safe Council
- Bear Valley Fire Safe Council
- Lytle Creek Fire Safe Council
- Mill Creek Fire Safe Council
- Mountain Rim Fire Safe Council
- Wrightwood Fire Safe Council

Since its beginnings, MAST has been the Unified Command that has successfully implemented and completed numerous programs leading to safer communities, a more educated public and an improved environment.

MAST provides an extensive Fuels Reduction Program. The Fuels Reduction Program began with removal of dead hazardous trees from areas threatening electrical transmission lines, evacuation routes, and structures within the San Bernardino Mountains. Dead and dying trees pose an extreme fire danger, and MAST members began removing these trees under state and federal grants, including a $70 million grant from the USDA Natural Resources Conservation Service. At the height of the program, Southern California Edison contractors were taking out 650 trees a day. As the program developed, additional hazards were identified, such as green fuel load density and wood shake roofs on structures within the San Bernardino Mountains

The MAST mission has expanded to include reducing green fuel by thinning live trees in densely wooded areas. Property owners also are being urged to thin the live trees and vegetation on their property to gain an upper hand on the bark beetle infestation and reduce the risk of catastrophic wildfires like the Grand Prix and Old fires in 2003.

Other MAST Achievements include:

- Increasing awareness of the drought-related bark beetle emergency and the threat of catastrophic wildfires
- Distributing fire safety and prevention information to the public
- Developing evacuation plans and distributing emergency planning information to the public
- Developing commercial use or disposal options for waste wood products.

The Mountain Area Safety Taskforce (MAST) Operations Section meets monthly. MAST Operations Section determines project priorities based on the benefit cost analysis of the projects and the effect of the project on the overall goals of the MAST organization.

Goals can change as detailed Benefit Cost Analysis is conducted and CEQA/NEPA reviews are completed.

7.1.2.2.3 Fire Safety Overlay District Mitigation

A General Plan Amendment to the Safety Element of the County of San Bernardino 2007 General Plan updated the Fire Safety Overlay District effective March 11, 2010. The Safety Element includes several hazard overlays that are included in the General Plan mapping system to inform the public of potential hazards to development of property within certain areas of the County and to enable the County to mitigate the risks presented to property owners by these hazards, by requiring fire resistant building construction methods. The overlays include potential fire hazards within the mountain regions as well as the valley and desert “interface”. Over the past twenty years, certain federal and state agencies have been in the process of digitizing much of this hazard data. The digitization of this data has allowed for greater accuracy as well as more timely updates. In recognition of the new data from various federal and state agencies, the County updated the Fire Safety Overlay District contained within the Safety Element of the General Plan. The Fire Safety Overlay District is amended by modifying four General Plan Quad Maps to incorporate updated fire safety mapping published by Cal Fire for the Valley area.

As new information is received, the overlay maps are updated to reflect changes. These updates are made by the Land Use Services Department in collaboration with County Fire Protection District. More areas have been added through annexation and contract for services and so there has been large growth and the overlay will be updated. The future 2018 CountyWide Plan will replace the General Plan, and will contain more update maps and regulations that will allow development to occur but ensure safety and sustainability within the Fire Safety Overlay District.

7.1.2.2.4 Public Education Programs

The County through MAST conducted a comprehensive mountain-wide multi-modality Public Outreach Program from 2006 to 2008. It can be found at www.CalMAST.org. The program in both English and Spanish created and presented multiple public educational meetings, newsletters,

brochures, calendars, and posters. Because of the large number of visitors to the forest, MAST also created Emergency Information Visitors brochure and glove box sized Emergency Response Evacuation maps for the mountain communities. The program won national awards for advertising and public relations. Other jurisdictions initiated their own public education activities but brought them back through MAST so that the entire group could receive the benefit. The City of Big Bear Lake Fire Department was the most prolific in developing innovative and creative educational programs. They developed the Thin-Is-In website at (www.thinisin.org) that is an excellent site for citizens and agencies as well. Since the Big Bear Valley is served by an excellent radio station KBHR (k-bear) they have posted numerous public safety messages. Also during the Butler, Butler II and Slide Fires, KBHR provided constant updates to the community regarding the fire.

7.1.2.2.5 County Fire Hazard Abatement

Land Use Services Department, Environmental Health Division is responsible for Fire Hazard Abatement (FHA). Fire Hazard Abatement works to reduce the potential for an individual’s property to be the source of fire and structural ignitability. Failing to maintain private property in a fire safe condition is seen as a fire threat and is considered a threat to neighbor’s property rights. To obtain compliance, FHA issues notices of violation to properties that have dry vegetation and flammable green vegetation. If the property owner doesn’t comply with the notice, FHA then obtains a warrant to go onto the property and abate the fire hazard.

The Fire Hazard Abatement portion of the County Code was completely rewritten and redesigned around real flammable fuels. The most significant change was to include certain types of green fuels as flammable vegetation.

Following in the City of Big Bear Lake’s path, the County adopted the new code in the fall of 2008. In January of 2010 the County amended the Hazard Overlay maps.

The Fire Hazard Abatement Division of the Land Use Services Department conducts annual inspections of all parcels of land in mountain regions for the purpose of identifying exterior fire hazards. Biannual inspections are completed in valley and desert serviced areas. The targeted hazards include high energy release shrubs, dead and hazardous trees, flammable vegetation, weeds, grasses and combustible rubbish. The Division completes more than 430,000 inspections, issues more than 45,000 Notices to Abate Fire Hazards, issues over 4,000 citations for non-compliance, and abates the fire hazards on more than 2,000 parcels annually. Within the last 5 years, the Fire Hazard Abatement Division has received even more financial resources that enable them to abate all properties declared a fire hazard.

7.1.2.2.6 Countywide Fuels Management Program

In May of 2005 the San Bernardino County Fire Protection District and the San Bernardino County Flood Control District formed a partnership to implement the Hazardous Tree Removal Program, later the Fuels Management Program. In this endeavor the Flood Control District formed the Hazardous Tree Removal Operations Division which was tasked with developing, bidding and administering Tree Removal and Fuel Reduction Contracts funded by various grants. Contracts originally focused on removing dead, dying, and diseased trees caused by the drought conditions and the bark beetle infestation. The program has evolved to include fuel modification projects which remove hazardous vegetative fuels through the thinning of live vegetation. In addition the location of the fuel reduction projects are moving beyond the limits of the San Bernardino Mountains and into the interface between the Mountain foothills and the high desert.

The following are the types of programs/projects included in the Fuels Management Program:

- Emergency Tree Removal Projects consist of the removal of a tree (or trees) that poses an immediate threat to safety, a structure, or the public right-of-way.
- Block Projects are dead dying diseased tree removal projects on multiple parcels which are located in close proximity to one another.
- Large Urban Parcel Projects are dead dying diseased tree removal projects on a single or multiple large parcels.
- Fuel Modification Projects focus on the removal of hazardous fire fuels in the wildland/urban interface. The fuels removed in these projects are both live and dead vegetation. The goal of these projects is to reduce a future forest fire's intensity as well as the removal of ladder fuels which carry the fire from the forest floor to the forest canopy and result in a crownfire.

In addition to the Hazardous Tree Removal Operations Division, the San Bernardino County Fire Fuels Management Crews are also funded by the same grant sources. The primary focus of the crews is to create and maintain fuel modification projects in the vicinity of communities at risk and construct fuel breaks. In addition the crews assist the public with curb side chipping programs throughout local partner jurisdictions.

7.1.2.2.7 Fireworks Interdiction

The unlawful transport of dangerous fireworks continues to be enforced by several local and state fire and law enforcement agencies, The program continues ensures that thousands of pounds of fireworks per year are seized and properly disposed of, preventing fires, fire injuries and fire deaths.

7.1.2.2.8 Programs Listed in Fire District Annex

Table 7-1: Wildfire Mitigation Implementation Methods

Mitigation type	Description
PPRO	SCE removes dead trees near power lines to reduce fire hazards. For more information, see Annex A Section A.6 Mitigation Project Prioritization and Implementation.
ES	Mountain Mutual Aid is an operational group of emergency responders.
PRV	The Alliance was created to act as a forum for all Fire Safe Councils in San Bernardino County. For more information, see Annex A Section A.6 Mitigation Project Prioritization and Implementation.
PRV	Fire Hazard Abatement works to reduce the potential for an individual's property to be the source of fire and structural ignitability. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
PE&A	Cal Fire provides programs to increase fire safety in high fire hazard severity zones. For more information, see Annex A Section A.6 Mitigation Project Prioritization and Implementation.
PRV, PPRO	The Contractor Certification program trains and certifies landscape contractors to provide a qualified workforce to conduct fuels reduction activities on individual properties. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
PRV, PPRO	CWPPs are designed to provide a means for a community to have input into and actively participate in the planning, strategy, goals, and objectives of creating a fire safe community. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .

7.1.2.3 Earthquake / Geologic

A General Plan Amendment to the Safety Element of the County of San Bernardino 2007 General Plan updated the Geologic Hazard Overlay Maps which became effective on March 11, 2010. The Safety Element includes several layers of hazard overlays that are included in the General Plan mapping system to inform the public of potential hazards to development of property within certain areas of the County and to enable the County to mitigate the risks presented to property owners by these hazards. These overlays include potential geologic hazards. Over the past twenty years, certain federal and state agencies have been in the process of digitizing much of this hazard data. The digitization of this data has allowed for greater accuracy as well as more timely updates. In recognition of the new data from various federal and state agencies, the County updated the geologic hazard overlay maps, specifically the Generalized Liquefaction

Susceptibility layer and the Generalized Landslide Susceptibility layer, contained within the Safety Element of the General Plan.

The Generalized Liquefaction Susceptibility layer was amended to modify four General Plan Quad Maps to incorporate new liquefaction data in the Big Bear Lake area designated by the County Geologist for the Big Bear Lake Valley. This information was then incorporated into the County-designated Geologic Hazard Overlay District.

The Generalized Landslide Susceptibility layer was amended by modifying 17 General Plan Quad Maps and one regional Quad Map, to incorporate updated existing landslide data published by the U. S. Geological Survey for the Mountain area. The County Geologist updated the landslide inventory within the Geologic Hazard Overlay District by incorporating new geologic mapping by the U.S. Geological Survey.

The following is a list of the updated General Plan Geologic Hazard Overlay Maps effective on March 11, 2010:

Table 7-2: General Plan Geologic Hazard Overlay Maps

Map #	Quad Name
FH08C	Fifteen Mile Valley
FH11C	Mt. San Antonio
FH12C	Telegraph Peak
FH13C	Cajon
FH14C	Silverwood Lake
FH15C	Lake Arrowhead
FH16C	Butler Peak
FH19C	Mt. Baldy
FH20C	Cucamonga Peak
FH21C	Devore
FH22C	San Bernardino North.
FH24C	Keller Peak
FH27C	Ontario
FH30C	San Bernardino South
FH31C	Redlands
FH32C	Yucaipa
FI09C	Fawnskin
FI10C	Big Bear City
FI17C	Big Bear Lake
FI18C	Moonridge
EH/FH C	SW Portion of County
FH23C	**Harrison Mtn.**

7.1.2.4 Flood

7.1.2.4.1 Existing Drainage Studies

Drainage studies including review of upstream properties, site drainage area, potential upstream development, and site-specific development will help to mitigate damage from future storm events. San Bernardino County owns landfill sites, transfer stations and closed disposal sites where combined site property totals several hundred acres. Landfills and disposal site properties include acreage that has been constructed to design grades and may include improved drainage systems. Also, within most landfill and disposal site properties there are many acres of property that remain in its natural state including native vegetation and natural grades. During severe weather events, both engineered areas and undisturbed areas are subject to erosion from storm run-off. The erosion can range from minor to severe depending on the storm event and amount of precipitation. Most sites where engineered drainage systems are in place hold up well experiencing only minor erosion and debris flow. However, during major storm events, runoff from native and unimproved areas carrying solids and debris flow may compromise downstream drainage systems and overwhelm system facilities. Much of the damage to landfill and disposal sites during the December 2010 Winter Storm event was caused by erosion with sediment carried from undeveloped/undisturbed areas or where no improved drainage system is in place.

Other events that may cause damage to property and structures include earthquakes, wildfires, high winds, extreme freezes, and lightning storms.

- Earthquakes have the potential of causing damage to site roadways, structures, and systems including concrete drainage systems, Landfill Gas systems (LFG) and Leachate Collection Recovery Systems (LCRS). With earthquakes, there is always the potential of slope failure and slides on the landfill surface. Damage to any of these facilities has the potential to result in an inability to temporarily service the community.
- High Winds can cause damage to temporary drainage structures, fencing, and metal structures. During past high wind events, Transfer Stations have experienced roof panels being torn from the beams. Landfill sites with exposed geo-synthetic liners may experience damage if the winds lift and tear the liners.
- In January 2007, the County experienced a loss of over $21,000 in damage when water pipes at three separate Transfer Stations froze, then burst, causing damage to offices and electrical equipment.

- Lightning storms have the potential to damage electrical components in scale houses, in-ground scales, LFG, and LCRS.

7.1.2.4.2 NFIP Program and County General Plan Policies

Because the County has entered into an agreement to participate in the National Flood Insurance Program (NFIP) which provides flood insurance within designated floodplains, the following goals, policies and programs shall apply:

As stated in the San Bernardino County General Plan Safety Element:

GOAL S 5
The County will provide adequate flood protection to minimize hazards and structural damage.

Policy S 5.1: Participate in the National Flood Insurance Program (NFIP), which provides flood insurance within designated floodplains.

Programs

1) Designate Floodway and Floodplain areas, as identified by the Federal Emergency Management Agency (FEMA) on flood insurance rate maps and flood boundary maps, as Floodway (FW) on the Land Use Maps and Floodplain Overlays on the Hazards Overlay Maps.

2) Designated floodway areas will be preserved for non-structural uses through restrictions of the FW Land Use Zoning District

3) All new development, including filling, grading, and construction, proposed within designated floodplains, will require submission of a written assessment prepared by a qualified hydrologist or engineer, in accordance with the latest "San Bernardino County Hydrology Manual" and the various detention basin policies (see Existing Policy FL-11), to determine whether the development will significantly increase flood hazard and to show that all new structures will be adequately protected. Development will be conditioned on receiving approval of this assessment by the San Bernardino County Surveyor Division of the Public Works Department. All new construction in a Floodplain Overlay area will be required to be flood-proofed, located, and designed to allow unrestricted flow of floodwaters.

4) The Land Use Compatibility Chart for 100-Year Flood Plains Table 5-1 will apply to County reviews of all discretionary and ministerial actions in County designated floodplains.

5) Lands within floodplain areas may be developed with non-critical and non-essential uses if mitigation measures are incorporated to ensure that the proposed development will not be hazardous, increase flood depths or velocities downstream, or degrade water quality, especially uses such as parks, trails, and open space.

6) Provide known flood hazard information with every discretionary or ministerial application.

7) When no mapped data exist, existing topographical, watershed, and drainage course data will be evaluated for a determination of potential flood hazard for every discretionary and ministerial action.

Policy S 5.2: Update data and maps with newly identified flood hazard areas in the County, as new information becomes available.

Programs

1) As new overflow studies and mapping are completed and approved by either the County's Land Development Engineer or the San Bernardino County Flood Control District, they will supplement the FEMA mapping and will be incorporated into Flood Hazard Overlay mapping.

2) Initiate and finance programs for the continuous evaluation and designation of floodway, floodplain, and drainage areas.

3) Timely application for FEMA mapping changes will be initiated to reflect any additions to or alterations in identified Floodways or Floodplains by the County Floodplain Management Administrator.

7.1.2.5 Drought

7.1.2.5.1 Water Efficient Landscape Ordinance

Over the years, the State of California has been promoting water conservation for all new development within the State. In a drought-prone California, where approximately 60 percent of all residential water is used in landscape applications, California lawmakers have adopted such legislation as Assembly Bill (AB) 325 (1990), AB 2717 (2004), and AB 1881 (2006) that outline, and in some instances mandate, the practice of water conservation in landscape applications. As part of AB 325, the Department of Water Resources (DWR) was charged to assemble a task force of stakeholders representing the landscape, water, and building industries as well as cities, counties, and other agencies that would help DWR prepare and promote the State's first Model Water Efficient Landscape Ordinance (MWELO).

While AB 325 did not require cities, counties, and other agencies within the State to comply with the first adopted MWELO, it did encourage local agencies to implement water conservation techniques into their local ordinances and codes. The County adopted Administrative Guidelines that were amended several times and ultimately given the status of "regulation" when they were incorporated into the Development Code (Chapter 83.10) during the 2007 General Plan Update process.

In 2006, State lawmakers adopted AB 1881, which gave guidelines and timelines for revision of the State's MWELO and mandated that every city, county, or other agency within the State of California adopt the State's revised MWELO, or be in compliance with it through their own ordinance, by January 2010. Local agencies are required to report their final action, along with findings of ordinance effectiveness, to DWR by January 2011. While this process was underway, Senate Bill X7-7 was enacted (2009). This bill requires the State of California to achieve a 20 percent reduction in urban per capita water use by December 31, 2020; additionally, it requires the State to make incremental progress towards this goal by reducing per capita water use by at least 10 percent by December 31, 2015. These requirements were incorporated into the MWELO and, in February 2008, DWR made a draft of the State's revised MWELO available to all cities, counties, and other agencies within the State. The final version of the revised MWELO was released in September 2009.

Upon review of the final version of the State's MWELO and the provisions of AB 1881, staff determined the County would need to revise Development Code Chapter 83.10 which sets forth landscaping and irrigation standards within the unincorporated areas of the County. This would in part, become a mitigation measure to assist with any drought hazard the County may encounter. In the meanwhile, the County began enforcing the State's revised MWELO in January 2010, as required by law.
Once the proposed changes to the Development Code have been adopted by the Board of Supervisors, staff will notify and forward all required information regarding the adoption and effectiveness of the County's Water Efficient Landscaping Ordinance to the State DWR as required by January 2011.

The proposed Development Code Amendment will revise the landscaping standards to reflect the changes governed by and to be as effective as, the State of California's revised Model Water Efficient Landscape Ordinance, while continuing to recognize the unique character of the regions that make up the County of San Bernardino.
The ***proposed revisions*** will require the applicant/developer to:

- Design and install systems that meet more effective and efficient water conservation standards in all landscaped areas on a project site, including residential;
- Comply with the revised standards for all new and rehabilitated landscape areas regardless of square footage for projects that are not homeowner installed and for all new and rehabilitated landscape areas, that are homeowner installed, that are 5,000 square feet or greater. This includes the following:
  - Submit a comprehensive Landscape Documentation Package, which has been prepared by a landscape architect licensed to work in the State of California or other licensed professional authorized to design and prepare Landscape Plans within the State of California;

  - Submit estimated annual water budget calculations for compliance with water conservation practices and the efficient use of water for each new or rehabilitated landscape. Calculations for the annual water budget for a project/site specific landscape shall use the formulas for the Maximum Applied Water Allowance (MAWA) and the Estimated Annual Water Use (EAWU) outlined in the ordinance;
  - Submit a Landscape Certificate of Compliance prepared by the landscape professional who prepared the Landscape Documentation Package conveying the project's compliance with the requirements of Development Code prior to final inspection;
  - Planting material within landscaped areas shall be chosen based on the information found in the Water Use Classification of Landscape Species, third edition (WUCOLS III) and the climate zone for the region based on information found in Sunset Western Garden Book;
  - Irrigation systems shall be equipped with a "smart" irrigation controller, which automatically adjusts the frequency and/or duration of irrigation events in response to changing environmental conditions.
  - Submit a rough and/or precise grading plan on all projects proposing more than 50 cubic yards of grading;
  - Submit a soil management report, that includes recommendations for soil modification and/or amendment;
  - Submit a project-specific regular maintenance schedule and two project-specific irrigation schedules for those projects subject to the ordinance.

Other provisions of the new regulations include standards for non-potable/recycled water use where it is available and new enforcement standards for compliance with water conservation practices.

Since the State law became effective on January 1, 2010, the Landscape Plan Review Fee was adjusted (Ordinance #4412, June 22, 2010) to reflect the increase in staff time necessary to meet these additional requirements.

The Planning Commission considered this ordinance on October 21, 2010. There was no one at the hearing who wished to address the Commission on this issue. The Commission recommended that the Board adopt the ordinance as presented on a vote of four commissioners in favor and one absent.

The proposed amendment is exempt from the California Environmental Quality Act (CEQA) in accordance with Section 15061(b) (3) of the CEQA Guidelines as the proposed change does not have the potential to cause a significant effect on the environment.

The proposed Ordinance is to be presented to the County of San Bernardino Board of Supervisors for adoption in the first quarter of 2011. Utilizing either the State Water Efficient Landscape Ordinance, which is in effect currently, or the County's specific Water Efficient Landscape Ordinance; the drought mitigation for this hazard is positive.

7.1.2.5.2 San Bernardino County Desert Area Groundwater Inventory and Atlas

As of January 2011, the California Department of Water Resources anticipates releasing the Final Local Groundwater Assistance (LGA) Guidelines later this calendar year. In December 2009, the draft LGA Guidelines and Proposal Solicitation Package (PSP) was available for public comment. The comment period ended on January 12, 2010.

Local public agencies with authority to manage groundwater resources are encouraged to apply Examples of projects that may be considered are: Groundwater data collection, modeling, monitoring and management studies; monitoring programs and installation of equipment; basin management; development of information systems; and other groundwater related work.

The County of San Bernardino Board of Supervisors may consider an action directing staff to apply for the grant when it becomes available for a Desert Area Groundwater Inventory (DGI) and Atlas. The DGI falls within the scope of the Local Groundwater Assistance (LGA) Program, which is funded with Prop 84 IRWM funds anticipated to be available for fiscal year 2010-2011. Grants are limited to $250,000 per recipient, and total funding is $4.7 million.

California Department of Water Resources will give priority to local agencies with adopted groundwater management plans (SB1938 compliant), and which demonstrate collaboration with other local agencies in managing groundwater basins. County's groundwater management ordinance satisfies this requirement.

By having a Desert Area Groundwater Inventory and Atlas, this would enable the County to have a database providing locational and water depth information for specific regions of the County that currently do not have a groundwater inventory. This Inventory and Atlas would provide information applicable for flood mitigation or ground water availability for usage during severe drought. The location and water depth in the inventory are important for an earthquake hazard analysis, if liquefaction potential exists.

Since there is not a Desert Area Groundwater Inventory currently, and if liquefaction is a concern in a specific region of the County, then the water depth data would estimate the vertical distance from the land surface to the top of the groundwater aquifer (i.e., the groundwater-saturated layer.)

Table 7-3: Tentative Schedule for the LGA Grant

Date	Event	
TBD	Release Final LGA Guidelines and PSP	Dependent upon Grant approval
TBD	Proposal Applications Due	Dependent upon Grant approval
TBD	Public Release of Draft Award Recommendations	Dependent upon Grant approval

Fund Source: Proposition 84

7.1.3 Continued Public Involvement

As indicated earlier, the County will continue to engage the general public and seek input on the mitigation and preparedness planning process. In addition to the San Bernardino County Board of Supervisor meetings, the actions include:

- Municipal Advisory Communities throughout the unincorporated County area,
- Flood Zone Advisor Committees,
- Special District Advisory Committees,
- Public hearings for County General Plan updates held four times a year,
- MAST and FAST meetings,
- Fire Safe Council meetings,
- Community Emergency Response Team meetings, and
- Public events where educational efforts are undertaken in the unincorporated areas.

Additionally, the public is kept involved through annual programs such as the Great Shakeout held annually in October, SKY Warn events sponsored by the National Weather Service, and other monthly safety programs. The County will continue to use several different methods to reach out to the public: mailers, cable TV, website, social networks, e-mail, posting in public libraries, and fairs.

Section 8. Works Cited

USGS. (2009).
USGS. (2016, April 7). *USGS Earthquake Hazards Program*. Retrieved from https://earthquake.usgs.gov/learn/glossary/?term=earthquake

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Appendix A. Outreach Documentation

A.1 Ready SB County Preparedness App Message

An App message was sent out to over 15,000 persons with the App and it is attached to the San Bernardino County Fire Website. .Ready SB County Preparedness Mobile App can be used on either an Android or iPhone. This app provides multiple resources for our residents that will assist them in preparing for a disaster and enhancing the recovery process. Protect yourself and your loved ones before, during and after a disaster.

Get the Latest News from SBCounty.gov, CalTrans, National Weather Service, and San Bernardino County Fire Office of Emergency Services. This app will provide you with an emergency supply kit list, grocery list and checklists tailored to your needs. You can access and update your plan as needed. Learn all you need to plan for and respond to natural disasters, terrorism and pandemic flu in San Bernardino County

A.2. San Bernardino County Fire Public Input Requested

San Bernardino County Fire Department/Office of Emergency Services (OES) is coordinating the update of the San Bernardino County Unincorporated Area Multi Hazard Mitigation Plan. Hazard Mitigation Plans are updated every five years and must be approved by Cal OES and FEMA. The purpose of the public input and comment is to show progress being made and elimination of hazards since the last plan. Your input is appreciated by reviewing and commenting on the current plan (link below) by calling OES at 909-356-3998 – ask for David Davis. Comment period **closed at 5:00 p.m., Wednesday, November 3, 2016.**
http://www.sbcfire.org/oes/Documents.aspx

A.3. MJHMP PowerPoint Presentation

Annex A. Fire Protection District

A.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Fire Protection District, a previously participating jurisdiction to the 2011 San Bernardino County Hazard Mitigation Plan Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the base plan document. As such, all sections of the base plan, including the planning process and other procedural requirements apply to and were met by the Fire Protection District. This Annex provides additional information specific to the Fire Protection District, with a focus on providing additional details on mitigation actions and projects.

The Board of Supervisors acts as the Board of Directors for the County Flood Control District, and as part of their responsibilities as an elected member of the County of San Bernardino Board of Supervisors.

A.2 Fire District Profile

The San Bernardino County Fire Department is an all-risk/full-service fire department committed to providing the highest level of service in the most efficient and cost effective manner to the citizens and communities that we serve. At 20,160 square miles, San Bernardino County is the largest county in the continental United States. Our jurisdiction encompasses 19,278 square miles of extremely diverse environments that stretch from the Los Angeles County line on the west, to the Colorado River on the east, to the Nevada State line and Kern and Inyo counties on the north. We provide services to more than 60 communities/cities and all unincorporated areas of the county.

Mission Statement
Community-based all-risk emergency services organization dedicated to the health and well-being of the citizens of San Bernardino County through a balance of regionalized services delivery and accountability to the local community supported by centralized management and services.

Service Motto
Duty, Honor, Community.

Standard of Commitment
"Where Courage, Integrity, and Service Meet."

Vision Statement
Committed to Providing Premier Fire Services.

Hazard Mitigation Planning Group:
Michael Antonucci – Emergency Services Manager

A.3 Planning Process

As described above, the County Fire District followed the planning process detailed in Section 3 of the base plan. In addition to providing representation on the San Bernardino County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table A-1. Additional details on plan participation and District representatives are included in Appendix A.

Table A-1: Fire District Planning Team

Name	Title / Role
Michael Antonucci	Emergency Services Manager
Cindy Serrano	Assistant Emergency Services Manager
David Davis	Emergency Services Officer
Miles Wagner	Emergency Services Officer
Cheryl Nagy	Emergency Services Officer
Carrie Cruz	Emergency Services Officer
Elli Maldonado	Office Assistant
Mary Barnett	Technical Writer / Plan Update and Edits
Michael Horton	Fire Marshal

Weekly meetings held every Tuesday since July 2016 with conference calls to the consultant group and other stakeholders plus all meetings listed in this document.

A.4 Hazard Identification and Prioritization

The County Fire Protection District Planning Team participated in the County hazard identification and prioritization process described in the base plan. The Fire District Planning Team assisted to summarize the extent, probability of future occurrences, potential magnitude/severity, and significance specific to the Fire District in the base plan.

The Planning Team (all participating jurisdictions) determined that the County and its Special Districts should focus over the next five (5) years on hazards that fell within the HIGH and MEDIUM “Probability” and “Impact” categories. While all the hazards present a potential problem in the County, the Planning Team felt that if they were able to reduce or eliminate the risk from “fire related” hazards, it would provide a greater service to the people within the jurisdiction. Table 4-3 illustrates how the final prioritization of the hazard; the “Green” colored box represents the highest priority hazards; and the “White” colored boxes represent lower (second and third tier) priority hazards.

Table A-2: Fire District Hazard Priority Matrix

		Impact		
		High	Medium	Low
Probability	High	**Wildfire** Flood Earthquake/ Geologic Hazards	Drought	
	Medium	Terrorism	Climate Change (Extreme Heat and other)	Hail Infestation
	Low		Dam Inundation	Tornado High Winds Winter Storm Lightning Extreme Cold

A.5 Coordination with existing Fire District Mechanisms

Coordination with other District planning efforts is paramount to the successful implementation of this plan. This Section provides information on how the Fire Protection District integrated the previously-approved 2011 Plan into existing planning mechanisms and programs.

While not designed or proposed specifically as mitigation projects, the County Fire Protection District undertakes many activities that incorporate mitigation elements and integrate risk reduction as an additional benefit. The following describes a number of these projects which exemplify how the County integrates hazard mitigation into county-wide programs.

A.5.1 Critical Route Planning Committee

San Bernardino County Fire Protection District Office of Emergency Services has a "Critical Route Planning Committee" that is developing countywide routes and alternate routes for use in evacuating residents from a disaster area while simultaneously allowing first responders' access into a disaster area without congestion and gridlock. The Committee members are from County departments, City and Town representatives, and key state and federal agencies. The Critical Route Planning effort is being coordinated with surrounding counties to prevent congestion and gridlock at the County boundaries.

A.5.2 Public Alert and Education Programs

A.5.2.1 Wireless Emergency Alerts (WEA)

During threatening emergencies in your area, authorized government agencies can send Wireless emergency Alerts to your mobile device. Messages regarding extreme weather, life threatening emergencies, AMBER alerts, and Presidential Alerts during a national emergency are all sent through the WEA system

A.5.2.2 Emergency Alert System (EAS)

The Emergency Alert Systems: national public warning system that requires TV and radio broadcasters, cable television systems, wireless cable systems, satellite digital audio radio service providers, direct broadcast satellite service providers and wireline video service providers to offer to the President the communications capability to address the American public during a national emergency. The FCC works with the Federal Emergency Management Agency and the National Oceanic and Atmospheric
Administration's National Weather Service to implement the EAS at the national level. Only the President determines when the EAS will be activated at the national level, and has delegated the administration of this function to FEMA.
Accordingly, FEMA activates the national EAS, and directs national EAS tests and exercises. The NWS uses the EAS on a local and statewide basis to provide the public with alerts and warnings regarding dangerous weather and other emergency conditions.

The EAS allows participating providers to send and receive emergency information quickly and automatically, even if their facilities are unattended. If one link in the system for spreading emergency alert information is broken, members of the public have multiple alternate sources of warning. EAS equipment also provides a method for automatic interruption of regular programming, and in certain instances is able to relay emergency messages in languages other than English.

A.5.2.3 Integrated Public Alert & Warning System (IPAWS)

During an emergency, alert and warning officials need to provide the public with lite-saving Information quickly. The Integrated Public Alert and Warning System (IPAWS) is a modernization and integration of the nation's alert and warning infrastructure and will save time when time matters most, protecting life and property. Federal, State, territorial, tribal and local alerting authorities can use IPAWS and integrate local systems that use Common Alerting Protocol (CAP) standards with the IPAWS infrastructure. IPAWS provides public safety officials with an effective way to alert and warn the public about serious emergencies using the Emergency Alert System {EAS}, Wireless Emergency Alerts (WEA), the National Oceanic and Atmospheric Administration (NOAA) Weather Radio and other public alerting systems from a single interface.

A.5.2.4 Telephone Emergency Notification System (TENS) Implementation

Emergency service agencies like the Sheriff's Office have implemented TENS on numerous occasions to notify residents in specified areas to evacuate. Most recently it was used to evacuate hundreds of homes in the eastern portion of Yucaipa during the Pendleton Fire and in Wrightwood during the Sheep Fire when the entire community was ordered evacuated.

A.5.2.5 Emergency Communications Services (ECS)

In the last 10 year the ECS program has continually provided support to all major and minor incidents. The more recent events were the Pilot Fire and the Blue Cut Fire in 2016. ECS provides communications and logistical support to public safety and disaster preparedness events. They have also set up a training program for other County Departments that are not typical emergency responders but provided support in an emergency. ECS delivered and set up amateur radio equipment for Department of Public Works, Department of Public Health, Preschool Services Department, and Department of Behavioral Health and provided training for the employees.

A.5.2.6 Fire Safe Council/CERT Community Based AM Radio Transmitters

The Wrightwood Fire Safe Council and the Big Bear City CSD set up and operates a local AM radio transmitter. It has been brought into use during local incidents including a power outage where it is very useful. In power outages, the AM radio in a person's car still works. It was also used to provide preparatory information to the citizens of Wrightwood as the Station Fire was approaching the community from the west. It is also used extensively during the Wrightwood Fire Wise Awareness Days to keep citizens apprised of community events.

A.5.3 OES Volunteer Programs

The San Bernardino County Fire, Office of Emergency Services (County OES) is proud to provide residents of San Bernardino County with meaningful disaster-related volunteer opportunities. Recognizing that during disasters and other emergencies professional responders may be overwhelmed or need assistance County OES trains residents to integrate with and support professional responders during incidents. County OES currently does these through three volunteer programs; the Community Emergency Response Team (CERT), Emergency Communications Service (ECS) and California Disaster Corps programs. Please visit the links below to learn about the programs offered.

A.5.3.1 Community Emergency Response Team (CERT)

The Community Emergency Response Team (CERT) Program educates people about disaster preparedness and trains them in basic response skills. Following a catastrophic event CERT

Members can assist themselves, their families, and others in their neighborhood or workplace until professional responders arrive. Fourteen (14) CERT programs are in the communities of:

- Angelus Oaks
- Big Bear Valley
- Helendale
- Lucerne Valley
- Lytle Creek
- Mill Creek Canyon
- Morongo Basin
- Mountain
- Oak Hills
- Phelan/Pinon Hills
- Rosena Ranch
- San Antonio Heights
- Silver Valley
- Wrightwood CERT

San Bernardino County Fire Protection District Office of Emergency Services has sworn in over 1000 CERT participants as California Disaster Service Workers. These participants have gone on to receive a Sheriff's Department background check to become members of their community's CERT.

The program receives guidance and resources from Department of Homeland Security, FEMA, Citizen Corps, and California Volunteers. The program is administered locally by the San Bernardino County Fire Protection District Office of Emergency Services.

A.5.3.2 LISTOS

Listos, which means "ready" in Spanish, is a twelve-hour disaster preparedness course created specifically for the Spanish-speaking community and is delivered entirely in Spanish. The program is intended to be adaptable, flexible and culturally relevant. This means participants are encouraged to involve the entire family and accommodations are made for young children. San Bernardino County Fire, Office of Emergency Services currently partners with the Cities of Fontana and Rialto to bring Listos to their communities

A.5.3.3 California Disaster Corps

The Disaster Corps is a first-in-the-nation effort to professionalize, standardize and coordinate highly trained disaster volunteers statewide. This program initiative was built collaboratively in partnership with California Volunteers from the ground up through public-private partnerships and with a wide range of subject matter experts including representatives from all levels of government, local emergency managers, state agency volunteer coordinators, and leaders in non-governmental volunteer programs.

Disaster Corps programs reside only in San Bernardino, San Francisco and Riverside Counties. San Bernardino County Disaster Corps volunteers are those volunteers participating in the volunteer programs residing within the unincorporated communities of San Bernardino County and have demonstrated commitment to their volunteer program and strive to continue developing their skills and training to better support their program and their community.

Within San Bernardino County Disaster Corps volunteers are set aside from regular CERT (Community Emergency Response Team) and ECS (Emergency Communication Services) volunteers by having the ability to be deployed throughout other areas of San Bernardino County and the state. They have received specialized training in SEMS and NIMS, plus have completed many other ICS courses and First Aid and CPR training. In addition there are additional training opportunities not offered to the regular CERT and ECS volunteers.

A.5.3.4 **ECS Emergency Communications Service**

The Emergency Communications Service (ECS) is a volunteer group providing front-line communications, technical and logistical support to the San Bernardino County Fire Department and Office of Emergency Services. Their primary mission is to support County Fire, County Government and other local agencies in time of disaster. In addition, ECS has provided telecommunications and event support to other County departments including Public Health, Behavioral Health, Public Works, Pre-School Services, Sheriff's Search and Rescue and other County Departments.

ECS coordinates disaster communications between city and county agencies, provides a communication link to Cal OES and ensures backup communication channels are kept open in times of a major disaster.

In an average calendar year, ECS supports approximately two-dozen events and incidents throughout the County. These events range from parades and community events, to major public safety incidents including fires and floods. The 200 ECS volunteers donate an average of 9,100 hours per year to the County of San Bernardino.

ECS currently provides multiple HAM licensing classes to County Departments and the residents of San Bernardino County each year.

A.5.4 ROPE Plan (Responders Organized For Pass Emergencies)

ROPE Field Operations Guide (FOG) and Standard Operating Guide (SOG) for use by participating Federal, State, County, and Municipal agencies and industries for day-to-day incidents in the Cajon Pass, as well as for larger regional incidents requiring coordinated and unified multi agency response. The ROPE FOG contains; communications information, emergency contact information, critical infrastructure mapping and ICS planning tools.

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A.5.5 Great ShakeOut County Drill in all Disciplines (held annually)

The San Bernardino County Operational Area will be participating in the annual The Great ShakeOut drill which will focus on the Southern California Regional Catastrophic Plan (SCRCP). This plan is based on a large scale magnitude earthquake scenario along the southern section of the San Andres Fault. The purpose for participation in the Great ShakeOut Exercise is to address the County's potential to respond to a catastrophic earthquake event based on the plan, and to better prepare for such an occurrence. The goal of the exercise will be to conduct an effective multiagency/multi-jurisdictional evaluation of the Regional Catastrophic Plan with our Operational Area response partners.

A.5.6 "Ready SB" Smart Phone App for Disaster Preparedness Program

The new mobile app, Ready SB, provides residents with multiple resources that will assist them in preparing for a disaster. Ready SB is now available as a free download from the Apple App Store and the Google Play Store it can immediately help residents prepare themselves for emergencies.

Ready SB features include: "My Plan", an individual emergency plan and/or a family or group plan. The person that downloads the application will receive county wide alerts and notifications of emergency situations in that person's area. There is a feature called "Share My Status" it is a place to update your status via text or email.

The app also includes information about areas that need to be evacuated, where to go, what routes are open and also what resources are available during that emergency.
The app features include: Evacuation Routes and Shelters, Need to Know, and has a Resources List.

A.5.7 Cal Fire

Cal Fire provides programs to increase fire safety in high fire hazard severity zones. It funds and staffs programs from public education activities to performing fuel modifications with inmate crews. One example is the active Re-Leaf program where mountain residents are educated about drought tolerant and fire resistive landscaping that is available and sustainable. Cal Fire is also the lead agency on reforestation after a wildfire to ensure the stability of the environment. Cal Fire Foresters are active participants in the MAST process helping educate citizens and leading forestry activities on private lands within the USFS boundary.

Numerous fuels projects have been completed by State inmate crews that do significant hand work in dense fuels adjacent to communities. Cal Fire has also led the way in countless re-forestation projects that ensure that new stands of the same trees will repopulate an area and that the original forest won't be overtaken by a different type of replacement forest.

A.5.8 Organized Group Volunteer Activities

Mountain communities are populated by several volunteer citizen groups that are capable of providing significant resources that are not provided by traditional governmental agency services.

Volunteer groups particularly “Mountain Hearts and Lives” (MHL) responded to numerous emergencies particularly of note the Grass Valley and Slide Fires. These groups have also spent significant time working to prepare citizens for disasters. MHL has coordinated CERT training as well as HAM radio operator training. Other activities can be found at www.heartsandlives.org. Other partners that assist in coordinated endeavors for disaster preparedness and disaster relief are Rim Family Services and the Rim Resource Community Network. Members of these and other groups work very closely with MAST, Mountain Mutual Aid and the American Red Cross.

A.6 Fire Protection District Mitigation Project Prioritizing

Cost effectiveness of each measure was a primary consideration when developing mitigation actions. Because mitigation is an investment to reduce future damages, it is important to select measures for which the reduced damages over the life of the measure are likely to be greater than the project cost. For structural projects, the level of cost effectiveness is primarily based on the likelihood of damages occurring in the future, the severity of the damages when they occur, and the level of effectiveness of the selected measure. While detailed analysis was not conducted during the mitigation action development process, these factors were of primary concern when selecting measures. For measures that do not result in a quantifiable reduction of damages, such as public education and outreach, the relationship of the probable future benefits and the cost of each measure was considered when developing the mitigation actions.

Based upon the Fire Districts capabilities, Table A-3: Mitigation Project Prioritization and Implementation shows primary actions selected for further implementation and development during the next planning cycle. Table A-3 provides details for each mitigation action with mitigation action descriptions, FEMA mitigation category, responsible party, and timeframe.

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A.7 Fire Protection District Mitigation Project Actions

Table A-3: Mitigation Project Prioritization and Implementation

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
ALL Hazard	**AH Action 1.1:** Valley Dispatch and Operations Center.	Update and maintain the operations of the facility and ensure cohesive working and response to any scale emergency and operations in a secure complex	ES	General Fund and HMP Grant	Fire Protection District/	1-3 Years	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
ALL Hazard	**AH Action 1.2:** Maintain Shelter Operations Compound (SHOC). This shelter concept provides a new one-stop shelter concept. The SHOC combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location.	After the 2003 Wildland Fires, the County and American Red Cross recognized the need to provide services beyond basic care and short-term sheltering, especially during large fires, floods, and earthquakes The Mass Care & Shelter Plan and Concept of Operations, outlines the framework of a new one-stop shelter concept, Shelter Operations Compound (SHOC). It combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location. Residents can access public information and referral services through the LAC, and then take a short walk to the Non-LAC Unit for communication, postal services, and other private organizations/business at little to no cost. The completion of the Plan in 2012 will help to sync local resources, encourage local self-sufficiency, foster partnership between public and private agencies, and serve as a reference document for the region. By June 2017, the program will have 32 trailers/caches equipped with mass care and shelter supplies, strategically placed throughout the County and ready for rapid deployment. It is expected to serve over 12,000 residents. In addition to enhancing the comfort levels of shelter residents, the program will produce standardized documents and protocols for procuring and maintaining Mass Care and Shelter trailers/caches. These plans and programs will help the County prepare for and mitigate damages from hazards. This is an update and expansion of the plan and done without more grant funds.	ES	To increase Mass Care and Shelter capability of the county, grants from 2008-2009 Homeland Security Grant Program (HSGP) and 2009 Riverside Regional Urban Area Security Initiative (UASI) funded the Mass Care and Shelter Trailer/Cache Program.	Fire Protection District/	1-5 Year	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
All-Hazard	**AH Action 2.1** Incorporate as appropriate requirements from the State of California's most recent land use regulations regarding the hazard mitigation planning process (Government Code 65302 and 8685.9).	Government Code 65302.6 requires the following elements to be included in the hazard mitigation plan: (1) An initial earthquake performance evaluation of public facilities that provide essential services, shelter, and critical governmental functions.	PRV, NRP	General Fund	Primary: Land Use Services Secondary: Fire Protection District/	1-3 years	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
		(2) An inventory of private facilities that are potentially hazardous, including, but not limited to, multiunit, soft story, concrete tilt-up, and concrete frame buildings. (3) A plan to reduce the potential risk from private and governmental facilities in the event of a disaster. Government Code 8685.9 requires that the state share shall not exceed 75 percent of total state eligible costs unless the local agency is located within a city, county, or city and county that has adopted a local hazard mitigation plan as part of the safety element of its general plan. In that situation, the Legislature may provide for a state share of local costs that exceeds 75 percent of total state eligible costs.					
Wildfire	**WF Action 1.1** Continue Mountain Area Safety Taskforce (MAST) funding to support mitigation activity.	MAST was formed to mitigate the region wide risk of a catastrophic wildfire due to dead and dying trees in the mountain communities. The mission of the MAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for the protection of property owners, residents, and property subject to the risk of catastrophic wildfire that could occur in San Bernardino County with an initial emphasis on the threat resulting from the Old and Grand Prix fires in 2003. MAST priorities are to continue reducing fire hazards through fuel reduction programs and hazard abatement though enforcement of county ordinances. The Mountain Area Safety Taskforce (MAST) Operations Section meets monthly. MAST Operations Section determines project priorities based on the benefit cost analysis of the projects and the effect of the project on the overall goals of the MAST organization. Goals can change as detailed Benefit Cost Analysis is conducted and CEQA/NEPA reviews are completed.	NRP, PPRO	Seeking additional funding through HMPG.	San Bernardino County Fire Protection District	On-Going	See Implementation plan on more information on MAST. See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
Wildfire	**WF Action 2.1:** Update Mountain Mutual Aid Map Book to document updated information contained in 2016 HMP.	The Map Book portion of the Community Safety and Structure Protection Plan provides not only a street network of the area but more importantly it provides the locations of strategic and critical resources for fire fighters. These include but are not limited to safe zones, open areas, locations for refuge. They also identify areas within communities that have narrow and steep winding streets and or with limited ingress and egress. The document is handed out to all responding strike teams from out of the	ES	Seeking additional funding through HMPG.	San Bernardino County Fire Protection District	On-Going	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
		area and has proved invaluable in directing and coordinating an effective fire-fighting response and reduces the potential for life loss and property damage.					
Wildfire	**WF Action 2.2** Update Community Structure Protection Plans as necessary.	This is an on-going action (from the 2011 MJHMP) with the goal to continue development of and continue the mission of mutual aid between first responders in the County mountain areas.	PPRO	HMP Grant Funding	Primary: San Bernardino County Fire Protection District Secondary: Land Use Services	On-Going	
Wildfire	**WF Action 3.1:** Implement identified community based fuels reduction projects.	The Fuels Reduction Program is designed to create community based fuel modification programs across the mountain communities. These projects are selected specifically to reduce the potential for catastrophic wildfires and the damage that they can do to the communities. Project design, contracting, and operations are managed by the County's Public Works Department with priorities set by local fire chiefs in monthly MAST Operations Meetings. This program is the oldest and most significant for reducing wildfire threat on a mountain wide basis.	PPRO	Current Funding: Seeking additional funding through HMPG.	Primary: San Bernardino Public Works Department Secondary: County Fire Protection District	On-Going	
Wildfire	**WF Action 3.2:** Develop fuels reduction "maintenance program" by obtaining participation from citizens and/or homeowners associations.	To survive a wildfire, property owners need to manage the land surrounding their homes and communities effectively. Removing fuels in the wildland fuel reduction zone beyond the defensible space can reduce the speed and intensity of an oncoming wildfire. But if these areas aren't regularly **maintained**, they lose their effectiveness. Plants grow back, and flammable vegetation needs to be routinely removed and disposed of properly. This guide provides tips on how to create and maintain defensible space and wildland fuels treatments around your property.	PPRO, PE&A	Seeking additional funding through HMPG	Primary: Public Works Secondary: Fire Protection District	On-Going	
Wildfire	**WF Action 4.1** Increase homeowner assistance services to mountain residents for fuel reduction.	This is an ongoing wildfire mitigation action (from the 2011 MJHMP) for the group Forest Care to achieve the goal of providing assistance to homeowners by expanding services to all communities in the Mountain areas of the County. Forest Care is a program dedicated to creating a healthier forest. This program provides foresters to assess individual properties for thinning the vegetation and then provides 75% of the funding to do so.	PPRO, PE&A	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 4.2** Continue working with Southern California Edison (SCE) to remove dead trees near power lines.	A significant number of fires across the State are caused by trees falling into power lines. When the forests in the mountain communities became infested with bark beetles the pine tree die off was unprecedented. Thousands of these dead trees were standing precariously close to power lines. Early in the Bark Beetle Emergency in 2004, Southern California Edison swiftly initiated a program to remove all trees that were dead, dying, and/or diseased that had the potential to fall into any SCE power lines. The role of Southern California Edison was critical to the success of MAST both operationally and financially. Edison still removes the most difficult trees, the most costly trees; and the ones that are most likely to be the source of ignition for a wild land fire. They are also removing the trees that are immediately threatening homes. They have removed 118,305 trees since the inception of the program in 2004. They also provided reimbursements to people that removed their own trees.	PRV, PPRO	As of July of 2010 Southern California Edison (SCE) has spent $179,758,978 to remove dead dying and diseased trees.	San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 5.1:** Inspect every residence in the mountain communities throughout the year to enforce the Fire Hazard Abatement code that addresses green fuels.	The Fire Hazard Abatement Program conducts surveys to identify fire hazards throughout the year. Fire hazards are identified and notices to abate the hazard(s) are mailed to property owners. Property owners are given 30 days to abate the violations. Failure to abate may result in citations, penalties, and/or fees for abatement by the County. The Fire Hazard Abatement Program responds to complaints year round in the unincorporated areas and contracting Cities and Fire Districts. The Division completes more than 430,000 inspections, issues more than 45,000 Notices to Abate Fire Hazards, issues over 4,000 citations for non-compliance, and abates the fire hazards on more than 2,000 parcels annually. Within the last 5 years, the Fire Hazard Abatement Division has received even more financial	PRV, PPRO, PE&A	Seeking additional funding through HMPG	Primary: Land Use Services Secondary: San Bernardino County Fire Protection District	On-Going	For more information on Contractor Certification, see Annex A Section A.6 Fire Protection District Mitigation Project .

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
		resources that enable them to abate all properties declared a fire hazard.					
Wildfire	**WF Action 5.2:** Continue to collaborate with Forest Care, Red, Cross and Cal Fire to overcome increased costs of enforcement.	This is an on-going action from the 2011 MJHMP with the goal of overcoming funding shortfalls for the County Fire Hazard Abatement Program.	PRV	HMP Grant Funding	San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 6.1** Train and Certify landscape contractors to comply with the Fire Hazard Abatement Code.	The City of Big Bear Lake created a program to train and certify landscape contractors to provide a qualified workforce to conduct fuels reduction activities on individual properties. The contractors are trained to comply with the new Fire Hazard Abatement Code that exists both in the City of Big Bear and the County unincorporated area. The City of Big Bear Lake Fire Department conducts the classes for landscapers and handy persons. This provides an incentive for the contractors and provides a level of certification that the homeowner can rely on when they are deciding to hire a landscape contractor to conduct fuels abatement around their home.	PRV, PPRO	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	On-Going
Wildfire	**WF Action 6.2:** Continue wildfire mitigation efforts under the Wood Shake Roof Replacement Program.	The County successfully passed an ordinance that requires the replacement of wood shake roofs by 2014. MAST has successfully mapped all of the wood shake roofs in the fire safety overlay and has created a strategy as to which roofs will be selected to participate in the FEMA funded project. This is an on-going project in cooperation with Big Bear Lake Fire Protection District in order to provide more funding for wood shake roof replacements by property owners.	PRV, PPRO, SP	Various Grant Funding from Edison, FEMA, Cal Fire	Primary: MAST Secondary: San Bernardino County fire Protection District	On-Going	
Wildfire	**WF Action 7.1:** Modify independent and unique CWPPs into a more common framework making them similar but leaving room to provide specific hazard characteristics and mitigation actions for each community.	Community Wildfire Protection Plans are designed to provide a means for a community, usually through the Fire Safe Council, to have input into and actively participate in the planning, strategy, goals, and objectives of creating a fire safe community.	PRV	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	On-Going For more information on CWPP see Annex A Section A.6 Fire Protection District Mitigation Project .

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 8.1:** Construct Arrowbear Drive Realignment and Widening.	The Arrowbear community off State Highway 18 has limited access to State Highway 138. The existing bridge/spillway and road needs to be realigned and widened to facilitate access by emergency personnel during wildfires and flooding. Mitigation strategy for this is to remove and replace existing bridge/spillway, realign and widen the road.	SP	Seeking grant funding Total Cost: $2,000,000	Primary: Public Works Secondary: San Bernardino County Fire Protection District	1-3 Years	
Wildfire	**WF Action 8.2:** Construct Cedar Glen Fire Access Road.	Lack of paved roads inhibits traffic circulation and the ability to enter and exit the area without backtracking during wildfire emergencies. Strategy is to Construct road and drainage improvements to Little Bear Creek Road and Elder Drive.	SP	Seeking grant funding **Total Cost:** $2,500,000	Primary: Public Works Secondary: San Bernardino County Fire Protection District	1-3 Years	
Wildfire	**WF Action 9.1:** Continue funding and support for Special Districts Projects relating to wildfire.	Continue funding and support for Special Districts Projects relating to wildfire in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Wildfire	**WF Action 9.2:** Emergency Water Supplies	Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.(completed with continuous fresh of supplies and rotation)	ES	TBD	Roads	TBD	

Annex B. Flood Control District

B.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Flood Control District, a previously participating jurisdiction to the 2010 San Bernardino County Hazard Mitigation Plan Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the base plan document. As such, all sections of the base plan, including the planning process and other procedural requirements apply to and were met by the Flood Control District. This Annex provides additional information specific to the Flood Control District, with a focus on providing additional details on mitigation actions and projects.

The Board of Supervisors acts as the Board of Directors for the County Flood Control District, and as part of their responsibilities as an elected member of the County of San Bernardino Board of Supervisors.

B.2 Flood District Profile

Flood Control District Functions:
The Flood Control functions are handled through the San Bernardino County Flood Control District under State legislation enacted in 1939. The District has developed a very extensive system of facilities, including dams, conservation basins, channels, and storm drains. The purpose of these facilities is to intercept and convey flood flows through and away from the major developed areas of the County. The principle functions are:

- Flood protection on major streams.
- Water conservation.
- Storm Drain construction.

Mission:
To enhance the quality of life for our communities by developing and maintaining public infrastructure, and providing a variety of municipal services that complements our natural resources and environment.

Vision:
Lead the way to a thriving community through innovation in public works, fiscal responsibility, and environmental stewardship.

B.3 Planning Process

As described above, the County Flood Control District followed the planning process detailed in Section 3 of the base plan. In addition to providing representation on the San Bernardino County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table B-4. Additional details on plan participation and District representatives are included in Appendix A.

Table B-4: Flood Control District Hazard Mitigation Planning Team

Name	Title	Role
Kevin Blakeslee	Deputy Director – Flood Control	Public Works Deputy Director
Kenneth Eke	Chief Flood Control Planning/ Water Resources Division	Public Works Engineer
Michael Fam	Flood Control Planning	Public Works Engineer
Mona Sadek	Flood Control Planning	Flood Control Planner
Marjorie Schrage	Flood Control Planning	Public Works Engineer Technician

B.4 Hazard Identification and Prioritization

The Flood Control District Planning Team participated in the County hazard identification and prioritization process described in the base plan. The Flood Control District Planning Team assisted to summarize the extent, probability of future occurrences, potential magnitude/severity, and significance specific to the Flood Control District (See Section 4).

The Planning Team determined that the County and its Special Districts should focus over the next five (5) years on hazards that fell within the HIGH and MEDIUM "Probability" and "Impact" categories. While all the hazards present a potential problem in the County, the Planning Team felt that if they were able to reduce or eliminate the risk from "food and drought related" hazards, it would provide a greater service to the people within the jurisdiction. Table 4-3 illustrates how the final prioritization of the hazard; the "Green" colored box represents the highest priority hazards; and the "White" colored boxes represent lower (second and third tier) priority hazards.

Table B-5: Prioritized Hazard Assessment Matrix

		Impact		
		High	Medium	Low
Probability	High	Wildfire **Flood**[x] Earthquake/ Geologic Hazards	Drought	
	Medium	Terrorism	Climate Change (Extreme Heat and other)	Hail Infestation
	Low		Dam Inundation	Tornado High Winds Winter Storm Lightning Extreme Cold

x = Flood District Area of Concentration

B.5 Coordination with Existing Flood District Mechanisms

Coordination with other County planning efforts is paramount to the successful implementation of this plan. This Section provides information on how the Flood Control District integrated the previously-approved 2011 Plan into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2011 MJHMP through other plans and programs shown below.

B.5.1 Flood Area Safety Taskforce (FAST)

During the devastating fires in the fall of 2003, there was great concern of what the ramifications might be for flooding in the burned areas, as well as in the valleys. In response to these concerns, an organization was established that mirrored the Mountain Area Safety Taskforce (MAST), mentioned above, which played a key role in minimizing damage.

While the fires were ravishing the countryside, representatives from multiple agencies met often to address potential issues associated with flood, mud and debris flows develop a strategy and to protect communities from flooding incidents. These agencies united together to become the Flood Area Safety Taskforce (FAST). FAST is structured as an ICS/SEMS Organization for managing incident activities both readiness and response. The FAST Organization stresses liaison with the communities, provides for community education and information, and places emphases on Community and city partnerships.

The FAST group includes:

- Elected State officials
- Representatives from all five (5) County Supervisorial Districts
- State Office of Emergency Services
- County Administrative Office
- County Public Works-Flood Control/ Transportation/Solid Waste
- County Fire Protection District
- County Fire Protection District/Office of Emergency Services (OES)
- County Sheriff's Department
- Representatives from the cities of Fontana, Highland Rancho Cucamonga, Rialto, and San Bernardino.
- USFS
- Caltrans
- CHP

The mission of the FAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for the protection of property owners, residents, and property subject to the risk of erosion, mudflows, and flooding that could occur in San Bernardino County with an initial emphasis on the threat resulting from the Old and Grand Prix fires in 2003.

The FAST Unified Command identified the following objectives as the focus and direction of the FAST:

- Provide for Community Safety.
- Develop Coordinated Public Information Dissemination between Cities, County, State, Federal and Non-Profit Agencies.
- Develop Immediate, Mid-range and Long-range Coordinated Agency Plans.
- Identify and Secure Potential Funding Resources to Provide Document Task Force Activities Including Mission, Goals and Objectives, Policies, Procedures, and Outcomes.

Prior to any type of flood threat, the following precautionary measures may be taken by FAST members to reduce the impact of impending flooding:

- Review mutual aid agreements
- Define evacuation areas and trigger points
- Review the use of alert and warning systems
- Provide information to the public of potentially susceptible flooding areas and protective measures in progress or planned for those areas
- Educate public on emergency self-help and preparedness
- Develop and maintain emergency notification procedures and checklists.

A FAST Concept of Operations (CONOPS) was developed to provide activity guidelines for pre-flood activities related to National Weather Service (NWS) watches and warnings. Due to the unstable condition of the burned areas, activities and coordination needed to be established and implemented between departments.

The CONOPS is "situation" and "incident" driven and subject to revision by the Unified Command which includes County Flood Control District & Co Roads, County Fire Protection District, United States Forest Service (USFS), California Department of Transportation (Caltrans), California Highway Patrol (CHP), County Sheriff, City of Fontana, City of Highland, City of Rancho Cucamonga, City of Rialto, and City of San Bernardino. The Unified Command has the ability to modify activities in these guidelines in response to current situations and predicted changes. Currently, the CONOPS includes both summer and Winter Storm Event Readiness.

In addition, the CONOPS includes the San Bernardino County Flood Area Safety Taskforce Paging Network and a draft of the Alert Communication Matrix by Rain Amount/NWS Warning.

Over the past 10 years, the County has used the FAST CONOPS many times, greatly enhancing the County's ability to respond to flash flood in the desert and foothill areas. The CONOPS activity coordination between the agencies has been very successful. Because of the great success of the CONOPS, State Emergency Management Agency (Cal EMA) is using the CONOPS as a model for other agencies throughout the State.

In addition, San Bernardino County the CONOPS and FAST Plan is updated every two years and has done so since been put in to action the latest update being May of 2015.

B.5.2 Alluvial Fan Task Force

In December of 2002, the California Floodplain Management Task Force Report recommended that "The State should convene a task force specifically for alluvial fans, with stakeholder participation, to review the state of knowledge regarding alluvial fan floodplains, determine future research needs, and, if appropriate, develop recommendations relating to alluvial fan floodplain management, with an emphasis on alluvial fan floodplains that are being considered for development."

In September of 2004, Governor Arnold Schwarzenegger signed Assembly Bill 2141, which recommended the creation of the Alluvial Fan Task Force (Task Force). The Director of the Department of Water Resources (DWR) convened the Task Force in December of 2007 after funding to support Task Force activities was secured from a Pre-Disaster Mitigation Planning Grant from the Federal Emergency Management Agency (FEMA) and a state match was authorized by Assembly Bill 466. Funding supported the tasks charged to the Task Force including:

- Review the state of knowledge regarding alluvial fan floodplains;
- Determine future research needs;
- Develop a voluntary locally-adopted model ordinance for communities subject to alluvial fan flooding that supports land use decisions on alluvial fans;
- Develop local planning tools to assist local communities evaluate development on alluvial fans;
- Prepare recommendations relating to alluvial fan floodplain management.

Appointments to the Task Force by DWR Director Lester Snow represented a broad range of interests. Members included elected officials, represented by five Supervisors from Kern, Los Angeles, Riverside, San Diego and San Bernardino County where future alluvial fan development is projected. Appointments also included representatives of the development and environmental community, local floodplain managers and associated state and federal agencies, including the Federal Emergency Management Agency (FEMA), plus at-large members representing other issues related to future development on alluvial fans. The entire process was coordinated by the Water Resources Institute at California State University San Bernardino.

Primarily, the purpose of the Alluvial Fan Taskforce *Findings and Recommendations Report* (July 2010) and *The Integrated Approach for Sustainable Development on Alluvial Fans* (July 2010) documents are to provide a non-prescriptive and flexible model that local governments can use at their own discretion adapting to local conditions and needs that supports wise future land use decisions associated with development on alluvial fans.

As one of the ten Southern California counties studied by the Task Force, the County may review the development of the suite of local planning tools for pre-project screening for future development proposals on alluvial fans. If funding allows for the review, these planning tools may be useful as an optional database reference for project management. Additionally, the flood management tools designed to analyze alluvial fan flood hazards and formulate flood hazard protection, which were developed to be consistent with FEMA guidelines, may provide an optional data source for project development. Long term funding for updating and maintaining the pre-project screening tools database is a concern regarding the reliability for current data.

If funding exists, for the implementation of the *Integrated Approach for Sustainable Development on Alluvial Fans*, the methods contained therein may be used as some of the approaches for planning and evaluating the suitability of development on alluvial fans. During the analysis and review, if budgets allow, the long term ecological and financial sustainability issues would also be evaluated.

Based on the Findings from the Alluvial Fan Task Force process, recommendations were made for specific future actions that the State and other public agencies should consider regarding alluvial fans. The San Bernardino County Departments of Land Use, Special Districts and the Flood Control District are all coordinating on the below recommendations:

Recommendation 1: *on-going*

In February 2010, a General Plan Amendment (GPA) to the Safety Element of the 2007 General Plan was adopted to amend the Flood Plain Safety Overlay District to incorporate revised FEMA (Federal Emergency Management Agency) Flood Plain data, modifying 47 detail and seven regional General Plan Quad Maps. The GPA also adopted the FEMA Digital Flood Insurance Rate Map database as released by FEMA as it currently exists and as updated in the future for the County allowing for automatic map updates as new data are published by FEMA. This action by the County of San Bernardino Board of Supervisors implements the portion of the first recommendation from the Alluvial Fan Task Force by working with FEMA to continue updating flood insurance rate maps.

In addition, the GPA for the Safety Element in 2010 (a) amended the Generalized Landslide Susceptibility layer, modifying 17 General Plan Quad Maps and one regional Quad Map, to incorporate updated existing landslide data published by the U. S. Geological Survey for the Mountain area; (b) amended the Fire Safety Overlay District, modifying four General Plan Quad Maps to incorporate updated fire safety mapping published by Cal Fire for the Valley area; and (c) amended the Generalized Liquefaction Susceptibility layer, modifying four General Plan Quad Maps to incorporate new liquefaction data in the Big Bear Lake area designated by the County Geologist for the Big Bear Lake area.

Recommendation 2: *on-going*

The County will coordinate with the California Geological Survey (CGS) and the United States Geological Survey (USGS) to review any newly developed Quaternary geologic maps in alluvial fan areas in order to identify potential hazards in areas projected for future development.

Recommendation 4: *on-going*

Historical, documentation of flooding occurrences are preserved by the County's Flood Control District that would review the recommendation to identify flooding events that were associated with alluvial fans.

Recommendation 6: *on-going*

The increased severity and intensity of wildfires in Southern California increase flood risk because the same structures subject to fire risk are also prone to post-fire debris flows. Many of the debris basins that were constructed some time ago did not anticipate the increased severity and intensity of wildfires or the additional developments that would follow. The CalOES projects that climate change will further increase the severity of storms, wildland fires, flooding, mudslides and landslides in areas of Southern California where existing debris basins are located.

All of San Bernardino County Flood Control District's Debris Basins in the valley area; from the Los Angeles County Line to Yucaipa, were analyzed after the Grand Prix and Old Fires. Flood Control District Safety Assessment Teams utilized the Corps of Engineers' Los Angeles District methodology to determine debris production, the same methodology the Corps uses when designing debris basins. In many cases basins were physically expanded and additional measures such as K-rails and debris racks were installed. The understanding of post-fire debris flows continues to evolve; we work closely with the USGS as they develop Post Wildfire Debris Flow Hazard Assessments. The rainfall "Trigger Points" in our FAST CONOPS is a result of the USGS assessments. All Flood Control Basins are also studied on an annual basis to determine existing capacity.

Any additional funding to support our efforts will meet the intent of recommendation #6 which states that the State and local agencies should conduct assessments of the adequacy of strategically located debris basins under a range of scenarios in urbanized areas in light of increased fire and post-fire debris-flow events.

Recommendation 8: *on-going*

When funding sources become available for the maintenance and further development of the database for the web-based portal; which would be utilized as a pre-project screening and flood management tool for special alluvial fan areas, the County may evaluate the benefits of its use in the planning process.

Recommendation 9: future proposal

As financial resources are allocated, the County will consider the analysis of the Integrated Approach tools to be studied for use in land use planning for development on alluvial fans.

Recommendation 10: f*uture proposal*

If funding is provided, the County will review and propose for adoption a model ordinance tailored for the specific needs of the County.

Recommendation 12: *future proposal*

The County's Office of Legislative Affairs, after consulting with the appropriate departments and staff, may explore supporting the economic strategies recommended in the Integrated Approach regarding future maintenance of flood management infrastructure.

B.5.3 StormReady

On July 29, 2009, the National Weather Service recognized San Bernardino County as a "StormReady County". This recognition is valid until July 29, 2012 and has been renewed in use (2016) when the National Weather Service will review the County's weather related planning and notification procedures prior to renewing the "StormReady County" status.

San Bernardino County is the only StormReady jurisdiction in the United States covered by three Weather Forecast Offices. The NWS Offices are:

- San Diego, CA;
- Las Vegas, NV; and
- Phoenix, AZ.

This NWS Recognition may provide the County residents with a discount on their Flood Insurance premiums.

Flood Project Prioritization and Implementation

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Earthquake	**EQ Action 5.1:** Divert runoff to Little Bear Creek.	To reduce the runoff over the cliff(s) in the Rimforest neighborhood, the runoff must be diverted to another path. This will be accomplished over three phases: • Phase 1: Reduce Runoff Tributary Area by 64%- 50.35 AC • Phase 2: Reduce Runoff Tributary Area by 30%- 23.79 AC • Phase 3: Reduce Runoff Tributary Area by 5%- 3.99 AC	SP, NRP, PRV	TBD	Primary: Public Works Secondary: San Bernardino County Flood Control District		
Flood	**FL Action 1.1:** Update NFIP data and maps with newly identified flood hazard areas in the County, as new information becomes available.	As required by the State of California, National Flood Insurance Program (NFIP) maps published by FEMA must be included in the HMP or General Plan Safety Element. Keeping this information current is an important mitigation action.	PRV, PPRO	TBD	San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 2.1:** Determine whether or not additional amendments to development standards or policies are merited, based on the Alluvial Fan Task Force Recommendations.	This is an on-going mitigation action from the 2011 MJHMP.	PRV	TBD	Primary: San Bernardino County Flood Control District Secondary: Land Use Services	On-Going	
Flood	**FL Action 3.1:** Amend the Flood Plain Safety Overlay District through automatic map updates as new data is released and published by FEMA.	Current San Bernardino County Hazard Maps can be found at: http://cms.sbcounty.gov/lus/Planning/ZoningOverlayMaps/HazardMaps.aspx.	PRV, NRP	TBD	Primary: San Bernardino County Flood Control District Secondary: Land Use Services	On-Going	
Flood	**FL Action 3.2:** Review development plans to ensure compliance with ordinances.	This is an on-going mitigation action from the 2011 MJHMP in order to reduce the flood hazards through development standards and policies stated in the General Plan and San Bernardino 2077 Development Code.	PRV	TBD	Primary: Land Use Services Secondary: San Bernardino	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
					County Flood Control District		
Flood	**FL Action 3.3:** Inspect construction to ensure compliance with approved development plans.	This is an on-going mitigation action from the 2011 MJHMP in order to reduce the flood hazards through development standards and policies stated in the General Plan and San Bernardino 2077 Development Code.	PRV, PPRO, SP	TBD	Primary: Public Works Secondary: San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 4.1:** In each flood control zone, construct facilities identified in those zones by the Flood Control Advisory Committee. See the following pages for a listing of projects.	This is an ongoing mitigation action from the 2011 MJHMP to achieve the goal of improving existing facilities and construct new facilities to mitigate flooding within the County.	SP	TBD	Primary: Public Works Secondary: San Bernardino County Flood Control District	On-Going	

B.7 Flood Project Prioritization and Implementation

The Flood District project rankings utilize the same format as the 2011 Multi-Jurisdictional Hazard Mitigation Plan, and rankings are based on the current project funding status as shown on the County Flood Control District's 10 year Plan. A 'High' Local Priority, or (3), indicates that project funding is expected to be complete within about the next three years, depending on the Flood Zone and its' available revenue. A 'Medium' Local Priority (2) indicates that project funding is expected to be complete within about four to seven years. A 'Low' Local Priority (1) indicates that the project is on the 10-Year Plan but complete funding is likely eight to ten years or more in the future.

The task of determining local project priority is the responsibility of the County Flood Control District's staff and City Engineers. Each of the six zones of the District is represented by a Citizens Advisory Committee, composed of eleven members and serving by appointment of the Board of Supervisors without compensation. Each committee is formed of spirited citizens and public officials with unselfish and devoted interests, organized to meet annually or on call to afford recommendations to the Board of Supervisors on matters of tax levies, budgets, work programs, priority of projects, ventures and other counsel. The Mayor of each incorporated city in the District is a committee member with full standing for the appropriate zone.

County Flood Control District staff and the City Engineers for each zone meet twice per year to discuss future project needs and current project status. Projects are proposed based on the public safety needs within the particular zone. In addition to public safety, other issues are considered in the prioritization process such as grant funding, environmental reviews and approvals, and other impediments that may cause construction of the project to be delayed. (See Annex 1 for examples of how these prioritization factors are applied to proposed projects.)

Almost without reservation, the recommendations of these organized committees have been accepted by the Board of Supervisors in its administration of County Flood Control District functions.

Each flood control zone constructs facilities identified in those zones by the Flood Control Advisory Committee. The City Engineers for each zone along with the Flood Control District I Advisory Committee establishes Project Priorities based on Benefit Cost Analysis, Community input, and fiscal resources available for the project in addition to any other noted factors. The following three tables illustrate priority rankings based on three key factors: Total Cost, Hazard Assessment, and Potential Fatalities.

Table B-6: Priority Flood Control Projects

Project No	Completion Date	Total Cost	Total Funding	Status
1-112	5 Year Plan	$10,000,000	$10,000,000	Priority
1-114	10 Year Plan	$15,000,000	$1,000,000	Priority

Project No	Completion Date	Total Cost	Total Funding	Status
1-701	5 Year Plan	$1,100,000	$1,100,000	Priority
1-806	10 Year Plan	$5,000,000	$1,000,000	Priority
1-809	5 Year Plan	$8,500,000	$1,000,000	Priority
1-910	10 Year Plan	$10,000,000	$2,000,000	Priority
2-113	10 Year Plan	$3,100,000	$500,000	Priority
2-308	10 Year Plan	$27,000,000	$500,000	Priority
F01272	10 Year Plan	$31,600,000	$600,000	Priority
F01336	2017-2018	$12,800,000	$13,740,000	Priority
F01389-2	10 Year Plan	$2,700,000	$1,430,000	Priority
F01417	10 Year Plan	$39,500,000	$21,150,000	Priority
F01452-2	2017-2018	$38,400,000	$1,170,000	Priority
F01473	10 Year Plan	$8,100,000	$5,001,000	Priority
F01650	2017-2018	$5,200,000	$3,440,000	Priority
F01667	10 Year Plan	$26,900,000	$16,000,000	Priority
F01911	2018-2019	$8,700,000	$3,140,000	Priority
F02129	10 Year Plan	$16,700,000	$1,024,000	Priority
F02228	10 Year Plan	$8,700,000	$7,600,000	Priority
F02243	10 Year Plan	$2,400,000	$400,000	Priority
	Totals:	$281,400,000	$91,795,000	

B.7.1 Priority Project Descriptions

B.7.1.1 1-112 West State Storm Drain – Priority

Channel Invert Repair
Status: Proposed
Completion Date: 5-year plan
Total Cost: 11.4 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure
Hazard Mitigated: Downstream flooding

B.7.1.2 1-114 Carbon Canyon Channel – Priority

Channel improvement
Status: Proposed
Completion Date: 10-year plan
Total Cost: 15 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure
Hazard Mitigated: Downstream flooding

B.7.1.3 1-701 Etiwanda Channel Invert Repair – Priority

Channel Invert Repair
Status: Proposed
Completion Date: 5-year plan
Total Cost: 1.1 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure
Hazard Mitigated: Downstream flooding

B.7.1.4 1-806 Hawker Crawford Channel and Rich Basin – Priority

Channel / Basin improvement
Status: Proposed
Completion Date: 10-year plan
Total Cost: 5 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure by reducing peak Q
Hazard Mitigated: Downstream flooding

B.7.1.5 1-809 West Fontana Channel (From Banana Basin to Hickory Basin) – Priority

Channel Repair
Status: Proposed
Completion Date: 5-year plan
Total Cost: 8.5 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure
Hazard Mitigated: Downstream flooding

B.7.1.6 1-910 Grove Basin-Priority

Basin out improvement
Status: Proposed
Completion Date: 10-year plan
Total Cost: 10 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure by reducing peak Q
Hazard Mitigated: Downstream flooding

B.7.1.7 2-113 Randal Basin outlet improvement – Priority

Outlet improvements D/S of the Basin
Status: Proposed
Completion Date: On 10-year plan

Local Priority: Medium
Total Cost: $3.1 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public Safety
Hazard Mitigated: Potential failure & flooding downstream
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.1.8 2-308 Cable Creek Channel – Priority

Channel improvements
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $27 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Compliance with FEMA Levee Certification program
Hazard Mitigated: Reduction of floodplain; reduction of potential for major flooding
Resources to Implement: High
Cost to Implement: High
Time to Implement: High

B.7.1.9 F01272 Rialto Channel, Etiwanda Avenue to Willow Avenue – Priority

Construct Rialto channel to ultimate condition
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $31.6 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Rialto
Project Selected for: Public Safety & convenience Hazard Mitigated: Residential area flooding and road closures due to wash-outs
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.10 F01336 Amethyst Detention Basin – Priority

Construct a detention basin at Amethyst and Sycamore
Status: Design completed, Permits In process
Completion Date: Estimated 2017/2018
Local Priority: High
Total Cost: $12.8 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Victorville
Project Selected for: Public Safety; protection of local and downstream infrastructure by reducing peak Q
Hazard Mitigated: downstream flooding

Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.11 F01389-2 Mojave River Phase II – Priority

Construct earthen levee lined with 1/2 ton rock slope protection between Oro Grande Wash and Mojave River Phase I
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $2.7million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: To finalize levee improvement construction; protection of Amtrak station
Hazard Mitigated: Local flooding, railroad flooding
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.12 F01417 Bandicoot Detention Basin (Phase I&II) – Priority

Construction of detention basin, inlet/outlet facilities, fencing to attenuate 10-year storm flows adjacent to California Aqueduct and downstream residential and commercial properties developments.
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $39.5 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: To protect the State water aqueduct
Hazard Mitigated: Flood damage to aqueduct & local area
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.13 F01452-2 West Fontana Channel, Phase I – Priority

Construction of concrete channel from Juniper to Banana Basin
Status: In process
Completion Date: Estimated 2017/2018
Local Priority: Medium
Total Cost: $38.4 million
Funding Description: San Bernardino County Flood Control Taxes, City of Fontana
Project Selected for: Public safety & convenience
Hazard Mitigated: Flooding of railroad & Metrolink tracks; road damage & closure
Resources to Implement: Medium
Cost to Implement: High

Time to Implement: High

B.7.1.14 F01473 Rialto Channel – Priority

Construct channel improvements south of Interstate 10
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Medium
Total Cost: $8.1 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Rialto
Project Selected for: Public Safety
Hazard Mitigated: Existing channel is interim and undersized
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.1.15 F01650 Sand Creek/ Warm Creek Channels – Priority

Improve existing confluence of Sand Creek and Warm Creek Channels
Status: In process
Completion Date: Estimated 2017/2018
Local Priority: Medium
Total Cost: $5.2 million
Funding Description: San Bernardino County Flood Control
Project Selected for: channel improvements to interim storm drain system
Hazard Mitigated: Potential damage to infrastructure
Resources to Implement: High
Cost to Implement: High
Time to Implement: High

B.7.1.16 F01667 Cactus Basins #4 & 5 – Priority

Construction of detention basins to mitigate downstream flooding of Rialto Channel Work includes inlet/outlet structures
Status: Proposed
Completion Date: 10-year plan
Local Priority: Low
Total Cost: $26.9 million
Funding Description: San Bernardino County Flood Control, City of Rialto
Project Selected for: Ability to reduce downstream peak Q
Hazard Mitigated: flooding of nearby area

B.7.1.17 F01911 Elder Gulch – Priority

Construct trapezoidal rock-lined channel
Status: Proposed
Completion Date: Estimated FY 18/19
Local Priority: High

Total Cost: $8.7 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public safety
Hazard Mitigated: Flooding of local area
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Medium

B.7.1.18 F02129 Wildwood Channel – Priority

Channel improvement
Status: In preliminary design process
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $16.7 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Yucaipa
Project Selected for: History of flooding due to high debris flows
Hazard Mitigated: reduction in size of floodplain; minimized flooding
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Low

B.7.1.19 F02228 Plunge Creek Spillway – Priority

Repair of severe damage caused by storms in 2005
Status: Proposed
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $3 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Necessary repairs due to previous flood damage
Hazard Mitigated: Potential failure & flooding downstream
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.20 F02243 Rialto Channel Priority Crossings – Priority

Status: In preliminary design process
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $2.4 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Rialto

Project Selected for: Public Safety & convenience
Hazard Mitigated: Elimination of flooding at intersections
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.2 Projects with Mitigation Benefits

Table B-7 is a list of the proposed projects to mitigate the Flood hazard within the County Unincorporated Area.

Table B-7: In Progress Flood Control Mitigation Projects

Project No	Completion Date	Total Cost	Total Funding	Status
F01312	2017/2018	4,400,000	2,200,000	Under Construction
F01666	2017/2018	17,800,000	17,800,000	Under Construction
F02094	2017	4,000,000	4,000,000	Under Construction
F02126	2017/2018	8,300,000	6,180,000	Under Construction
	Totals:	34,500,000	30,180,000	

B.7.2.1 F01312 English Channel/ Peyton Drive (Under Construction)

Construct triple RCB and channel upstream and downstream of Peyton Drive.
Status: In preliminary design process
Completion Date: Estimated 2017/2018
Local Priority: High
Total Cost: $4.4 million
Funding Description: San Bernardino County Flood Control Property Taxes, 50% and City of Chino Hills 50%
Project Selected for: Public safety & convenience
Hazard Mitigated: Flooding of roads in residential area
Resources to Implement: High
Cost to Implement: High
Time to Implement: Medium

B.7.2.2 F01666 Cactus Basin #3/ Expansion of Basin #3 – (Under Construction)

Status: In process
Completion Date: Estimated 2017/2018
Local Priority: High
Total Cost: $17.8 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Rialto

Project Selected for: Public safety & improved future development; protection of water filtration plant across the street; reduction of peak Q downstream.
Hazard Mitigated: Flooding of immediate area and downstream along Rialto Channel
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Medium

B.7.2.3 F02094 Cucamonga Basin #6, Phase II – (Under Construction)

Landscaping improvements
Status: Partial Completed
Completion Date: Mid-2011 – (Landscaping Phase Completion date end of 2017)
Local Priority: High
Total Cost: $4.0 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Environmental compliance & aesthetics
Hazard Mitigated:
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Low

B.7.2.4 F02126 Francis Street Storm Drain (Under Construction)

Construct ultimate storm drain improvements from Sultana Avenue east to beyond Grove Avenue
Status: In preliminary design process
Completion Date: Estimated 2017/2018
Local Priority: Low
Total Cost: $8.3 million
Funding Description: San Bernardino County Flood Control Property Taxes 75% and City of Ontario 25%
Project Selected for: Public safety & convenience
Hazard Mitigated: Existing storm drain is undersized/interim; local flooding
Resources to Implement: Medium

B.7.3 Future Year Projects

Table B-8: Future Year Projects

Project Number/Name	Completion Date	Total Cost	Status
2-509 Little Sand Creek	10 Year Plan	$10,500,000	Future
3-501 Mission Channel	10 Year Plan	$28,800,000	Future
3-601 Wilson Creek (10th St-I-10)	10 Year Plan	$38,800,000	Future
CSDP Drain Project	10 Year Plan	$18,500,000	Future
Extension of VV Line E-01	10 Year Plan	$2,000,000	Future
F01284	10 Year Plan	$7,200,000	Future
F01582	10 Year Plan	$19,000,000	Future
F01584	2018/2019	$11,700,000	Future
F01609	10 Year Plan	$32,500,000	Future
F02225	10 Year Plan	$33,100,000	Future
F02475	10 Year Plan	$9,000,000	Future
F02476	10 Year Plan	$32,300,000	Future
H1458	2021	$3,000,000	Future
Institution Road	2021	$30,000,000	Future
Line C-01 Hesperia	10 Year Plan	$5,300,000	Future
Line D-01 Hesperia	10 Year Plan	$32,500,000	Future
Line E-01 Apple Valley	10 Year Plan	$36,300,000	Future
Lone Pine Canyon Road Culvert	TBD	$25,000,000	Future
National Trails Hwy Bridge	TBD	$40,000,000	Future
Old Waterman Canyon Rd Culvert	TBD	$2,500,000	Future
Pine View Dr. Storm Drain	TBD	$6,000,000	Future
Piute Wash	2021	$34,500,000	Future
Rimforest Drainage Project	10 Year Plan	$6,900,000	Future
Rock Springs Rd Bridge Replacement	TBD	$32,876,000	Future
Tussing Ranch-Juniper Basin	10 Year Plan	$6,500,000	Future
Yermo Rd/National Trails Hwy Bridge	TBD	$40,000,000	Future
	Totals:	$544,776,000	

B.7.3.1 2-509 Little Sand Creek

Creek improvements between Date Street and Del Lemon basin
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $10.5 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety; residential area with school nearby
Hazard Mitigated: Flooding and pedestrian hazards
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.3.2 3-501 Mission Channel

Channel Repair, Construct concrete channel improvements
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $28.8 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety; residential area with school nearby
Hazard Mitigated: Flooding and pedestrian hazards
Resources to Implement: Medium

Cost to Implement: High
Time to Implement: High

B.7.3.3 3-601 Wilson Creek (from 10st Street to I-10)

Channel Repair, between 10st Street to I-10
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $38.8 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety; residential area with school nearby
Hazard Mitigated: Flooding and pedestrian hazards
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.3.4 CSDP -- Storm Drain Project – Colton

Construction of storm drains from Randall Basin to the Santa Ana River according to Comprehensive Storm Drain Plan (CSDP) 3-5 and 3-8
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Medium
Total Cost: $18.5 million
Funding Description: San Bernardino County Flood Control Property Taxes
Hazard Mitigated: Existing channel is interim and undersized
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.3.5 Extension of Victorville Line E-01

Construct Storm Drain line E-01
Status: In preliminary design process
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $2.0 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Victorville
Project Selected for: Public safety of commercial area
Hazard Mitigated: local flooding; road closure/road damage (State Hwy)
Resources to Implement: High
Cost to Implement: High
Time to Implement: Low

B.7.3.6 F01284 Donnell Basin (Phase I&II)

Construct detention basin.
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $7.2 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public Safety; roadway protection; Safe Routes to School Program (SR2S)
Hazard Mitigated: Flood protection for homes, infrastructure, and pedestrians
Resources to Implement: Low

B.7.3.7 F01582 Desert Knolls II

Construct flood control channel from Apple Valley Road to Tuscola Road
Status: Proposed
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $19 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety/future development
Hazard Mitigated: Potential localized flooding due to increased development
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.3.8 F01584 Desert Knolls

Construct channel improvements from the Mojave River to Phase I
Strategy: Construct concrete lined channel to provide for 100 year storm flows and debris flows.
Status: Proposed
Completion Date: Estimated FY 18/19
Local Priority: High
Total Cost: $11.7 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Environmental requirements
Hazard Mitigated: This project is the mitigation aspect of Phase II
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Medium

B.7.3.9 F01609 Ranchero Basin

Construct detention basin
Status: Proposed

Completion Date: 10-year plan
Local Priority: High
Total Cost: $32.5 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and reduction of peak Q
Hazard Mitigated: Potential damage to bridges and roads downstream due to high flows
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.3.10 F02225 Del Rosa

Channel Repair, Construct concrete channel improvements between Pacific Street and Del Rosa Avenue
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $33.1 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety; residential area with school nearby
Hazard Mitigated: Flooding and pedestrian hazards
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.3.11 F02475 Seneca Basin

Construct detention basin
Status: Proposed
Completion Date: 10-year plan
Local Priority: High
Total Cost: $9 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and reduction of peak Q
Hazard Mitigated: Potential damage to bridges and roads downstream due to high flows
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.3.12 F02476 Oak Hills Basin

Construct detention basin
Status: Proposed
Completion Date: 10-year plan
Local Priority: High
Total Cost: $32.3 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and reduction of peak Q
Hazard Mitigated: Potential damage to bridges and roads downstream due to high flows
Resources to Implement: Low

Cost to Implement: High
Time to Implement: High

B.7.3.13 H1458 Arrowbear Dr. Bridge Replacement

Replacement of bridge crossing on Arrowbear Drive and increase spillway flow capacity to prevent flooding
Status: Proposed
Completion Date: 2021
Total Cost: $3,000,000.00
Funding Description: Major Local Highway Project Funds
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.14 Institution Road

Construction of bridge crossing along Institution Road on Cajon Wash
Status: Proposed
Completion Date: 2021
Total Cost: $30,000,000.00
Funding Description: seeking grant funding
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.15 Line C-01 Hesperia

Construction of concrete trapezoidal channel improvements, short reach of levee along the channel, 96 inch RCP and reconstruction of the existing deficient reach as a concrete trapezoidal channel with a portion of riprap channel
Status: Proposed
Completion Date: 10-year plan
Total Cost: $5.3 million
Funding Description: San Bernardino County flood Control
Project selected for: Public safety and roadway protection
Hazard Mitigated: Flooded roads and residential area
Resources to implement: High
Cost to implement: High
Time to implement: High

B.7.3.16 Line D-01 Hesperia

Improve the storm drain facility.
Status: Proposed
Completion Date: 10-year plan
Total Cost: $32.5 million
Funding Description: San Bernardino County flood Control
Project selected for: Public safety and roadway protection
Hazard Mitigated: Flooded roads and residential area
Resources to implement: High
Cost to implement: High

Time to implement: High

B.7.3.17 Line E-01 Apple Valley

Improve the storm drain facility.
Status: Proposed
Completion Date: 10-year plan
Total Cost: $36.3 million
Funding Description: San Bernardino County flood Control
Project selected for: Public safety and roadway protection
Hazard Mitigated: Flooded roads and residential area
Resources to implement: High
Cost to implement: High
Time to implement: High

B.7.3.18 Lone Pine Canyon Road Culvert

Construction of Culvert on Long Pine Canyon Road
Status: Proposed
Completion Date: No date until funding is available
Total Cost: $2,500,000.00
Funding Description: TBD
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.19 National Trails Highway Bridge Replacement

Removal of approximately 31 old timber bridges and construction of replacement bridges spanning Under 20' on National Trails Highway
Status: Preliminary engineering and environmental study only
Completion Date: No date until funding is available
Total Cost: $40,000,000.00
Funding Description: TBD
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.20 Old Waterman Canyon Road Culvert

Removal of approximately 31 old timber bridges and construction of replacement bridges spanning less than 20' on National Trails Highway
Status: Preliminary engineering and environmental study only
Completion Date: No date until funding is available
Total Cost: $2,500,000.00
Funding Description:
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.21 Pine View Dr. Storm Drain

Construction of storm drain on Pine View Drive
Status: Proposed
Completion Date: Shelf ready but no date until funding is available
Total Cost: $6,000,000.00
Funding Description: TBD
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.22 Piute Wash

Construction of bridge crossing along Needles highway road on Piute washes to prevent flooding and washing the road out.
Status: Proposed
Completion Date: 2021
Total Cost: $34,500,000
Funding Description: seeking grant funding
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.23 Rimforest Drainage Project – Rimforest Area

Capture the surface water within Rimforest and convey it to Little Bear Creek, away from the escarpment.
Status: In preliminary design process
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $6.9 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public safety of commercial area
Hazard Mitigated: Public safety and reduction of peak Q
Resources to Implement: High
Cost to Implement: High
Time to Implement: Low

B.7.3.24 Rock Springs Road Bridge Replacement

Construct Replacement Bridge on Glen Helen Parkway over Cajon Wash It will increase flow capacity with a longer span and reduce flooding of the roadway.
Status: Proposed
Completion Date: No date until full funding is available
Total Cost: $32,876,000
Funding Description: Partially funded with General Fund Money
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.25 Tussing Ranch – Juniper Basin

Construct detention basin
Status: Proposed
Completion Date: 10-year plan
Local Priority: High
Total Cost: $6.5 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and reduction of peak Q
Hazard Mitigated: Potential damage to bridges and roads downstream due to high flows
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.3.26 Yermo Road and National Trails Highway Bridge Replacement

Removal of approximately 11 old timber bridges and construction of replacement bridges spanning under 20' on National Trails Highway and Yermo Road. The military is using high load tractors and trailers warranting the need to increase the load capacity of the bridges.
Status: Preliminary engineering and environmental study only
Completion Date: No date until funding is available
Total Cost: $40,000,000.00
Funding Description: TBD
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

COUNTY OF SAN BERNARDINO - Hazard Mitigation Plan Update

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Annex C. Special Districts Department

C.1 Introduction

Special Districts Department, under the direction of the San Bernardino County Board of Supervisors, provides administrative oversight and manages the operation of over 100 special districts throughout San Bernardino County. Through the formation of County Service Areas (CSAs) and Improvement Zones, these special districts provide a variety of municipal-type services to unincorporated areas of the county.

C.2 Special Districts Profile

Special District Functions:
The County Service Areas (CSAs) and Improvement Zones can provide one or all of the following services to meet the individual needs of communities, neighborhoods and new developments depending on needs and financial feasibility:

- Cemetery
- Dam Operation
- Detention Basin
- Engineering and Construction
- Landscaping
- Open Spaces
- Park and Recreation
- Public Financing
- Refuse
- Roads
- Streetlights
- Television Translator
- Water and Sanitation

Mission:
The Special Districts Department works to ensure safe, healthy, and enjoyable communities by providing customizable programs and municipal services for those who work, play and stay in San Bernardino County.

Vision:
To be recognized as the preeminent provider of customized municipal services focusing on improved quality of life for the residents and visitors of San Bernardino County.

C.3 Planning Process

As described above, the County Flood Control District followed the planning process detailed in Section 3 of the base plan. In addition to providing representation on the San Bernardino County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table C-9. Additional details on plan participation and District representatives are included in Appendix A.

Table C-9: Special District Hazard Mitigation Planning Team

Name	Title
Jeffrey Rigney	Director of Special Districts
Steve Samaras	Water and Sanitation Division Manager
Tim Millington	Engineering Division Manager,
Reese Troublefield	Operations Division Manager
Erin Opliger	Districts Services Coordinator

The Special Districts Department has attending the following planning meetings:

Meeting Date	Meeting Type	Attendees	Additional Details
6/23/16	LHMP Update - Kickoff Meeting	Steve Samaras, Erin Opliger	
8/30/16	LHMP Group Meeting	Erin Opliger	
10/26/16	LHMP Blue Jeans Meeting	Erin Opliger	

The County of San Bernardino Special Districts Department (Department) has historically identified goals, objectives, and projects to mitigate the negative effects of hazards. The Department continues to work with various Advisory Commissions and the public to identify and mitigate the impacts of hazards to the various services that the Department provides, including: cemetery operations, dam operations, detention basin operations, landscaping services, open space, parks and recreation, refuse services, roads, streetlights, television translator, water distribution and treatment system operations, sewer collection system operations, and wastewater treatment plant operations.

The Department diligently identifies the hazards that each service district or County Service Area (CSA) and its zones face, and has assessed the vulnerability according to the potential event. Hazards, whether they are technological or natural, affect CSAs with varying frequency and can cause injury, impose monetary losses, and the disruption of services, affecting the Department's mission as a public agency service provider. Losses can be substantially reduced or eliminated through comprehensive pre- disaster planning and mitigation actions.

Many groups and individuals have contributed to the Department's planning for Disasters and the necessary hazard mitigation efforts. Advisory Committees, located in the Department's various CSAs, provide on-going input and support for the various aspects of hazard mitigation, including identifying persistent hazards that develop after storm events and options for mitigation.

Department staff participates in the hazard mitigation process by completing semi-annual audits of various CSAs, recommending temporary fixes and/or permanent solutions. CSA customers and the public have also participated in hazard mitigation planning by approaching staff in the field, contacting the office, and/or attending public meetings to identify temporary and ongoing hazards that need to be addressed. These resources have proved valuable to the Department in identifying and mitigating potential hazards. The Department also uses the following process to prepare hazard mitigation plans:

- Identify and prioritize disaster events that are most probable and destructive;
- Identify critical facilities;
- Identify areas within communities that are most vulnerable;
- Develop goals and objectives for reducing the effects of a disaster event;
- Develop specific projects to be implemented for each goal;
- Identify funding sources;
- Develop procedures for monitoring progress;
- Mitigate identified potential hazards.

The Department has identified areas for mitigation projects within the Special Districts of San Bernardino County as a result of their internal planning processes. These projects, shown below, are organized by type of special district these proposed projects are in the conceptual stage and detailed planning will be done in the future as funding becomes available. Prioritization of projects will be done in the planning stages, based on the risk prioritizations developed for the current Multi-Jurisdictional Hazard Mitigation Plan.

C.4 Hazard Identification and Prioritization

The Special Districts Planning Team participated in the County hazard identification and prioritization process described in the base plan. The Special Districts Planning Team assisted to summarize the extent, probability of future occurrences, potential magnitude/severity, and significance specific to the Special Districts (See Section 4).

C.5 Coordination with County Planning Efforts

Coordination with other County planning efforts is paramount to the successful implementation of this plan. This Section provides information on how the Special Districts integrated the previously-approved 2011 Plan into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2011 MJHMP through other plans and programs shown below.

C.5.1 3.2 Water Systems (Distribution Systems):

Fire:

- Rockscape or paved property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.
- Re-roof buildings and structures with tile, metal or fire resistant material.

Flood:

- Add drainage, elevate facilities and adjust sloping for facilities in low-lying areas and in natural waterways or floodplains. (Recent Completion)
- Conduct hydrologic and hydraulic studies for all facilities located near flood plains/natural waterways.
- Encase water pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.

Earthquake:

- Retrofit structures to higher seismic standards.
- Purchase portable containers (Conex containers) to stage emergency supplies and equipment for the first responders (i.e. water, food, small off road vehicles, fuel, cots, toiletries, communication devices, blankets, wet weather gear, etc.) at strategic water system locations throughout County of San Bernardino. Conex containers can be relocated if necessary to assist field staff during a disaster to maintain the operations of water systems. (Recent Completion and in implementation phase)

General Hazard (Fire/Flood/Earthquake):

- Retrofit existing buildings and facilities with connectors/ATS for emergency generators and/or install permanent emergency generators at critical facilities, including wells and booster station locations.
- Develop a plan for speeding the repair of and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.
- Develop a plan for areas subject to high ground shaking, earthquake-induced ground failure, and surface fault rupture to determine a replacement schedule for pipelines (along with importance, age, type of construction material, size, condition, and maintenance or repair history).(Project now in effect)
- Develop a plan for short-term and intermediate-term sheltering of employees.
- Develop a plan to work with local agencies that handle hazardous materials to coordinate mitigation efforts for the possible release of these materials due to a natural disaster such as an earthquake, flood, fire, or landslide.

- Utilization of SCADA and Smart Water Meters to get real time data on problems with the system and reduce drive time emissions as a result of traditional meter reading.
- Provide emergency supplies of food, water, and portable generators for employees at office and field locations.
- Install emergency generators at district facilities

C.5.2 3.3 Sewer Systems (Collection Systems):

Fire:

- Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.(Completion and program implementation by January 2017 estimated)
- Re-roof buildings and structures with tile or fire resistant material.

Flood:

- Add drainage, elevate facilities and adjust sloping for facilities in low-lying areas and in natural waterways or floodplains.
- Encase sewer pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.

Earthquake:

- Develop a plan for short-term and intermediate-term sheltering of employees.
- Retrofit structures to higher seismic standards.

General Hazard (Fire/Flood/Earthquake):

- Retrofit existing buildings and facilities with connectors/ATS for emergency generators and/or install permanent emergency generators.
- Develop a plan for speeding the repair and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.
- Develop a plan for areas subject to high ground shaking, earthquake-induced ground failure, and surface fault rupture to determine a replacement schedule for pipelines (along with importance, age, type of construction material, size, condition, and maintenance or repair history).
- Install emergency power generators at district facilities.

C.5.3 3.4 Wastewater Treatment Plant

Fire:

- Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.
- Purchase and store water pumps capable of suppressing fire.

Flood

- Add drainage, elevate facilities and adjust sloping for facilities in low-lying areas and in natural waterways or floodplains.

Earthquake:

- Develop a plan for short-term and intermediate-term sheltering of employees.

C.5.4 3.5 Roads

Fire:

- Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.
- Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.(completed with continuous fresh of supplies and rotation)
- Clear vegetation from Road District facilities/yards

Flood:

- Upgrade culverts in all flood prone areas. Most existing culvert sizes were never designed for high water volume. Upgrading will prevent roadway washouts caused by water bypassing existing culverts.(Complete and continuous maintenance)
- Upgrade culvert sizes in Main Channels and replace old culverts in Main Channels as required.(complete and continuous maintenance)
- Slope stabilization at water crossing areas along roadways. This will prevent the loss of the roadways at these areas by preventing undermining by the water.
- Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.
- Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.
- Soil stabilization on roadway shoulders. This will prevent erosion caused by flood conditions.

- Soil stabilization of dirt roadways. This will help mitigate the loss of material from the roadway during flooding conditions.
- Employ on call contractors to assist in emergency situations.

Earthquake:
Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.
Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal. (Completed and refresh of supplies as needed)

C.5.5 3.6 Television Translator Districts

General Hazard (Fire, Flooding, Earthquake):
- Install and maintain emergency generators at all TV Translator sites. Newberry Springs, Lucerne Valley, and Morongo Valley TV Transmitter sites are in need emergency generators. Pinto and Elephant Mountain sites have existing generators. Installing emergency generators at these sites will enable emergency information to be disseminated to the residents living in these remote locations.(Complete and maintenance of upgrades)
- Establish a centralized communications network to monitor channel output for TV Districts and provide emergency information by way of character generator tied to channel transmissions.
- Conduct annual tower and guide wire inspections to mitigate storm/wind/earthquake hazards from knocking out communications.
- Install poly insulators on power poles with high voltage power lines for Pinto Mountain. Establish an open purchase order for a High Voltage Electrician to provide annual inspections of power poles and service lines.(Completed and continuous maintenance)
- Maintain roadways on mountaintops and within washes leading to remote tower sites. Earthquakes and flash floods can block roadways, making them impassable to restore emergency communications.
- Maintain lights on all tower locations.

C.5.6 3.7 Parks Districts

- Trim large trees in parks to avert limb breakage and toppling during storm events.
- Establish emergency centers to ration drinking water at various County Park Community Centers.
- Establish community garden plots in designated County Park areas as an ongoing and emergency food source, including planting fruit bearing trees.
- Conduct an inventory or list of County Park Facilities and Community Centers to establish a list of pre-designated emergency operations or disaster relief sites. Not all Community

Centers are an appropriate size to accommodate large numbers of evacuees and may only serve as command and control centers or distribution centers.
- Establish small solar energy fields or other forms of renewable power at County Community Centers to facilitate stand-alone emergency operations for the community.
- Conduct repair and replacement of old roofs, and clearing of gutters and roof drains to minimize potential damage from major storm events.(Completed and continuous maintenance)
- Conduct an evaluation or study of County Park and Community Center facilities to install curbs, retaining walls, and drains to carry or divert water away from buildings.
- Connect water systems to generators to ensure delivery even in disaster situations.
- Provide emergency supply of food and water for employees in disaster situations.

C.E Special Districts Mitigation Project Prioritizing

Cost effectiveness of each measure was a primary consideration when developing mitigation actions. Because mitigation is an investment to reduce future damages, it is important to select measures for which the reduced damages over the life of the measure are likely to be greater than the project cost. For structural projects, the level of cost effectiveness is primarily based on the likelihood of damages occurring in the future, the severity of the damages when they occur, and the level of effectiveness of the selected measure. While detailed analysis was not conducted during the mitigation action development process, these factors were of primary concern when selecting measures. For measures that do not result in a quantifiable reduction of damages, such as public education and outreach, the relationship of the probable future benefits and the cost of each measure was considered when developing the mitigation actions.

Based upon the Special Districts capabilities, Table C-10 shows primary actions selected for further implementation and development during the next planning cycle. Table C-10 provides details for each mitigation action with mitigation action descriptions, FEMA mitigation category, responsible party, and timeframe.

Table C-10: Mitigation Project Prioritization and Implementation

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
All-Hazard	**AH Action 2.1:** Continue funding and support for Special Districts Projects relating to all hazards.	Continue funding and support for Special Districts Projects relating to water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District for all hazards. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
All-Hazard	**AH Action 2.2:** Install Generators at Critical Facilities	Retrofit existing buildings and facilities with connectors/ ATS for emergency generators and/or install permanent emergency generators at critical facilities, including wells and booster station locations.	ES, SP	TBD	Water Systems	TBD	Critical sites are already set up for connection or has a permanently installed generator
All-Hazard	**AH Action 2.3:** Water Systems Repair Plan	Develop a plan for speeding the repair of and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.	PRV	SDD WAS	Water Systems	TBD	We have a warehouse and inventory. Add'l inventory would need to be purchased from local wholesaler
All-Hazard	**AH Action 2.4:** Smart Water Meters and SCADA	Utilization of SCADA and Smart Water Meters to get real time data on problems with the system and reduce drive time emissions as a result of traditional meter reading.	PRV	Individual CSAs	Water Systems	Ongoing	Both SCADA and Smart Meters have been installed and continue to be installed
All-Hazard	**AH Action 2.5:** Provide Employees with Emergency Supplies	Provide emergency supplies of food, water, and portable generators for employees at office and field locations.	ES	SDD/WAS	Water Systems	Ongoing	WAS has a stock of emergency food supplies, water, and generators.
All-Hazard	**AH Action 2.6:** Annual Tower and Guide Wire Inspections	Conduct annual tower and guide wire inspections to mitigate storm/wind/earthquake hazards from knocking out communications.	PRV	TBD	TV Districts	7/1/2016-7/1/2017	All Districts
All-Hazard	**AH Action 2.7**: Maintain Tower Lighting	Maintain lights on all tower locations.	SP	TBD	TV Districts	June-17	
All-Hazard	**AH Action 2.8:** Designate Emergency Operations Sites	Conduct an inventory or list of County Park Facilities and Community Centers to establish a list of pre-designated emergency operations or disaster relief sites. Not all Community Centers are an appropriate size to accommodate large numbers of evacuees and may only serve as command and control centers or distribution centers.	PRV	TBD	Park Districts	April-17	All Districts
All-Hazard	**AH Action 2.9:** Establish Power Sources for Emergency Operations Sites	Establish small solar energy fields or other forms of renewable power at County Community Centers to facilitate stand-alone emergency operations for the community.	PRV, SP	TBD	Park Districts	12/1/2016-7/1/2018	Lucerne Valley Joshua Tree
All-Hazard	**AH Action 2.10:** Connect Water Systems to Generators	Connect water systems to generators to ensure delivery even in disaster situations.	PRV, SP	TBD	Park Districts	TBD	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
All-Hazard	**AH Action 2.11:** Establish a Centralized Communications Network	Establish a centralized communications network to monitor channel output for TV Districts and provide emergency information by way of character generator tied to channel transmissions.	PRV	TBD	TV Districts	7/1/2017-12/1/2017	All districts
Wildfire	**WF Action 3.3:** Vegetation Removal	Clear vegetation from Road District facilities/yards	PRV	TBD	Roads	TBD	
Wildfire	**WF Action 6.3:** Protect Property in Wilderness Areas	Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.	PPRO, PRV, SP	TBD	Sewer Systems	January-17	All sewer pump stations have paving
Wildfire	**WF Action 8.3:** Structural Fire Breaks Widening	Double the width of external fire breaks on grounds which have structures located in wilderness and or areas prone to wildfires.	SP, PRV	Individual CSAs	Water Systems	7/1/2017-7/19/2019	
Wildfire	**WF Action 9.1:** Continue funding and support for Special Districts Projects relating to wildfire.	Continue funding and support for Special Districts Projects relating to wildfire in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Wildfire	**WF Action 9.2:** Emergency Water Supplies	Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.(completed with continuous fresh of supplies and rotation)	ES	TBD	Roads	TBD	
Earthquake	**EQ Action 2.2:** Seismic Strapping	Seismic strapping for existing water tanks and future construction.	SP, PRV	CSA 64	Water Systems	7/17/2017- 7/1/2019	Ongoing currently
Earthquake	**EQ Action 2.3:** Employee Emergency Sheltering	Develop a plan for short-term and intermediate-term sheltering of employees.	PRV	WAS	Sewer Systems	7/17/2017-7/19/2019	To purchase cots, small portable generators, tents, etc.
Earthquake	**EQ Action 4.2:** Generator Installation	Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.	SP, PPRO	TBD	Roads	TBD	
Earthquake	**EQ Action 6.1:** Continue funding and support for Special Districts Projects relating to earthquake hazards.	Continue funding and support for Special Districts Projects relating to earthquake hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Flood	**FL Action 3.4:** Soil Stabilization on Roadways and Along Roadway Shoulders	Soil stabilization on roadway shoulders and dirt roads. This will prevent erosion caused by flood conditions.	SP, PRV	TBD	Roads	TBD	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Flood	**FL Action 3.5:** Encasing Pipelines	Encase water pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.	SP, PRV	CSA 70 J	Water Systems	7/17/2017-7/1/2027	
Flood	**FL Action 6.1:** Continue funding and support for Special Districts Projects relating to flood hazards.	Continue funding and support for Special Districts Projects relating to flood hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Flood	**FL Action 6.2:** On Call Contractors	Employ on call contractors to assist in emergency situations.	PRV, ES	TBD	Roads	TBD	
Drought	**DR Action 3.1:** Continue funding and support for Special Districts Projects relating to drought hazards.	Continue funding and support for Special Districts Projects relating to drought hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Anti-Terrorism	**AT Action 2.1:** Continue funding and support for Special Districts Projects relating to terrorism hazards.	Continue funding and support for Special Districts Projects relating to terrorism hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Climate Change	**CC Action 3.1:** Continue funding and support for Special Districts Projects relating to climate change hazards.	Continue funding and support for Special Districts Projects relating to climate change hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	

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APPENDIX F

RESOLUTIONS ADOPTING 2020 UWMP,

2020 WSCP AND 2015 UWMP ADDENDUM

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RESOLUTION 2021-06-01

RESOLUTION OF THE WATER FACILITIES AUTHORITY
ADOPTING THE 2020 URBAN WATER MANAGEMENT PLAN

WHEREAS, The California Urban Water Management Planning Act, (Wat. Code § 10610, et seq. (the Act)), mandates that every urban supplier of water providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare, and adopt an Urban Water Management Plan (Plan); and

WHEREAS, the Act generally requires that said Plan be updated and adopted at least once every five years on or before July 1, in years ending in six and one; and

WHEREAS, pursuant to recent amendments to the Act, urban water suppliers are required to update and electronically submit their 2020 Plans to the California Department of Water Resources (DWR) by July 1, 2021; and

WHEREAS, pursuant to Water Conservation Act of 2009, also referred to as SB X7-7 (Wat. Code § 10608 et seq.), an "urban retail water supplier" is defined as a water supplier that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre feet of potable water annually at retail for municipal purposes, and an "urban wholesale water supplier" is defined as a water supplier that provides more than 3,000 acre feet of water annually at wholesale for potable municipal purposes; and

WHEREAS, Water Facilities Authority meets the definition of an urban retail water supplier for purposes of the Act and SB X7-7; and

WHEREAS, Water Facilities Authority has prepared a 2020 Plan in accordance with the Act and SB X7-7, and in accordance with applicable legal requirements, has undertaken certain coordination, notice, public involvement, public comment, and other procedures in relation to its 2020 Plan; and

WHEREAS, in accordance with the Act and SB X7-7, Water Facilities Authority has prepared its 2020 Plan with its own staff, with the assistance of consulting professionals, and in cooperation with other governmental agencies, and has utilized and relied upon industry standards and the expertise of industry professionals in preparing its 2020 Plan, and has also utilized DWR's Urban Water Management Plan Guidebook 2020, including its related appendices, in preparing its 2020 Plan; and

WHEREAS, in accordance with applicable law, including Water Code sections 10608.26 and 10642, and Government Code section 6066, a Notice of a Public Hearing regarding Water Facilities Authority's 2020 Plan was published within the jurisdiction of Water Facilities Authority on June 3, 2021 and June 10, 2021; and

WHEREAS, in accordance with applicable law, including but not limited to Water Code sections 10608.26 and 10642, a public hearing was held on June 17, 2021 at 7:30 AM, or soon thereafter, via Zoom web conference and teleconference in order to provide members of the public and other interested entities with the opportunity to be heard in connection with proposed adoption of the 2020 Plan and issues related thereto; and

WHEREAS, pursuant to said public hearing on Water Facilities Authority's 2020 Plan, Water Facilities Authority, among other things, encouraged the active involvement of diverse social, cultural, and economic members of the community within Water Facilities Authority's service area with regard to the 2020 Plan and encouraged community input regarding Water Facilities Authority's 2020 Plan; and

WHEREAS, the Board of Directors has reviewed and considered the purposes and requirements of the Act and SB X7-7, the contents of the 2020 Plan, and the documentation contained in the administrative record in support of the 2020 Plan, and has determined that the factual analyses and conclusions set forth in the 2020 Plan are legally sufficient; and

WHEREAS, the Board of Directors desires to adopt the 2020 Plan prior to July 1, 2021 in order to comply with the Act and SB X7-7; and

WHEREAS, Section 10652 of the California Water Code provides that the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) (CEQA) does not apply to the preparation and adoption of the 2020 Plan pursuant to this part.

NOW THEREFORE BE IT RESOLVED, the Board of Directors of the Water Facilities Authority hereby resolves as follows:

1. The Water Facilities Authority's 2020 Plan is hereby adopted as amended by changes incorporated by the Board of Directors as a result of input received (if any) at the public hearing.

2. The General Manager is hereby authorized and directed to include a copy of this Resolution in Water Facilities Authority's 2020 Plan.

3. The General Manager is hereby authorized and directed, in accordance with Water Code sections 10621(d) and 10644(a)(1)-(2), to electronically submit a copy of the 2020 Plan to the DWR no later than July 1, 2021.

4. The General Manager is hereby authorized and directed, in accordance with Water Code section 10644(a), to submit a copy of the 2020 Plan to the California State Library, and any city of county within which Water Facilities Authority provides water supplies no later than thirty (30) days after this adoption date.

5. The General Manager is hereby authorized and directed, in accordance with Water Code section 10645, to make the 2020 Plan available for public review at the Water Facilities Authority's offices during normal business hours or on the Water Facilities Authority's website no later than thirty (30) days after filing a copy of the Plan with DWR.

6. The General Manager is hereby authorized and directed, in accordance with Water Code Section 10635(c), to provide that portion of the 2020 Plan prepared pursuant to Water Code Section 10635(a)-(b) to any city or county within which Water Facilities Authority

provides water supplies no later than sixty (60) days after submitting a copy of the Plan with DWR.

7. The General Manager is hereby authorized and directed to implement the 2020 Plan in accordance with the Act and SB X7-7 and to provide recommendations to the Board of Directors regarding the necessary budgets, procedures, rules, regulations, or further actions to carry out the effective and equitable implementation of the 2020 Plan.

8. Board of Directors finds and determines that this resolution is not subject to CEQA pursuant to Water Code Section 10652 because CEQA does not apply to the preparation and adoption, including addenda thereto, of an urban water management plan or to the implementation of the actions taken pursuant to such plans. Because this resolution comprises Board of Director's adoption of the 2020 Plan and involves its implementation, no CEQA review is required.

9. Pursuant to CEQA, the Board of Directors directs staff to file a Notice of Exemption with the Clerk's office of San Bernardino County within five (5) working days of adoption of this resolution.

10. The document and materials that constitute the record of proceedings on which this resolution and the above findings have been based are located at Water Facilities Authority's main office. The custodian for these records is the Office Manager.

APPROVED AND ADOPTED at a regular meeting of the Governing Board of Water Facilities Authority held on the 17th day of June, 2021, by the following vote, to wit:

Ayes:	Dorst-Porada, Milhiser, Rogers, Ulloa, Velto
Nays:	None
Absent:	None
Abstain:	None

Peter Rogers, Chairman

ATTEST:

Debra Dorst-Porada, Board Secretary

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RESOLUTION 2021-06-02

RESOLUTION OF THE WATER FACILITIES AUTHORITY
ADOPTING A WATER SHORTAGE CONTINGENCY PLAN (WSCP)

WHEREAS, The California Urban Water Management Planning Act, (Wat. Code §10610, et seq. (the Act)), mandates that every urban supplier of water providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare and adopt, in accordance with prescribed requirements, a Water Shortage Contingency Plan (WSCP) as part of its Urban Water Management Plan (Plan); and

WHEREAS, the Act specifies the requirements and procedures for adopting such WSCPs; and

WHEREAS, pursuant to recent amendments to the Act, urban water suppliers are required to adopt and electronically submit their WSCPs to the California Department of Water Resources (DWR) by July 1, 2021; and

WHEREAS, pursuant to the Act, "urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers; and

WHEREAS, Water Facilities Authority meets the definition of an urban water supplier for purposes of the Act and is required to prepare and adopt and WSCP as part of its 2020 Plan; and

WHEREAS, Water Facilities Authority has prepared a WSCP in accordance with the Act, and in accordance with applicable legal requirements, has undertaken certain coordination, notice, public involvement, public comment, and other procedures in relation to its WSCP; and

WHEREAS, in accordance with the Act, Water Facilities Authority has prepared its WSCP with its own staff, with the assistance of consulting professionals, and in cooperation with other governmental agencies, and has utilized and relied upon industry standards and the expertise of industry professionals in preparing its WSCP, and has also utilized DWR's Urban Water Management Plan Guidebook 2020, including its related appendices, in preparing its WSCP; and

WHEREAS, in accordance with applicable law, including Water Code section 10642, and Government Code section 6066, a Notice of a Public Hearing regarding Water Facilities Authority's WSCP was published within the jurisdiction of Water Facilities Authority on June 3, 2021 and June 10, 2021; and

WHEREAS, in accordance with applicable law, including but not limited to Water Code section 10642, a public hearing was held on June 17, 2021 at 7:30 AM, or soon thereafter, via zoom web conference and teleconference in order to provide members of the public and other interested entities with the opportunity to be heard in connection with proposed adoption of the WSCP and issues related thereto; and

WHEREAS, pursuant to said public hearing on Water Facilities Authority's WSCP, Water Facilities Authority, among other things, encouraged the active involvement of diverse social, cultural, and economic members of the community within Water Facilities Authority's service area with regard to the WSCP, and encouraged community input regarding Water Facilities Authority's WSCP; and

WHEREAS, the Board of Directors has reviewed and considered the purposes and requirements of the Act, the contents of the WSCP, and the documentation contained in the administrative record in support of the WSCP, and has determined that the factual analyses and conclusions set forth in the WSCP are legally sufficient; and

WHEREAS, the Board of Directors desires to adopt the WSCP and to incorporate it as part of its 2020 Plan prior to July 1, 2021 in order to comply with the Act.

WHEREAS, Section 10652 of the California Water Code provides that the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) (CEQA) does not apply to the preparation and adoption of a WSCP as part of Plan pursuant to California Water Code section 10632.

NOW THEREFORE BE IT RESOLVED, the Board of Directors of the Water Facilities Authority hereby resolves as follows:

1. The Water Shortage Contingency Plan (WSCP) is hereby adopted as amended by changes incorporated by the Board of Directors as a result of input received (if any) at the public hearing and shall be incorporated into Water Facilities Authority's 2020 Plan;

2. The General Manager is hereby authorized and directed to include a copy of this Resolution in Water Facilities Authority's WSCP and/or in Water Facilities Authority's 2020 Plan;

3. The General Manager is hereby authorized and directed, in accordance with Water Code sections 10621(d) and 10644(a)(1)-(2), to electronically submit a copy of the WSCP, as part of its 2020 Plan, to DWR no later than July 1, 2021;

4. The General Manager is hereby authorized and directed, in accordance with Water Code section 10644(a), to submit a copy of the WSCP, as part of its 2020 Plan, to the California State Library, and to any city or county within which Water Facilities Authority provides water supplies no later than thirty (30) days after this adoption date;

5. The General Manager is hereby authorized and directed, in accordance with Water Code section 10645, to make the WSCP available for public review at Water Facilities Authority's offices during normal business hours and on its website at www.wfajpa.org no later than thirty (30) days after filing a copy of the WSCP, as part of its 2020 Plan, with DWR;

6. The General Manager is hereby authorized and directed to implement the WSCP in accordance with the Act and to provide recommendations to the Board of Directors regarding the necessary budgets, procedures, rules, regulations, or further actions to carry out the effective and equitable implementation of the WSCP.

7. Board of Directors finds and determines that this resolution is not subject to CEQA pursuant to Water Code Section 10652 because CEQA does not apply to the preparation and adoption of a WSCP or to the implementation of the actions taken pursuant to such plans. Because this resolution comprises Board of Director's adoption of its WSCP and involves its implementation, no CEQA review is required.

8. Pursuant to CEQA, the Board of Directors directs staff to file a Notice of Exemption with the clerk's office at County of San Bernardino within five (5) working days of adoption of this resolution.

9. The document and materials that constitute the record of proceedings on which this resolution and the above findings have been based are located at Water Facilities Authority's main office. The custodian for these records is the Office Manager.

APPROVED AND ADOPTED at a regular meeting of the Governing Board of Water Facilities Authority held on the 17th day of June, 2021, by the following vote, to wit:

Ayes:	Dorst-Porada, Milhiser, Rogers, Ulloa, Velto
Nays:	None
Absent:	None
Abstain:	None

Peter Rogers, Chairman

ATTEST:

Debra Dorst-Porada, Board Secretary

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RESOLUTION 2021-06-03

RESOLUTION OF THE WATER FACILITIES AUTHORITY
ADOPTING AN ADDENDUM TO THE 2015 URBAN WATER MANAGEMENT PLAN

WHEREAS, The California Urban Water Management Planning Act, (Wat. Code §10610, et seq. (the Act)), mandates that every urban supplier of water providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare an Urban Water Management Plan (Plan); and

WHEREAS, the Act generally requires that said Plan be updated and adopted at least once every five years on or before July 1, in years ending in six and one; and

WHEREAS, pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code § 85000, et seq.), the Delta Plan, and Water Code section 85021, which declares that the State's policy is to "reduce reliance on the Delta in meeting California's future water needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency," urban water suppliers are encouraged by the California Department of Resources (DWR) and the Delta Stewardship Council (DSC) to consider adopting an Addendum to their 2015 Plans to demonstrate consistency with the Delta Plan Policy WR P1 to Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003); and

WHEREAS, Water Facilities Authority meets the definition of an urban retail water supplier for purposes of the Act; and

WHEREAS, Water Facilities Authority has prepared an Addendum to its 2015 Plan in accordance with Delta Plan Policy WR P1, and in accordance with applicable legal requirements, has undertaken certain coordination, notice, public involvement, public comment, and other procedures in relation to its Addendum; and

WHEREAS, in accordance with the Act and Delta Plan Policy WR P1, Water Facilities Authority has prepared its Addendum to the 2015 Plan with its own staff, with the assistance of consulting professionals, and in cooperation with other governmental agencies, and has utilized and relied upon industry standards and the expertise of industry professionals in preparing its Addendum to its 2015 Plan, and has also utilized DWR's Urban Water Management Plan Guidebook 2020, including its related appendices, in preparing its Addendum to the 2015 Plan; and

WHEREAS, in accordance with applicable law, including Water Code section 10642, and Government Code section 6066, a Notice of a Public Hearing regarding Water Facilities Authority's Addendum to the 2015 Plan was published within the jurisdiction of Water Facilities Authority on June 3, 2021 and June 10, 2021; and

WHEREAS, in accordance with applicable law, including but not limited to Water Code section 10642, a public hearing was held on June 17, 2021 at 7:30 AM, or soon thereafter, via Zoom web conference and teleconference in order to provide members of the public and other interested entities with the opportunity to be heard in connection with proposed adoption of the Addendum to the 2015 Plan and issues related thereto; and

WHEREAS, pursuant to said public hearing on Water Facilities Authority's Addendum to the 2015 Plan, Water Facilities Authority, among other things, encouraged the active involvement of diverse social, cultural, and economic members of the community within Water Facilities Authority's service area with regard to the Addendum to the 2015 Plan and encouraged community input regarding Water Facilities Authority's Addendum to the 2015 Plan; and

WHEREAS, the Board of Directors has reviewed and considered the purposes and requirements of the Act and Delta Plan Policy WR P1, the contents of the Addendum to the 2015 Plan, and the documentation contained in the administrative record in support of the Addendum to the 2015 Plan, and has determined that the factual analyses and conclusions set forth in the Addendum to the 2015 Plan are legally sufficient; and

WHEREAS, the Board of Directors desires to adopt the Addendum to the 2015 Plan prior to July 1, 2021 in order to comply with the Act and Delta Plan Policy WR P1.

WHEREAS, Section 10652 of the California Water Code provides that the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) (CEQA) does not apply to the preparation and adoption, including addenda thereto, of urban water management plans pursuant to this part.

NOW THEREFORE BE IT RESOLVED, the Board of Directors of the Water Facilities Authority hereby resolves as follows:

1. The Addendum to Water Facilities Authority's 2015 Urban Water Management Plan to demonstrate consistency with the Delta Plan Policy to Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance is hereby adopted as amended by changes incorporated by the Board of Directors as a result of input received (if any) at the public hearing;

2. The General Manager is hereby authorized and directed to include a copy of this Resolution in Water Facilities Authority's 2015 Plan Addendum;

3. The General Manager is hereby authorized and directed, in accordance with Water Code sections 10621(d) and 10644(a)(1)-(2), to electronically submit a copy of the Addendum to the 2015 Plan to DWR no later than July 1, 2021;

4. The General Manager is hereby authorized and directed, in accordance with Water Code section 10644(a), to submit a copy of the Addendum to the 2015 Plan to the California State Library, and to any city or county within which Water Facilities Authority provides water supplies no later than thirty (30) days after this adoption date;

5. The General Manager is hereby authorized and directed, in accordance with Water Code section 10645, to make the Addendum to the 2015 Plan available for public review at Water Facilities Authority's offices during normal business hours and on its website at www.wfajpa.org no later than thirty (30) days after filing a copy of the Addendum to the 2015 Plan with DWR.

6. Board of Directors finds and determines that this resolution is not subject to CEQA pursuant to Water Code Section 10652 because CEQA does not apply to the preparation and

adoption, including addenda thereto, of an urban water management plan or to the implementation of the actions taken pursuant to such plans. Because this resolution comprises Board of Director's adoption of its Addendum to the 2015 Plan and involves its implementation, no CEQA review is required.

7. Pursuant to CEQA, the Board of Director directs staff to file a Notice of Exemption with the clerk's office at County of San Bernardino within five (5) working days of adoption of this resolution.

8. The document and materials that constitute the record of proceedings on which this resolution and the above findings have been based are located at Water Facilities Authority's main office. The custodian for these records is the Office Manager.

APPROVED AND ADOPTED at a regular meeting of the Governing Board of Water Facilities Authority held on the 17th day of June, 2021, by the following vote, to wit:

Ayes: Dorst-Porada, Milhiser, Rogers, Ulloa, Velto
Nays:
Absent:
Abstain:

Peter Rogers

Peter Rogers, Chairman

ATTEST:

Debra Dorst-Porada, Board Secretary

APPENDIX G

CEQA NOTICE OF EXEMPTION

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NOTICE OF EXEMPTION

TO:	☐ Clerk of the Board of Supervisors or ☒ County Clerk County of: San Bernardino	FROM: Terry Catlin Water Facilities Authority 1775 North Benson Avenue Upland, CA 91784
1.	Project Title:	2020 Urban Water Management Plan, 2020 Water Shortage Contingency Plan, and Addendum to 2015 Urban Water Management Plan
2.	Project Location – Identify street address and cross streets or attach a map showing project site (preferably a USGS 15' or 7 1/2' topographical map identified by quadrangle name):	Water Facilities Authority 1775 North Benson Avenue (between 17th & 18th Streets) Upland, CA 91784
3.	(a) Project Location – City:	Upland
	(b) Project Location – County:	San Bernardino
4.	Description of nature, purpose, and beneficiaries of Project:	Statutory requirement to provide information regarding wholesaler's existing and projected sources of water supply, existing and projected water demands, water service reliability, demand management measures, and water shortage contingency planning. Beneficiaries are the Department of Water Resources, the public and those served within the service area of the Water Facilities Authority.
5.	Name of Public Agency approving project:	Water Facilities Authority
6.	Name of Person or Agency carrying out project:	Terry Catlin, General Manager
7.	Exempt status: (check one)	
	(a) ☐ Ministerial project.	
	(b) ☐ Not a project.	
	(c) ☐ Emergency Project.	
	(d) ☐ Categorical Exemption. State type and class number:	
	(e) ☐ Declared Emergency.	
	(f) ☒ Statutory Exemption. State Code section number:	California Water Code §10652
	(g) ☐ Other. Explanation:	
8.	Reason why project was exempt:	The Project is <u>statutorily exempt</u> from CEQA pursuant to California Water Code §10652 because CEQA does not apply to the preparation and adoption of an (urban water management plan/water shortage contingency plan) or to the implementation of the actions taken pursuant to such plans. Because this Project comprises of Water Facilities Authority's urban water management plan/water shortage contingency plan and involves its implementation, no CEQA review is required.
9.	Contact Person:	Terry Catlin, General Manager
	Telephone:	909.981.9454, x12
10.	Attach Preliminary Exemption Assessment (Form "A") before filing.	

NOTICE OF EXEMPTION

Date Received for Filing: ____________	____________ Signature (Lead Agency Representative) TERRY CATLIN
(Clerk Stamp Here)	General Manager Title

PRELIMINARY EXEMPTION ASSESSMENT

(Certificate of Determination
When Attached to Notice of Exemption)

11.	Name or description of project:	2020 Urban Water Management Plan, 2020 Water Shortage Contingency Plan, and Addendum to 2015 Urban Water Management Plan			
12.	Project Location – Identify street address and cross streets or attach a map showing project site (preferably a USGS 15' or 7 1/2' topographical map identified by quadrangle name):	Water Facilities Authority 1775 North Benson Avenue (between 17th & 18th Streets) Upland, CA 91784			
13.	Entity or person undertaking project:	A.	909.981.9454, 12		
	Water Facilities Authority	B.	Other (Private)		
			(1)	Name	Terry Catlin, General Manager
			(2)	Address	1775 North Benson Avenue Upland, CA 91784

14. Staff Determination:

The Lead Agency's Staff, having undertaken and completed a preliminary review of this project in accordance with the Lead Agency's "Local Guidelines for Implementing the California Environmental Quality Act (CEQA)" has concluded that this project does not require further environmental assessment because:

(a)	☐	The proposed action does not constitute a project under CEQA.	
(b)	☐	The project is a Ministerial Project.	
(c)	☐	The project is an Emergency Project.	
(d)	☐	The project constitutes a feasibility or planning study.	
(e)	☐	The project is categorically exempt.	
		Applicable Exemption Class:	
(f)	☒	The project is statutorily exempt.	
		Applicable Exemption:	California Water Code §1652
(g)	☐	The project is otherwise exempt on the following basis:	
(h)	☐	The project involves another public agency which constitutes the Lead Agency.	
		Name of Lead Agency:	

Date: June 17, 2021

Staff: [signature]

Terry Catlin, General Manager

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APPENDIX G

Chino Basin Desalter Authority 2020 UWMP

CHINO BASIN DESALTER AUTHORITY

CDA CHINO BASIN DESALTER AUTHORITY

JUNE 2021

FINAL

2020 URBAN WATER MANAGEMENT PLAN

STETSON ENGINEERS INC.

Northern California • Southern California • Arizona • Colorado • Oregon

CHINO BASIN
DESALTER
AUTHORITY

Chino Basin Desalter Authority (CDA) 2020 Urban Water Management Plan

JUNE 2021

STETSON ENGINEERS INC.
861 Village Oaks Drive, Suite 100 • Covina, California 91724
Phone: (626) 967-6202 • FAX: (626) 331-7065 • Web site: www.stetsonengineers.com
Northern California • Southern California • New Mexico • Arizona • Nevada • Colorado

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LIST OF ACRONYMS

AB	Assembly Bill
AF	Acre-Feet
AFY	Acre-Feet per Year
AWWA	American Water Works Association
CY	Calendar Year
CIMIS	California Irrigation Management Information System
CWC	California Water Code
CDA	Chino Basin Desalter Authority
CEQA	California Environmental Quality Act
COCs	Constituents of Concern
Delta	Sacramento- San Joaquin Delta
DOF	California Department of Finance
DMM	Demand Management Measures
DRA	Drought Risk Assessment
DWR	California Department of Water Resources
DYYP	MWD's Dry-Year Yield Program
EOP	San Bernardino County Emergency Operations Plan
ERP	Emergency Response Plan
ETo	Evapotranspiration
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GAC	Granular Activated Carbon
GPCD	Gallons per Capita per Day
GPM	Gallons per Minute
GIS	Geographical Information Systems
GSP	Groundwater Sustainability Plan
IEUA	Inland Empire Utilities Agency
InSAR	Remote Sensing Techniques
JCSD	Jurupa Community Services District
JPA	Joint Exercise of Powers Agreement
kWh	Kilowatt Hours
MGD	Million gallons per day
MWD	Metropolitan Water District of Southern California
M&I	Municipal and Industrial
MZ	Management Zone
OBMP	Chino Basin Optimum Basin Management Program
PCE	Perchloroethylene
Plan	Urban Water Management Plan
PWS	Public Water System

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RRA	Risk and Resilience Assessment
SARWC	Santa Ana River Water Company
SB	Senate Bill
SBCFCD	San Bernardino County Flood Control District
SB X7-7	The Water Conservation Act of 2009
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SGMA	Sustainable Groundwater Management Act of 2014
SWRCB-DDW	State Water Resources Control Board - Division of Drinking Water
SWP	State Water Project
TCE	Trichloroethylene
1,2,3- TCP	Trichloropropane
TDS	Total Dissolved Solids
USEPA	United States Environmental Protection Agency
UWMP	Urban Water Management Plan
VOCs	Volatile Organic Chemicals
WEWAC	Water Education Water Awareness Committee
WMWD	Western Municipal Water District
WRCC	Western Regional Climate Center
WSCP	Water Shortage Contingency Plan
WUE	Water Use Efficiency

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Chapter 1

URBAN WATER MANAGEMENT PLAN INTRODUCTION AND OVERVIEW

LAY DESCRIPTION - INTRODUCTION

An urban water supplier is defined (pursuant to Section 10617 of the California Water Code1) as "*a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers.*"

The Chino Basin Desalter Authority (CDA) is classified as an urban water supplier because it serves more than 3,000 customers (i.e. individual metered accounts) and it supplies more than 3,000 acre-feet of water annually to its member agency customers for municipal purposes.

In accordance with the "Urban Water Management Planning Act", which was enacted by the California Legislature in 1983, every urban water supplier (including CDA) is required to prepare and adopt an Urban Water Management Plan (UWMP), periodically review its UWMP, and incorporate updated and new information into an updated UWMP at least once every five years.

CDA's most recent update was its 2015 UWMP (or 2015 Plan) which was submitted to, and approved by, the California Department of Water Resources (DWR). Urban water suppliers (including CDA) are required to complete and submit their 2020 UWMPs to DWR by July 1st, 2021.

The current requirements for preparing the UWMP are included in California Water Code (CWC) Sections 10608 through 10657. CDA's 2020 UWMP (or 2020 Plan) was prepared consistent with the CWC and the recommended organization provided in DWR's Final "Urban Water Management Plan Guidebook 2020" (Final 2020 UWMP Guidebook), dated March 2021.

The UWMP provides urban water suppliers (including CDA) with a reliable management action plan for long-term resource planning to ensure adequate water supplies are available to meet existing and future water supply needs. In addition, the 2020 UMWP incorporates water supply reliability determinations resulting from potential prolonged drought, regulatory revisions, and/or changing climatic conditions.

1 References to CWC Sections in this 2020 UWMP were obtained from https://leginfo.legislature.ca.gov/

CDA's 2020 Plan consists of the following Chapters:

Chapter 1 Urban Water Management Plan Introduction and Overview
Chapter 2 Plan Preparation
Chapter 3 System Description
Chapter 4 Water Use Characterization
Chapter 5 SB_X7-7 Baselines, Targets, and 2020 Compliance
Chapter 6 Water Supply Characterization
Chapter 7 Water Service Reliability and Drought Risk Assessment
Chapter 8 Water Shortage Contingency Plan
Chapter 9 Demand Management Measures
Chapter 10 Plan Adoption, Submittal, and Implementation

A lay description is presented at the beginning of each of these Chapters.

LAY DESCRIPTION – CHAPTER 1

URBAN WATER MANAGEMENT PLAN INTRODUCTION AND OVERVIEW

Chapter 1 (Urban Water Management Plan Introduction and Overview) of CDA's 2020 Plan discusses and provides the following:

- An overall lay description of the 2020 Plan, including California Water Code and Urban Water Management Plan Act requirements, is provided. CDA is required to prepare an Urban Water Management Plan.
- CDA's 2020 Plan was prepared consistent with the recommended organization provided in DWR's Final "Urban Water Management Plan Guidebook 2020", dated March 2021. A description regarding the organization of the 2020 Plan, including a summary of each Chapter, is provided. CDA's Water Shortage Contingency Plan (discussed in Chapter 8) is also included in the 2020 Plan.
- The 2020 Plan incorporates DWR's water use and supply tables (standardized tables) for the reporting and submittal of UWMP data. These tables are included within the respective sections of the 2020 Plan and in Appendix A.
- CDA's coordination efforts with other planning agencies are discussed, including coordination efforts with the Inland Empire Utilities Agency and the Southern California Association of Governments.
- CDA's eligibility to receive grants and loans administered by the State of California and/or DWR, as a result of preparing the 2020 Plan, is discussed.
- The checklist developed by DWR and used by CDA to incorporate the specific UWMP requirements is discussed. The completed checklist is provided in Appendix B.

1.1 RECOMMENDED UWMP ORGANIZATION

CDA's 2020 Urban Water Management Plan (2020 Plan) was prepared consistent with the recommended organization provided in DWR's Final "Urban Water Management Plan Guidebook 2020" (Final 2020 UWMP Guidebook), dated March 2021. CDA's 2020 Plan consists of the following Chapters:

Chapter 1	Urban Water Management Plan Introduction and Overview
Chapter 2	Plan Preparation
Chapter 3	System Description
Chapter 4	Water Use Characterization
Chapter 5	SB X7-7 Baselines, Targets, and 2020 Compliance
Chapter 6	Water Supply Characterization
Chapter 7	Water Service Reliability and Drought Risk Assessment
Chapter 8	Water Shortage Contingency Plan
Chapter 9	Demand Management Measures
Chapter 10	Plan Adoption, Submittal, and Implementation

Pursuant to CWC requirements, CDA's 2020 Plan incorporates DWR's water use and supply tables (standardized tables) for the reporting and submittal of UWMP data. DWR's standardized tables are provided within the body of the 2020 Plan text as well as in Appendix A. CDA also submitted the UWMP data (standardized tables) electronically through DWR's Online Submittal Tool.

CDA's 2020 Plan also provides supporting documents (appendices) including notification letters of the Plan update, public notice of the Plan hearing, and adoption resolution from CDA's governing body. Further discussions regarding these supporting documents are provided within the individual Chapters of CDA's 2020 Plan.

1.2 UWMPS IN RELATION TO OTHER EFFORTS

CDA's 2020 Plan was prepared in coordination with planning agencies including the Inland Empire Utilities Agency (IEUA) Planning Division, the San Bernardino County Planning Division, and the Southern California Association of Governments (SCAG). In addition, CDA's 2020 Plan was prepared using management documents including IEUA's "Regional Water Use Efficiency Business Plan 2015 – 2020" and San Bernardino County's 2017 "San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan" and "San Bernardino County Emergency Operations Plan (EOP)".

CDA is a wholesale water agency formed under a Joint Exercise of Powers Agreement by a group of local agencies including the Jurupa Community Services District (JCSD), Santa Ana River

Water Company (SARWC), IEUA, Western Municipal Water District (WMWD), and the Cities of Chino, Chino Hills, Norco, and Ontario. CDA provided its 2020 Plan to its member agencies which includes projections of its water deliveries to CDA's member agencies in five-year increments for a normal year, a single dry year, and a five consecutive year drought conditions over the next 25 years.

1.3 UWMPS AND GRANT OR LOAN ELIGIBILITY

Pursuant to DWR's Final 2020 UWMP Guidebook:

"*In order for a Supplier to be eligible for any water grant or loan administered by DWR, the Supplier must have a current UWMP on file that has been determined by DWR to address the requirements of the Water Code. A current UWMP must also be maintained by the Supplier throughout the term of any grant or loan administered by DWR. A UWMP may also be required in order to be eligible for other state funding, depending on the conditions that are specified in the funding guidelines. Suppliers are encouraged to seek guidance on the specifics of any state funding source from the respective funding agencies. The following sections of the Water Code are pertinent to Suppliers considering pursuit of grants or loans*."

CDA's 2020 Plan has been prepared to meet eligibility requirements for grants and loans administered by the State and/or DWR.

1.4 DEMONSTRATION OF CONSISTENCY WITH THE DELTA PLAN FOR PARTICIPANTS IN COVERED ACTIONS

Pursuant to DWR, an urban water supplier that anticipates participating in or receiving water from a proposed project (or "covered action") such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Sacramento-San Joaquin Delta (Delta) should provide information in their 2015 and 2020 UWMPs for use in demonstrating consistency with Delta Plan Policy WR P1, "*Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance*". In addition, pursuant to California Code of Regulations, Title 23, § 5003:

> *(c)(1) Water suppliers that have done all of the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:*
>
> > *(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for*

> *compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;*
>
> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and*
>
> *(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).*

CDA was formed to treat contaminated groundwater from the southwesterly portion of Chino Basin and provide that treated water to its member agencies. The quantity of groundwater being treated is fixed, regardless of climate change conditions, in order to control contaminant migration. In this context, each member agency's UWMP will describe the agency's reduced regional reliance on imported water supplies from the Delta. However, CDA does not have a demand on the imported water supplies and this section is not applicable.

1.5 TIPS FOR UWMP PREPARERS

CDA's 2020 Plan (which includes CDA's 2020 Water Shortage Contingency Plan (WSCP)) is considered an update to CDA's 2015 Plan. However, the 2020 Plan and the WSCP are considered stand-alone documents. As discussed in Section 1.1, CDA's 2020 Plan was prepared consistent with the recommended organization provided in DWR's Final 2020 UWMP Guidebook.

A checklist of specific UWMP requirements is included in Appendix B. The checklist includes the page number where the required elements are addressed to assist in DWR's review of the submitted Plan.

Chapter 2

PLAN PREPARATION

LAY DESCRIPTION – CHAPTER 2

PLAN PREPARATION

Chapter 2 (Plan Preparation) of CDA's 2020 Plan discusses and provides the following:

- The basis for preparing an Urban Water Management Plan is provided. CDA is required to prepare the 2020 Plan because it is an "urban water supplier" (CDA serves more than 3,000 customers and it supplies more than 3,000 acre-feet of water annually to its customers for municipal purposes).
- CDA's Plan has been prepared as an "individual" plan rather than a "regional" plan in an effort to provide information specific to CDA to best inform its employees, management, and customers.
- Information presented in CDA's 2020 Plan is provided on "Fiscal Year" basis which is from July 1 through June 30 of the following year.
- Water quantities presented in CDA's 2020 Plan are provided on an "acre-foot" basis.
- CDA's coordination and outreach efforts with wholesale water agencies, other retail water agencies, and the community are described. CDA coordinated the preparation of its 2020 Plan with the following:
    - City of Chino
    - City of Chino Hills
    - City of Eastvale
    - City of Jurupa Valley
    - City of Norco
    - City of Ontario
    - County of San Bernardino
    - County of Riverside
    - Jurupa Community Services District
    - Santa Ana Watershed Project Authority
    - Inland Empire Utilities Agency
    - Metropolitan Water District of Southern California
    - Chino Basin Watermaster
- CDA's notification process to the cities and county within which CDA provides water supplies to is discussed.

2.1 PLAN PREPARATION

As discussed in Section 1.1, CDA's 2020 Plan was prepared consistent with the recommended organization provided in DWR's Final 2020 UWMP Guidebook. Pursuant to DWR's Final 2020 UWMP Guidebook:

"*The California Water Code (Water Code) specifies several requirements for preparing a UWMP, including who is required to prepare a UWMP; how to prepare a UWMP, depending on whether the Supplier choses to participate in a regional or individual planning effort; selection of reporting year-type; and coordination, notification, and outreach.*"

Pursuant to CWC requirements, CDA's 2020 Plan incorporates DWR's water use and supply tables (standardized tables) for the reporting and submittal of UWMP data.

2.2 BASIS FOR PREPARING A PLAN

CWC 10617.

"Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

CWC 10620.

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

CWC 10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update.

CDA's 2020 Plan was prepared in accordance with the UWMP Act which was established in 1983. The UWMP Act requires every "urban water supplier" to prepare and adopt a Plan, to periodically review its Plan at least once every five years and make any amendments or changes which are indicated by the review. An "Urban Water Supplier" is defined as a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually.

Section 10621(a) of the CWC states, "*Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update*". As a result, DWR requires the 2020 Plans be submitted by July 1, 2021.

CDA is an "urban water supplier" pursuant to Section 10617 of the CWC and indirectly serves potable water to more than 3,000 customers and supplies more than 3,000 acre-feet per year (AFY) at retail for municipal purposes. CDA's 2020 Plan is an update to CDA's 2015 Plan.

2.2.1 PUBLIC WATER SYSTEMS

CWC 10644.

(a)(2) The plan, or amendments to the plan, submitted to the department ... shall include any standardized forms, tables, or displays specified by the department.

California Health and Safety Code 116275.

(h) "Public water system" means a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year.

Pursuant to CWC requirements, CDA's 2020 Plan incorporates DWR's standardized tables for the reporting and submittal of UWMP data. The standardized tables are provided within the body of the 2020 Plan text as well as in Appendix A. CDA also submitted the UWMP data (from the standardized tables) electronically through DWR's Online Submittal Tool.

CDA consists of two Public Water Systems (PWS) which are regulated by the State Water Resources Control Board - Division of Drinking Water (SWRCB-DDW). The PWS number for CDA – Desalter 1 is CA3610075 and the PWS number for CDA – Desalter 2 is CA3310083. However, as a wholesale water agency, CDA is not required by DWR to provide PWS information in this Plan, therefore Table 2-1 is not applicable.

Table 2-1 Public Water Systems (Not Applicable)
Table 2-1 is not applicable for wholesalers.

2.2.2 SUPPLIERS SERVING MULTIPLE SERVICE AREAS / PUBLIC WATER SYSTEMS

CDA has developed its 2020 Plan, based solely on its water sales to its member agencies, to address all requirements of the CWC. However, based upon their 2020 water production and imported water deliveries, the following urban water suppliers (or Public Water Systems) receiving CDA water supplies may be required to prepare a Plan:

- Jurupa Community Services District
- Santa Ana River Water Company
- Western Municipal Water District
- City of Chino
- City of Chino Hills
- City of Norco
- City of Ontario

2.3 REGIONAL PLANNING

CDA has developed its 2020 Plan based on water sales to its member agencies to address all requirements of the CWC. CDA's 2020 Plan was not developed as a Regional Plan. However, CDA's Plan is available for use and reference to its member agencies.

CDA coordinated with its member agencies regarding the development of the 2020 Plan. Likewise, IEUA and WMWD's 2020 Plans are available for use and reference by its member agencies and urban water suppliers within those member agencies.

2.4 INDIVIDUAL OR REGIONAL PLANNING AND COMPLIANCE

As shown in Table 2-2, CDA's 2020 Plan is an "Individual UWMP". CDA has developed its 2020 Plan reporting solely on its water sales to its member agencies to address all requirements of the CWC. CDA notified and coordinated with appropriate regional agencies and constituents (See Section 2.6).

Table 2-2 Plan Identification Type

Submittal Table 2-2: Plan Identification			
Select Only One	Type of Plan		Name of RUWMP or Regional Alliance *if applicable* (select from drop down list)
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

2.4.1 REGIONAL UWMP

CWC 10620.

(d)(1) An urban water supplier may satisfy the requirements of this part by participation in area wide, regional, watershed, or basin wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

As indicated in Table 2-2, CDA's 2020 Plan was developed as an "Individual UWMP" and not part of a Regional Plan.

2.4.2 REGIONAL ALLIANCE

CWC 10608.20.

(a)(1) …Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28…

CWC 10608.28.

(a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

(1) Through an urban wholesale water supplier.

(2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31 (commencing with Section 81300)).

(3) Through a regional water management group as defined in Section 10537.

(4) By an integrated regional water management funding area.

(5) By hydrologic region.

(6) Through other appropriate geographic scales for which computation methods have been developed by the department.

(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

As indicated in Table 2-2, CDA's 2020 Plan was developed as an "Individual UWMP" and not part of a Regional Alliance.

2.5 FISCAL OR CALENDAR YEAR AND UNITS OF MEASURE

CWC 10608.20.

(a)(1) Urban retail water suppliers…may determine the targets on a fiscal or calendar year basis.

2.5.1 FISCAL OR CALENDAR YEAR

The data provided in CDA's 2020 Plan is reported on a fiscal year (FY) basis, unless noted otherwise, as shown in Table 2-3. A FY begins on July 1st of every year.

Table 2-3 Supplier Identification

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☑	Supplier is a wholesaler
☐	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables are in calendar years
☑	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
07/01	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

2.5.2 REPORTING COMPLETE 2020 DATA

The data provided in CDA's 2020 Plan is provided on a FY basis through June 30, 2020.

2.5.3 UNITS OF MEASURE

As shown in Table 2-3, the data provided in CDA's 2020 Plan is reported in units of AF, unless noted otherwise.

2.6 COORDINATION AND OUTREACH

CWC 10631.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

2.6.1 WHOLESALE AND RETAIL COORDINATION

CDA is a wholesale agency comprised of eight (8) member agencies. The following list is a list of CDA's member agencies:

- Jurupa Community Services District
- Santa Ana River Water Company
- Inland Empire Utilities Agency
- Western Municipal Water District
- City of Chino
- City of Chino Hills
- City of Norco
- City of Ontario

CDA provides water supplies to its member agencies, with the exception of Inland Empire Utilities Agency. As indicated in Table 2-4, CDA has provided its 2020 Plan to its member agencies which includes water use projections of its water sales to its member agencies in five-year increments for a normal year, a single dry year, and a five consecutive year drought conditions over the next 25 years.

Table 2-4 Water Supplier Information Exchange

Submittal Table 2-4 Wholesale: Water Supplier Information Exchange (select one)	
☑	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with Water Code Section 10631. Completion of the table below is optional. If not completed, include a list of the water suppliers that were informed.
Section 2.6	**Provide page number for location of the list.**
☐	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631. **Complete the table below.**
Water Supplier Name	
Add additional rows as needed	
NOTES:	

2.6.2 COORDINATION WITH OTHER AGENCIES AND THE COMMUNITY

CWC 10620.

(d)(3) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

CWC 10642.

Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of both the plan…

CDA is a wholesale water supplier that provides treated groundwater from the Chino Basin to its member agencies. CDA notified its member agencies (including cities and counties within the area receiving its water supplies) and public agencies that share a common source of supply from the Chino Basin about the preparation of CDA's 2020 Plan. CDA provided copies of the draft plan to the following:

- City of Chino
- City of Chino Hills
- City of Eastvale
- City of Jurupa Valley
- City of Norco
- City of Ontario
- County of San Bernardino
- County of Riverside
- Jurupa Community Services District
- Santa Ana Watershed Project Authority
- Inland Empire Utilities Agency
- Metropolitan Water District of Southern California
- Chino Basin Watermaster

As discussed in Section 10.2, CDA notified these agencies, as well as the cities and counties within which CDA provides water supplies, at least sixty (60) days prior to the public hearing of the preparation of the 2020 Plan and invited them to participate in the development of the 2020 Plan. A copy of the notification letters sent to these agencies is provided in Appendix C.

2.6.3 NOTICE TO CITIES AND COUNTIES

CWC 10621.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

As discussed in Section 10.2, notification was provided to the cities and counties within which CDA provides water supplies that CDA was reviewing and considering amendments (updates) to the previous 2015 Plan and as a result, prepare the 2020 Plan. Notification was provided at least 60 days prior to the public hearing (see Appendix C).

Chapter 3

SYSTEM DESCRIPTION

LAY DESCRIPTION – CHAPTER 3

SYSTEM DESCRIPTION

Chapter 3 (System Description) of CDA's 2020 Plan discusses and provides the following:

- A description of the area receiving water supplies from CDA is provided. The area receiving water supplies from CDA is located within the Western Municipal Water District in Riverside County and/or within the Inland Empire Utilities Agency in San Bernardino County. CDA was formed under a Joint Exercise of Powers Agreement to remove salts from brackish groundwater extracted from the lower Chino Basin and distribute it to its member agencies.
- The area receiving water supplies from CDA encompasses an area of approximately 304 square miles. The location of the area receiving water supplies form CDA is provided in Figure 1.
- A description regarding the climate of the area receiving water supplies from CDA is provided. The monthly historical average temperatures (including minimum and maximum), monthly historical average rainfall, and monthly evapotranspiration in the vicinity of the area receiving water supplies from CDA area is summarized. The sources of the climate information are also discussed.
- The population within the area receiving water supplies from CDA is discussed and projected. The sources of the population information are also discussed. CDA provides water service to an area with a current population of 664,270. The area receiving water supplies from CDA is projected to have a population of 963,819 by Fiscal Year 2044-45.
- A discussion of land use information used by CDA to develop the 2020 Plan is provided. CDA reviewed the current and projected land uses within its service area. CDA also reviewed data provided by the Southern California Association of Governments, the Department of Finance, and the United States Census Bureau and prepared for counties, cities, and unincorporated areas within Southern California.

3.1 GENERAL DESCRIPTION

<u>CWC 10631.</u>

(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.

In June 2000, the Optimum Basin Management Program was adopted by Chino Basin Watermaster and approved by the Superior Court to address water quality problems with the Chino Basin and to increase and improve the water supply. On September 25, 2001, CDA was formed under a Joint Exercise of Powers Agreement to remove salts from brackish groundwater extracted from the lower Chino Basin and distribute it to its member agencies. The CDA member agencies are located within the Western Municipal Water District in Riverside County and/or within the Inland Empire Utilities Agency in San Bernardino County. The area which receives water supplies from CDA is 304 square miles. A map showing the area which receives water supplies from CDA is provided in Figure 1.

CDA removes salts from brackish groundwater extracted from the lower Chino Basin with the Chino I and II Desalter facilities. The Chino I Desalter commenced operation in 2001 and was expanded in 2005. The Chino II Desalter is located in Jurupa Valley began operation in 2006 utilizing ion exchange (IX) and reverse osmosis (RO) treatment to treat brackish groundwater wells that also have elevated nitrate concentration. The original combined IX and RO treatment capacity was 10 million gallons per day (MGD). A 10.5 MGD expansion (6.5-mgd RO, 4.0-mgd IX) was subsequently constructed in 2011, for a total capacity of 20.5 (10 + 10.5) MGD. The expansion was constructed as part of the Phase 3 Expansion Project, to reach the groundwater extraction goal of 40,000 acre-feet per year (AFY) through upgrades to both desalters (Chino I and Chino II), new wells, pipelines, and pumping stations. Product water from the Chino II Desalter meets all state and federal drinking water regulations and provides 21,000 AFY (20.5 MGD) to the Cites of Ontario and Norco, Jurupa Community Services District, Santa Ana River Water Company, and Western Municipal Water District.

The overall RO process at the Chino II Desalter consists of five RO trains that normally operate at a recovery of 83.5 percent. The capacities of these trains are not identical. The permeate and concentrate production capacities of the three original RO trains are 2.0 and 0.04 MGD, respectively. The permeate and concentrate production capacities of the two RO trains added as part of the Chino II expansion are 3.25 MGD and 0.64 MGD, respectively. There are a total of eight IX vessels. The facility also has the capability to bypass a portion of the raw groundwater flow around the treatment processes to blend with the treated water, while meeting the final product water quality goals of 350 mg/L total dissolved solids (TDS) and 25 mg/L nitrate.

Subsequent to the plant expansion, CDA constructed the Concentrate Reduction Facility in 2017, which utilizes chemical softening to remove the limiting foulants (specifically, calcium and silica) from the RO concentrate. Softened water is then passed through granular media filters to provide particulate removal upstream of a secondary RO (SRO) process. Treated water (SRO permeate) is blended with the primary RO permeate, and SRO concentrate is disposed of into the Inland Empire Brine Line (IEBL), that conveys the concentrate to Orange County Sanitation District. Using this approach, total water recovery from the RO system at the Chino II Desalter is increased from 83.5 percent to as high as 95 percent, substantially reducing the volume of brine disposed into the IEBL while increasing permeate production.

The Chino II Desalter's original wellfield consisted of eight wells that supplied groundwater to the Chino II Desalter through a PVC pressure raw water pipeline. An additional three wells have been constructed for a total of eleven groundwater wells supplying the Desalter system. The wells are primarily located within the Cities of Ontario, Eastvale, and Jurupa Valley.

Additional components of the Chino II Desalter System were constructed as part of the South Archibald Plume Project to be operational in 2021, with the goal of removing and treated trichloroethylene (TCE) from groundwater wells impacted by the South Archibald Plume. The project entails integrating additional improvements into the Chino II system, including construction of dedicated transmission pipeline to convey impacted groundwater to the Desalter, and treating the high TCE ground water using CDA's existing reverse osmosis (RO) system, and a new air stripper system.

These Desalter systems collectively include 30 groundwater extraction wells, pumps, and pipelines that produce and convey untreated groundwater to treatment facilities. Waste process water is discharged to the Inland Empire Brine Line and conveyed to the Orange County Sanitation District for treatment and discharge to the Pacific Ocean.

3.2 SERVICE AREA BOUNDARY MAPS

As discussed in Section 3.1, the area which receives water supplies from CDA covers approximately 304 square miles, encompassing portions of the Counties of San Bernardino and Riverside. The area which receives water supplies from CDA relative to the municipal boundaries within the Counties of San Bernardino and Riverside is provided in Figure 2. The location of the service areas for CDA's member agencies is provided in Figure 3.

The map of the area receiving water supplies from CDA was submitted online through DWR's Population Tool in a "KML" file format (i.e. Google Earth format). The KML file was originally created in a Geographical Information Systems (GIS) shape file format and converted into a KML format. To the extent information was available, metadata was included in the KML file (including map projection, contact information, start and end dates for which the map is valid, constraints, attribute table definitions, and digitizing base).

3.3 SERVICE AREA CLIMATE

CWC 10631.

(a) Describe the service area of the supplier, including … climate…

CWC 10630.

It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

The monthly historical average temperatures (including minimum and maximum), monthly historical average rainfall, and monthly evapotranspiration (ETo) in the vicinity of the area receiving water supplies from CDA is summarized in the tabulation below. Historical climate information was obtained from the Western Regional Climate Center (WRCC), the National Oceanic and Atmospheric Administration, and from DWR's California Irrigation Management Information System (CIMIS).

Service Area Climate Information

Month	Average Temperature (F)	Average Minimum Temperature (F)	Average Maximum Temperature (F)	Average Total Precipitation (Inches)	ETo (Inches)
January	55.5	44.1	67.6	2.2	1.95
February	55.1	44.9	67.4	2.7	2.41
March	58.8	48.2	58.8	1.3	3.75
April	60.9	51.0	74.8	0.9	4.55
May	67.9	55.6	79.6	0.3	5.19
June	71.2	59.8	86.2	0.0	5.97
July	77.8	64.7	93.1	0.1	6.60
August	78.9	65.2	94.2	0.0	6.41
September	75.4	62.9	90.7	0.1	4.88
October	67.8	56.6	82.0	0.5	3.46
November	58.9	48.6	73.9	0.8	2.31
December	54.7	43.2	66.2	1.9	1.72
Annual	65.2	53.7	77.9	10.7	49.20

Source:

Historical average monthly precipitation and temperature information was obtained from the National Oceanic and Atmospheric Administration (https://search.usa.gov/search?utf8=%E2%9C%93&affiliate=noaa.gov&query=ontario+ca) from 1998 through 2020 (for Ontario International Airport). Historical monthly average ETo information was obtained from the California Irrigation Management Information Systems (http://wwwcimis.water.ca.gov) and is based on data collected from Station 255 (Chino).

The historical average rainfall in the vicinity of the area receiving CDA's water supplies is 10.7 inches. This area has a dry climate and summers can reach average maximum daily temperatures of over 90 degrees Fahrenheit. Although changes in climatic conditions may have an impact (as discussed in Section 4.5) on the total demands of CDA's member agencies, the projected water supply sales to CDA's member agencies will be constant to control groundwater contamination regardless of an average year, a single dry year, and five consecutive year drought conditions. Precipitation within the vicinity of the area receiving water supplies from CDA is discussed further in Section 7.2.

3.4 SERVICE AREA POPULATION AND DEMOGRAPHICS

3.4.1 SERVICE AREA POPULATION

CWC 10631.

(a) Describe the service area of the supplier, including current and projected population… The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

The area receiving water supplies from CDA has a current population of 664, 270. Table 3-1 presents the current and projected population of the area receiving water supplies from CDA from FY 2019-20 to FY 2044-45. The area receiving water supplies from CDA is projected to have a population of 963, 819 by FY 2044-45.

The projected population in the areas receiving water supplies from CDA was based on growth rate projections obtained from data provided by the Southern California Association of Governments. The data provided by SCAG was based on their "The 2020-2045 Regional Transportation Plan / Sustainable Communities Strategy of the SCAG", dated September 2020, and incorporates demographic trends, existing land use, general plan land use policies, and input and projections through the year 2045 from the Department of Finance (DOF) and the U.S. Census Bureau for counties, cities, and unincorporated areas within Southern California.

Table 3-1 Population – Current and Projected

Submittal Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	664,270	715,607	770,912	830,491	894,675	963,819
NOTES: The 2020 population and the populations projected through 2045 were based on ACS population data (2019 Census) and an average between CDA's historical annual population growth rate and IEUA's current projected growth rate (See Section 3.4.1 and Section 5.4.1).						

3.4.2 OTHER SOCIAL, ECONOMIC, AND DEMOGRAPHIC FACTORS

CWC 10631.

(a) Describe the service area of the supplier, including… other social, economic, and demographic factors affecting the supplier's water management planning.

No other demographic factors affect CDA's water management planning. However, increased population will have an impact on water demand.

3.5 LAND USES WITHIN SERVICE AREA

CDA is a wholesale water agency which provides treated groundwater water to its retail member agencies. Therefore, CDA does not provide water directly to retail customers. As discussed in Section 3.4, CDA obtained data from the SCAG document entitled "The 2020-2045 Regional Transportation Plan / Sustainable Communities Strategy of the SCAG", dated September 2020. Projected populations in the area receiving water supplies from CDA were based on growth rate projections developed by SCAG. The data provided by SCAG incorporates demographic trends, existing land use, general plan land use policies, and input and projections through the year 2045 from the Department of Finance and the U.S. Census Bureau for counties, cities, and unincorporated areas within Southern California. The projected population was used to project future demand from its member agencies through the year 2045. As discussed in Section 2.6, CDA coordinated the preparation of the 2020 Plan with the Cities of Chino, Chino Hills, Eastvale, Jurupa Valley, Norco, Ontario, the Counties of San Bernardino and Riverside, and other agencies.

Chapter 4

WATER USE CHARACTERIZATION

LAY DESCRIPTION – CHAPTER 4

WATER USE CHARACTERIZATION

Chapter 4 (Water Use Characterization) of CDA's 2020 Plan discusses and provides the following:

- CDA provides water service to an individual water use category. This water use category is sales to other agencies. A description for this water use category is provided in Section 4.2.1.
- CDA's total water demands from its member agencies over the past 10 years have ranged from 27,098 AFY to 35,003 AFY, with an average of 29,673 AFY. CDA currently measures its water use through meter data and billing records.
- CDA's current and projected water demands from its member agencies are provided in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 4-3.

4.1 NON-POTABLE VERSUS POTABLE WATER USE

Chapter 4 addresses CDA's potable water demands. Recycled water is not served by CDA, as shown in Table 4-3. Raw water is also not served by CDA and is not applicable.

4.2 PAST, CURRENT, AND PROJECTED WATER USES BY SECTOR

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

CWC 10631.

(d)(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following…

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(4)(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.
(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

CDA's current and projected water demands are provided in five-year increments over the next 25 years (through FY 2044-45) in Tables 4-1, 4-2, and 4-3. CDA's total water demands for sale to its member agencies were projected based on the current capacity of the desalters.

CDA provides water service to one individual water use category. The water use category supplied by CDA is discussed in Section 4.2.1. The water use for this category during FY 2019-20 is provided in Table 4-1. The projected water use for this water use category is provided in Table 4-2 and is based on the water use from the water use sector in FY 2019-20.

4.2.1 WATER USE SECTORS LISTED IN WATER CODE

CWC 10631.

(d)(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.
(J) Distribution system water loss.

As shown in Table 4-1, CDA includes the following water use category listed in the CWC:

- Sales to Other Agencies
  (Water sales made to another agency. Projected sales may be based on projected demand provided by the receiving agency. There is inherent uncertainty in future projections, therefore, any projected sales reported in the Plan are for planning purposes only and are not considered a commitment on the part of the seller. This is a wholesale demand.)

4.2.2 WATER USE SECTORS IN ADDITION TO THOSE LISTED IN WATER CODE

CDA does not include other water demand categories which are not listed in the CWC (including exchanges, surface water augmentation, transfers, and wetlands or wildlife habitat).

4.2.3 PAST WATER USE

Chapter 6 provides a discussion of the source of water supply CDA uses to meet its water demands from its member agencies. Section 6.1 provides a tabulation of CDA's historical annual water demands for the source of water supply. Over the past ten years, CDA's water demands have ranged from 27,098 AFY to 35,003 AFY, with an average of 29,673 AFY.

4.2.4 DISTRIBUTION SYSTEM WATER LOSS

CWC 10631.

(d)(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following…

(J) Distribution system water loss.

CWC 10631.

(3)(A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.

(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met the distribution loss standards enacted by the board pursuant to Section 10608.34.

As a wholesale supplier, CDA is not required by DWR to perform water loss audits and report distribution system water loss.

4.2.5 CURRENT WATER USE

CDA currently measures its water use through meter data and billing records. The water use for CDA's individual water use category during FY 2019-20 is provided in Table 4-1. CDA does not produce recycled water as shown in, Table 4-3.

DWR has created an optional "Planning Tool Worksheet" for water suppliers to review and assess monthly water use trends. However, DWR has deemed the tool as optional and CDA is not required by DWR to use the tool. However, Section 6.1 provides a tabulation of CDA's historical annual water use. During the past 10 years, CDA's member agencies experienced a five consecutive year drought from FY 2011-12 to FY 2015-16.

4.2.6 PROJECTED WATER USE

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

CWC 10631.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

CWC 10631.

(d)(4)(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(d)(4)(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.
(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

CDA's projected water demands are provided in five-year increments over the next 25 years (through FY 2044-45) in Table 4-3. CDA's projected water demands during a normal year, a single dry year, and a five consecutive year drought are provided in Chapter 7. The projected water demands for CDA's water use category is provided in Table 4-2.

As a wholesale supplier, CDA's water demand projections are not required by DWR to incorporate water savings, or "passive savings", which are the result of implementation of new plumbing codes along with consumer awareness of the need to conserve water.

4.2.7 CHARACTERISTIC FIVE-YEAR WATER USE

CWC 10635.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

CDA's projected water demands are provided in five-year increments over the next 25 years (and through FY 2044-45) in Table 4-3. CDA's projected water demands and water supplies during a normal year, a single dry year, and a five consecutive year drought over the next 25 years (and through FY 2044-45) are provided in Chapter 7.

CDA's "Drought Risk Assessment" (DRA) for the next five years (from FY 2020-21 through FY 2024-25) is discussed in Section 7.3. The DRA includes CDA's projected annual water demands and supplies for each of the next five years and was prepared based on the five driest consecutive years on record. The DRA provides an assessment of CDA's water service reliability during a drought lasting five years.

4.3 WORKSHEETS AND REPORTING TABLES

CDA's current and projected water demands from its member agencies, including the water demands from its member agencies for CDA's water use category, are provided in five-year increments over the next 25 years (and through FY 2044-45) in Tables 4-1, 4-2, and 4-3.

4.3.1 OPTIONAL PLANNING TOOL USE ANALYSIS WORKSHEET

As discussed in Section 4.2.5, DWR has deemed the "Planning Tool Worksheet" as optional and CDA is not required by DWR to use the tool. A further discussion regarding the reliability of CDA's water supply source is provided in Chapter 7.

4.3.2 DWR 2020 UWMP SUBMITTAL TABLES

CDA's current water demands for its water use category during FY 2019-20 are provided in Table 4-1. CDA's projected total water demands for the water use sector, in five-year increments over the next 25 years (and through FY 2044-45), are provided in Table 4-2. CDA's total projected water demands for potable water, in five-year increments over the next 25 years (and through FY 2044-45), are summarized in Table 4-3. As a wholesale supplier, CDA is not required by DWR to perform water loss audits and report distribution system water loss.

Table 4-1 Demands for Potable and Non-Potable Water – Actual

Submittal Table 4-1 Wholesale: Demands for Potable and Non-Potable[1] Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only use types that will be recognized by the WUE data online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Sales to other agencies		Drinking Water	30,247
Other Non-Potable	Waste Process Water	Raw Water	4,756
		TOTAL	35,003
[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.* [2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES:			

Table 4-2 Use for Potable and Non-Potable Water – Projected

Submittal Table 4-2 Wholesale: Use for Potable and Raw Water [1] - Projected						
Use Type	Additional Description (as needed)	Projected Water Use [2] Report To the Extent that Records are Available				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool.		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Sales to other agencies		35,200	35,200	35,200	35,200	35,200
Other Non-Potable		4,800	4,800	4,800	4,800	4,800
	TOTAL	40,000	40,000	40,000	40,000	40,000

[1] Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4. *[2]*
Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.

Table 4-3 Total Gross Water Use (Potable and Non-Potable)

Submittal Table 4-3 Wholesale: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable and Raw Water From Tables 4-1W and 4-2W	35,003	40,000	40,000	40,000	40,000	40,000
Recycled Water Demand* From Table 6-4W	0	0	0	0	0	0
TOTAL WATER DEMAND	35,003	40,000	40,000	40,000	40,000	40,000

**Recycled water demand fields will be blank until Table 6-4 is complete.*

NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.

Table 4-4 12 Month Water Loss Audit Report (Not Applicable)

Table 4-4 is not applicable for wholesalers.

4.4 WATER USE FOR LOWER INCOME HOUSEHOLDS

CWC 10631.1.

(a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

California Health and Safety Code 50079.5.

(a) "Lower income households" means persons and families whose income does not exceed the qualifying limits for lower income families… In the event the federal standards are discontinued, the department shall, by regulation, establish income limits for lower income households for all geographic areas of the state at 80 percent of area median income, adjusted for family size and revised annually.

As a wholesale supplier, CDA is not required by DWR to report projected water demands for lower income single-family and multi-family households.

Table 4-5 Inclusion in Water Use Projections (Not Applicable)
Table 4-5 is not applicable for wholesalers.

4.5 CLIMATE CHANGE CONSIDERATIONS

CWC 10630.

It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

CWC 10635.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following…

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

CDA removes salts from brackish groundwater extracted from the lower Chino Basin with the Chino I and II Desalter facilities. The Chino I Desalter commenced operation in 2001 and was expanded in 2005. The Chino II Desalter became operational in 2006. These systems include 30 groundwater extraction wells, pumps, and pipelines that produce and convey untreated groundwater to treatment facilities. CDA produces approximately 35,200 AF from the Chino Basin every year for the purpose of groundwater cleanup and control of contaminant migration. This production is fixed to achieve the desired groundwater cleanup goal and is not impacted by climate change. Impacts of climate change to CDA's member agencies and their sources of supply are included in their respective UWMPs.

Chapter 5

SB X7-7 BASELINES, TARGETS, AND 2020 COMPLIANCE

LAY DESCRIPTION – CHAPTER 5

SB X7-7 BASELINES, TARGETS, AND 2020 COMPLIANCE

Chapter 5 (SB X7-7 Baselines, Targets, and 2020 Compliance) of CDA's 2020 Plan discusses and provides the following:

- The Water Conservation Act of 2009 (or SB X7-7) required the State of California achieve a 20 percent reduction in urban water use by the year 2020.
- SB X7-7 required urban water suppliers to develop a "2020 Water Use Target" to assist the State of California to achieve the 20 percent reduction. The 2020 Water Use Target represents the amount of water each person should use per day (i.e. gallons per capita per day or GPCD) by the year 2020.
- As a wholesale water agency, CDA is not required to calculate a 2020 Water Use Target or show compliance with the 2020 Water Use Target. However, an assessment regarding CDA's present and proposed future measures, programs, and policies to assist the retail water suppliers in CDA's service area achieve their individual 2020 Water Use Targets is provided (in Chapter 9).

5.1 GUIDANCE FOR WHOLESALE AGENCIES

<u>CWC 10608.12.</u>

(I) "Urban wholesale water supplier," means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

CDA is a wholesale agency and is not required by DWR to complete Section 5.2 through 5.8.

5.2 SB X7-7 FORMS AND SUMMARY TABLE

CWC 10608.20.

(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

CDA is a wholesale agency and is not required by DWR to complete Section 5.2.

5.2.1 SB X7-7 VERIFICATION FORM (BASELINES AND TARGETS)

5.2.2 SB X7-7 COMPLIANCE FORM

5.2.3 SUBMITTAL TABLES 5-1 AND 5-2

5.2.4 REGIONAL UWMP/ REGIONAL ALLIANCE

Table 5-1 Baselines and Targets Summary from SB X7-7 Verification Form (Not Applicable)
Table 5-1 is not applicable for wholesalers.

Table 5-2 2020 Compliance from SB X7-7 2020 Compliance Form (Not Applicable)
Table 5-2 is not applicable for wholesalers.

5.3 BASELINE AND TARGET CALCULATIONS FOR 2020 UWMPS

CDA is a wholesale agency and is not required by DWR to complete Section 5.3.

5.3.1 SUPPLIER SUBMITTED 2015 UWMP, NO CHANGE TO SERVICE AREA

5.4 METHODS FOR CALCULATING POPULATION AND GROSS WATER USE

CWC 10608.20.

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

CWC 10644.

(a)(2) The plan… shall include any standardized forms, tables, or displays specified by the department.

CDA is a wholesale agency and is not required by DWR to complete Section 5.4.

5.4.1 SERVICE AREA POPULATION

5.4.2 GROSS WATER USE

5.5 2020 COMPLIANCE DAILY PER CAPITA WATER USE (GPCD)

CWC 10608.12.

(h) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.
(2) The net volume of water that the urban retail water supplier places into long-term storage.
(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.
(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

California Code of Regulations Title 23 Division 2 Chapter 5.1 Article 1, Section 596.

(a) An urban retail water supplier that has a substantial percentage of industrial water use in its service area is eligible to exclude the process water use of existing industrial water customers from the calculation of its gross water use to avoid a disproportionate burden on another customer sector.

CDA is a wholesale agency and is not required by DWR to complete Section 5.5.

5.5.1 2020 ADJUSTMENTS FOR FACTORS OUTSIDE OF SUPPLIER'S CONTROL

5.5.2 SPECIAL SITUATIONS

5.5.3 IF SUPPLIER DOES NOT MEET 2020 TARGET

5.6 REGIONAL ALLIANCE

CDA is a wholesale agency and is not required by DWR to complete Section 5.6.

Chapter 6

WATER SUPPLY CHARACTERIZATION

LAY DESCRIPTION – CHAPTER 6

WATER SUPPLY CHARACTERIZATION

Chapter 6 (Water Supply Characterization) of CDA’s 2020 Plan discusses and provides the following:

- CDA’s water supply source consists of groundwater from the southwesterly portion of the Chino Basin which is treated at its treatment facilities. A tabulation of CDA’s historical water supplies is provided in Section 6.1.
- A discussion regarding CDA’s groundwater supplies from the Chino Basin is provided. Information regarding basin location, adjudication, management, water levels, water quality, water rights, and historical production is provided.
- CDA’s proposed future projects to maximize its water supply resources are discussed.
- CDA’s “energy intensity” is discussed and represents the quantity of energy consumed, measured in kilowatt hours, divided by the volume of water, measured in acre-feet over a one-year period. The total energy intensity associated with CDA’s water management processes was estimated during FY 2019-20.

In this Chapter, CDA will identify and describe its source of water supply. In addition, CDA will describe the following:

- Management of the water supply source;
- Current provisions of a basin adjudication or Groundwater Sustainability Plan (GSP), as applicable, pertaining to management of groundwater supplies;
- Measures CDA is taking to develop potential new sources of water supply (as applicable); and
- Opportunities for exchanges and transfers on a long- or short-term basis.

The characterization of CDA’s water supply source will account for the anticipated availability during a normal year, a single dry year, a five consecutive year drought, along with projections through FY 2044-45.

6.1 WATER SUPPLY ANALYSIS OVERVIEW

CWC 10631.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:

(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies

CWC 10631.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

CDA's water supply source consists of groundwater from the southwesterly portion of the Chino Basin which is treated at its treatment facilities. A tabulation of CDA's historical water supply is provided below.

Fiscal Year	System Water Supply Sources (AF)	Total
	Groundwater	
	Chino Basin	
2010-11	29,349	29,349
2011-12	28,381	28,381
2012-13	27,098	27,098
2013-14	29,282	29,282
2014-15	30,022	30,022
2015-16	28,191	28,191
2016-17	28,284	28,284
2017-18	29,918	29,918
2018-19	31,199	31,199
2019-20	35,003	35,003

Source: Data provided by the Chino Basin Desalter Authority

6.1.1 SPECIFIC ANALYSIS APPLICABLE TO ALL WATER SUPPLY SOURCES

The section below provides a discussion of the following information to the extent practical:

- CDA's existing and planned sources of water supply are identified;
- The source of supply is quantified in five-year increments through FY 2044-45;
- The anticipated supply availability under normal, single dry, and five consecutive dry years, and any other water year conditions included in the DRA (see Chapter 7) are described;
- The management of the water supply in correlation with other identified supplies is described; and,
- Information pertinent to the reliability analysis is considered.

CDA has historically relied on groundwater supplies from the Chino Basin to serve its member agencies. The following descriptions summarize CDA's source of supply (detailed descriptions are provided in Section 6.2).

Existing and Planned Sources of Supply

Purchased Imported Water

CDA does not purchase imported water supplies to meet its water demands.

Groundwater

CDA has historically pumped groundwater directly from the Chino Basin as described in Section 6.2.2. In addition, Section 6.2.2 provides a detailed discussion of the existing and planned supply of the groundwater, including a description of the management and reliability of those groundwater supplies. Table 6-8 summarizes the actual groundwater supplies for FY 2019-20. In addition, Table 6-9 summarizes the projected water supply, in five-year increments, through FY 2044-45 under varying water supply conditions.

Surface Water

CDA does not use surface water supplies to meet its water demands.

Storm Water

CDA has historically treated groundwater from the Chino Basin. Management and use of the stormwater runoff from the groundwater basin watershed, which is crucial to groundwater management, is described in Section 6.2.4. However, CDA currently does not have its own program to beneficially use stormwater runoff as a direct source of supply.

Wastewater and Recycled Water

CDA does not use wastewater and recycled water supplies to meet its water demands.

6.1.2 OTHER CHARACTERIZATION CONSIDERATIONS

A description of CDA's water system along with a map of the area which receives water supplies from CDA is included in Chapter 3. In addition, the agencies which manage the water supplies treated by CDA are identified in Section 6.2.1 (imported water), 6.2.2 (groundwater), 6.2.3 (surface water), 6.2.4 (stormwater), and 6.2.5 (recycled water).

6.1.3 OPTIONAL PLANNING TOOL

As discussed in Section 4.2.5, DWR has created an optional "Planning Tool Worksheet" for water suppliers to review and assess monthly water use trends. However, DWR has deemed the tool as optional and CDA is not required by DWR to use the tool. However, Section 6.1 provides a tabulation of CDA's historical annual water use. During the past 10 years, CDA's member agencies experienced a five consecutive year drought from FY 2011-12 to FY 2015-16.

6.2 NARRATIVE SECTIONS FOR SUPPLIER'S UWMP WATER SUPPLY CHARACTERIZATION

6.2.1 PURCHASED OR IMPORTED WATER

CDA does not use purchased or imported water supplies to meet its water demands.

6.2.2 GROUNDWATER

CWC 10631.

(b)(4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(C) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(D) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

CHINO BASIN

Chino Basin - Sustainable Groundwater Management Act

The Chino Basin is a sub-basin of the Upper Santa Ana Valley Groundwater Basin pursuant to DWR Bulletin 118, Basin Number 8-2.01. Pursuant to the Sustainable Groundwater Management Act of 2014 (SGMA), the Chino Basin was named as an adjudicated groundwater basin and is exempt from the requirements of developing a GSP and subsequently was designated a very-low-priority basin in DWR's 2019 SGMA Basin Prioritization report. In compliance with SGMA, the Chino Basin Watermaster submits its Annual Report to DWR.

Chino Basin - Adjudication

The Chino Basin was adjudicated under the Chino Basin Judgment, entered on January 27, 1978 by the Superior Court for the County of San Bernardino. A copy of the Chino Basin Judgment is provided in Appendix D. The provisions of the Judgment are administered and managed by the court-ordered Chino Basin Watermaster.

The Chino Basin Judgment originally established a Safe Yield for the Chino Basin of 140,000 AFY. Pursuant to the most recent Safe Yield reset effective in 2020, the Safe Yield in the Chino Basin is currently 131,000 AFY (July 1 to June 30). The Safe Yield is recalculated every 10 years and is defined in the Chino Basin Judgment as "the long-term average annual quantity of ground water (excluding replenishment of stored water but including return flow to the Basin from use of replenishment or stored water) which can be produced from the Chino Basin under conditions of a particular year without causing an undesirable result". The Chino Basin Judgment's allocation of the Safe Yield includes three separate Pools: (1) the "Overlying Agricultural Pool"; (2) the "Overlying Non-Agricultural Pool"; and (3) the "Appropriative Pool".

Appropriators who are Parties to the Chino Basin Judgment, are authorized to produce groundwater in excess of their rights. Appropriators pay assessments for such production to the Chino Basin Watermaster. The assessments are used to replenish the Chino Basin through replenishment of imported surface water. The Chino Basin Watermaster purchases water from Metropolitan Water District of Southern California through Inland Empire Utilities Agency and Three Valleys Municipal Water District, on behalf of the Parties, to replenish the Chino Basin. Occasionally, Watermaster has purchased water from storage accounts from Parties within the Chino Basin.

The Chino Basin Watermaster can reallocate the unused portion of the Chino Basin Safe Yield from the Overlying Agricultural Pool to the Appropriative Pool members as a supplement to the Appropriative Pool share of Operating Safe Yield rights in any year. These transfers are permanent if agricultural land has been converted to non-agricultural use, or temporary if agricultural pool extractions are less than their share of the Safe Yield. From FY 2000-01 to FY 2019-20, the annual quantity of the Agricultural Pool share available for reallocation to Appropriative Pool members[2] ranged from 40,822 AF to 61,014 AF, with an annual average of approximately 50,457 AF. As Agricultural Pool production declines within the Chino Basin, the reallocation of water to the Appropriative Pool will increase.

Chino Basin - Description

The Chino Basin is located within the Upper Santa Ana Valley, which is located in San Bernardino County and is bounded on the east by the Rialto-Colton fault; on the southeast by the contact with impermeable rocks forming the Jurupa Mountains; on the south by impermeable rocks of the Puente Hills and by the Chino fault; on the northwest by the San Jose fault; and on the north by the impermeable rocks of the San Gabriel Mountains and by the Cucamonga fault. The location of the Chino Basin is provided in Figure 4. The surface area of the Chino Basin is approximately 154,000 acres (or 240 square miles). The San Antonio Creek and Cucamonga Creek drain the Chino Basin area southward and flow into the Santa Ana River. Pursuant to DWR Bulletin 118 (for Basin Number 8-2.01), the total storage capacity of the Chino Basin is approximately 18,300,000 AF.

The water-bearing units in the Chino Basin includes Holocene and Upper Pleistocene alluvium. This Holocene alluvium consists mainly of alluvial-fan deposits, with maximum thickness of 150 feet that are coarsest in and near the mouths of the canyons and are finer away from canyon mouths in the southern part of the Chino Basin. The Pleistocene alluvium is exposed mainly in the northern part of the subbasin and supplies most of the water to wells located within the Chino Basin. The Pleistocene alluvium is about 600 to 700 feet thick throughout most of the Chino Basin. The alluvium contains interfingering finer, alluvial-fan deposits and coarser, fluvial deposits.

The Chino Basin is bounded by three major fault systems. Many of the faults within the Chino Basin form groundwater barriers marked by discontinuities in groundwater elevations. The Rialto-Colton fault forms the eastern boundary of the Chino Basin. Although it has no surface expression, it forms a major barrier to groundwater movement. The San Jose fault forms the northwest boundary of the Chino Basin. The Cucamonga fault zone forms part of the northern boundary of the Chino Basin. Displacement on the Cucamonga fault amounts to about 1,000 feet on its west end to 4,000 feet at its east end.

2 Pursuant to the Chino Basin Watermaster "*Fiscal Year 2019-20, 43rd Annual Report*", Appendix G

Chino Basin - Management

Basin Production

Over the past 20 years, total groundwater production from the Chino Basin has ranged from approximately 133,275 AFY to 188,910 AFY[3]. A majority of production currently is pumped for municipal and agricultural purposes and the remaining production is pumped by non-agricultural Parties.

Groundwater Level Monitoring

Groundwater elevation contours in the Chino Basin Watermaster's 2018 State of the Basin Report show a regional depression of groundwater surrounding the Chino-II Desalter well field and the eastern half of the Chino-I Desalter well field. Hydraulic Control of the Chino Basin is achieved east of Chino Desalter Well I-20. The contours also indicate groundwater flowing past the desalter wells west of Chino Desalter Well I-20, indicating only partial Hydraulic Control.

Chino Basin Desalter Authority

On September 25, 2001, CDA was formed under a Joint Exercise of Powers Agreement to remove salts from brackish groundwater extracted from the lower Chino Basin. The area which receives water supplies from CDA is 304 square miles. A map showing CDA Desalter facilities and associated wells is provided below.

CDA removes salts from brackish groundwater extracted from the lower Chino Basin through the Chino I and II Desalter facilities. The Chino I Desalter is located in the City of Chino and commenced operation in 2001 and was expanded in 2005 to have a total capacity of 14.2 MGD. The Chino I Desalter includes reverse osmosis, ion exchange, and air stripper treatment for treating brackish water and removing nitrate and volatile organic chemicals (VOCs). The Chino II Desalter is located in Jurupa Valley and began operation in 2006 and was expanded in 2011 and again in 2017 to have a total capacity of 33 MGD. The Chino II Desalter includes reverse osmosis and ion exchange treatment for treating brackish water and removing nitrate. Following the expansion, CDA constructed the Concentrate Reduction Facility in 2017, which utilizes chemical softening to remove the limiting foulants (specifically, calcium and silica) from the reverse osmosis concentrate. Additional components of the Chino II Desalter were constructed as part of the South Archibald Plume Project which will be operational in 2021, with the goal of removing and treated trichloroethylene (TCE) from groundwater wells impacted by the South Archibald Plume.

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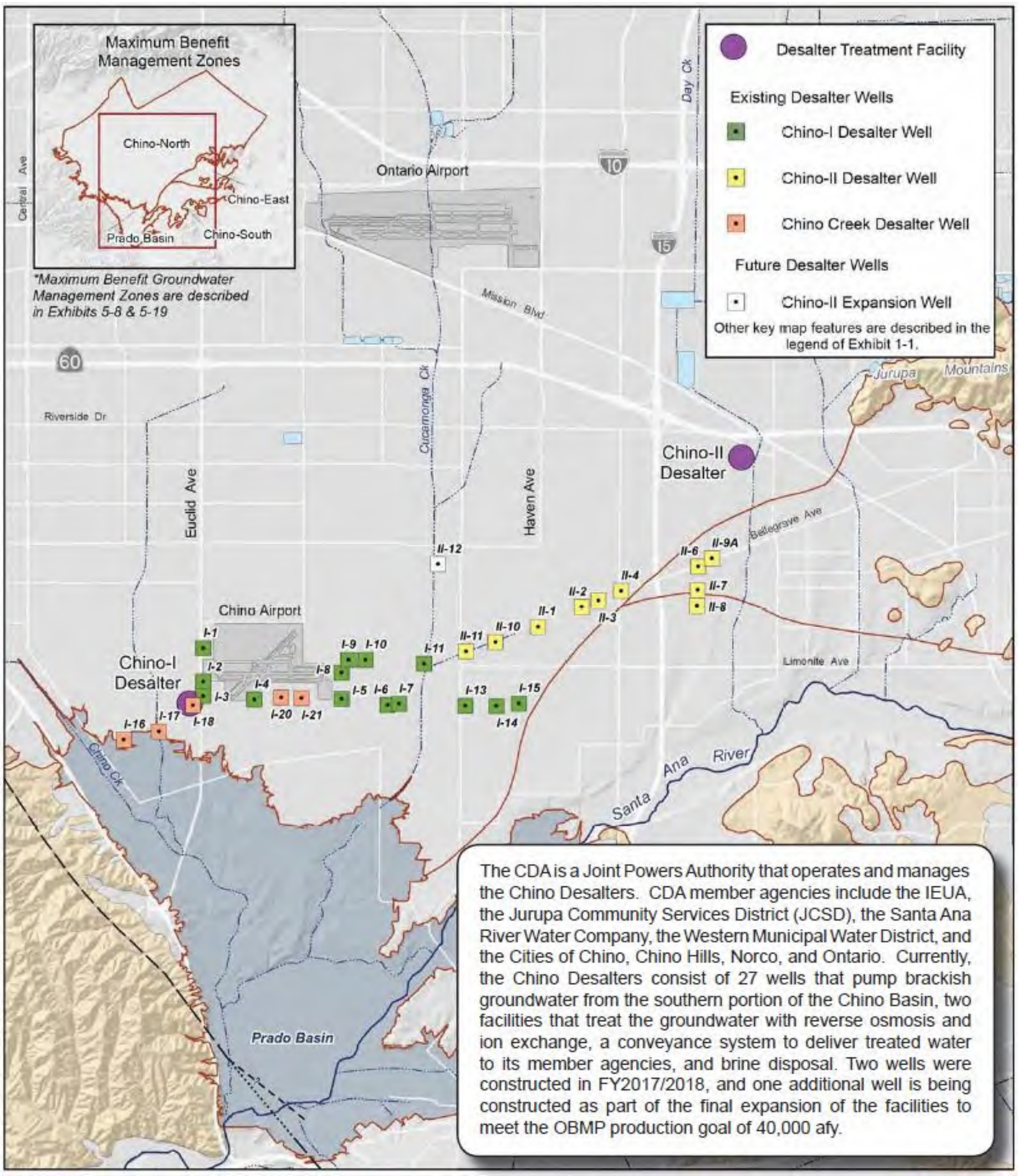
3 Pursuant to the Chino Basin Watermaster "*Fiscal Year 2019-20, 43rd Annual Report*", Appendix H http://www.cbwm.org/rep_annual.htm

Location of CDA Facilities



(source: Chino Basin Optimum Basin Management Program 2018 State of the Basin Report)

Treated water is distributed to CDA's member agencies which include the City of Chino, City of Chino Hills, City of Norco, City of Ontario, Inland Empire Utilities Agency, Jurupa Community

Services District, Santa Ana River Water Company, and Western Municipal Water District. The CDA's member agencies provide water service within Riverside County and San Bernardino County. The member agencies have contract entitlements to receive a total of 35,200 AFY of treated water from CDA.

A portion of the production is in-lieu of those CDA member agencies producing an equal amount of groundwater from their own groundwater wells using their individual water rights. An additional portion of the production is temporarily assigned as "controlled overdraft". Pursuant to the Chino Basin Judgment, a total of 200,000 AF was authorized for controlled overdraft between the period of 1978 through 2017. In 2007, the Peace II Agreement was adopted to establish measures for achieving hydraulic control of the Chino Basin. One of the measures put forth included increasing the authorized controlled overdraft to 600,000 AF. This increase in controlled overdraft is separate from, and in addition to, the 200,000 AF authorized in the Chino Basin Judgment and is available for utilization until December 31, 2030. For the balance of the production, the Chino Basin Watermaster levies an annual Replenishment Assessment to purchase replenishment water to replace that overproduced water. The untreated imported water demands are shared proportionally amongst CDA's member agencies.

Chino Basin Optimum Basin Management Program

In 2000, the Chino Basin Watermaster developed the Chino Basin Optimum Basin Management Program (OBMP). The OBMP was developed in a collaborative process that identified the needs of the stakeholders, described the physical state of the basin, defined a set of management goals, identified impediments to these goals, and established a series of actions that would remove these impediments and achieve the management goals. The goals identified in the 2000 OBMP included: (1) Enhance Basin Water Supplied; (2) Protect and Enhance Water Quality; (3) Enhance Management of the Basin; and (4) Equitably Finance the OBMP.

In September 2018, the Chino Basin Watermaster initiated the process to update the OBMP and its Implementation Plan. Throughout 2019, the Chino Basin Watermaster held a series of public listening sessions to support the development process of the 2020 OBMP Update. The purpose of the listening sessions was to confirm the need to update the OBMP, to identify the issues, needs, and wants of the stakeholders, to define the goals for the 2020 OBMP Update, and to identify new and revised actions that could be included in to 2020 OBMP Update to remove the impediments to achieving the 2020 OBMP Update goals. After an assessment of the basin, the stakeholders concluded that the four (4) goals defined in the 2000 OBMP are unchanged and still relevant for the 2020 OBMP Update.

In 2019, the stakeholders identified and described 12 management activities that, if implemented, would address their issues, needs, and wants. The 12 management activities addressed 55 of the 57 needs identified by the stakeholders. Nine of the activities (A, B, C, D, E, F, G, K, and L) were combined into seven basin management activities and the remaining three activities (H, I, and J) were identified as actions that can be accomplished by incorporating them into the scope of work of every activity or were more appropriate for inclusion within an implementation agreement. The seven basin management activities selected to help achieve the goals of the 2020 OBMP Update are:

- *Activity A – Increase the capacity to store and recharge storm and supplemental water*
- *Activity B – Develop, implement, and optimize Storage and Recovery Programs*
- *Activity C and G – Identify and implement regional conveyance and treatment projects/ programs and optimize the use of all water supply sources*
- *Activity D – Maximize the reuse of recycled water produced by the IEUA and others*
- *Activity E and F – Develop and implement a groundwater-quality management plan to address contaminants of emerging concern*
- *Activity K – Develop a management strategy within the maximum-benefit salt and nutrient management plan to ensure compliance with recycled water recharge dilution requirements*
- *Activity L – Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory requirements*

Each activity is a management process to optimize some aspect of basin management. The actions defined by the stakeholders to remove the impediments to the four OBMP goals were grouped into Program Elements, each of which included a list of implementation actions and an implementation schedule. The nine Program Elements defined in the 2000 OBMP were retained for the 2020 OBMP Update. Each of the seven activities, and the associated implementation actions, were incorporated into Program Elements, which were updated based on feedback from the stakeholders. The Program Elements defined in the 2020 OBMP Update include:

- Program Element 1 - Develop and Implement Comprehensive Monitoring Program
- Program Element 2 - Develop and Implement Comprehensive Recharge Program
- Program Element 3 - Develop and Implement a Water Supply Plan for Impaired Areas
- Program Element 4 - Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1
- Program Element 5 - Develop and Implement Regional Supplemental Water Program
- Program Element 6 - Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin
- Program Element 7 - Develop and Implement Salt Management Plan
- Program Element 8 - Develop and Implement Groundwater Storage Management Program
- Program Element 9 - Develop and Implement Storage and Recovery Programs

<u>Chino Basin Storage Management Plan</u>

The Chino Basin Storage Management Plan was created to mitigate adverse impacts to the Chino Basin from factors including reductions in net recharge and Safe Yield, and increased groundwater discharge to the Santa Ana River contributing to the loss of Hydraulic Control. The Chino Basin Storage Management Plan identifies technical storage management issues within the Chino Basin, establishes storage management activities for producers, and outlines key measures for the Storage and Recovery Programs.

Since the Chino Basin Judgment came into effect in 1978, the Chino Basin Watermaster developed rules and regulations, standard storage agreements, and related forms. Since 2000, Chino Basin Watermaster administered groundwater storage in the Chino Basin pursuant to the storage management plan described in Program 8 of the 2000 OBMP and evaluated in the Programmatic Environmental Impact Report. Since then, Parties have indicated that they will likely exceed the storage space initially estimated in the OBMP Implementation Plan. Thus, Chino Basin Watermaster found it necessary to develop a new storage management plan.

The three types of storage agreements that result in five types of storage accounts: Excess Carryover, Local Supplemental-Recycled, Local Supplemental-Imported, Pre-2000 Quantified Supplemental, and Storage and Recovery. An Excess Carryover account includes a Party's unproduced rights in the Safe Yield and Basin Water purchased or transferred from other Parties. A Local Supplemental Water account includes any imported and/or recycled water that is recharged by a producer and similar water acquired from other Parties. A Storage and Recovery Account includes Supplemental Water and is intended to produce a broad and mutual benefit to the Parties of the Judgement." The Chino Basin Watermaster tracks the puts, takes, losses, and end-of-year storage totals for all storage accounts and reports on this accounting on an annual basis. The Chino Basin Watermaster assesses losses by considering water in managed storage (excluding Carryover) and offsets the increases in groundwater discharge to the Santa Ana River and from the Chino Basin attributable to managed storage (excluding Carryover). Chino Basin Watermaster also considers losses due to evaporation on the puts when water is recharged in spreading basins.

The individual Parties are involved in water transfers of annual unproduced rights in the Safe Yield and water in their storage accounts. Chino Basin Watermaster has an application and review process for these transfers. The Parties engage in conjunctive-use activities individually by storing Chino Basin and Supplemental Water that are in excess of their demands and recover that water as necessary. These activities collectively cause a temporary increase in the managed storage. The Parties' aggregate amount of water in managed storage was 541,845 AF as of June 30, 2020.

The Metropolitan Water District's Dry-Year Yield Program (DYYP) is an active storage and Recovery Program in Chino Basin. The DYYP can store up to 100,000 AF with maximum replenishment of 25,000 AFY and maximum extraction of 33,000 AFY. As of June 30, 2020, there was 45,961 AF within the DYYP account, resulting in a total managed storage volume of 587,806 AF (541,845 AF + 45,961 AF). The agreement that authorized the DYYP will expire in

2028. The combined volume of managed storage by Metropolitan's DYYP and the Parties is projected to have a maximum of 790,000 AF in 2028, assuming DYYP has 100,000 AF in storage and that MWD removes the contract rate of 33,000 AFY starting in 2029.

Of the first 1,000,000 AF of managed storage, 800,000 AF is reserved for the Parties' conjunctive-use activities (including Carryover, Excess Carryover, and Supplemental Accounts) and MWD's DYYP. This 800,000 AF is referred to as the "First Managed Storage Band". The managed storage between 800,000 AF and 1,000,000 AF is reserved for Storage and Recovery Programs. Allocation of storage space reservations may be revised in subsequent updates of the Storage Management Plan. Use of managed storage greater than 1,000,000 AF is allowed if the storing entity submits a Storage and Recovery Program application, demonstrates that the program will have broad mutual benefits, ensure there will be no adverse impacts, meets mitigation requirements of the Chino Basin Watermaster, complies with the California Environmental Quality Act (CEQA), and obtains approval from the Chino Basin Watermaster.

The Parties and IEUA, through the OBMP, have substantially increased the amount of storm and supplemental water recharge capacity in the Chino Basin. The increase in supplemental water recharge capacity was done to ensure that the Chino Basin Watermaster is able to meet replenishment requirements pursuant to Regional Board and Court orders. The Chino Basin Watermaster indicates that it will prioritize the use spreading basins to satisfy replenishment obligations over the use of spreading basins for other uses.

Storage and Recovery programs are applied in Management Zone 2 and Management Zone 3 to avoid new land subsidence and interfering with land subsidence management in Management Zone 1, to minimize the impact of storage and recovery operations on solvent plumes, to retain hydraulic control, and to utilize the larger groundwater storage capacity of Management Zone 2 and Management Zone 3. The Chino Basin Watermaster reviews each Storage and Recovery Program application, estimates the surface and groundwater level response, prepares a report that describes potential adverse impacts, and develops mitigation requirements.

Chino Basin Watermaster will periodically and review the Storage Management Plan on no less than a five-year frequency, when the Safe Yield is recalculated, or when the Chino Basin Watermaster determines an update is warranted based on new information or needs of the Parties or the Chino Basin.

The Storage Management Plan was prepared in parallel with the 2020 OBMP Update. Chino Basin Watermaster published the final Storage Management Plan report and it was incorporated into Program Elements 8 and 9 (Storage and Recovery Programs) of the OBMP update process and was approved in June 2020.

Chino Basin Subsidence Management Plan

The Chino Basin Subsidence Management Plan was developed in 2015 and its purpose was to: minimize subsidence and fissuring; collect information necessary to understand the extent, rate, and mechanisms of subsidence and fissuring; and establish a management plan to reduce tolerable levels or abate future subsidence and fissuring.
From 2001 to 2005, Chino Basin Watermaster developed, coordinated, and conducted the MZ-1 Interim Monitoring Program and the main conclusions derived were:

1. Groundwater production from the deep, confined aquifer system in the southwestern region of MZ-1 causes the greatest stress to the aquifer system.
2. Groundwater-level decline due to pumping of the deep aquifer can cause irreversible compaction of the aquifer-system sediments, resulting in land subsidence.
3. The state of aquifer-system deformation in southern MZ-1 (in the vicinity of Ayala Park) was essentially elastic. Very little non-recoverable compaction was occurring in MZ-1, which contrasted historical measurements when about 2.2 feet of land subsidence occurred from about 1987 to 1995 and was accompanied by ground fissuring.
4. During this study, a previously undetected barrier to groundwater flow, the "Riley Barrier," was identified. The Riley Barrier is located within the deep aquifer system and aligned with the historical zone of ground fissuring. Pumping from the deep aquifer system was limited to the area west of the barrier, and the resulting groundwater-level decline did not propagate eastward across the barrier.
5. InSAR and ground-level survey data indicated that subsidence had occurred in the central region of MZ-1 in the past and was continuing to occur. The InSAR data also suggested that the groundwater barrier extends northward into central MZ-1.

The Chino Basin Watermaster currently conducts the monitoring program as described below:

- Production - Production data will be collected from the owners of wells.
- Recharge - The volumes of imported, storm, and recycled waters that are artificially recharged at basins in the Area, and of recycled water that is used for direct use will be collected from IEUA for each fiscal year.
- Piezometric Levels - Piezometric levels will be measured and recorded once every 15 minutes using pressure transducers at select wells. The wells used in the monitoring program will be periodically assessed, and transducers in wells will be removed or added as deemed necessary by the Ground-Level Monitoring Committee.
- Vertical Aquifer-System Deformation - Watermaster will measure and record the vertical component of aquifer-system deformation at the Ayala Park Extensometer (MZ-1 Managed Area) and the Chino Creek Extensometer (Southeast Area) once every 15 minutes.

- Vertical Ground-Surface Deformation - Watermaster will measure vertical ground motion via traditional leveling surveys and remote sensing techniques (InSAR). The Ground-Level Monitoring Committee will annually recommend the scope and frequency of leveling surveys and InSAR measurements within the Area.
- Horizontal Ground-Surface Deformation - Watermaster will measure horizontal ground motion across areas that are susceptible to ground fissuring in the MZ-1 Managed Area and Northwest MZ-1 Area via EDMs.

At the beginning of each calendar year, Chino Basin Watermaster staff and engineers will analyze the data generated during the prior calendar year. Results and interpretations generated from the analysis will be documented in an annual report and is used to prepare recommendations for future planning.

Groundwater Clean-up

Groundwater in areas of the Chino Basin is currently contaminated with Perchlorate and VOCs, including 1,2,3-Tricholropropane (1,2,3-TCP), trichloroethylene (TCE), and perchloroethylene (PCE). In addition, nitrates and TDS concentrations in areas of the Chino Basin exceed drinking water quality standards. Wellhead treatment is necessary in these areas to allow delivery of the groundwater for potable purposes.

Chino Basin - Historical and Projected Basin Production

CDA can produce approximately 40,000 AF from the Chino Basin every year for the purpose of groundwater cleanup and control of contaminant migration. This production is fixed to achieve the desired groundwater cleanup goal. CDA’s member agencies have contract entitlements to receive a total 35,200 AFY of treated water from CDA. CDA’s treatment process also results in waste process water (i.e. brine) which is discharged to the Inland Empire Brine Line and conveyed to the Orange County Sanitation District for treatment and disposal to the Pacific Ocean. Over the past five years, CDA has produced 28,191 AFY to 35,003 AFY, with an average of 30,519 AFY from the Chino Basin.

Table 6-1 Groundwater Volume Pumped

Submittal Table 6-1 Wholesale: Groundwater Volume Pumped						
☐	Supplier does not pump groundwater. The supplier will not complete the table below.					
☑	All or part of the groundwater described below is desalinated.					
Groundwater Type Drop Down List	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
Alluvial Basin	Chino Basin	28,191	28,284	29,918	31,199	35,003
	TOTAL	28,191	28,284	29,918	31,199	35,003
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

6.2.3 SURFACE WATER

CDA does not use surface water supplies to meet its water demands.

6.2.4 STORMWATER

CDA does not use stormwater to meet its water demands.

6.2.5 WASTEWATER AND RECYCLED WATER

CWC 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands,

industrial reuse, potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

As a wholesale water supplier, CDA provides treated groundwater to its member agencies which in turn provides water to their retail customers. Wholesale suppliers are not required to summarize wastewater generation or treatment within their service area. CDA does not provide supplemental treatment to recycled water prior to distribution.

CDA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by CDA and there are no plans for use within the planning horizon of this UWMP.

6.2.5.1 RECYCLED WATER COORDINATION

CWC 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area…

CDA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by CDA and there are no plans for use within the planning horizon of this UWMP. This section is not applicable to CDA.

6.2.5.2 WASTEWATER COLLECTION, TREATMENT, AND DISPOSAL

CWC 10633.

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

CDA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by CDA and there are no plans for use within the planning horizon of this UWMP. This section is not applicable to CDA.

Table 6-2 Wastewater Collected Within Area in 2020 (Not Applicable)

Table 6-2 is not applicable for wholesalers.

Table 6-3 Wastewater Treatment and Discharge within Service Area in 2020

Submittal Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2020											
☑	Wholesale Supplier neither distributes nor provides supplemental treatment to recycled water. The Supplier will not complete the table below.										
							2020 volumes [1]				
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area? *Drop down list*	Treatment Level *Drop down list*	Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Add additional rows as needed											
						Total	0	0	0	0	0
[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3. [2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility											
NOTES:											

6.2.5.3 RECYCLED WATER SYSTEM DESCRIPTION

CWC 10633.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

CDA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by CDA and there are no plans for use within the planning horizon of this UWMP. This section is not applicable to CDA.

6.2.5.4 POTENTIAL, CURRENT, AND PROJECTED RECYCLED WATER USES

CWC 10633.

(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use. A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

CDA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by CDA and there are no plans for use within the planning horizon of this UWMP. This section is not applicable to CDA.

Table 6-4 Current and Projected Recycled Water Direct Beneficial Uses Within Service Area

Submittal Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
☑	Recycled water is not directly treated or distributed by the Supplier. The Supplier will not complete the table below.						
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment *Drop down list*	2020*	2025*	2030*	2035*	2040*	2045* *(opt)*
Add additional rows as needed							
	Total	0	0	0	0	0	0
*** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.							
NOTES:							

Table 6-5 2015 Recycled Water Use Projection Compared to 2020 Actual

Submittal Table 6-5 Wholesale: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☑	Recycled water was not used or distributed by the supplier in 2015, nor projected for use or distribution in 2020. The wholesale supplier will not complete the table below.	
Name of Receiving Supplier or Direct Use by Wholesaler	2015 Projection for 2020*	2020 Actual Use*
Add additional rows as needed		
Total	0	0
****Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*		
NOTES:		

6.2.5.5 ACTIONS TO ENCOURAGE AND OPTIMIZE FUTURE RECYCLED WATER USE

CWC 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

CDA does not have a service area, but rather provides potable water supplies within the service areas of its member agencies. Recycled water is not used by CDA and there are no plans for use within the planning horizon of this UWMP. This section is not applicable to CDA.

Table 6-6 Methods to Expand Future Recycled Water Use (Not Applicable)
Table 6-6 is not applicable for wholesalers.

6.2.6 DESALINATED WATER OPPORTUNITIES

CWC 10631.

(g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

Chino Basin

As discussed in Section 6.2.2, CDA removes salts from brackish groundwater extracted from the lower Chino Basin through the Chino I and II Desalter facilities. The Chino I Desalter is located in the City of Chino and commenced operation in 2001 and was expanded in 2005 to have a total capacity of 14.2 MGD. The Chino I Desalter includes reverse osmosis, ion exchange, and air stripper treatment for treating brackish water and removing nitrate and VOCs. The Chino II Desalter is located in Jurupa Valley and began operation in 2006 and was expanded in 2011, and again in 2017 to have a total capacity of 33 MGD. The Chino II Desalter includes reverse osmosis and ion exchange treatment for treating brackish water and removing nitrate. Following the expansion, CDA constructed the Concentrate Reduction Facility in 2017, which utilizes chemical softening to remove the limiting foulants (specifically, calcium and silica) from the reverse osmosis concentrate. Additional components of the Chino II Desalter were constructed as part of the South Archibald Plume Project which will be operational in 2021, with the goal of removing and treated TCE from groundwater wells impacted by the South Archibald Plume. Information regarding the Chino I and II Desalter facilities is provided in Table 6-8ds.

OPTIONAL Table 6-8ds: Source Water Desalination										
☐	Neither groundwater nor surface water are reduced in salinity prior to distribution.									
Plant Name or Well ID	Plant Capacity	Intake Type *Drop down list*	Source Water Type *Drop down list*	Influent TDS	Brine Discharge *Drop down list*	Volume of Water Desalinated				
						2016	2017	2018	2019	2020
Chino I Desalter	14.2 MGD	vertical well	groundwater	1,330 mg/L	Brine Line	28191	28284	29918	31199	35003
Chino II Desalter	33 MGD	vertical well	groundwater	640 mg/L	Brine Line	0	0	0	0	0
					Total	28191	28284	29918	31199	35003
**Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*										
Notes: "Brine Discharge" is to the Santa Ana River Interceptor. "Volume of Water Desalinated" for Chino 1 Desalter is based on the combined volume for both the Chino I and Chino II Desalters										

Treated water is distributed to CDA's member agencies which include the City of Chino, City of Chino Hills, City of Norco, City of Ontario, Inland Empire Utilities Agency, Jurupa Community Services District, Santa Ana River Water Company, and Western Municipal Water District. The member agencies have contract entitlements to receive a total of 35,200 AFY of treated water from CDA. A portion of the production is in-lieu of those CDA member agencies producing an equal amount of groundwater from their own groundwater wells from the Chino Basin using their individual water rights.

6.2.7 WATER EXCHANGES AND TRANSFERS

CWC 10631.

(c) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

6.2.7.1 EXCHANGES

Pursuant to DWR's 2020 Final Guidebook, "*Water exchanges are typically water delivered by one water user to another water user, with the receiving water user providing water in return at a specified time or when the conditions of the parties' agreement are met. Water exchanges can be strictly a return of water on a basis agreed upon by the participants or it can include payment and the return of water.*"

CDA does not have any current or planned water exchange opportunities. CDA's purpose is to produce treated groundwater for its member agencies. However, CDA's member agencies participate in MWD's Dry-Year Yield Program. The DYYP is a groundwater storage and recovery program where supplemental water is stored in the Chino Basin during surplus years and could be recovered in-lieu of imported water from MWD through IEUA. The DYYP allows maximum use of imported water supplies available during wet years and stored groundwater in the Chino Basin during dry years. The DYYP can store up to 100,000 AF with maximum replenishment of 25,000 AFY and maximum extraction of 33,000 AFY. During FY 2019-20, there was 45,961 AF within the DYYP account. The agreement that authorized the DYYP will expire in 2028.

6.2.7.2 TRANSFERS

Pursuant to DWR's 2020 Final Guidebook, "*The Water Code defines a water transfer as a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer, sale, lease, or exchange of water or water rights.*"

Transfers are not generally available to CDA from a supplier because CDA's purpose is to produce treated groundwater for its member agencies. However, CDA's member agencies are able to make transfers between each other pursuant to the Optimum Basin Management Plan and the Peace Agreement which provide for interagency transfer of water rights.

6.2.7.3 EMERGENCY INTERTIES

Emergency interconnections are distribution system interconnections between water agencies for use during critical situations where one system or the other is temporarily unable to provide sufficient potable water to meet its water demands and/or fire protection needs. An emergency interconnection will allow a water system to continue serving water during critical situations such as local water supply shortages as a result of earthquakes, fires, prolonged power outages, and droughts.

Emergency interconnections are not available to CDA because CDA is a wholesale water agency that provides treated groundwater supplies to its member agencies. However, CDA has multiple connections with several of its member agencies to provide these agencies with water supplies during emergency situations.

6.2.8 FUTURE WATER PROJECTS

CWC 10631.

(f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single-dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

The water supply potential of the Chino Basin has been limited over the years due to multiple contamination threats from historical agricultural and industrial operations, leading to basin-wide concerns with total dissolved solids and nitrate, as well as localized plumes of multiple constituents of concern (COCs). CDA is now facing challenges from new COCs stemming from the nearby Chino Airport Plume. In July 2020, CDA proposed Granular Activated Carbon (GAC) treatment to provide groundwater treatment for existing and proposed CDA and County-owned wells. The North GAC Treatment expansion of the Chino I Desalter facility would be designed to accommodate a total flow of 1,255 gallons per minute (GPM). The South GAC Treatment would be designed to treat a total flow of 3,125 GPM. An additional 800 GPM of GAC absorption capacity can be acquired should more wells be added.

Table 6-7 quantifies the increase in CDA's water supply reliability per completion of these projects.

Table 6-7 Expected Future Water Supply Projects or Programs

Submittal Table 6-7 Wholesale: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☐	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
Section 6.2.8	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description *(if needed)*	Planned Implementation Year	Planned for Use in Year Type *Drop Down list*	Expected Increase in Water Supply to Supplier*
	Drop Down Menu	*If Yes, Supplier Name*				
Add additional rows as needed						
Chino I Desalter VOC Treatment Facilities Project	*Yes*	San Bernardino County	Install Granular Activated Carbi treatment to to treat existing CDA and proposed County-owned wells	2023	All Year Types	3,000
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: Information obtained from CDA's "Chino I Desalter VOC Treatment Facilities Project Final Draft Basis of Design Report (BODR)", dated July 2020						

6.2.9 SUMMARY OF EXISTING AND PLANNED SOURCES OF WATER

CWC 10631.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following…

(b)(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

6.2.9.1 DESCRIPTION OF SUPPLIES

As discussed in Section 6.2, CDA's water supply source consists of groundwater from the Chino Basin (see Section 6.2.2). CDA's member agencies have contract entitlements to receive a total of 35,200 AFY of treated water from CDA. However, additional groundwater must be produced by CDA to account for waste process water which is discharged. The actual quantity of the water supply source produced by CDA during FY 2019-20 is summarized in Table 6-8. The reliable quantity of projected water supply source available to CDA in five-year increments through FY 2044-45 during normal or average years are summarized in Table 6-9. The reliability of this source of supply are addressed in Section 7.2.3, including during normal years, single dry years, and five consecutive year droughts.

6.2.9.2 QUANTIFICATION OF SUPPLIES

The actual quantity of the water supply source produced by CDA during FY 2019-20 are summarized in Table 6-8. The reliable quantity of projected water supply source produced by CDA in five-year increments through FY 2044-45 during average years are summarized in Table 6-9. The reliability of this source of supply are addressed in Section 7.2.3, including during normal years, single dry years, and five consecutive year droughts.

CDA's projected quantities of groundwater supplies from the Chino Basin are based on the requirement to pump and treat contaminated groundwater to control contaminant migration.

Table 6-8 Water Supplies – Actual

Submittal Table 6-8 Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Desalinated Water - Groundwater		35,003	Drinking Water	
	Total	35,003		0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*				
NOTES:				

Table 6-9 Water Supplies – Projected

Submittal Table 6-9 Wholesale: Water Supplies — Projected											
Water Supply	Additional Detail on Water Supply	Projected Water Supply* Report To the Extent Practicable									
		2025		2030		2035		2040		2045 (opt)	
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Desalinated Water - Groundwater		40,000		40,000		40,000		40,000		40,000	
	Total	40,000	0	40,000	0	40,000	0	40,000	0	40,000	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*											
NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.											

6.2.10 SPECIAL CONDITIONS

6.2.10.1 CLIMATE CHANGE EFFECTS

CDA removes salts from brackish groundwater extracted from the lower Chino Basin with the Chino I and II Desalter facilities. The Chino I Desalter commenced operation in 2001 and was expanded in 2005. The Chino II Desalter became operational in 2006 and was expanded in 2011 and again in 2017. These systems include 30 groundwater extraction wells, pumps, and pipelines that produce and convey untreated groundwater to treatment facilities. CDA produces approximately 40,000 AF from the Chino Basin every year for the purpose of groundwater cleanup and control of contaminant migration. This production is fixed to achieve the desired groundwater cleanup goal and is not impacted by climate change. Impacts of climate change to CDA's member agencies and their sources of supply are included in their respective UWMPs.

6.2.10.2 REGULATORY CONDITIONS AND PROJECT DEVELOPMENT

CDA has considered the implications of changing regulatory conditions and project development on the availability of planned water supplies.

6.2.10.3 OTHER LOCALLY APPLICABLE CRITERIA

There are no locally applicable criteria which applies to CDA.

6.3 SUBMITTAL TABLES COMPLETION USING THE OPTIONAL PLANNING TOOL

As discussed in Section 4.2.5, DWR has created an optional "Planning Tool Worksheet" for water suppliers to review and assess monthly water use trends. However, DWR has deemed the tool as optional and CDA is not required by DWR to use the tool. However, Section 6.1 provides a tabulation of CDA's historical annual water use. During the past 10 years, CDA's member agencies experienced a five consecutive year drought from FY 2011-12 to FY 2015-16.

6.4 ENERGY USE

<u>CWC 10631.2.</u>

(a) In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain:

(1) An estimate of the amount of energy used to extract or divert water supplies.

(2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.

(3) An estimate of the amount of energy used to treat water supplies.

(4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.

(5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.

(6) An estimate of the amount of energy used to place water into or withdraw from storage.

(7) Any other energy-related information the urban water supplier deems appropriate.

"Energy intensity" is defined as the quantity of energy consumed, measured in kilowatt hours (kWh), divided by the volume of water, measured in AF for a water management process over a one-year period. The information used to calculate the estimated energy intensity associated with CDA's water system is provided below. The energy intensity information is based on readily obtainable energy and water use data for the following water management processes: 1) extraction or diversion of water supplies; 2) placement into storage; 3) conveyance to distribution; 4) treatment; and 5) water system distribution.

CDA has tabulated its energy intensity using readily obtainable energy consumption data obtained from monthly electricity bills from Southern California Edison (SCE) for the whole water system and the corresponding water use data obtained from available water meter readings. CDA has reported the energy intensity associated with the water management processes which occur within its operational control. Because CDA does not track individual energy usage for each water management process identified above, CDA has estimated the energy intensity using the a "total utility approach" (i.e. sum of all water management processes). The total energy consumed was approximately 48,998,850 kWh during FY 2019-20. The total energy consumption reported does not include electricity usage for general administration (e.g. at CDA's headquarters) which is not associated with any water management processes.
The total volume of water entering the potable water system was approximately 35,003 AF during FY 2019-20 and is consistent with the total volume of water provided in Table 4-1.

The total energy intensity associated with CDA's water management processes is estimated at 1,400 kWh/AF. The energy intensity data and calculations based on the "total utility approach" are provided in Table O-1B below.

CDA's water management processes do not include "consequential hydropower generation" where the energy generation is a direct consequence of water delivery (i.e. all water passing through the energy generation devices is delivered to users). CDA's water management processes do not include "non-consequential hydropower generation" where the energy generation is not a direct consequence of water delivery (i.e. energy could be generated even if no water was being delivered to water users). In addition, CDA's water management processes do not include any substantial "self-generated energy sources" including solar, wind, geothermal, biomass, co-generation, and diesel generator sources.

Table O-1B. Recommended Energy Reporting — Total Utility Approach

Urban Water Supplier: *Chino Basin Desalter Authority*

Water Delivery Product (If delivering more than one type of product use Table O-1C)

Wholesale Potable Deliveries

Table O-1B: Recommended Energy Reporting - Total Utility Approach				
Enter Start Date for Reporting Period	7/1/2019	Urban Water Supplier Operational Control		
End Date	6/30/2020			
☐ Is upstream embedded in the values reported?		Sum of All Water Management Processes	Non-Consequential Hydropower	
Water Volume Units Used	*AF*	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (volume unit)		*35003*	*0*	*35003*
Energy Consumed (kWh)		*48998850*	*0*	*48998850*
Energy Intensity (kWh/volume)		*1399.8*	*0.0*	*1399.8*

Quantity of Self-Generated Renewable Energy

0 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Combination of Estimates and Metered Data

Data Quality Narrative:

The total energy consumed was identified based on Southern California Edison (SCE) billing records. The total energy consumption reported does not include electricity usage for general administration (e.g. at CDA's headquarters) which is not associated with any water management processes.

Narrative:

The total energy consumption includes energy associated with operating groundwater production wells and booster pumps to deliver water in the distribution system. Energy consumption is associated with operating groundwater treatment. Energy consumption is also associated with plant lighting and air conditioning, and operating the Supervisory Control and Data Acquisition (SCADA) system and chlorination injection pumps.

Chapter 7

WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

LAY DESCRIPTION – CHAPTER 7

WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

Chapter 7 (Water Service Reliability and Drought Risk Assessment) of CDA's 2020 Plan discusses and provides the following:

- FY 2019-20 represents an "average" or "normal" water year for CDA in which the total amount of rainfall was similar to the historical average rainfall.
- A "single dry" year for CDA was represented in FY 2017-18, in which the total amount of rainfall was below the historical average rainfall.
- A "five consecutive year drought" period for CDA is represented from FY 2011-12 to FY 2015-16, where the total amount of rainfall during each of these years was less than the historical average rainfall.
- CDA's current and projected water supplies available during normal years in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 7-2.
- CDA's current and projected water supplies available during single dry years in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 7-3.
- CDA's current and projected water supplies available during each year of a five consecutive year drought in five-year increments over the next 25 years are provided (through Fiscal Year 2044-45) as shown on Table 7-4.
- The reliability of CDA's water supply source, including a review of water supply constraints, is provided. A single dry year or a five consecutive year drought period will not compromise CDA's ability to provide a reliable supply of water to its member agencies.
- A Drought Risk Assessment is provided which includes an assessment of CDA's water supply reliability over a five consecutive year drought period. CDA's DRA assumes a five consecutive year drought from FY 2020-21 through FY 2024-25 and includes a review of water supplies, water uses, and water supply reliability during this period. CDA's water system has experienced a prior five consecutive year drought with no limitation to its water supplies CDA has the ability to enact varying water shortage levels (see Chapter 8) to help educate its customers and provide an economic incentive for the retail customers to reduce their water consumption.

7.1 INTRODUCTION

CDA serves a dual purpose of providing reliable water supply and improving groundwater quality in the Chino Basin. Member agencies are required to purchase a minimum amount of treated water production to support this function. This section of CDA's UWMP describes CDA's ability to meet member agency water demands, including minimum purchase allocations, from its member agencies. This section assesses CDA's water service reliability during average years, single dry years, and during a five consecutive year drought period to meet the water needs of its member agencies' customers. This section also includes the discussion of a DRA which provides a mechanism for CDA to evaluate the risk to its water supply under a drought lasting for the next five consecutive years.

7.2 WATER SERVICE RELIABILITY ASSESSMENT

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

Information regarding the reliability of CDA's water supplies is based on the historical precipitation data in the Chino Basin area. Historical annual precipitation in the Chino Basin area is discussed in Section 3.3 and is based on historical data collected from Station 255 (Chino, California). Furthermore, Section 4.5 of this Plan notes that potential future climate change impacts may result in an increase in the average annual precipitation within the area receiving water supplies from CDA, thus indicating use of historical data is a reasonable and conservative approach. As indicated in Section 3.3, the historical average rainfall in the area receiving water supplies from CDA is 10.7 inches. FY 2019-20 represents an average or normal water year for CDA in which the total amount of rainfall was similar to the historical average rainfall. A single dry year for CDA was represented in FY 2017-18, in which the total amount of rainfall was below the historical average rainfall. A five consecutive year drought period for CDA is represented from FY 2011-12 to FY 2015-16, where the total amount of rainfall during each of these years was less than the historical average rainfall. Table 7-1 summarizes these "base years" for average, single dry, and five consecutive year drought and provides the total amount of water supplies available to CDA during those base years. The following discussion assesses the water service reliability of CDA's water supply sources.

Water Service Reliability - Groundwater

Chino Basin

The Chino Basin groundwater supplies are managed by the Chino Basin Watermaster, as discussed in Section 6.2.2. During a normal year (FY 2019-20), CDA pumped 35,003 AF of groundwater supplies to meet the demands from its member agencies with its supplies from the Chino Basin. During a single dry year (FY 2017-18), CDA pumped 29,918 AF of groundwater supplies to meet the demands from its member agencies with its supplies from the Chino Basin. During a five consecutive year drought multiple dry year period (FY 2011-12 to FY 2015-16), CDA pumped between 27,098 AF and 30,022 AF of groundwater supplies to meet the demands from its member agencies with its supplies from the Chino Basin.

Water Service Reliability Summary

Table 7-1 shows the water supplies during the base years (for average year, single dry year, and a five consecutive year drought). As a result of CDA's water supply , water supplies are expected to be sufficient during a five consecutive year drought to meet CDA's water demands from its member agencies.

7.2.1 SERVICE RELIABILITY - CONSTRAINTS ON WATER SOURCES

CWC 10631.

(b)(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

CDA's source of supply consists of contaminated groundwater pumped from the Chino Basin which is then treated and provided to its member agencies, as described in Section 6.2. Although this supply is managed, the following constraints may occur which CDA has considered in this reliability analysis.

Chino Basin

CDA produces contaminated groundwater from the Chino Basin which is then treated and provided to its member agencies. The groundwater historically had been impacted by contamination. However, CDA has developed and implemented appropriate treatment (blending and/or treatment facilities) which have been approved by SWRCB-DDW. These groundwater supplies are considered reliable both from a water quality and quantity standpoint.

7.2.2 SERVICE RELIABILITY - YEAR TYPE CHARACTERIZATION

7.2.2.1 TYPES OF YEARS

CDA's base years for an average year, a single dry year, and a five consecutive year drought are discussed in Section 7.2 and are summarized in Table 7-1. As indicated in Chapter 6, CDA's water supplies sources have been sufficient in meeting CDA's historical water demands from its member agencies during an average year, a single dry year, and a five consecutive year drought. An average year was based on a historical year during the past 10 years with a total precipitation similar to the historical average precipitation in the area receiving water supplies from CDA. Because a single dry year or a five consecutive year drought period will not compromise CDA's ability to provide a reliable supply of water to its member agencies, a single dry year in this Plan was selected based on one of the driest years during the past 10 years. The five consecutive year drought period was based on a period of five consecutive dry years during the past 10 years.

As indicated in Section 3.3, the historical average rainfall in the area receiving water supplies from CDA is 10.7 inches. FY 2019-20 represents an average or normal water year for CDA in which the total amount of rainfall was similar to the historical average rainfall. A single dry year for CDA was represented in FY 2017-18, in which the total amount of rainfall was less than the historical average rainfall. A five consecutive year drought period for CDA is represented from FY 2011-12 to FY 2015-16, where the total amount of rainfall during each of these years was less than the historical average rainfall. Table 7-1 summarizes these "base years" for an average year, a single dry year, and a five consecutive year drought period and provides the total amount of water supplies available to CDA during those base years.

Table 7-1 Basis of Water Year Data (Reliability Assessment)

Submittal Table 7-1 Wholesale: Basis of Water Year Data (Reliability Assessment)			
Year Type	Base Year If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000	Available Supplies if Year Type Repeats	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ______________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	% of Average Supply
Average Year	2020	40,000	100%
Single-Dry Year	2018	40,000	100.0%
Consecutive Dry Years 1st Year	2012	40,000	100.0%
Consecutive Dry Years 2nd Year	2013	40,000	100.0%
Consecutive Dry Years 3rd Year	2014	40,000	100.0%
Consecutive Dry Years 4th Year	2015	40,000	100.0%
Consecutive Dry Years 5th Year	2016	40,000	100.0%

Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table. Suppliers may create an additional worksheet for the additional tables.

***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.

7.2.2.2 SOURCES FOR WATER DATA

The monthly historical average temperatures (including minimum and maximum), monthly historical average rainfall, and monthly ETo in the vicinity of the area receiving water supplies from CDA are discussed in Section 3.3 Historical climate information was obtained from the WRCC, the National Oceanic and Atmospheric Administration, and from DWR's CIMIS.

7.2.3 WATER SERVICE RELIABILITY – SUPPLY AND DEMAND COMPARISON

CWC 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

CDA obtains its water supplies from groundwater wells located in the Chino Basin. As previously discussed in Section 7.2.1, a single dry year or a five consecutive year drought period will not compromise CDA's ability to provide a reliable supply of water to its member agencies' customers.

As previously discussed in Section 4.2.6, CDA's projected normal year water demands from its member agencies over the next 25 years, in five-year increments is provided in Table 4-3. Table 7-2, Table 7-3, and Table 7-4 summarize CDA's projected groundwater demands and supplies over the next 25 years in five-year increments, including during normal years, single dry years, and a five consecutive year drought period. These tables indicate CDA can meet water demands from its member agencies during normal years, single dry years, and a five consecutive year drought period over the next 25 years.

7.2.3.1 WATER SERVICE RELIABILITY – NORMAL YEAR

Table 7-2 summarizes CDA's projected groundwater demands to meet the demands from its member agencies and supplies over the next 25 years in five-year increments during normal years. Table 7-2 indicates CDA can meet water demands from its member agencies during normal years over the next 25 years.

Table 7-2 Normal Year Supply and Demand Comparison

Submittal Table 7-2 Wholesale: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	40,000	40,000	40,000	40,000	40,000
Demand totals *(autofill fm Table 4-3)*	40,000	40,000	40,000	40,000	40,000
Difference	0	0	0	0	0
NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.					

7.2.3.2 WATER SERVICE RELIABILITY – SINGLE DRY YEAR

Table 7-3 summarizes CDA's projected groundwater demands to meet the demands from its member agencies and supplies over the next 25 years in five-year increments during single dry years. Table 7-3 indicates CDA can meet water demands from its member agencies during single dry years over the next 25 years.

Table 7-3 Single Dry Year Supply and Demand Comparison

Submittal Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	40,000	40,000	40,000	40,000	40,000
Demand totals*	40,000	40,000	40,000	40,000	40,000
Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.					

7.2.3.3 WATER SERVICE RELIABILITY – FIVE CONSECUTIVE DRY YEARS

Table 7-4 summarizes CDA's projected groundwater demands to meet the demands from its member agencies and supplies over the next 25 years in five-year increments during five consecutive year drought periods. Table 7-4 indicates CDA can meet water demands from its member agencies during five consecutive year drought periods over the next 25 years.

Table 7-4 Multiple Dry Years Supply and Demand Comparison

Submittal Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Second year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Third year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Fourth year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Fifth year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG) m** *ust remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.						

7.2.4 DESCRIPTION OF MANAGEMENT TOOLS AND OPTIONS

CWC 10620.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

Chino Basin

As noted in Section 6.2.2, the Chino Basin is managed by the Chino Basin Watermaster. During the period of management under the Judgment, significant drought events have occurred. In each drought cycle, the Chino Basin has been managed to maintain water levels. Therefore, based on historical and on-going management practices, CDA will be able to rely on the Chino Basin for adequate supply over the next 25 years under single dry years and a five consecutive year drought periods.

Section 6.2.2 provides a description of the management of groundwater resources in the Chino Basin, as well as information on basin management. Chapter 6 also demonstrates the management structure of the Chino Basin which provides a reliable source of groundwater supply for CDA during a normal year, a single-dry year and a five consecutive year drought. Historical data indicates the Chino Basin has been well managed for the full period of the adjudication, resulting in a stable and reliable water supply. Basin management changes are discussed in Section 6.2.2, and include increased direct use of recycled water (see Section 6.5) and the continued use of recycled water for groundwater replenishment in the Chino Basin to reduce the need to import water from other regions. Therefore, the groundwater supplies in the Chino Basin are deemed reliable.

7.3 DROUGHT RISK ASSESSMENT

CWC 10635.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

(1) A description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive water years, starting from the year following when the assessment is conducted.

(2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

CDA's source of supply consists of contaminated groundwater pumped from the Chino Basin which is then treated and provided to its member agencies. The following discussion provides a DRA which assesses CDA's water supply reliability over a five consecutive year drought period. CDA's DRA incorporates a five consecutive year drought from FY 2020-21 through FY 2024-25 and includes a review of water supplies, water uses, and water supply reliability.

7.3.1 DRA DATA, METHODS, AND BASIS FOR WATER SHORTAGE CONDITIONS

CDA's DRA was prepared using historical production data from CDA's water supply source. The following assumptions were considered during the preparation of CDA's DRA for each year of the five consecutive year drought.

- The five consecutive year drought period associated with the 2020 UWMP is based on five consecutive dry years from FY 2020-21 through FY 2024-25.
- The projected water supplies available during each year of this five consecutive year drought are assumed to be equal to the amount of groundwater pumped by CDA for water quality management purposes and for maintaining hydraulic control within Chino Basin.
- The projected demands during this five consecutive year drought is assumed to be equal to the projected water supplies.

- The projected demands were compared to the projected supplies to identify potential water supply deficits which may require implementation of the Water Shortage Contingency Plan (discussed further in Chapter 8).

The following methodologies were considered during the preparation of CDA's DRA during for each year of the five consecutive year drought:

- Drought Year 1: The region receiving water supplies from CDA had experienced an average to above average year of precipitation in the prior year. Member agencies' retail water use in the prior year had been below average due to a reduced need for outdoor water use, the groundwater basin had been replenished from above average local stormwater runoff, and imported water supplies were not restricted.
- Drought Year 2: The region receiving water supplies from CDA experienced a second year of below average precipitation and runoff. Member agencies' retail customers increased water use for outdoor irrigation to compensate for lack of precipitation. Groundwater and imported water supplies have not been impacted. Local surface water supplies have not been impacted.
- Drought Year 3: The region receiving water supplies from CDA experienced a third year of below average precipitation and runoff. Member agencies' retail customers increase water use for outdoor irrigation to compensate for lack of precipitation. Groundwater and imported water supplies have not been impacted. However, there is an increased demand on both groundwater and treated imported water because local surface water supplies have been significantly impacted.
- Drought Year 4: The region receiving water supplies from CDA experienced a fourth year of below average precipitation and runoff. Groundwater supplies have not been impacted. However, there is an increased demand on groundwater because member agencies' local surface water supplies continue to be significantly impacted.
- Drought Year 5: Fifth year of below average precipitation and runoff. Groundwater supplies have not been impacted. However, there is an increased demand on groundwater because member agencies' local surface water supplies continue to be significantly impacted.

7.3.2 DRA INDIVIDUAL WATER SOURCE RELIABILITY

CDA pumps up to 40,000 AFY of contaminated groundwater from the Chino Basin and provides up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2 of the 2020 UWMP. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption. However, for the purposes of the DRA, CDA has incorporated a five consecutive year drought based on five consecutive dry years commencing in FY 2021-22. The quantity of water supplies available for each year during this five consecutive year drought period included in CDA's DRA is assumed to be the same as the projected quantity of water supplies produced by CDA (to meet its member agency demands). Production data for those years have been tabulated in Section 6.1. The following describes the anticipated reliability of the water source for each year of the five consecutive year drought based on recent experience.

Groundwater – Chino Basin

CDA receives water supplies from the Chino Basin, which is actively managed by the Chino Basin Watermaster, as described in Section 6.2.2. Each year, the Chino Basin Watermaster reviews water supply conditions including local rainfall, groundwater levels, local stormwater runoff available for replenishment, imported water availability, and the amount of imported water stored in the groundwater basin for future demands. The Watermaster identifies the annual amount of groundwater which may be pumped (such as an Operating Safe Yield) before more expensive imported water would need to be purchased from MWD through IEUA to replenish the Basin for all production in excess of the water rights. Regardless of the annual safe yield adopted, there is never a restriction on the amount of water which may be pumped from the Chino Basin, only the cost of producing the groundwater is impacted. The Chino Basin Watermaster is not restricted as to when or how much untreated imported water be delivered to the Chino Basin, only that it ultimately be delivered. The quantity of groundwater used (and reliably available) during the most recent and historical five consecutive year drought period have been tabulated in Section 6.1. During this period, CDA was able to maintain its production of its groundwater supplies from an adjudicated and managed groundwater basin. As a result of these collective actions (and experience during and prior to five consecutive year droughts), CDA does not anticipate a water supply shortage from the Chino Basin.

Summary

CDA's water system has previously experienced a five consecutive year drought with no limitation to its water supplies. CDA's member agencies have the ability to enact varying water shortage levels (see Chapter 8) to help educate its customers and provide an economic incentive for the member agency retail customers to reduce their water consumption.

7.3.3 DRA TOTAL WATER SUPPLY AND USE COMPARISON

Gross water use for the projected five consecutive year drought is shown on Table 7-5. Section 7.3.2 describes the water source reliability for the source of supply CDA will rely on during a five consecutive year drought. CDA pumps up to 40,000 AFY of contaminated groundwater from the Chino Basin and provides up to 35,200 AFY of treated water to its member agencies. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption. However, when necessary, CDA's member agencies can implement various water shortage levels of their respective Water Shortage Contingency Plans (discussed in Chapter 8) in order to reduce water demands. For the purposes of the DRA, the total water supplies available to CDA are based on the quantity of supplies pumped by CDA during the most recent historical five consecutive drought period (from FY 2011-12 through FY 2015-16). As shown in Table 7-5, assuming no additional water supply benefits will be available from groundwater supplies, CDA's member agencies will implement various stages of its Water Shortage Contingency Plan to balance water demands with available supplies during years 1, 2, 3, 4, and 5 of the projected five consecutive year drought.

Table 7-5 Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b)

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)	
2021	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2022	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2023	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2024	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2025	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

7.3.4 OPTIONAL PLANNING TOOL WORKBOOK

DWR has deemed the "Planning Tool Worksheet" as optional and CDA is not required by DWR to use the tool. CDA has provided sufficient water supplies to its member agencies, including during long-term droughts and years with historically high water demands from its member agencies. CDA has also been able to provide water service to meet maximum day water demands from its member agencies for these years, including during the summer months. CDA obtains its water supplies from a managed groundwater basin which is not subject to seasonal fluctuation. Consequently, an evaluation regarding water supplies on a monthly basis was not considered.

Chapter 8

WATER SHORTAGE CONTINGENCY PLAN

LAY DESCRIPTION – CHAPTER 8

WATER SHORTAGE CONTINGENCY PLAN

Chapter 8 (Water Shortage Contingency Plan) of CDA's 2020 Plan discusses and provides the following:

- CDA pumps up to 40,000 AFY of contaminated groundwater from the Chino Basin and provides up to 35,200 AFY of treated water to its member agencies. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption. Consequently, development of a Water Shortage Contingency Plan by CDA is not required; however, CDA coordinates its activities with its member agencies, and CDA's member agencies are required to develop a Water Shortage Contingency Plan. Preparation of CDA's "Annual Water Supply and Demand Assessment" (or Annual Assessment) is discussed. Commencing July 1, 2022, CDA is required to submit the Annual Assessment. The Annual Assessment will include a review of CDA's "unconstrained" water demands from its member agencies for the current year and for a potential upcoming single dry year.
- For each declared water supply shortage level, CDA's member agencies' customers will be required to reduce their consumption by the percentage specified in the corresponding water supply shortage level. These demand reduction actions include irrigation and other outdoor use restrictions, rate structure changes, and other water use prohibitions.
- The operational changes CDA will consider in addressing water shortages on a short-term basis are discussed to enforce demand reduction measures.
- CDA's Emergency Response Plan is summarized. The Emergency Response Plan provides the management, procedures, and designated actions CDA and its employees will implement during emergency situations (including catastrophic water shortages) resulting from natural disasters, system failures, and other unforeseen circumstances.
- The preparation of CDA's seismic risk assessment and mitigation plan is discussed. The locations of earthquake faults in the vicinity of the area receiving water supplies from CDA are provided.

The following Water Shortage Contingency Plan includes references to Chapters and Sections from the Chino Basin Desalter Authority's 2020 Urban Water Management Plan:

8.1 WATER SUPPLY RELIABILITY ANALYSIS

CWC 10632.

(a)(1) The analysis of water supply reliability conducted pursuant to Section 10635.

CDA pumps up to 40,000 AFY of contaminated groundwater from the Chino Basin and provides up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2 of the 2020 UWMP. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption. Consequently, development of a WSCP by CDA is not required; however, CDA coordinates it activities with its member agencies, and CDA's member agencies are required to develop a WSCP. The Chino Basin is adjudicated and groundwater supplies are managed. The reliability of this source of supply is discussed in Chapter 7 of this UWMP.

8.2 ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

CWC 10632.

(a)(2) The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:

(A) The written decision-making process that an urban water supplier will use each year to determine its water supply reliability.

(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:

(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.

(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.

(iii) Existing infrastructure capabilities and plausible constraints.

(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.

(v) A description and quantification of each source of water supply.

CWC 10632.1.

An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later.

Commencing July 1, 2022, CDA is required to submit an "Annual Water Supply and Demand Assessment" (Annual Assessment) in accordance with DWR's guidance and requirements. The Annual Assessment will include a review of CDA's unconstrained water demands from its member agencies (i.e. water demands from its member agencies prior to any projected response actions CDA may trigger under this WSCP) for the current year and the upcoming (potential single dry) year. . CDA pumps up to 40,000 AFY of contaminated groundwater from the Chino Basin and provides up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2 of the 2020 UWMP. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption.

For each Annual Assessment, CDA plans to prepare a preliminary assessment of its water supplies for the current and upcoming years by April of each year. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption. The preliminary assessment will include a review of water supplies for at least a single dry year.

The components of an Annual Assessment consist of the following:

- A written decision-making process
- Key data inputs and assessment methodology

8.2.1 DECISION MAKING PROCESS

CDA produces contaminated groundwater from the Chino Basin which is then treated and provided to its member agencies. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption. The Chino basin is managed on a fiscal year basis. Consequently, during the third quarter of each fiscal year CDA will review its water demands from its member agencies from the initial six months along with the current groundwater basin conditions and local hydrology. Member agencies also have minimum purchase commitments from CDA. This information will be used to help develop the Annual Assessment. A draft of the Annual Assessment will be circulated internally within CDA for peer review and comment. Based on comments received, a redraft will be prepared and provided to CDA managers during the Spring of each year. The draft will subsequently be provided to the General Manager for final review. Subsequently, a final draft of the Annual Assessment will be provided to CDA's Board of Directors for review and included in the agenda as part of a Board meeting such that it can be approved and any recommended specific shortage response actions may be enacted. The final Annual Assessment will be provided to DWR no later than July 1 of each year.

8.2.2 DATA AND METHODOLOGIES

The key data inputs and methodologies which will be evaluated by CDA during the preparation of the preliminary assessment will include the following. However, the groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption.:

1) Evaluation Criteria: The locally applicable evaluation criteria used to prepare the Annual Assessment will be identified. The evaluation criteria will include, but is not limited to, an analysis of current local hydrology (including rainfall and groundwater levels) within the area receiving water supplies from CDA, current water demands from its member agencies, and water quality regulations which may impact groundwater availability.

2) Water Supply: A description of the available water supply source will be provided. The description will include a quantification of the available water supply source and will be based on review of current production capacities, historical production, Urban Water Management Plans, and prior water supply studies (including Water Supply Assessments and/or Master Plans).

3) Unconstrained Water Demand: The potential unconstrained water demands from its member agencies during the current year and the upcoming (potential single dry) year, prior to any special shortage response actions, will be reviewed. The review will include factors such as weather, existing and projected land uses and populations, actual customer consumption and the water use factor, and monthly Urban Water Supplier Monthly Reports.

4) Planned Water Use for Current Year Considering Dry Subsequent Year: The water supplies available to meet the demands, including the minimum demand pursuant to the purchase agreements of its member agencies during the current year and the upcoming (potential single dry) year will be considered and identified by each type of supply. The evaluation will include factors such as weather, water quality, existing available pumping capacities, contractual obligations, and regulatory issues.

5) Infrastructure Considerations: The capabilities of the water distribution system infrastructure to meet the water demands from its member agencies during the current year and the upcoming (potential single dry) year will be considered. Available production capacities (e.g. groundwater well capacities) and distribution system water losses (see

Section 4.2.4) will be reviewed. In addition, capital improvement and replacement projects will be considered.

6) Other Factors: Additional local considerations, if any, which can affect the availability of water supplies will be described.

8.3 SIX STANDARD WATER SHORTAGE LEVELS

CWC 10632.

(a)(3)(A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.
(a)(3)(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross reference relating its existing categories to the six standard water shortage levels.

CDA serves a dual purpose of providing reliable water supply and improving groundwater quality in the Chino Basin. Member agencies are required to purchase a minimum amount of treated water production to support this function. These minimum purchase agreements form a fixed portion of the water supply portfolios of each of the CDA retail member agencies. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption.

However, depending on their individual water supply constraints, member agencies may employ plans for water usage appropriate to their water shortage levels. The standard shortage levels for each member agency can be found in their individual 2020 UWMPs. These standard shortage levels and corresponding response actions are executed by the individual member agency, independent of CDA. CDA's member agencies plans for water usage during periods of shortage is designed to incorporate six standard water shortage levels corresponding to progressive ranges from up to 10, 20, 30, 40, and 50 percent shortages, and greater than 50 percent shortage.

CDA member agencies are located within the Western Municipal Water District in Riverside County and/or within the Inland Empire Utilities Agency in San Bernardino County. IEUA member agencies are subject to IEUA's "Regional Drought Contingency Plan", adopted in April 2020, which previously established five (5) water shortage levels. WMWD member agencies are subject to WMWD's Ordinance 386 "Updated Retail Customer Water Supply Shortage Contingency Program," which previously established five (5) water shortage levels. In accordance with the CWC in which urban water suppliers are required to define six standard water shortage levels, CDA has provided the crosswalks illustrated below that translates IEUA's and WMWD's previously established shortage levels to the mandated standard shortage levels for their respective member agencies.

Corresponding Relationships Between IEUA's 2015 Shortage Levels and the 2020 WSCP Mandated Shortage Levels

Established Level	Supply Condition/ Shortage
0	0%
1	1 to 5%
2	6 to 15%
3	16 to 25%
4	26 to 50%
5	> 50%

2020 Standard Level	Shortage Level
1	≤10%
2	10 to 20%
3	20 to 30%
4	30 to 40%
5	40 to 50%
6	> 50%

Corresponding Relationships Between WMWD's 2015 Shortage Levels and the 2020 WSCP Mandated Shortage Levels

Established Level	Supply Condition/ Shortage
1	0%
2	Up to 4%
3	5 to 15%
4	16 to 50%
5	> 50%

2020 Standard Level	Shortage Level
1	≤10%
2	10 to 20%
3	20 to 30%
4	30 to 40%
5	40 to 50%
6	> 50%

Table 8-1 provides a description of the six stages of action, or water shortage levels, which may be triggered by a shortage in CDA's member agencies' water supply, depending on the severity of the shortage and its anticipated duration.

Table 8-1 Water Shortage Contingency Planning Levels

Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions** (*Narrative description)*
1	Up to 10%	IEUA member agencies may be subject to implement direct installation programs, hold more landscape workshops, consider escalation of local water waste prohibitions, etc. WMWD member agencies' customers may be subject to a 5 to 15% water use reduction.
2	Up to 20%	In addition to Shortage Level 1; IEUA member agencies may expand micro-targeting customers and increase marketing efforts. WMWD member agencies may be subject to prohibition of new water service and reductions in water budgets.
3	Up to 30%	In addition to Shortage Level 2; IEUA member agencies may increase penalties, implement emergency alerts, etc. WMWD member agencies may be subject to additional requirements deemed necessary by individual member agencies.
4	Up to 40%	In addition to Shortage Level 3; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies. WMWD member agencies may be subject to additional requirements deemed necessary by individual member agencies.
5	Up to 50%	In addition to Shortage Level 4; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies. WMWD member agencies may be subject to additional requirements deemed necessary by individual member agencies.
6	>50%	In addition to Shortage Level 5; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies. WMWD member agencies may be subject to additional requirements deemed necessary by individual member agencies.
NOTES:		

8.4 SHORTAGE RESPONSE ACTIONS

CWC 10632.

(a)(4) Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:

(A) Locally appropriate supply augmentation actions.

(B) Locally appropriate demand reduction actions to adequately respond to shortages.

(C) Locally appropriate operational changes.

(D) Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions.

(E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.

The wholesale members of IEUA and WMWD have approved WSCP's with shortage response actions, which are outlined in each of their 2020 UWMPs. A summary of these shortage response actions imposed on CDA's member agencies is provided in this section.

8.4.1 DEMAND REDUCTION

CDA recognizes IEUA and WMWD water shortage response actions for its member agencies to reduce demand on water supplies. Member agencies may employ their own demand reduction actions and/or IEUA or WMWD demand reduction actions at their own discretion. Demand reduction actions include irrigation and other outdoor use restrictions, rate structure changes, public outreach strategies, other water use prohibitions. Many demand reduction actions are applicable to all levels of water shortages while others are exclusive to certain levels of shortage. The structure of demand reduction actions under a specific water shortage level are designed to encourage those customers with high gallon per capita usage to achieve proportionally greater reduction than those with low use. Violations of these demand reduction actions will be considered waste and an unreasonable use of water. Table 8-2 describes each demand reduction action and its effect on reducing the shortage gap.

STANDARD DEMAND REDUCTION ACTIONS
The following demand reduction actions are in effect at all times, regardless of a declared standard water shortage level:

<u>IEUA Member Agencies</u>

- Implement the following programs:
  - SoCal WaterSmart Residential and Commercial Rebates
  - Turf Replacement Program
  - Residential Irrigation Tune-up
  - Home Surveys
  - Landscape Workshops
  - Design Services
- Promote water efficient properties.

<u>WMWD Member Agencies</u>
The following permanent prohibitions shall be continually in effect at all levels of standard water shortage level declarations in addition to the requirements specific to each level:

- All irrigators shall ensure automatic irrigation times are adjusted according to changing weather patterns and landscape requirements.
- All open hoses shall be equipped with automatic, positive shut-off nozzles.
- Watering of lawns and/or groundcovers and irrigating landscaping is permitted only between the hours of 8:00 PM and 8:00 AM.
- All swimming pools, spas, ponds, and fountains shall be equipped with re-circulating pumps.
- All plumbing leaks, improperly adjusted sprinklers, or other water conduits/ fixtures that require repair or adjustment shall be corrected to the satisfaction of WMWD within 96 hours of notification by MWMD.
- No person shall use water to wash down sidewalks, driveways, parking areas, except to alleviate immediate fire or sanitation hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with an automatic, positive self-closing shut-off device, or a low volume, high-pressure cleaning machine.
- No person shall allow water to leave his or her property by drainage onto adjacent properties or public or private roadways or streets due to excessive irrigation and/ or uncorrected leaks.
- The washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment is permitted at any time with a hand-held bucket or a hand-held hose equipped with an automatic, positive shut-off nozzle. Provided, however, such washing may be done at any time on the immediate premises of a commercial service station or a car dealership with commercial car washing equipment, or by a licensed mobile detailing/ car wash professional using low volume, high pressure washing equipment. Further, such washings are exempted from these regulations where the health, safety, and welfare of the public is

contingent upon frequent vehicle cleanings, such as garbage trucks and vehicles used to transport food and perishables.

- Construction operations receiving water from a construction meter, hydrant meter, or water truck shall not use water for any purpose other than those required by regulatory agencies. Construction projects requiring watering for new landscaping materials shall adhere to the designated irrigation requirements set forth in this WSCP.

STANDARD WATER SHORTAGE LEVEL 1

The following are implemented during a Standard Water Shortage Level 1:

IEUA Member Agencies

- Implement direct installation programs including the Residential Smart Irrigation Direct Installation and the School Smart Irrigation Direct Installation.
- Hire additional landscape designers to expand landscape design services.
- Hold more frequent landscape workshops.
- Increase the volume of home surveys performed.
- Utilize general customer messaging to communicate need to increase water efficiency levels.
- Profile customers and micro-target high potential customers, utilizing messaging that will best resonate with those customers.
- Consider escalation of local water waste prohibitions.
- Introduce influencer marketing (role models and respected community members)
- Prepare IEUA WEFlex funding proposal and plans for expanded customer communication and enforcement administration.
- Additional requirements deemed necessary by individual member agencies.

WMWD Member Agencies

- Potable water customers in areas directly served by WMWD that do not have water budgets shall reduce water use by 5 to 15% from the Base Period during declarations of any Sub-level under Standard Water Shortage Level 1.
- Sub-levels under Standard Water Shortage Level
    - Sub-level 1A: WMWD shall eliminate all adjustments to existing residential customer's outdoor Water Budgets including, but not limited to, increases for landscape size, and/or swimming pool, spa, or pond maintenance adjustments. New water using features or expanded landscapes shall not quality for a Water Budget adjustment.
    - Sub- level 1B: Tier 4 water rates shall be eliminated. Customers with Water Budgets, and whose water use exceeds one hundred and twenty-five percent (125%) of their total water Budget during a Billing Period will be charged the applicable Tier 5 water rates.
    - Sub-level 1C: Tier 3 water rates shall be eliminated. Customers who have Water Budgets, and whose water use exceeds 100% of their total Water Budgets during a Billing Period, shall be charged the applicable Tier 5 water rates.

STANDARD WATER SHORTAGE LEVEL 2

In addition to tasks implemented in Standard Water Shortage Level 1, the following applies to Standard Water Shortage Level 2:

IEUA Member Agencies

- Continue base programs and incentive amounts for turf replacement, high efficiency nozzles, smart controllers, laminar flow restrictor, and plumbing control valves.
- Continue smart irrigation direct installation programs.
- Expand profiling and micro-targeting to include mid-range water users as well as high-water use customers.
- Increase influencer marketing.
- Hire additional local staff and set up operations for expanded customer communication and enforcement administration.
- Additional requirements deemed necessary by individual member agencies.

WMWD Member Agencies

- No new potable water service connections shall be provided, no new temporary meters or permanent meters shall be provided, and no statements of immediate ability to serve or provide potable water service (such as will serve letters, certificates, or letters of availability) shall be issued, except under the following circumstances:
    - A valid, unexpired building permit has been issued for the project; or
    - The project is necessary to protect the public's health, safety, and welfare; or
    - The applicant provides a Conservation Offset or pays a Conservation Offset Fee established by WMWD in an amount necessary to cover the cost of implementing such conservation techniques or acquiring alternative water sources, to offset the new demand. The fee will be based on the Conservation Offset required to meet the projected demand of the proposed project. Such fee shall apply to residential as well as commercial and industrial building and may be adjusted from time to time as determined by WMWD. The existence and application of a Conservation Offset, and the amount of Conservation Offset Fee and other terms and conditions for any Conservation Offset, shall be determined at WMWD's sole discretion. The existence and application of any water meter moratorium or other similar restrictions shall be determined by separate and subsequent action of the Board of Directors, or;
    - Where an existing service connection exists and an existing water meter is inoperable and cannot be repaired. In such an instance, the size of the new water meter shall be the same or smaller than the water meter being replaced.
- Sub-levels under Standard Water Shortage Level 2
    - Sub-level 2A
        - All landscape water budgets shall be reduced by 10%. Residential customers who have Water Budgets, and whose water use exceeds 100% of their Tier 1 and 90% of their Tier 2 Water Budgets during a Billing Period, shall be charged at the applicable Tier 5 water rates. Landscape customers who have Water Budgets, and whose water use exceeds 90% of their Water

Budget during a Billing Period shall be charged the applicable Tier 5 water rates.

- Commercial or industrial customers who are served through mixed-use meter, and who have Water Budgets, shall reduce landscape and non-essential outdoor water use by 25%.
- Potable water customers in areas directly served by WMWD and who do not have Water Budgets shall reduce their outdoor water use by 10% from the Base Period.

- Sub-level 2B
  - All outdoor Water Budgets shall be reduced be 40%. Residential customers who have Water Budgets, and whose water use exceeds 100% of their Tier 1 and 40% of their Tier 2 Water Budgets during a Billing Period, shall be charged at the applicable Tier 5 water rates. Landscape customers who have Water Budgets, and whose water use exceeds 40% of their Water Budget during a Billing Period shall be charged the applicable Tier 5 water rates.
  - Commercial or industrial customers who are served through dedicated or mixed-use meter, and who have Water Budgets, shall reduce landscape and non-essential outdoor water use by 10%.
  - Potable water customers in areas directly served by WMWD and who do not have Water Budgets shall reduce their outdoor water use by 40% from the Base Period.
- Sub-level 2C
  - All outdoor Water Budgets shall be reduced be 65%. Residential customers who have Water Budgets, and whose water use exceeds 100% of their Tier 1 and 35% of their Tier 2 Water Budgets during a Billing Period, shall be charged at the applicable Tier 5 water rates. Landscape customers who have Water Budgets, and whose water use exceeds 35% of their Water Budget during a Billing Period shall be charged the applicable Tier 5 water rates.
  - Installation of new landscapes shall be prohibited unless irrigated with recycled water. Exceptions may be provided for projects with prior approval by the appropriate jurisdiction.
  - Commercial or industrial customers who are served through dedicated or mixed-use meters, and who have Water Budgets, shall water use by 20%.
  - Potable water customers in areas directly served by WMWD and who do not have Water Budgets shall reduce their outdoor water use by 65% from the Base Period.
  - No new construction or hydrant meters will be issued. Potable water shall not be used for earth work, road construction purposes, dust control, compaction, or trenching jetting. Construction projects necessary to maintain the health, safety, and welfare of the public are exempt from these regulations.

- WMWD shall develop a public information campaign to provide customers with options for achieving demand reduction goals and complying with their applicable allocation. WMWD may explore increased customer incentives for conservation measures.

STANDARD WATER SHORTAGE LEVEL 3

In addition to tasks implemented in Standard Water Shortage Level 2, the following applies to Standard Water Shortage Level 3:

IEUA Member Agencies

- Increase penalties.
- Implement emergency alerts.
- Implement news media coverage.
- Additional requirements deemed necessary by individual member agencies.

WMWD Member Agencies

- Additional requirements deemed necessary by individual member agencies.

STANDARD WATER SHORTAGE LEVEL 4

In addition to tasks implemented in Standard Water Shortage Level 3, the following applies to Standard Water Shortage Level 4:

IEUA Member Agencies

- Additional requirements deemed necessary by individual member agencies.

WMWD Member Agencies

- Additional requirements deemed necessary by individual member agencies.

STANDARD WATER SHORTAGE LEVEL 5

In addition to tasks implemented in Standard Water Shortage Level 4, the following applies to Standard Water Shortage Level 5:

IEUA Member Agencies

- Additional requirements deemed necessary by individual member agencies.

WMWD Member Agencies

- Additional requirements deemed necessary by individual member agencies.

STANDARD WATER SHORTAGE LEVEL 6

In addition to tasks implemented in Standard Water Shortage Level 5, the following applies to Standard Water Shortage Level 6:

IEUA Member Agencies

- Only offer indoor plumbing and property leak detection programs.
- Suspend all landscape and irrigation programs.
- Conduct stringent enforcement of restrictions.
- Additional requirements deemed necessary by individual member agencies.

WMWD Member Agencies

- All landscape and non-essential outdoor water use for all customers in all areas of WMWD's retail water service area shall be prohibited.
- Except as to property for which a building permit has been heretofore issued, no new water meter(s) shall be provided, except in the following circumstances:
    - For projects necessary to protect the public's health, safety, and welfare; or
    - When using recycled water
- Sub-levels under Standard Water Shortage Level 6
    - Sub-level 6A
        - All indoor residential Water Budgets shall be reduced by 10% to 54 GPCD. Residential customers who have Water Budgets and whose water use exceeds 90% of their modified Tier 1 Water Budget and 0% of Tier 2 Water Budget during a Billing Period, or 50 GPCD, shall be charged at the applicable Tier 5 water rates.
        - Commercial and industrial customers who are served through dedicated or mixed-use meters, and who have Water Budgets, shall reduce their water consumption by 30%.
        - Potable water customers in areas directly served by WMWD that do not have Water Budgets shall reduce their indoor water use by 10%
    - Sub-level 6B
        - All indoor residential Water Budgets shall be reduced by 15% to 51 GPCD. Residential customers who have Water Budgets and whose water use exceeds 85% of their modified Tier 1 Water Budget and 0% of Tier 2 Water Budget during a Billing Period, or 51 GPCD, shall be charged at the applicable Tier 5 water rates.
        - Commercial and industrial customers who are served through dedicated or mixed-use meters, and who have Water Budgets, shall reduce their water consumption by 40%.
        - Potable water customers in areas directly served by WMWD that do not have Water Budgets shall reduce their indoor water use by 15% from the Base Period. All non-essential outdoor and landscape water use shall be prohibited.
    - Sub-level 6C

- All residential customers who have Water Budgets shall have their indoor Water Budgets reduced by 20% to 48 GPCD. Residential customers who have Water Budgets and whose water use exceeds 80% of their modified Tier 1 Water Budget and 0% of Tier 2 Water Budget during a Billing Period, or 48 GPCD, shall be charged at the applicable Tier 5 water rates.
- Commercial and industrial customers who are served through dedicated or mixed-use meters, and who have Water Budgets, shall reduce their water consumption by 50%.
- Potable water customers in areas directly served by WMWD that do not have Water Budgets shall reduce their indoor water use by 20% from the Base Period.

- The use of water for commercial, manufacturing, or processing purposes may be further reduced in volume than is indicated in the sub-stages of this section if it is determined to be in the best interest of the health, sanitation, and fire flow protection in the communities served by WMWD. This determination may be made by the WMWD Board of Directors, the General Manager, or his or her authorized designee.
- All dedicated irrigation meters will be locked off by WMWD personnel.
- Customers with a WMWD authorized Medical Adjustment to their Tier 1 allocation will be permitted 100% of their Tier 1 Water Budget.
- WMWD shall develop a public information campaign to provide customers with options for achieving Level 6 demand reduction goals and complying with their allocation. WMWD may explore increased customer incentives for conservation measures.

Table 8-2 Demand Reduction Actions

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
1	Expand Public Information Campaign	Collective reduction from all Shortage Level 1 actions is up to 596 AFY	Applicable to IEUA member agencies	No
1	Increase Frequency of Meter Reading	Collective reduction from all Shortage Level 1 actions is up to 596 AFY	Applicable to IEUA member agencies	No
1	Increase Water Waste Patrols	Collective reduction from all Shortage Level 1 actions is up to 596 AFY	Applicable to IEUA member agencies	Yes
1	Implement or Modify Drought Rate Structure or Surcharge	Collective reduction from all Shortage Level 1 actions is up to 596 AFY	Applicable to WMWD member agencies	Yes
2	Other	Collective reduction from Shortage Level 1 plus all Shortage Level 2 actions is up to 1,193 AFY	All actions under Shortage Level 1	Yes
2	Moratorium or Net Zero Demand Increase on New Connections	Collective reduction from all Shortage Level 2 actions is up to 1,193 AFY	Applicable to IEUA member agencies	Yes
2	Implement or Modify Drought Rate Structure or Surcharge	Collective reduction from all Shortage Level 2 actions is up to 1,193 AFY	Applicable to WMWD member agencies	Yes
3	Other	Collective reduction from Shortage Level 2 plus all Shortage Level 3 actions is up to 1,789 AFY	All actions under Shortage Level 2	Yes
4	Other	Collective reduction from Shortage Level 3 plus all Shortage Level 4 actions is up to 2,386 AFY	All actions under Shortage Level 3	Yes
5	Other	Collective reduction from Shortage Level 4 plus all Shortage Level 5 actions is up to 2,982 AFY	All actions under Shortage Level 4	Yes
6	Other	Collective reduction from Shortage Level 5 plus all Shortage Level 6 actions is greater than 2,982 AFY	All actions under Shortage Level 5	Yes
NOTES: CDA promotes IEUA and WMWD water shortage response actions for its member agencies to reduce demand on their individual water supplies. Member agencies may employ their own demand reduction actions and/or IEUA or WMWD demand reduction actions at their own discretion.				

8.4.2 SUPPLY AUGMENTATION

CDA's purpose is to produce treated groundwater for its member agencies. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption.CDA does not anticipate augmenting water supplies. However, CDA's member agencies may consider increased supplies from existing sources. Table 8-3 reflects this approach and does not identify any new supplies. Instead, CDA's member agencies will focus on demand reduction measures in the event existing sources of supply are not sufficient to meet customer demands. As discussed in Chapter 6, CDA's source of water supply is groundwater produced from the Chino Basin. As noted in Section 8.2, beginning July 1, 2022, CDA will prepare and submit an Annual Assessment which will include a review of the water supply available to help meet water demands for the current and upcoming years.

As noted in Section 6.2.2, the Chino Basin is managed by the Chino Basin Watermaster. During the period of management under the Chino Basin Judgment, significant drought events have occurred. In each drought cycle, the Chino Basin has been managed to maintain water levels. Groundwater quality is carefully monitored and managed by the Chino Basin Watermaster. Treatment facilities, including CDA, and/or blend plans have been developed by water agencies to meet potable water standards and to prevent the spread of any groundwater contamination. Groundwater quality in the Chino Basin is not expected to impact potable supplies or constrain supply reliability. Based on historical and on-going management practices, CDA continue to provide potable water to its member agencies from the Chino Basin.

Table 8-3 Supply Augmentation and Other Actions

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
1	Transfers	Not applicable (see Notes)	
2	Transfers	Not applicable (see Notes)	
3	Transfers	Not applicable (see Notes)	
4	Transfers	Not applicable (see Notes)	
5	Transfers	Not applicable (see Notes)	
6	Transfers	Not applicable (see Notes)	
NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2. CDA does not anticipate augmenting water supplies. However, CDA's member agencies will consider increased production from the Chino Basin (through potential transfer of water rights) using existing facilities to address increased demands. As noted on Table 8-2, CDA's member agencies plan to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.			

8.4.3 OPERATIONAL CHANGES

During a water supply shortage situation, CDA will manage its water supply resource to provide water supplies capable of meeting a portion of the demands of its member agencies. Section 8.4.1 describes CDA's member agencies' demand reduction actions such as rate structure changes, public outreach strategies, other operational changes. Section 8.4.2 describes CDA's water supply source.

As noted in Section 8.2, beginning July 1, 2022, CDA will prepare and submit an Annual Assessment which will include a review of the water supplies available to meet a portion of the water demands from its member agencies for the current and upcoming years. Preparation of the Annual Assessment will assist CDA in determining any potential operational changes. The operational changes CDA will consider in addressing non-catastrophic water shortages on a short-term basis include the following:

- Improved monitoring, maintenance, and repairs to reduce water distribution system losses.

8.4.4 ADDITIONAL MANDATORY RESTRICTIONS

The mandatory restrictions which are promoted by CDA to reduce member agencies' customer demands are discussed in Section 8.4.1. There are no additional mandatory restrictions planned at this time.

8.4.5 EMERGENCY RESPONSE PLAN

Catastrophic water shortages are incorporated in CDA's member agencies' standard water shortage levels (identified in Section 8.3) and the associated demand reduction measures (described in 8.4.1). In addition to potential operational changes (Section 8.4.3) which CDA may consider in order to continue providing water supplies, CDA will review and implement any necessary steps included in its "Emergency Response Plan".

As part of the "America's Water Infrastructure Act of 2018", community water systems serving a population greater than 3,300 people, including CDA, are required to review and update their "Risk and Resilience Assessment" (RRA) and the associated "Emergency Response Plan" (ERP) every five (5) years. However, due to security concerns regarding the submitting of these reports, water systems are required to submit certifications to the United States Environment Protection Agency (USEPA), from March 31, 2020 and December 30, 2021, confirming the current RRA and ERP have been reviewed and updated.

CDA's RRA, which is currently being prepared, evaluates the vulnerabilities, threats, and consequences from potential hazards to CDA's water system. CDA is preparing its RRA (which is incorporated by reference) by evaluating the following items:

- Natural hazards and malevolent acts (i.e., all hazards);
- Resilience of water facility infrastructure (including pipes, physical barriers, water sources and collection, treatment, storage and distribution facilities, and electronic, computer and other automated systems);
- Monitoring practices;
- Financial systems (e.g., billing systems);
- Chemical storage and handling; and
- Operation and maintenance.

CDA's RRA evaluated a series of potential malevolent acts, natural hazards, and other threats in order to estimate the potential "monetized risks" (i.e. associated economic consequences to both the water system and surrounding region, and the likelihood of occurrence) associated with CDA's water facility assets. The cost-effectiveness of implementing potential countermeasures to reduce risks was also reviewed.

CDA's ERP, which is currently being prepared, provides the management, procedures, and designated actions CDA and its employees will implement during emergency situations (including catastrophic water shortages) resulting from natural disasters, system failures and other unforeseen circumstances. CDA's ERP (which is incorporated by reference) provides the guidelines for evaluating an emergency situation, procedures for activating an emergency response, and details of the different response phases in order to ensure that customers receive a reliable and adequate supply of potable water. The scope of the ERP includes emergencies which directly affect the water system and the ability to maintain safe operations (such as a chlorine release, and earthquake or a threat of contamination). The ERP also incorporates the results of CDA's RRA and includes the following:

- Strategies and resources to improve resilience, including physical and cybersecurity
- Plans and procedures for responding to a natural hazard or malevolent act
- Actions and equipment to lessen the impact of a natural hazard or malevolent act
- Strategies to detect natural hazards or malevolent act

CDA will review the ERP for procedures regarding the utilization of alternative water supply sources in response to water supply shortages, including during the standard water shortage levels. CDA will also review applicable procedures described in the ERP regarding any necessary temporary shutdown of water supply facilities, including appropriate regulatory and public notifications.

8.4.6 SEISMIC RISK ASSESSMENT AND MITIGATION PLAN

CWC 10632.5.

(a) In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.

(b) An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.

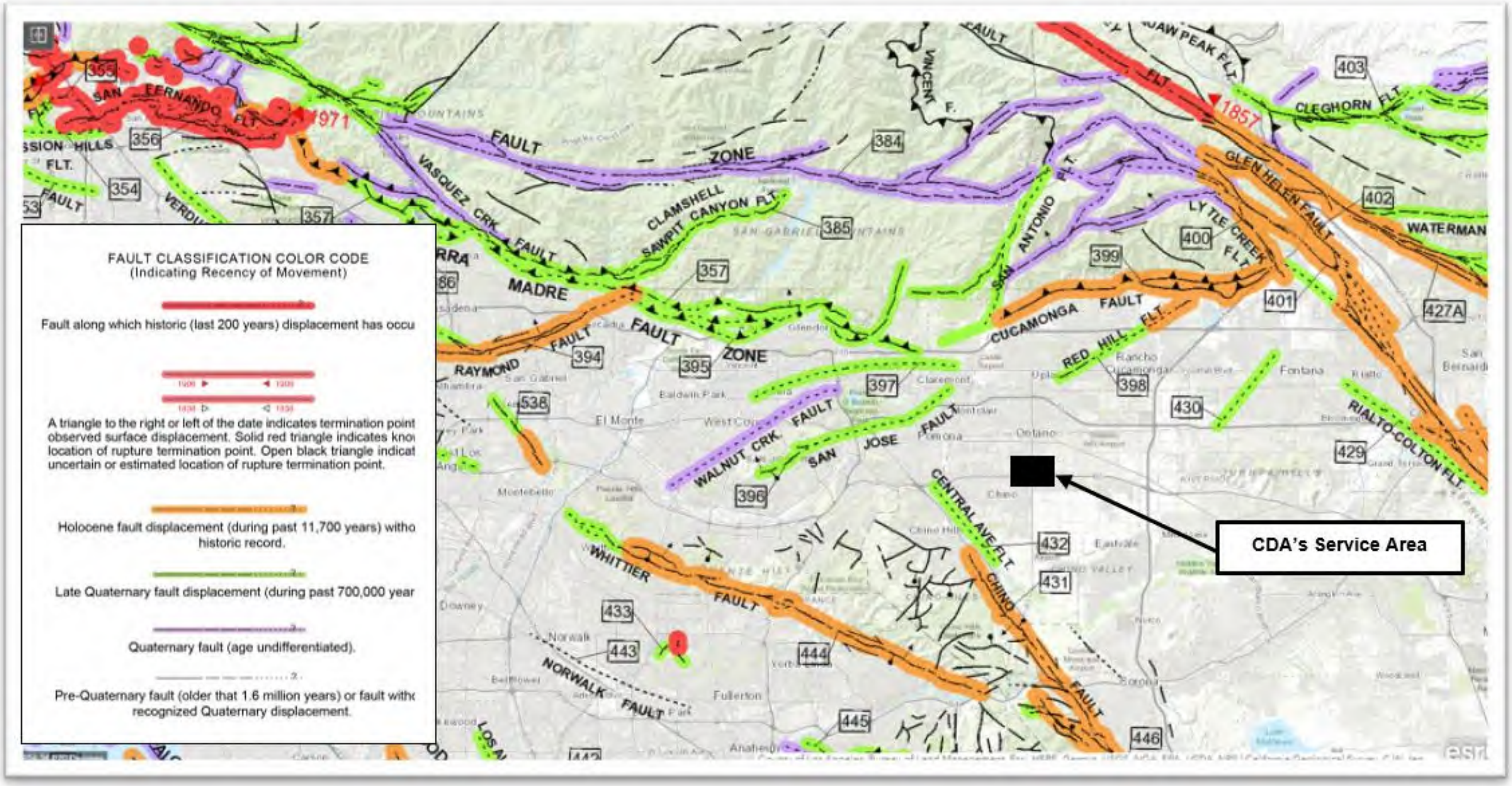
(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

The County of San Bernardino prepared a "Multi-Jurisdictional Hazard Mitigation Plan" which was approved by the Federal Emergency Management Agency (FEMA) in June 2017. The County's Multi-Jurisdictional Hazard Mitigation Plan identified methods to assess significant natural hazards (including earthquakes) affecting areas throughout San Bernardino County, and the mitigation strategies necessary to reduce risks, including seismic risk. The County's Multi-Jurisdictional Hazard Mitigation Plan is provided in Appendix E.

The County of Riverside prepared a "Multi-Jurisdictional Local Hazard Mitigation Plan" which was approved by FEMA in June 2018. The County's Multi-Jurisdictional Local Hazard Mitigation Plan identified methods to assess significant natural hazards (including earthquakes) affecting areas throughout Riverside County, and the mitigation strategies necessary to reduce risks, including seismic risk. The County's Multi-Jurisdictional Local Hazard Mitigation Plan is provided in Appendix F.

The California Geological Survey has published the locations of numerous faults which have been mapped in the Southern California region. Although the San Andreas fault is the most recognized and is capable of producing an earthquake with a magnitude greater than 8 on the Richter scale, some of the lesser-known faults have the potential to cause significant damage. The locations of these earthquake faults in the vicinity of the area receiving water supplies form CDA are provided in the figure below. The faults that are located in close proximity to and could potentially cause significant shaking in the area receiving water supplies from CDA include the San Andreas fault, the San Jose fault, the Red Hill fault, the Cucamonga fault, the Chino fault, the Central Avenue fault, and the Sierra Madre fault.

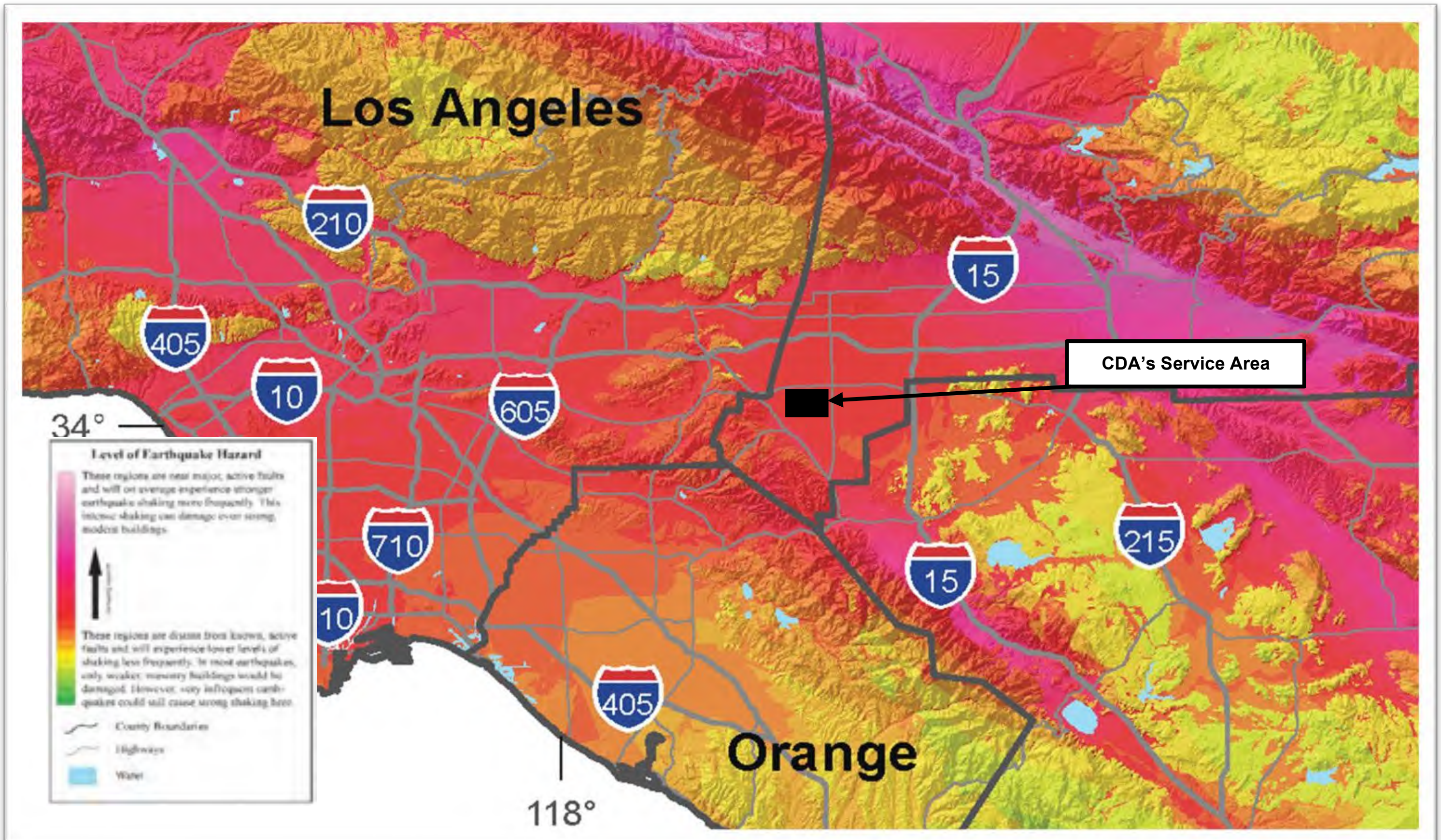
Location of Earthquake Faults



Source: https://maps.conservation.ca.gov/cgs/fam/App/

The following figure provides the relative intensity of ground shaking in the vicinity of the area receiving water supplies from CDA from anticipated future earthquakes. The locations of relatively long-period (1.0 second) earthquake shaking, including the are receiving water supplies from CDA, are provided. Long-period shaking affects tall, relatively flexible buildings, but also correlates with earthquake damage. The shaking potential is calculated based on the level of ground motion that has a 2 percent chance of being exceeded in 50 years (or the level of ground-shaking with an approximate 2,500-year average repeat time). As discussed in Section 8.4.5, CDA has prepared an Emergency Response Plan which provides the management, procedures, and designated actions CDA and its employees will implement during emergency situations resulting from natural disasters, including during earthquakes, to ensure that member agencies receive a reliable and adequate supply of potable water. CDA's ERP is incorporated by reference.

Earthquake Shaking Potential



Source: "Earthquake Shaking Potential for California", 2016, California Geological Survey and United States Geological Survey

8.4.7 SHORTAGE RESPONSE ACTION EFFECTIVENESS

CDA serves a dual purpose of providing reliable water supply and improving groundwater quality in the Chino Basin. CDA's member agencies are required to purchase a minimum amount of treated water production to support this function. The groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption. Nonetheless, CDA supports local agencies in efforts to enforce regulations and prohibitions on water use. The effectiveness of each of CDA's member agencies' shortage response actions, designed in support of IEUA's and WMWD's shortage response actions for its member agencies to reduce any potential gaps between their individual portfolios of supply and demand, has been quantified in Table 8-2 and Table 8-3. These tables are representative of CDA's member agencies' expected demand reduction pursuant to IEUA's and/or WMWD's shortage response actions described in Section 8.4.1.

Section 6.1 provides a tabulation of CDA's historical annual water demands from its member agencies for its water supply source. During the past 10 years, CDA experienced a five consecutive year drought within the area receiving its water supplies from FY 2011-12 to FY 2015-16. Throughout this extended dry year period, CDA's annual water production ranged from 27,098 AF to 30,022 AF, with an average of approximately 28,595 AF. In addition, historical records indicate CDA previously produced a maximum of up to 35,003 AF during FY 2019-20.

CDA's water demands from its member agencies during the most recent five years (from FY 2015-16 to FY 2019-20) averaged approximately 30,519 AFY. As discussed in Section 8.4.2, based on historical and on-going management practices, CDA will be able to continue providing potable water to its member agencies from the Chino Basin in response to each of the standard water shortage levels identified in Section 8.3.

8.5 COMMUNICATION PROTOCOLS

CWC 10632.

(a)(5) Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:

(A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.

(B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.

(C) Any other relevant communications.

Pursuant to CWC 10632.1, CDA's Annual Assessment will be submitted to DWR by July 1 of each year or within 14 days of receiving its final allocation, whichever is later. The Annual Assessment will include a review of CDA's unconstrained water demands from its member agencies (i.e. water demands from its member agencies prior to any projected response actions CDA may trigger under this WSCP) for the current year and the upcoming (potential single dry) year. However, the groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption. See Section 8.2 for more information regarding the Annual Assessment.

IEUA Member Agencies

IEUA's communication protocols and procedures to inform its customers, the public, interested parties, and local, regional, and state governments, of current or predicted shortages and any triggered shortage response actions can be found in IEUA's 2020 UWMP, including:

- The IEUA Drought Response Taskforce to gain consensus on appropriate regional response actions. The taskforce is comprised of representatives from each of the eight IEUA member agencies and regional personnel from IEUA. These recommendations will be brought to each agency's respective management for approval. CDA will utilize broad messaging through IEUA (news stories, radio/tv ads, billboards, etc.) to communicate water scarcity, urgency to act, and commitment to continue to provide safe, reliable supply. Additionally, CDA will utilize targeted action messaging through IEUA aimed towards specific customers via phone, letter, email, etc.

WMWD Member Agencies

WMWD's communication protocols and procedures to inform its customers, the public, interested parties, and local, regional, and state governments, of current or predicted shortages and any triggered shortage response actions can be found in WMWD's 2020 UWMP, including:

- WMWD shall provide written notice by mail of:
  - Proposed increases to such rates and charges to the record owner of each parcel upon which the rates and charges are proposed for imposition and any tenant directly liable for payment of the rates.
  - The amount of the rates and charges proposed to be implemented on each parcel.
  - The basis upon which the rates and charges were calculated.
  - The reason for the rates and charges.
  - And the date, time, and location of a public hearing on the proposed rates and charges.

  Such notice is required to be provided to the affected property owners and any tenant directly liable for the payment of the rates and charges no less than 45 days prior to the public hearing on the proposed rates and charges.
- The declaration of any water shortage level or sub-level shall be made by resolution of the Board of Directors. Within 10 calendar days of the adoption of the resolution declaring the applicable level or sub-level, WMWD shall make a public announcement and provide notice of the applicable standard water shortage level. Such declaration and notice shall provide the extent, terms, and conditions as well as the associated water budget allocations and fines and/or penalties respecting the use and consumption of water in accordance with the applicable water shortage level. Upon such declaration and publication of such notice, due and proper notice shall be deemed to have been given to each and every person supplied water with WMWD. The water shortage level designated shall become effective immediately upon announcement.

8.6 COMPLIANCE AND ENFORCEMENT

CWC 10632.

(a)(6) For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.

As a wholesale supplier, CDA is not required by DWR to complete Section 8.6.

8.7 LEGAL AUTHORITIES

CWC 10632.

(a)(7)(A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions.

(B) A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1.

(C) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

CWC Division 1, Section 350

The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, shall declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

CDA’s groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption.

CDA’s member agencies may declare a water shortage emergency and may immediately enact the response actions of any of the levels designated in this WSCP and their own individual WSCP’s. The required measures of the designated water shortage level determined by the member agency will be communicated to the public within their service area.

CDA shall coordinate with any city, county, or agency within which it provides water supply services for the possible proclamation of a local emergency.

8.8 FINANCIAL CONSEQUENCES OF WSCP

CWC 10632.

(a)(8) A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:

(A) A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(B) A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(C) A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.

CDA serves a dual purpose of providing reliable water supply and managing groundwater quantity and quality in the Chino Basin. CDA member agencies are required to purchase a minimum amount of production to support this function. These minimum purchase agreements form a fixed portion of the water supply portfolios of each of the CDA retail member agencies. Implementation of the provisions of this WSCP does not pose any impending financial consequences to CDA, due to member agencies' minimum purchase agreements. Revenues are constant, as are the expenditures.

Expenditures may be impacted only in the event of a catastrophic interruption of water supplies. Damages would increase expenditures in case of necessary emergency repairs. Expenditures on power, water treatment chemicals, and operational costs would decrease during emergency repairs, where CDA would pump less water.

8.9 MONITORING AND REPORTING

CWC 10632.

(a)(9) For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.

As a wholesale supplier, CDA is not required by DWR to complete Section 8.9.

8.10 WSCP REFINEMENT PROCEDURES

CWC 10632.

(a)(10) Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.

CDA's groundwater production is required to maintain groundwater cleanup priorities and is not subject to interruption. Nonetheless, CDA's Water Shortage Contingency Plan has been prepared as an adaptive management plan in support of CDA's member agencies' requirement to reduce demand on water supplies during designated water shortage levels. CDA's member agencies will review the implementation results for any current or potential shortage gaps between water supplies and demands. CDA will evaluate the need for revising the Water Shortage Contingency Plan, as necessary, based on IEUA and/or WMWD's implementation results of their WSCPs. CDA will consider the following potential revisions made by IEUA and/or WMWD in the event of a potential shortage gap:

- Implementation of additional public outreach, education, and communication programs (in addition to the programs discussed in Chapter 9).
- Incorporation of additional actions recommended by CDA, IEUA, and/or WMWD staff or other interested parties.

This Water Shortage Contingency Plan is adopted as part of CDA's 2020 Urban Water Management Plan adoption process discussed in Section 10.3. It is anticipated CDA will review, revise, and adopt an updated Water Shortage Contingency Plan as part of preparing its 2025 Urban Water Management Plan as necessary. However, CDA may update the Water Shortage Contingency Plan, as necessary. Any updates to CDA's Water Shortage Contingency Plan will include a public hearing and adoption process by CDA's Board (see Section 8.12).

8.11 SPECIAL WATER FEATURE DISTINCTION

CWC 10632.

(b) For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

As a wholesale supplier, CDA is not required by DWR to complete Section 8.11.

8.12 PLAN ADOPTION, SUBMITTAL, AND AVAILABILITY

CWC 10632.

(c) The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.

CDA's Water Shortage Contingency Plan is adopted as part of CDA's 2020 Urban Water Management Plan adoption process discussed in Chapter 10. The process for adopting CDA's Water Shortage Contingency Plan includes the following:

- CDA will conduct a public hearing and make the Water Shortage Contingency Plan available for public inspection.
- CDA will provide notification of the time and place of the public hearing to any city or county in which water is provided.
- CDA will publish notice of public hearing in a newspaper once a week, for two successive weeks (with at least five days between publication dates).
- CDA's Board will adopt the 2020 Urban Water Management Plan and the Water Shortage Contingency Plan.
- As part of submitting the 2020 Urban Water Management Plan to DWR, CDA will also submit the Water Shortage Contingency Plan (electronically through DWR's online submittal tool) within 30 days of adoption and by July 1, 2021. CDA will submit a copy of the Water Shortage Contingency Plan to the California State Library and to any city or county in which water is provided within 30 days of adoption. In addition, CDA will make the Water Shortage Contingency Plan available for public review within 30 days of adoption.

If there are any subsequent amendments required, the process for adopting an amended Water Shortage Contingency Plan includes the following:

- CDA will conduct a public hearing and make the amended Water Shortage Contingency Plan available for public inspection.
- CDA's Board will adopt the amended Water Shortage Contingency Plan.
- CDA will submit the amended Water Shortage Contingency Plan to DWR (electronically through DWR's online submittal tool) within 30 days of adoption.

Additional information regarding the adoption, submittal, and availability of CDA's Water Shortage Contingency Plan (and 2020 Urban Water Management Plan) is provided in Chapter 10.

Chapter 9

DEMAND MANAGEMENT MEASURES

LAY DESCRIPTION – CHAPTER 9

DEMAND MANAGEMENT MEASURES

Chapter 9 (Demand Management Measures) of CDA's 2020 Plan discusses and provides the following:

- CDA has implemented "Demand Management Measures" to reduce its water demands and achieve its water use targets (discussed in Chapter 5).
- CDA's Demand Management Measures include metering of all its water supply connections with its retail member agencies.
- CDA's Demand Management Measures include public education and outreach programs regarding water conservation.
- CDA's Demand Management Measures include staffing of its water conservation program.
- Additional Demand Management Measures including rebate, conservation, asset management, and wholesale supplier assistance programs are discussed.
- A summary of the Demand Management Measures CDA has implemented over the past five (5) years is provided.

9.1 DEMAND MANAGEMENT MEASURES FOR WHOLESALE SUPPLIERS

CWC 10631.

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(ii) Metering.

(iv) Public education and outreach.
(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.

(2) For an urban wholesale water supplier, as defined in Section 10608.12, a narrative description of the items in clauses (ii), (iv), (vi), and (vii) of subparagraph (B) of paragraph (1),

and a narrative description of its distribution system asset management and wholesale supplier assistance programs.

CDA delivers desalinated Chino Basin groundwater to its member agencies which in turn, participate in conservation efforts made by IEUA or WMWD.

9.1.1 METERING

CDA fully meters its connections to its member agencies. All agency connections are administered by purchasing agreements with CDA and its member agencies.

9.1.2 PUBLIC EDUCATION AND OUTREACH

CDA's member agencies' customers have access to IEUA and WMWD public information programs which promote water conservation. IEUA and WMWD provide marketing and outreach materials by using social media platforms, websites, community events, education training, monthly newsletters, and direct communication to retail consumers regarding water use. Retail consumers learn about rebates and additional programs through the IEUA and WMWD websites.

WMWD provides customer support programs such as free efficiency evaluations for irrigation systems and tips for efficient landscaping. WMWD also promotes regional programs such as Riverside County gardening workshops, national green plumbing training programs, and water efficient landscape training programs.

IEUA provides water use efficiency programs, water saving tips, and rebates to retail consumers. Water use efficiency programs include free landscape design training, consultations, and design renderings; irrigation auditing; and pressure regulation valve installation, repair, and maintenance. IEUA also offers a residential automatic water softener rebate. IEUA also hosts and sponsors a wide range of community events including Earth Day Celebration, compost giveaways, Days at the LA Fair, and a Landscape Water Conservation Fair.

IEUA and WMWD conduct water conservation school education programs to the regional elementary schools. Programs include school assemblies and lesson materials to educate students on water conservation. IEUA and WMWD are members of the Water Education Water Awareness Committee (WEWAC) which provides water education to local schools, including schools within CDA's member agencies' service areas. WEWAC hosts art and essay contests and provides financial support for lesson plan materials about water issues.

9.1.3 WATER CONSERVATION PROGRAM COORDINATION AND STAFFING SUPPORT

CDA's member agencies maintain staff who are responsible for setting policies and priorities of their respective agencies. Monthly board and city council meetings are conducted to adopt programs contributing to water reliability which the CDA member agency staff then implement through conservation programs. Key objectives include promoting education and water use efficiency to enhance water supplies. CDA's member agency staff are responsible for marketing, outreach, and possible augmentation programs within their individual service areas.

9.1.4 OTHER DEMAND MANAGEMENT MEASURES

In addition to the Demand Management Measures (DMMs) discussed above, IEUA and WMWD participate in MWD's SoCal Water$mart Program, a regional rebate program available to residential and commercial customers. There are rebates available for indoor plumbing including high efficiency clothes washers and toilets. Rebates are also available for outdoor plumbing, including those for weather-based irrigation controllers, rotating sprinkler nozzles, and replacement of irrigated lawn with drought tolerant plants or other approved landscape options. IEUA and WMWD plan to continue implementation of these programs to promote water conservation for CDA's member agencies.

9.1.5 ASSET MANAGEMENT

CDA manages long-term assets through its Capital Improvement Program. Renewal and replacement activities are anticipated and budgeted through annual budget planning and financial reports. Short-term asset management is addressed through preventative and corrective maintenance programs for the desalter facilities.

9.1.6 WHOLESALE SUPPLIER ASSISTANCE PROGRAMS

Wholesale supplier assistance programs are administered by IEUA and WMWD for CDA's member agencies. As discussed in the introduction to Chapter 9, CDA promotes conservation through IEUA and WMWD, who provide marketing and outreach materials to its retail consumers using social media platforms, their websites, community events, education training, monthly newsletters, and direct communication to consumers regarding their water use.

9.2 EXISTING DEMAND MANAGEMENT MEASURES FOR RETAIL SUPPLIERS

CWC 10631.

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(i) Water waste prevention ordinances.

(ii) Metering.

(iii) Conservation pricing.

(iv) Public education and outreach.

(v) Programs to assess and manage distribution system real loss.

(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.

As a wholesale agency, CDA is not required by DWR to complete Section 9.2.

9.3 REPORTING IMPLEMENTATION

9.3.1 IMPLEMENTATION OVER THE PAST FIVE YEARS

CWC 10631.

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) (A) ...a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years.

CDA is committed to implementing water conservation programs through IEUA and WMWD to provide water conservation programs for their member agencies' customers. The highlights of DMM implementation over the past five years are described below.

As discussed in Section 9.1.1, CDA fully meters its connections to its member agencies. All agency connections are administered by purchasing agreements between the member agencies and CDA.

As discussed in Section 9.1.2, CDA customers have access to IEUA and WMWD public information programs to promote water conservation. IEUA and WMWD provide marketing and outreach materials by using social media platforms, their websites, community events, education training, monthly newsletters, and direct communication to retail consumers regarding their water use. Customers learn about rebates and additional programs through the IEUA and WMWD websites. IEUA and WMWD are also members of the WEWAC that promotes the education of water issues to local schools, including schools within CDA's member agency service areas.

As discussed in Section 9.1.3, CDA's member agency staff are responsible for setting policies and priorities of the agencies. Monthly board and city council meetings are conducted to adopt programs contributing to water reliability which CDA member agency staff then implement through conservation programs. Key objectives include promoting education and water use efficiency to enhance water supplies and reduce demand on imported water supply.

As discussed in Section 9.1.4, in addition to the DMMs discussed above, IEUA and WMWD participate in MWD's regional rebate program, the SoCal Water$mart Program, which is available to residential and commercial customers.

As described in Section 9.1.5, CDA manages long-term assets through the Capital Improvement Program. Renewal and replacement activities are anticipated and budgeted through annual budget planning and financial reports. Short-term asset management is handled through preventative and corrective maintenance programs for the desalter facilities.

As described in Section 9.1.6, wholesale supplier assistance programs are administered by IEUA and WMWD for CDA's member agencies.

9.3.2 IMPLEMENTATION TO ACHIEVE WATER USE TARGETS

CWC 10631.

(F)(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

The Demand Management Measures implemented by CDA are discussed in Section 9.2. Descriptions regarding the nature and extent of these Demand Management Measures implemented by CDA over the past five years are discussed in Section 9.3. CDA will continue to implement these Demand Management Measures and other water conservation programs and work collaboratively with IEUA and WMWD to provide water conservation programs for CDA's member agencies' residents.

9.4 WATER USE OBJECTIVES (FUTURE REQUIREMENTS)

Retail water agencies are currently working with DWR to develop Water Use Objectives pursuant to Assembly Bill (AB) 1668 and Senate Bill (SB) 606. Beginning in 2024, retail water agencies are required to begin reporting compliance of their Water Use Objectives consisting of indoor residential water use, outdoor residential water use, commercial, industrial and institutional, irrigation with dedicated meters, water loss, and other unique local uses.

CDA is not a retail water agency and is not required to comply with the Water Use Objectives. However, CDA will continue to implement the Demand Management Measures discussed in Section 9.2.

Chapter 10

PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

LAY DESCRIPTION – CHAPTER 10

PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Chapter 10 (Plan Adoption, Submittal, and Implementation) of CDA's 2020 Plan discusses and provides the following:

- The steps CDA has performed to adopt and submit its 2020 Plan are detailed.
- The steps CDA has performed to adopt and submit its Water Shortage Contingency Plan are detailed.
- CDA coordinated the preparation of its 2020 Plan with Cities of Chino, Chino Hills, Eastvale, Jurupa Valley, Norco, Ontario, the Counties of San Bernardino and Riverside, and other agencies. CDA notified these agencies at least sixty (60) days prior to the public hearing of the preparation of the 2020 Plan and invited these agencies to participate in the development of the 2020 Plan.
- CDA provided a notice of the public hearing to the same agencies regarding the time, date, and place of the public hearing.
- CDA published a newspaper notification of the public hearing, once a week for two successive weeks
- CDA conducted a public hearing to discuss and adopt CDA's 2020 Plan and CDA's Water Shortage Contingency Plan.
- Within 30 days of adoption, CDA submitted the 2020 Plan and Water Shortage Contingency Plan to the California Department of Water Resources.
- Within 30 days of adoption, CDA submitted all data tables associated with the 2020 Plan to the California Department of Water Resources.
- Within 30 days of adoption, CDA submitted a copy of the 2020 Plan to the State of California Library.
- Within 30 days of adoption, CDA submitted a copy of the 2020 Plan (and Water Shortage Contingency Plan) to the County of San Bernardino Assessor- Recorder/ Clerk's office and the County of Riverside Assessor- County Clerk-Recorder's office.
- Within 30 days after submittal of the 2020 Plan to the California Department of Water Resources, CDA made the 2020 Plan (including the Water Shortage Contingency Plan) available at CDA's headquarters and on CDA's website.
- The steps CDA will perform to amend the 2020 Plan and/or the Water Shortage Contingency Plan, if necessary, are provided.

10.1 WSCP INCLUSION OF ALL 2020 DATA

The data provided in CDA's 2020 Plan and the WSCP is provided on a FY basis through June 30, 2020 (as discussed in Section 2.5).

10.2 NOTICE OF PUBLIC HEARING

CDA's public hearing notification process for its 2020 Plan and the WSCP is discussed below.

10.2.1 NOTICE TO CITIES AND COUNTIES

CWC 10621.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

CWC 10642.

…The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area…

10.2.1.1 60 DAY NOTIFICATION

As discussed in Section 2.6.2., CDA coordinated the preparation of the 2020 Plan with the Cities of Chino, Chino Hills, Eastvale, Jurupa Valley, Norco, Ontario, the Counties of San Bernardino and Riverside, and other agencies. CDA notified these agencies, as well as to the cities and county within which CDA provides water supplies, at least sixty (60) days prior to the public hearing of the preparation of the 2020 Plan and invited them to participate in the development of the Plan. A copy of the notification letters sent to these agencies is provided in Appendix C.

10.2.1.2 NOTICE OF PUBLIC HEARING

CDA provided a notice of the public hearing to the Cities of Chino, Chino Hills, Eastvale, Jurupa Valley, Norco, Ontario, the Counties of San Bernardino and Riverside, and other agencies. The notice includes the time and place of the public hearing. To ensure that the Plan and the WSCP were available for review, CDA placed a copy of the draft 2020 Plan and the draft WSCP at the

CDA headquarters and made a copy available for review on its website. Copies of the notice of the public hearing are provided in Appendix C.

10.2.1.3 SUBMITTAL TABLES

Table 10-1 summarizes the agencies which were provided notifications by CDA.

Table 10-1 Notification to Cities and Counties

Submittal Table 10-1 Wholesale: Notification to Cities and Counties (select one)		
☐	Supplier has notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
	Provide the page or location of this list in the UWMP.	
☑	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Chino	Yes	Yes
Chino Hills	Yes	Yes
Eastvale	Yes	Yes
Jurupa Valley	Yes	Yes
Norco	Yes	Yes
Ontario	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Riverside County	Yes	Yes
San Bernardino County	Yes	Yes
NOTES:		

10.2.2 NOTICE TO THE PUBLIC

CDA encouraged the active involvement of the population within the area which receives water supplies from CDA prior to and during the preparation of the Plan. Pursuant to Section 6066 of the Government Code, CDA published a notice of public hearing in the newspaper during the weeks of May 12, 2021 and May 19, 2021. A notice of public hearing was CDA's website. A copy of the published notice is provided in Appendix C. To ensure that the draft 2020 Plan and the draft WSCP were available for review, CDA placed a copy at the CDA's headquarters and made a copy available for review on its website.

CWC 10642.

…Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies.

Government Code 6066.

Publication of notice pursuant to this section shall be once a week for two successive weeks. Two publications in a newspaper published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the fourteenth day, including therein the first day.

10.3 PUBLIC HEARING AND ADOPTION

CWC 10642.

…Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon.

CWC 10608.26.

(a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.

(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.

(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

10.3.1 PUBLIC HEARING

Prior to adopting the draft 2020 Plan and the WSCP, CDA held a public hearing on July 3, 2021 which included input from the community regarding CDA's draft 2020 Plan and the draft WSCP. In addition, CDA considered the economic impacts of meeting these water use targets; including measures described in Section 8.8.

10.3.2 ADOPTION

CWC 10642.

… After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

Following the public hearing, CDA adopted both the draft 2020 Plan and the draft WSCP (included in Chapter 8). A copy of the resolution adopting the 2020 Plan and the WSCP is provided in Appendix G.

10.4 PLAN SUBMITTAL

CWC 10621.

(e) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.

CWC 10644.

(a) (1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption.

CWC 10635.

(c) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

CDA's submittal process for its 2020 Plan and the WSCP is discussed below.

10.4.1 SUBMITTING A UWMP AND WATER SHORTAGE CONTINGENCY PLAN TO DWR

CDA's Board of Directors adopted the 2020 Plan on June 3, 2021 and within 30 days of adoption, CDA submitted the adopted 2020 Plan (including the WSCP) to DWR. The 2020 Plan and WSCP were submitted through DWR's "Water Use Efficiency (WUE) Data Portal" website.

DWR developed a checklist which was used by CDA to assist DWR with its determination that CDA's 2020 Plan has addressed the requirements of the CWC. CDA has completed the DWR checklist by indicating where the required CWC elements can be found within CDA's 2020 Plan (See Appendix B).

10.4.2 ELECTRONIC DATA SUBMITTAL

CWC 10644.

(a)(2) The plan, or amendments to the plan, submitted to the department ...shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

Within 30 days of adoption of the 2020 Plan, CDA submitted all data tables associated with the 2020 Plan through DWR's "Water Use Efficiency Data Portal" website.

10.4.3 SUBMITTING A UWMP, INCLUDING WSCP, TO THE CALIFORNIA STATE LIBRARY

Within 30 days of adoption of the 2020 Plan by the Board of Directors, a copy (CD or hardcopy) of the 2020 Plan was submitted to the State of California Library. A copy of the letter to the State Library will be maintained in CDA's file. The 2020 Plan will be mailed to the following address if sent by regular mail:

California State Library
Government Publications Section
Attention: Coordinator, Urban Water Management Plans
P.O. Box 942837
Sacramento, CA 94237-0001

The 2020 Plan will be mailed to the following address if sent by courier or overnight carrier:

California State Library
Government Publications Section
Attention: Coordinator, Urban Water Management Plans
900 N Street
Sacramento, CA 95814

10.4.4 SUBMITTING A UWMP TO CITIES AND COUNTIES

Within 30 days of adoption of the 2020 Plan (including the WSCP) by the Board of Directors, a copy of the 2020 Plan was submitted to the County of San Bernardino Assessor- Recorder/ Clerk's office and the County of Riverside Assessor- County Clerk-Recorder's office. A copy of the letters to the County of Riverside and San Bernardino will be maintained in CDA's file.

10.5 PUBLIC AVAILABILITY

CWC 10645.

(a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

Within 30 days after submittal of the 2020 Plan to DWR, CDA made the 2020 Plan (including the WSCP) available at the CDA headquarters during normal business hours and on CDA's website.

10.6 NOTIFICATION TO PUBLIC UTILITIES COMMISSION

CWC 10621.

(c) An urban water supplier regulated by the Public Utilities Commission shall include its most recent plan and water shortage contingency plan as part of the supplier's general rate case filings.

CDA is not regulated by the California Public Utilities Commission.

10.7 AMENDING AN ADOPTED UWMP OR WATER SHORTAGE CONTINGENCY PLAN

CWC 10621.

(d)The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

CWC 10644.

(a)(1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

CDA's amendment process for its 2020 Plan is discussed below.

10.7.1 AMENDING A UWMP

If CDA amends the adopted 2020 Plan, the amended Plan will undergo adoption by CDA's governing board. Within 30 days of adoption, the amended Plan will then be submitted to DWR, the State of California Library, the County of San Bernardino Assessor- Recorder/ Clerk's office and the County of Riverside Assessor- County Clerk-Recorder's office.

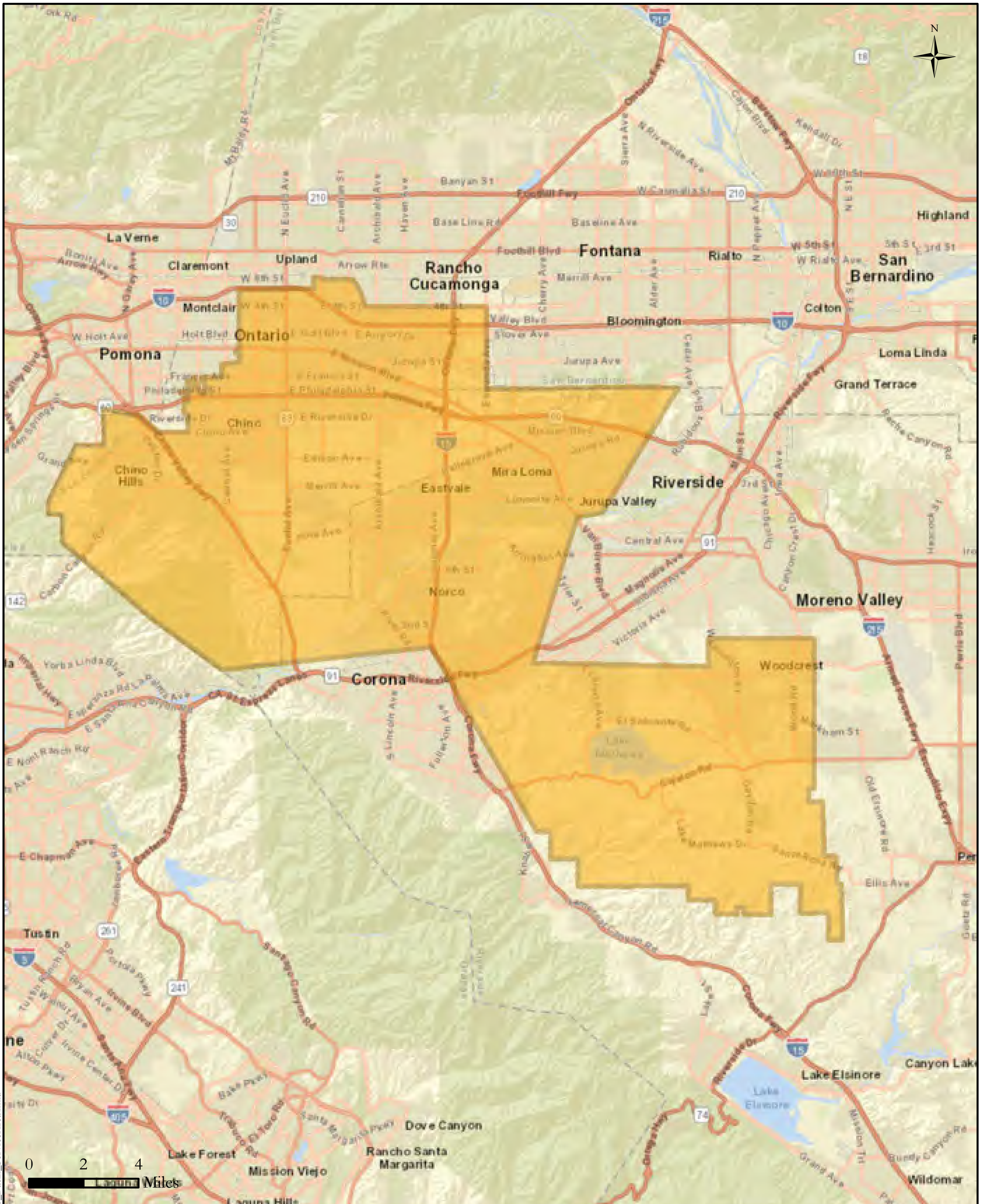
10.7.2 AMENDING A WATER SHORTAGE CONTINGENCY PLAN

CWC 10644.

(b) If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

If CDA amends the adopted 2020 Plan (including the WSCP), the amended Plan (and WSCP) will undergo adoption by CDA's governing board. Within 30 days of adoption, the amended Plan (and WSCP) will then be submitted to DWR, the State of California Library, the County of San Bernardino Assessor- Recorder/ Clerk's office and the County of Riverside Assessor- County Clerk-Recorder's office.

FIGURE 1

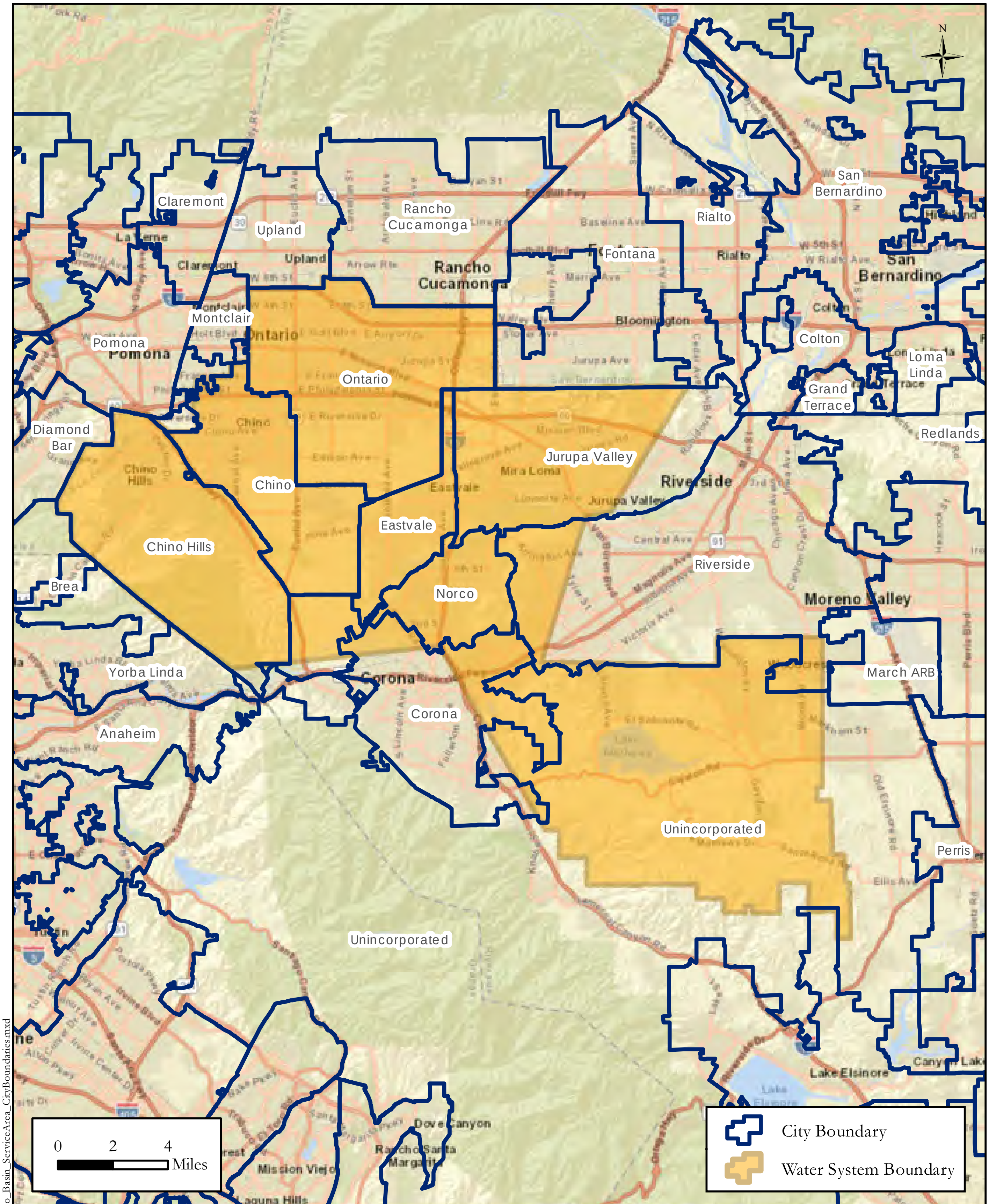


Document Path: J:\jn2741\Chino_Basin_ServiceArea.mxd

STETSON
ENGINEERS INC.

CHINO BASIN DESALTER AUTHORITY
WATER SERVICE AREA

FIGURE 2

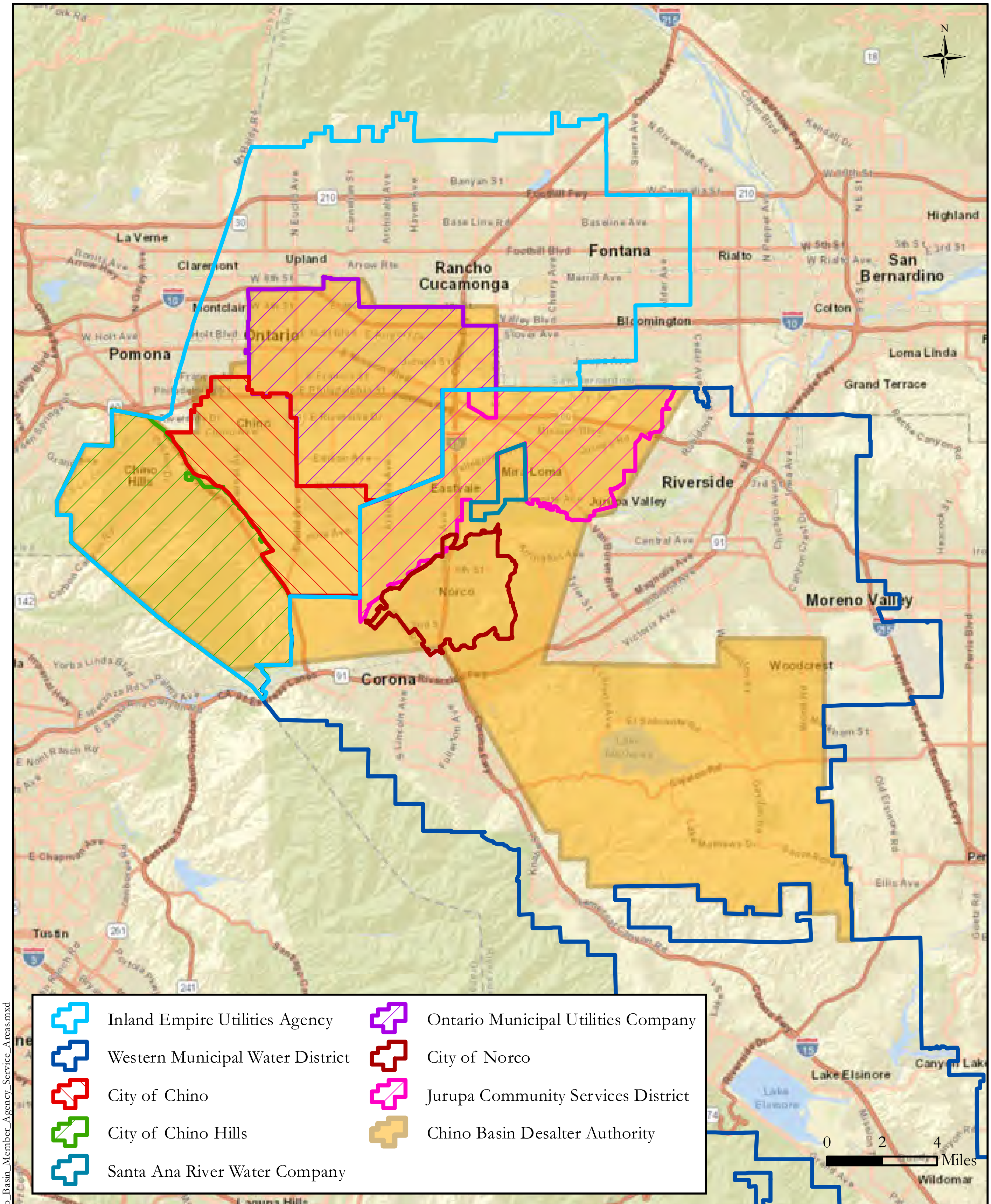


CHINO BASIN DESALTER AUTHORITY
SERVICE AREA
AND CITY BOUNDARIES

City Boundaries Source:
Census 2010 (TIGER 2011)

STETSON ENGINEERS INC.

Document Path: J:\jn2741\Chino_Basin_ServiceArea_CityBoundaries.mxd

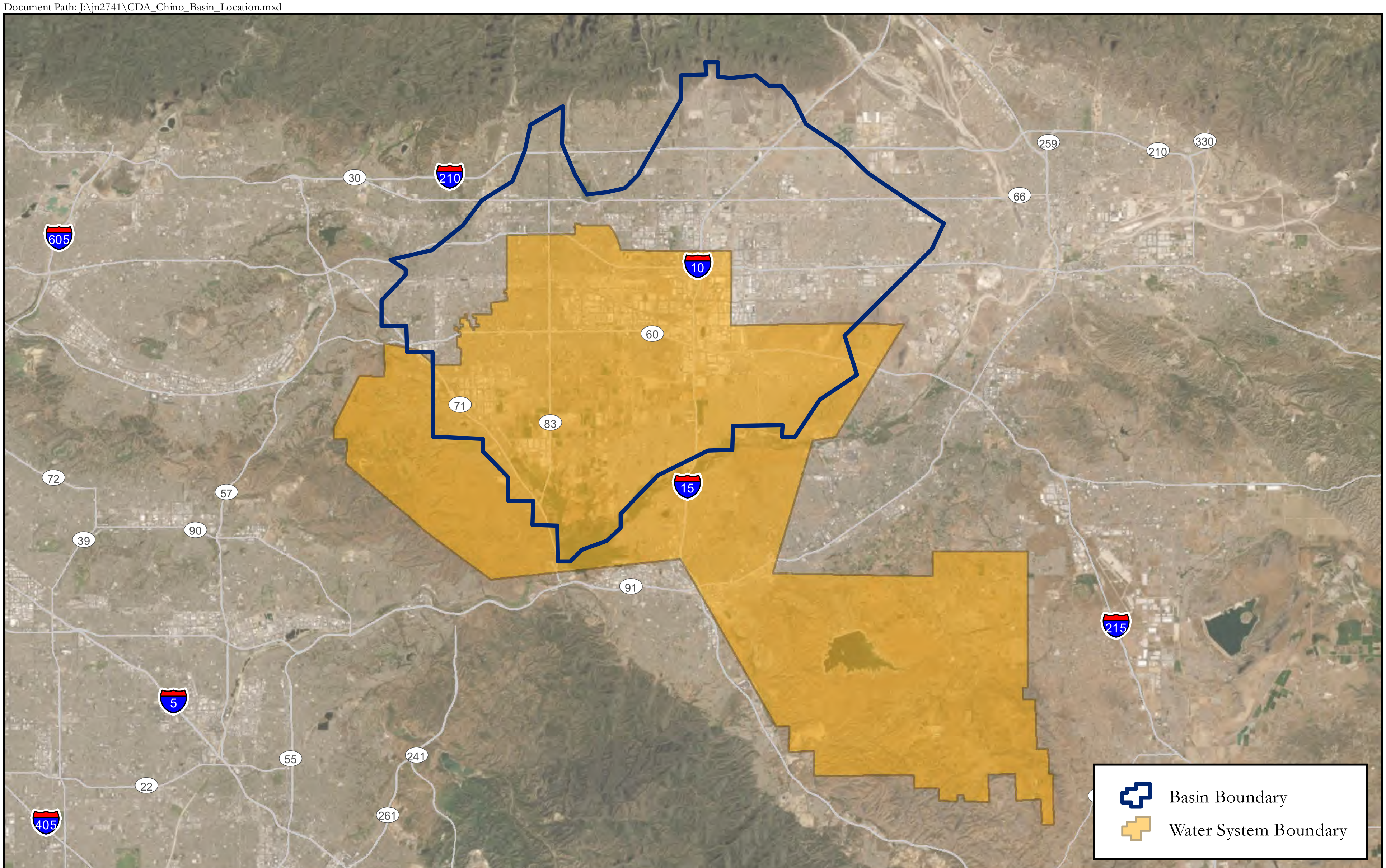


CHINO BASIN DESALTER AUTHORITY
MEMBER AGENCY SERVICE AREAS

STETSON ENGINEERS INC.

Document Path: J:\jn2741\Chino_Basin_Member_Agency_Service_Areas.mxd

Document Path: J:\jn2741\CDA_Chino_Basin_Location.mxd



STETSON ENGINEERS INC.

CHINO BASIN DESALTER AUTHORITY
CHINO BASIN LOCATION

0 2.5 5 Miles
N

FIGURE 4

APPENDIX A

DWR STANDARDIZED TABLES

Submittal Table 2-2: Plan Identification

Select Only One	Type of Plan		Name of RUWMP or Regional Alliance *if applicable* (select from drop down list)
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☑	Supplier is a wholesaler
☐	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables are in calendar years
☑	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
07/01	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

Submittal Table 2-4 Wholesale: Water Supplier Information Exchange (select one)	
☑	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with Water Code Section 10631. Completion of the table below is optional. If not completed, include a list of the water suppliers that were informed.
Section 2.6	**Provide page number for location of the list.**
☐	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631. **Complete the table below.**
Water Supplier Name	
Add additional rows as needed	
NOTES:	

Submittal Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	664,270	715,607	770,912	830,491	894,675	963,819
NOTES: The 2020 population and the populations projected through 2045 were based on ACS population data (2019 Census) and an average between CDA's historical annual population growth rate and IEUA's current projected growth rate (See Section 3.4.1 and Section 5.4.1).						

Submittal Table 4-1 Wholesale: Demands for Potable and Non-Potable[1] Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only use types that will be recognized by the WUE data online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Sales to other agencies		Drinking Water	30,247
Other Non-Potable	Waste Process Water	Raw Water	4,756
		TOTAL	35,003

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*

[2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 4-2 Wholesale: Use for Potable and Raw Water [1] - Projected						
Use Type	Additional Description (as needed)	Projected Water Use [2] Report To the Extent that Records are Available				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool.		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Sales to other agencies		35,200	35,200	35,200	35,200	35,200
Other Non-Potable		4,800	4,800	4,800	4,800	4,800
TOTAL		40,000	40,000	40,000	40,000	40,000

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.* [2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.

Submittal Table 4-3 Wholesale: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable and Raw Water From Tables 4-1W and 4-2W	35,003	40,000	40,000	40,000	40,000	40,000
Recycled Water Demand* From Table 6-4W	0	0	0	0	0	0
TOTAL WATER DEMAND	35,003	40,000	40,000	40,000	40,000	40,000
**Recycled water demand fields will be blank until Table 6-4 is complete.*						
NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.						

Submittal Table 6-1 Wholesale: Groundwater Volume Pumped

☐	Supplier does not pump groundwater. The supplier will not complete the table below.					
☑	All or part of the groundwater described below is desalinated.					
Groundwater Type Drop Down List	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
Alluvial Basin	Chino Basin	28,191	28,284	29,918	31,199	35,003
	TOTAL	28,191	28,284	29,918	31,199	35,003
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2020											
☑	Wholesale Supplier neither distributes nor provides supplemental treatment to recycled water. The Supplier will not complete the table below.										
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area? *Drop down list*	Treatment Level *Drop down list*	2020 volumes [1]				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Add additional rows as needed											
						Total	0	0	0	0	0

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.

[2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility

NOTES:

Submittal Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
☑	Recycled water is not directly treated or distributed by the Supplier. The Supplier will not complete the table below.						
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment *Drop down list*	2020*	2025*	2030*	2035*	2040*	2045* *(opt)*
Add additional rows as needed							
	Total	0	0	0	0	0	0
*** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.							
NOTES:							

Submittal Table 6-5 Wholesale: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☑	Recycled water was not used or distributed by the supplier in 2015, nor projected for use or distribution in 2020. The wholesale supplier will not complete the table below.	
Name of Receiving Supplier or Direct Use by Wholesaler	2015 Projection for 2020*	2020 Actual Use*
Add additional rows as needed		
Total	0	0
Units of measure (AF, CCF, MG) *must remain consistent throughout the UWMP as reported in Table 2-3.*		
NOTES:		

Submittal Table 6-7 Wholesale: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☐	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
Section 6.2.8	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description *(if needed)*	Planned Implementation Year	Planned for Use in Year Type *Drop Down list*	Expected Increase in Water Supply to Supplier*
	Drop Down Menu	*If Yes, Supplier Name*				
Add additional rows as needed						
Chino I Desalter VOC Treatment Facilities Project	*Yes*	San Bernardino County	Install Granular Activated Carbi treatment to to treat existing CDA and proposed County-owned wells	2023	All Year Types	3,000
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: Information obtained from CDA's "Chino I Desalter VOC Treatment Facilities Project Final Draft Basis of Design Report (BODR)", dated July 2020						

Submittal Table 6-8 Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Desalinated Water - Groundwater		35,003	Drinking Water	
	Total	35,003		0
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*				
NOTES:				

Submittal Table 6-9 Wholesale: Water Supplies — Projected											
Water Supply	Additional Detail on Water Supply	Projected Water Supply* Report To the Extent Practicable									
		2025		2030		2035		2040		2045 (opt)	
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Desalinated Water - Groundwater		40,000		40,000		40,000		40,000		40,000	
Total		40,000	0	40,000	0	40,000	0	40,000	0	40,000	0

Units of measure (AF, CCF, MG) *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.

Submittal Table 7-1 Wholesale: Basis of Water Year Data (Reliability Assessment)			
Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000	**Available Supplies if Year Type Repeats**	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ___________________________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	**% of Average Supply**
Average Year	2020	40,000	100%
Single-Dry Year	2018	40,000	100.0%
Consecutive Dry Years 1st Year	2012	40,000	100.0%
Consecutive Dry Years 2nd Year	2013	40,000	100.0%
Consecutive Dry Years 3rd Year	2014	40,000	100.0%
Consecutive Dry Years 4th Year	2015	40,000	100.0%
Consecutive Dry Years 5th Year	2016	40,000	100.0%

Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table. Suppliers may create an additional worksheet for the additional tables.

***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.

Submittal Table 7-2 Wholesale: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	40,000	40,000	40,000	40,000	40,000
Demand totals *(autofill fm Table 4-3)*	40,000	40,000	40,000	40,000	40,000
Difference	0	0	0	0	0
NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.					

Submittal Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	40,000	40,000	40,000	40,000	40,000
Demand totals*	40,000	40,000	40,000	40,000	40,000
Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.					

Submittal Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Second year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Third year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Fourth year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Fifth year	Supply totals	40,000	40,000	40,000	40,000	40,000
	Demand totals	40,000	40,000	40,000	40,000	40,000
	Difference	0	0	0	0	0
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0

***Units of measure (AF, CCF, MG) m** ust remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2.

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)	
2021	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2022	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2023	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2024	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2025	**Total**
Total Water Use	40,000
Total Supplies	40,000
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions** **(*Narrative description)***
1	Up to 10%	IEUA member agencies may be subject to implement direct installation programs, hold more landscape workshops, consider escalation of local water waste prohibitions, etc. WMWD member agencies' customers may be subject to a 5 to 15% water use reduction.
2	Up to 20%	In addition to Shortage Level 1; IEUA member agencies may expand micro-targeting customers and increase marketing efforts. WMWD member agencies may be subject to prohibition of new water service and reductions in water budgets.
3	Up to 30%	In addition to Shortage Level 2; IEUA member agencies may increase penalties, implement emergency alerts, etc. WMWD member agencies may be subject to additional requirements deemed necessary by individual member agencies.
4	Up to 40%	In addition to Shortage Level 3; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies. WMWD member agencies may be subject to additional requirements deemed necessary by individual member agencies.
5	Up to 50%	In addition to Shortage Level 4; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies. WMWD member agencies may be subject to additional requirements deemed necessary by individual member agencies.
6	>50%	In addition to Shortage Level 5; IEUA member agencies may be subject to additional requirements deemed necessary by individual member agencies. WMWD member agencies may be subject to additional requirements deemed necessary by individual member agencies.
NOTES:		

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
1	Expand Public Information Campaign	Collective reduction from all Shortage Level 1 actions is up to 596 AFY	Applicable to IEUA member agencies	No
1	Increase Frequency of Meter Reading	Collective reduction from all Shortage Level 1 actions is up to 596 AFY	Applicable to IEUA member agencies	No
1	Increase Water Waste Patrols	Collective reduction from all Shortage Level 1 actions is up to 596 AFY	Applicable to IEUA member agencies	Yes
1	Implement or Modify Drought Rate Structure or Surcharge	Collective reduction from all Shortage Level 1 actions is up to 596 AFY	Applicable to WMWD member agencies	Yes
2	Other	Collective reduction from Shortage Level 1 plus all Shortage Level 2 actions is up to 1,193 AFY	All actions under Shortage Level 1	Yes
2	Moratorium or Net Zero Demand Increase on New Connections	Collective reduction from all Shortage Level 2 actions is up to 1,193 AFY	Applicable to IEUA member agencies	Yes
2	Implement or Modify Drought Rate Structure or Surcharge	Collective reduction from all Shortage Level 2 actions is up to 1,193 AFY	Applicable to WMWD member agencies	Yes
3	Other	Collective reduction from Shortage Level 2 plus all Shortage Level 3 actions is up to 1,789 AFY	All actions under Shortage Level 2	Yes
4	Other	Collective reduction from Shortage Level 3 plus all Shortage Level 4 actions is up to 2,386 AFY	All actions under Shortage Level 3	Yes
5	Other	Collective reduction from Shortage Level 4 plus all Shortage Level 5 actions is up to 2,982 AFY	All actions under Shortage Level 4	Yes
6	Other	Collective reduction from Shortage Level 5 plus all Shortage Level 6 actions is greater than 2,982 AFY	All actions under Shortage Level 5	Yes
NOTES: CDA promotes IEUA and WMWD water shortage response actions for its member agencies to reduce demand on their individual water supplies. Member agencies may employ their own demand reduction actions and/or IEUA or WMWD demand reduction actions at their own discretion.				

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
1	Transfers	Not applicable (see Notes)	
2	Transfers	Not applicable (see Notes)	
3	Transfers	Not applicable (see Notes)	
4	Transfers	Not applicable (see Notes)	
5	Transfers	Not applicable (see Notes)	
6	Transfers	Not applicable (see Notes)	
NOTES: CDA will pump up to 40,000 AFY of contaminated groundwater from the Chino Basin for water quality management purposes, groundwater cleanup, and hydraulic control required by the Regional Water Quality Control Board. CDA will provide up to 35,200 AFY of treated water to its member agencies, as discussed in Section 6.2. CDA does not anticipate augmenting water supplies. However, CDA's member agencies will consider increased production from the Chino Basin (through potential transfer of water rights) using existing facilities to address increased demands. As noted on Table 8-2, CDA's member agencies plan to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.			

Submittal Table 10-1 Wholesale: Notification to Cities and Counties (select one)		
☐	Supplier has notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
	Provide the page or location of this list in the UWMP.	
☑	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Chino	Yes	Yes
Chino Hills	Yes	Yes
Eastvale	Yes	Yes
Jurupa Valley	Yes	Yes
Norco	Yes	Yes
Ontario	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Riverside County	Yes	Yes
San Bernardino County	Yes	Yes
NOTES:		

APPENDIX B

COMPLETED PLAN CHECKLIST

Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Chapter 1	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Chapter 1 Lay Description
x	x	Chapter 1	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Beginning of each Chapter
x	x	Section 2.2	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.2
x	x	Section 2.6	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.6
x	x	Section 2.6.2	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.6.2
x		Section 2.6, Section 6.1	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	Not applicable
	x	Section 2.6	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.6
x	x	Section 3.1	Describe the water supplier service area.	System Description	Section 3.1
x	x	Section 3.3	Describe the climate of the service area of the supplier.	System Description	Section 3.3
x	x	Section 3.4	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4
x	x	Section 3.4.2	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.4.2
x	x	Sections 3.4 and 5.4	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4
x	x	Section 3.5	Describe the land uses within the service area.	System Description	Section 3.5
x	x	Section 4.2	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2
x	x	Section 4.2.4	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Not applicable
x	x	Section 4.2.6	In projected water use, include estimates of water savings from adopted codes, plans and other policies or laws.	System Water Use	Section 4.2.6
x	x	Section 4.2.6	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 4.2.6
x	optional	Section 4.3.2.4	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Not applicable
x	optional	Section 4.4	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Not applicable
x	x	Section 4.5	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 4.5
x		Chapter 5	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Not applicable
x		Chapter 5	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Not applicable
	x	Section 5.1	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1

Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x		Section 5.2	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Not applicable
x		Section 5.5	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Not applicable
x		Section 5.5 and Appendix E	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Not applicable
x	x	Sections 6.1 and 6.2	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Sections 6.1, 6.2, 7.1, and 7.2
x	x	Sections 6.1	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change.*	System Supplies	Section 6.1
x	x	Section 6.1	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6.1
x	x	Section 6.1.1	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.1.1
x	x	Section 6.2.8	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 6.2.8
x	x	Section 6.2	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2
x	x	Section 6.2.2	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2
x	x	Section 6.2.2	Describe the groundwater basin.	System Supplies	Section 6.2.2
x	x	Section 6.2.2	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2
x	x	Section 6.2.2.1	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Not applicable
x	x	Section 6.2.2.4	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.2
x	x	Section 6.2.2	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 6.2.2
x	x	Section 6.2.7	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6.2.7
x	x	Section 6.2.5	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.5	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.6	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.2.6
x	x	Section 6.2.5	Describe the wastewater collection and treatment systems in the supplier's service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.2.5
x	x	Section 6.2.8, Section 6.3.7	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Sections 6.2.8 and 6.2.9

Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 6.4 and Appendix O	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 6.4
x	x	Section 7.2	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.2
x	x	Section 7.2.4	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.2.4
x	x	Section 7.3	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.3
x	x	Section 7.3	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.3
x	x	Chapter 8	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8
x	x	Chapter 8	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Chapter 8
x	x	Section 8.10	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Section 8.10
x	x	Section 8.2	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Section 8.2
x	x	Section 8.2	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Section 8.2
x	x	Section 8.3	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Section 8.3
x	x	Section 8.3	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Section 8.3
x	x	Section 8.4	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Section 8.4.2
x	x	Section 8.4	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4.1
x	x	Section 8.4	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4.3
x	x	Section 8.4	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Section 8.4.4
x	x	Section 8.4	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Section 8.4.7
x	x	Section 8.4.6	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Section 8.4.6
x	x	Section 8.5	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Section 8.5

Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 8.5 and 8.6	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Section 8.5
x		Section 8.6	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Not applicable
x		Section 8.7	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Not applicable
x	x	Section 8.7	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Section 8.7
x	x	Section 8.7	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Section 8.7
x	x	Section 8.8	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8
x	x	Section 8.8	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8
x		Section 8.8	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	Section 8.8
x		Section 8.9	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Section 8.9
x		Section 8.11	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Not applicable
x	x	Sections 8.12 and 10.4	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Sections 8.12 and 10.4
x	x	Section 8.12	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Section 8.12
	x	Sections 9.1 and 9.3	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3
x		Sections 9.2 and 9.3	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Not applicable
x		Chapter 10	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Not applicable
x	x	Section 10.2.1	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 10.2.1
x	x	Section 10.4	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Section 10.4
x	x	Sections 10.2.2, 10.3, and 10.5	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Sections 10.2, 10.3, and 10.5
x	x	Section 10.2.2	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Section 10.2.2
x	x	Section 10.3.2	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.2
x	x	Section 10.4	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4.3
x	x	Section 10.4	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4
x	x	Sections 10.4.1 and 10.4.2	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2
x	x	Section 10.5	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5

Retail	Wholesale	2020 Guidebook Location	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 10.5	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5
x	x	Section 10.6	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	Section 10.6
x	x	Section 10.7.2	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	Section 10.7.2

APPENDIX C

60 – DAY NOTIFICATION LETTERS AND PUBLIC HEARING NOTIFICATIONS

CDA CHINO BASIN DESALTER AUTHORITY

Tom Haughey, Chairperson
Betty Anderson, Vice Chairperson
Jim Bowman, Secretary
Kati Parker, Director
Greg Newton, Director
Peter J. Rogers, Director
Vicki Rupe, Director
Gracie Torres, Director

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 Thomas M. O'Neill, General Manager/CEO

November 10, 2020

Mr. Leonard Hernandez
Chief Executive Officer
County of San Bernardino
385 N. Arrowhead Avenue
San Bernardino, CA 92415

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Hernandez:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

As an urban water supplier, the Chino Basin Desalter Authority is required pursuant to Section 10620(d)(3) of the California Water Code to coordinate with water management agencies, relevant public agencies, and other water suppliers regarding the preparation of the UWMP. Pursuant to Section 10621(b) of the California Water Code, the Chino Basin Desalter Authority will be reviewing the UWMP and will make amendments or changes, as appropriate. The Chino Basin Desalter Authority invites you to submit comments in anticipation of the development of our 2020 UWMP Update. Please provide written comments within the next 30 days to the Chino Basin Desalter Authority.

Sincerely,

Thom O'Neill

Thomas O'Neill
General Manager/CEO

CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 Thomas M. O'Neill, General Manager/CEO

November 10, 2020

Mr. George Johnson
County Executive Officer
County of Riverside
4080 Lemon Street – 4th Floor
Riverside, CA 92501

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Johnson:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

As an urban water supplier, the Chino Basin Desalter Authority is required pursuant to Section 10620(d)(3) of the California Water Code to coordinate with water management agencies, relevant public agencies, and other water suppliers regarding the preparation of the UWMP. Pursuant to Section 10621(b) of the California Water Code, the Chino Basin Desalter Authority will be reviewing the UWMP and will make amendments or changes, as appropriate. The Chino Basin Desalter Authority invites you to submit comments in anticipation of the development of our 2020 UWMP Update. Please provide written comments within the next 30 days to the Chino Basin Desalter Authority.

Sincerely,

Thomas O'Neill

Thomas O'Neill
General Manager/CEO

CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

November 10, 2020

Mr. Andy Okoro
City Manager
City of Norco
2870 Clark Avenue
Norco, CA 92860

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Okoro:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thomas O'Neill

Thomas O'Neill
General Manager/CEO

CDA | Chino Basin Desalter Authority

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 Thomas M. O'Neill, General Manager/CEO

November 10, 2020

Mr. Scott Ochoa
City Manager
City of Ontario
303 E. "B" Street
Ontario, CA 91764

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Ochoa:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thomas O'Neill

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General Manager/CEO

CDA | CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

November 10, 2020

Mr. Matthew Ballantyne
City Manager
City of Chino
13220 Central Avenue
Chino, CA 91710

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Ballantyne:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thomas O'Neill

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General Manager/CEO

CDA | CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

November 10, 2020

Mr. Benjamin Montgomery
City Manager
City of Chino Hills
14000 City Center Drive
Chino Hills, CA 91709

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Montgomery:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thomas O'Neill
General Manager/CEO

CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

November 10, 2020

Mr. Bryan Jones
City Manager
City of Eastvale
12363 Limonite Avenue, Suite 910
Eastvale, CA 91752

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Jones:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thomas O'Neill

Thomas O'Neill
General Manager/CEO

CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

November 10, 2020

Mr. Rod Butler
City Manager
City of Jurupa Valley
8930 Limonite Avenue
Jurupa Valley, CA 92509

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Butler:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thomas O'Neill

Thomas O'Neill
General Manager/CEO

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 Thomas M. O'Neill, General Manager/CEO

November 10, 2020

Mr. Jeffrey Kightlinger
General Manager
Metropolitan Water District
PO Box 54153
Los Angeles, CA 90054

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Kightlinger:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thomas O'Neill

Thomas O'Neill
General Manager/CEO

CDA **CHINO BASIN DESALTER AUTHORITY**

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

November 10, 2020

Mr. Peter Kavounas
General Manager
Chino Basin Watermaster
9641 San Bernardino Road
Rancho Cucamonga, CA 91730

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Kavounas:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thom O'Neill

Thomas O'Neill
General Manager/CEO

CDA | Chino Basin Desalter Authority

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

November 10, 2020

Mr. Scott Burton
Utilities Manager
City of Ontario
1425 South Bon View Avenue
Ontario, CA 91761

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Burton:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thomas O'Neill
General Manager/CEO

CDA | Chino Basin Desalter Authority

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230

November 10, 2020

Mr. Shivaji Deshmukh, P.E.
General Manager
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Deshmukh:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

Thomas O'Neill
General Manager/CEO

CDA Chino Basin Desalter Authority

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230

November 10, 2020

Mr. Chris Berch
General Manager
Jurupa Community Services District
11201 Harrel Street
Jurupa Valley, CA 91752

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Berch:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Thomas O'Neill

Thomas O'Neill
General Manager/CEO

CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230

November 10, 2020

Mr. Rich Haller
General Manager
Santa Ana Watershed Project Authority
11615 Sterling Avenue
Riverside, CA 92503

SUBJECT: 2020 Urban Water Management Plan Update

Dear Mr. Haller:

The Chino Basin Desalter Authority is currently in the process of reviewing its Urban Water Management Plan (UWMP) for the upcoming 2020 Update. The Urban Water Management Planning Act requires every urban water supplier, which provides water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least once every five years. The UWMP is a planning document and a source document to direct urban water suppliers to evaluate and compare their water supply and reliability to their existing water conservation efforts. The Chino Desalter Authority is currently in the process of preparing the 2020 UWMP Update.

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Sincerely,

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General Manager/CEO

THE PRESS-ENTERPRISE

Ad Copy:

1825 Chicago Ave, Suite 100
Riverside, CA 92507
951-684-1200
951-368-9018 FAX

PROOF OF PUBLICATION
(2010, 2015.5 C.C.P)

Publication(s): The Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: 2020 UWMP Hearing Notice /

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper in general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673, under date of August 25, 1995, Case Number 267864, and under date of September 16, 2013, Case Number RIC 1309013; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

05/12, 05/19/2021

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: May 19, 2021
At: Riverside, California

Legal Advertising Representative, The Press-Enterprise

CHINO BASIN DESALTER AUTHORITY
3550 E. PHILADELPHIA STREET, SUITE 170
ONTARIO, CA 91761

Ad Number: 0011461427-01

P.O. Number:

**NOTICE OF PUBLIC HEARING
BY THE BOARD OF DIRECTORS OF
CHINO BASIN DESALTER AUTHORITY
REGARDING THE DRAFT CHINO BASIN DESALTER AUTHORITY
2020 URBAN WATER MANAGEMENT PLAN,
SAN BERNARDINO COUNTY/RIVERSIDE COUNTY, STATE OF CALIFORNIA**

NOTICE IS HEREBY GIVEN that the Board of Directors of the Chino Basin Desalter Authority (CDA) has scheduled a public hearing to receive comments and testimony regarding the Draft Chino Basin Desalter Authority 2020 Urban Water Management Plan (CDA 2020 UWMP), San Bernardino County/Riverside County, State of California.

NOTICE IS FURTHER GIVEN that said public hearing will be held at the following date, time and place for the purpose of hearing any and all public testimony and comments, for, against, or neutral, regarding the draft CDA 2020 UWMP.

According to the directives from the California Department of Public Health and Executive Order issued by Governor Gavin Newsom, members of the public are invited to participate via video or teleconference:

DATE: Thursday, June 3, 2021

TIME: 2:00 p.m.

VIDEO CONFERENCE:	https://zoom.us	Meeting ID: 813 5205 9101 Passcode: 380557
TELECONFERENCE:	(669) 900 6833	Meeting ID: 813 5205 9101 Passcode: 380557

NOTICE IS FURTHER GIVEN that all interested persons are invited and encouraged to attend the public hearing and provide testimony and written comments regarding the draft CDA 2020 UWMP. Oral statements will be heard; however, to ensure the accuracy of the record, all important testimony and comments relating to the draft CDA 2020 UWMP should be submitted in writing to Casey Costa, CDA Executive Assistant, at the address below, prior to the time set for the public hearing or directly to the CDA Board of Directors during the public hearing. If you challenge the Final CDA 2020 Urban Water Management Plan in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this Notice, or in written correspondence delivered to CDA prior to or at the public hearing.

NOTICE IS FURTHER GIVEN that a copy of the draft CDA 2020 UWMP can be found online at http://chinodesalter.org. A hard copy of the draft CDA 2020 UWMP is also available for inspection at the Chino Basin Desalter Authority office located at 3550 E. Philadelphia Street, Suite 170, Ontario, CA 91761. Please direct comments and questions to Casey Costa, CDA Executive Assistant, at (909) 218-3730; ccosta@chinodesalter.org.

Press-Enterprise: 5/12, 5/19

Advertising Order Confirmation

Ad Number	Ad Size	Color	Production Color	Ad Attributes	Production Method	Production Notes
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External Ad Number	Pick Up	Ad Type	Released for Publication
		Legal Liner	

NOTICE OF PUBLIC HEARING
BY THE BOARD OF DIRECTORS OF
CHINO BASIN DESALTER AUTHORITY
REGARDING THE DRAFT CHINO BASIN DESALTER AUTHORITY
2020 URBAN WATER MANAGEMENT PLAN,
SAN BERNARDINO COUNTY/RIVERSIDE COUNTY, STATE OF CALIFORNIA

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Published: May 11, 18 2021 Inland Valley Daily Bulletin Ad#11462800

Product	Requested Placement	Requested Position	Run Dates	# Inserts
Daily Bulletin	Legals CLS LA-SB-PE	General IE - 1076~	05/18/21	1
SB Sun	Legals CLS NP	General NP - 1076~	05/18/21	1
PE Riverside:Full Run	Legals CLS LA-SB-PE	General IE - 1076~	05/18/21	1

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Please note: To meet our printer's deadline, we must have your proof returned by the published deadline, and as indicated by your sales rep.

Advertising Order Confirmation

Please note: If you pay by bank card, your card statement will show the merchant as "SoCal Newspaper Group".

CHINO BASIN DESALTER AUTHORITY

Ken McLaughlin, Chairperson
Jim Bowman, Vice Chairperson
Greg Newton, Director
Peter J. Rogers, Director
Vicki Rupe, Director
Gracie Torres, Director
Marco Tule, Director
Eunice Ulloa, Director

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

May 6, 2021

Mr. Leonard Hernandez
Chief Executive Officer
County of San Bernardino
385 N. Arrowhead Avenue
San Bernardino, CA 92415

SUBJECT: Notice of Public Hearing for
2020 Urban Water Management Plan and
Water Shortage Contingency Plan

Dear Mr. Hernandez,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

The 2020 Urban Water Management Plan and Water Shortage Contingency Plan were prepared pursuant to the "Urban Water Management Planning Act" and the California Water Code. The California Department of Water Resources requires every urban water supplier to prepare and adopt an Urban Water Management Plan, including the Water Shortage Contingency Plan, and periodically update the Urban Water Management Plan at least once every five years, in years ending in six and one.

Information regarding CDA's PUBLIC HEARING follows:

Date: Thursday, June 3, 2021
Time: 2:00 p.m.
Place: VIDEO CONFERENCE: https://zoom.us Meeting ID: 813 5205 9101 Passcode: 380557
TELECONFERENCE: (669) 900 6833 Meeting ID: 813 5205 9101 Passcode: 380557

The meeting link will be posted on the CDA's website at the following address: https://www.chinodesalter.org/

CDA invites all interested entities to attend and present their comments. A copy of the draft 2020 Urban Water Management Plan and Water Shortage Contingency Plan will be available at the CDA's website. Please provide written comments by 5 p.m. on June 14, 2021 to the Chino Basin Desalter Authority.

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

May 6, 2021

Mr. George Johnson
County Executive Officer
County of Riverside
4080 Lemon Street – 4th Floor
Riverside, CA 92501

SUBJECT: Notice of Public Hearing for
2020 Urban Water Management Plan and
Water Shortage Contingency Plan

Dear Mr. Johnson,

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CHINO BASIN DESALTER AUTHORITY

Ken McLaughlin, Chairperson
Jim Bowman, Vice Chairperson
Greg Newton, Director
Peter J. Rogers, Director
Vicki Rupe, Director
Gracie Torres, Director
Marco Tule, Director
Eunice Ulloa, Director

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

May 6, 2021

Mr. Andy Okoro
City Manager
City of Norco
2870 Clark Avenue
Norco, CA 92860

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Okoro,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

May 6, 2021

Mr. Scott Ochoa
City Manager
City of Ontario
303 E. "B" Street
Ontario, CA 91764

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Ochoa,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230

May 6, 2021

Mr. Matthew Ballantyne
City Manager
City of Chino
13220 Central Avenue
Chino, CA 91710

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Ballantyne,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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CDA Chino Basin Desalter Authority

Ken McLaughlin, Chairperson
Jim Bowman, Vice Chairperson
Greg Newton, Director
Peter J. Rogers, Director
Vicki Rupe, Director
Gracie Torres, Director
Marco Tule, Director
Eunice Ulloa, Director

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

May 6, 2021

Mr. Benjamin Montgomery
City Manager
City of Chino Hills
14000 City Center Drive
Chino Hills, CA 91709

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Montgomery,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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Marco Tule, Director
Eunice Ulloa, Director

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 Thomas M. O'Neill, General Manager/CEO

May 6, 2021

Mr. Bryan Jones
City Manager
City of Eastvale
12363 Limonite Avenue, Suite 910
Eastvale, CA 91752

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Jones,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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CDA CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

May 6, 2021

Mr. Rod Butler
City Manager
City of Jurupa Valley
8930 Limonite Avenue
Jurupa Valley, CA 92509

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Butler,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 Thomas M. O'Neill, General Manager/CEO

May 6, 2021

Mr. Jeffrey Kightlinger
General Manager
Metropolitan Water District
PO Box 54153
Los Angeles, CA 90054

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Kightlinger,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230

Thomas M. O'Neill, General Manager/CEO

May 6, 2021

Mr. Peter Kavounas
General Manager
Chino Basin Watermaster
9641 San Bernardino Road
Rancho Cucamonga, CA 91730

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Kavounas,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

May 6, 2021

Mr. Scott Burton
Utilities Manager
City of Ontario
1425 South Bon View Avenue
Ontario, CA 91761

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Burton,

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CDA CHINO BASIN DESALTER AUTHORITY

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Jim Bowman, Vice Chairperson
Greg Newton, Director
Peter J. Rogers, Director
Vicki Rupe, Director
Gracie Torres, Director
Marco Tule, Director
Eunice Ulloa, Director

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

May 6, 2021

Mr. Shivaji Deshmukh
General Manager
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708

SUBJECT: Notice of Public Hearing for
2020 Urban Water Management Plan and
Water Shortage Contingency Plan

Dear Mr. Deshmukh,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230 *Thomas M. O'Neill, General Manager/CEO*

May 6, 2021

Mr. Chris Berch
General Manager
Jurupa Community Services District
11201 Harrel Street
Jurupa Valley, CA 91752

SUBJECT: Notice of Public Hearing for 2020 Urban Water Management Plan and Water Shortage Contingency Plan

Dear Mr. Berch,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230

Thomas M. O'Neill, General Manager/CEO

May 6, 2021

Mr. Jeffrey Mosher
General Manager
Santa Ana Watershed Project Authority
11615 Sterling Avenue
Riverside, CA 92503

**SUBJECT: Notice of Public Hearing for
2020 Urban Water Management Plan and
Water Shortage Contingency Plan**

Dear Mr. Haller,

The Chino Basin Desalter Authority (CDA) will hold a PUBLIC HEARING on July 3, 2021 for the purposes of adopting its 2020 Urban Water Management Plan and its Water Shortage Contingency Plan. The CDA's 2020 Urban Water Management Plan incorporates the CDA's Water Shortage Contingency Plan.

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CHINO BASIN DESALTER AUTHORITY

3550 E. Philadelphia Street, Suite 170 • Ontario, CA 91761 • (909) 218-3230

APPENDIX D

CHINO BASIN JUDGMENT

DONALD D. STARK
A Professional Corporation
Suite 201 Airport Plaza
2061 Business Center Drive
Irvine, California 92715
Telephone: (714) 752-8971

CLAYSON, ROTHROCK & MANN
601 South Main Street
Corona, California 91720
Telephone: (714) 737-1910

Attorneys for Plaintiff

Rec'd J. Stam Jan 27, 1978 tcl

'78 JAN 30 AM 11 41

FILED - West District
San Bernardino County Clerk
OCT 12 1989

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

MICROFILMED

CHINO BASIN MUNICIPAL WATER DISTRICT, Plaintiff, v. CITY OF CHINO, et al. Defendants.	No. 164327 RCN 51010

JUDGMENT

Routing ..... Date ..... Appeals ..... Exhibits ..... Asst. Co. Clerk ..... Supervisor ..... Index ..... Secretary ..... File ..... Other

JUDGMENT
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IRVINE, CALIFORNIA 92715
(714) 752-8971

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Telephone: (714) 752-8971

CLAYSON, ROTHROCK & MANN
601 South Main Street
Corona, California 91720
Telephone: (714) 737-1910

Attorneys for Plaintiff

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

CHINO BASIN MUNICIPAL WATER DISTRICT, Plaintiff, v. CITY OF CHINO, et al. Defendants.	No. 164327 JUDGMENT

I. INTRODUCTION

1. Pleadings, Parties and Jurisdiction. The complaint herein was filed on January 2, 1975, seeking an adjudication of water rights, injunctive relief and the imposition of a physical solution. A first amended complaint was filed on July 16, 1976. The defaults of certain defendants have been entered, and certain other defendants dismissed. Other than defendants who have been dismissed or whose defaults have been entered, all defendants have appeared herein. By answers and order of this Court, the issues have been made those of a full *inter se* adjudication between the

parties. This Court has jurisdiction of the subject matter of this action and of the parties herein.

2. Stipulation For Judgment. Stipulation for entry of judgment has been filed by and on behalf of a majority of the parties, representing a majority of the quantitative rights herein adjudicated.

3. Trial; Findings and Conclusions. Trial was commenced on December 16, 1977, as to the non-stipulating parties, and findings of fact and conclusions of law have been entered disposing of the issues in the case.

4. Definitions. As used in this Judgment, the following terms shall have the meanings herein set forth:

(a) Active Parties. All parties other than those who have filed with Watermaster a written waiver of service of notices, pursuant to Paragraph 58.

(b) Annual or Year -- A fiscal year, July 1 through June 30, following, unless the context shall clearly indicate a contrary meaning.

(c) Appropriative Right -- The annual production right of a producer from the Chino Basin other than pursuant to an overlying right.

(d) Basin Water -- Ground water within Chino Basin which is part of the Safe Yield, Operating Safe Yield, or replenishment water in the Basin as a result of operations under the Physical Solution decreed herein. Said term does not include Stored Water.

(e) CBMWD -- Plaintiff Chino Basin Municipal Water District.

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(714) 752-8971

(f) <u>Chino Basin</u> or <u>Basin</u> -- The ground water basin underlying the area shown as such on Exhibit "B" and within the boundaries described in Exhibit "K".

(g) <u>Chino Basin Watershed</u> -- The surface drainage area tributary to and overlying Chino Basin.

(h) <u>Ground Water</u> -- Water beneath the surface of the ground and within the zone of saturation, i.e., below the existing water table.

(i) <u>Ground Water Basin</u> -- An area underlain by one or more permeable formations capable of furnishing substantial water storage.

(j) <u>Minimal Producer</u> -- Any producer whose production does not exceed five acre-feet per year.

(k) <u>MWD</u> -- The Metropolitan Water District of Southern California.

(l) <u>Operating Safe Yield</u> -- The annual amount of ground water which Watermaster shall determine, pursuant to criteria specified in Exhibit "I", can be produced from Chino Basin by the Appropriative Pool parties free of replenishment obligation under the Physical Solution herein.

(m) <u>Overdraft</u> -- A condition wherein the total annual production from the Basin exceeds the Safe Yield thereof.

(n) <u>Overlying Right</u> -- The appurtenant right of an owner of lands overlying Chino Basin to produce water from the Basin for overlying beneficial use on such lands.

(o) <u>Person</u>. Any individual, partnership, association, corporation, governmental entity or agency, or other organization.

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(p) PVMWD -- Defendant Pomona Valley Municipal Water District.

(q) Produce or Produced -- To pump or extract ground water from Chino Basin.

(r) Producer -- Any person who produces water from Chino Basin.

(s) Production -- Annual quantity, stated in acre feet, of water produced.

(t) Public Hearing -- A hearing after notice to all parties and to any other person legally entitled to notice.

(u) Reclaimed Water -- Water which, as a result of processing of waste water, is suitable for a controlled use.

(v) Replenishment Water -- Supplemental water used to recharge the Basin pursuant to the Physical Solution, either directly by percolating the water into the Basin or indirectly by delivering the water for use in lieu of production and use of safe yield or Operating Safe Yield.

(w) Responsible Party -- The owner, co-owner, lessee or other person designated by multiple parties interested in a well as the person responsible for purposes of filing reports hereunder.

(x) Safe Yield -- The long-term average annual quantity of ground water (excluding replenishment or stored water but including return flow to the Basin from use of replenishment or stored water) which can be produced from the Basin under cultural conditions of a particular year without causing an undesirable result.

(y) SBVMWD -- San Bernardino Valley Municipal Water

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District.

(z) State Water -- Supplemental Water imported through the State Water Resources Development System, pursuant to Chapter 8, Division 6, Part 6 of the Water Code.

(aa) Stored Water -- Supplemental water held in storage, as a result of direct spreading, in lieu delivery, or otherwise, for subsequent withdrawal and use pursuant to agreement with Watermaster.

(bb) Supplemental Water -- Includes both water imported to Chino Basin from outside Chino Basin Watershed, and reclaimed water.

(cc) WMWD -- Defendant Western Municipal Water District of Riverside County.

5. List of Exhibits. The following exhibits are attached to this Judgment and made a part hereof:

"A" -- "Location Map of Chino Basin" showing boundaries of Chino Basin Municipal Water District, and other geographic and political features.

"B" -- "Hydrologic Map of Chino Basin" showing hydrologic features of Chino Basin.

"C" -- Table Showing Parties in Overlying (Agricultural) Pool.

"D" -- Table Showing Parties in Overlying (Non-agricultural Pool and Their Rights.

"E" -- Table Showing Appropriators and Their Rights.

"F" -- Overlying (Agricultural) Pool Pooling Plan.

"G" -- Overlying (Non-agricultural) Pool Pooling Plan.

"H" -- Appropriative Pool Pooling Plan.

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"I" -- Engineering Appendix.

"J" -- Map of In Lieu Area No. 1.

"K" -- Legal Description of Chino Basin.

II. DECLARATION OF RIGHTS

A. HYDROLOGY

6. Safe Yield. The Safe Yield of Chino Basin is 140,000 acre feet per year.

7. Overdraft and Prescriptive Circumstances. In each year for a period in excess of five years prior to filing of the First Amended Complaint herein, the Safe Yield of the Basin has been exceeded by the annual production therefrom, and Chino Basin is and has been for more than five years in a continuous state of overdraft. The production constituting said overdraft has been open, notorious, continuous, adverse, hostile and under claim of right. The circumstances of said overdraft have given notice to all parties of the adverse nature of such aggregate over-production.

B. WATER RIGHTS IN SAFE YIELD

8. Overlying Rights. The parties listed in Exhibits "C" and "D" are the owners or in possession of lands which overlie Chino Basin. As such, said parties have exercised overlying water rights in Chino Basin. All overlying rights owned or exercised by parties listed in Exhibits "C" and "D" have, in the aggregate, been limited by prescription except to the extent such rights have been preserved by self-help by said parties. Aggregate preserved overlying rights in the Safe Yield for agricultural pool use, including the rights of the State of California, total 82,800 acre feet per year. Overlying rights for non-agricultural pool use

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total 7,366 acre feet per year and are individually decreed for each affected party in Exhibit "D". No portion of the Safe Yield of Chino Basin exists to satisfy unexercised overlying rights, and such rights have all been lost by prescription. However, uses may be made of Basin Water on overlying lands which have no preserved overlying rights pursuant to the Physical Solution herein. All overlying rights are appurtenant to the land and cannot be assigned or conveyed separate or apart therefrom.

9. Appropriative Rights. The parties listed in Exhibit "E" are the owners of appropriative rights, including rights by prescription, in the unadjusted amounts therein set forth, and by reason thereof are entitled under the Physical Solution to share in the remaining Safe Yield, after satisfaction of overlying rights and rights of the State of California, and in the Operating Safe Yield in Chino Basin, in the annual shares set forth in Exhibit "E".

(a) Loss of Priorities. By reason of the long continued overdraft in Chino Basin, and in light of the complexity of determining appropriative priorities and the need for conserving and making maximum beneficial use of the water resources of the State, each and all of the parties listed in Exhibit "E" are estopped and barred from asserting special priorities or preferences, *inter se*. All of said appropriative rights are accordingly deemed and considered of equal priority.

(b) Nature and Quantity. All rights listed in Exhibit "E" are appropriative and prescriptive in nature. By reason of the status of the parties, and the provisions of Section

1007 of the Civil Code, said rights are immune from reduction or limitation by prescription.

10. Rights of the State of California. The State of California, by and through its Department of Corrections, Youth Authority and Department of Fish and Game, is a significant producer of ground water from and the State is the largest owner of land overlying Chino Basin. The precise nature and scope of the claims and rights of the State need not be, and are not, defined herein. The State, through said departments, has accepted the Physical Solution herein decreed, in the interests of implementing the mandate of Section 2 of Article X of the California Constitution. For all purposes of this Judgment, all future production by the State or its departments or agencies for overlying use on State-owned lands shall be considered as agricultural pool use.

C. RIGHTS TO AVAILABLE GROUND WATER STORAGE CAPACITY

11. Available Ground Water Storage Capacity. There exists in Chino Basin a substantial amount of available ground water storage capacity which is not utilized for storage or regulation of Basin Waters. Said reservoir capacity can appropriately be utilized for storage and conjunctive use of supplemental water with Basin Waters. It is essential that said reservoir capacity utilization for storage and conjunctive use of supplemental water be undertaken only under Watermaster control and regulation, in order to protect the integrity of both such Stored Water and Basin Water in storage and the Safe Yield of Chino Basin.

12. Utilization of Available Ground Water Capacity. Any person or public entity, whether a party to this action or not, may make reasonable beneficial use of the available ground water

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storage capacity of Chino Basin for storage of supplemental water; provided that no such use shall be made except pursuant to written agreement with Watermaster, as authorized by Paragraph 28. In the allocation of such storage capacity, the needs and requirements of lands overlying Chino Basin and the owners of rights in the Safe Yield or Operating Safe Yield of the Basin shall have priority and preference over storage for export.

III. INJUNCTION

13. Injunction Against Unauthorized Production of Basin Water. Each party in each of the respective pools is enjoined, as follows:

(a) Overlying (Agricultural) Pool. Each party in the Overlying (Agricultural) Pool, its officers, agents, employees, successors and assigns, is and they each are ENJOINED AND RESTRAINED from producing ground water from Chino Basin in any year hereafter in excess of such party's correlative share of the aggregate of 82,800 acre feet allocated to said Pool, except pursuant to the Physical Solution or a storage water agreement.

(b) Overlying (Non-Agricultural) Pool. Each party in the Overlying (Non-agricultural) Pool, its officers, agents, employees, successors and assigns, is and they each are ENJOINED AND RESTRAINED from producing ground water of Chino Basin in any year hereafter in excess of such party's decreed rights in the Safe Yield, except pursuant to the provisions of the Physical Solution or a storage water agreement.

(c) Appropriative Pool. Each party in the

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Appropriative Pool, its officers, agents, employees, successors and assigns, is and they are each ENJOINED AND RESTRAINED from producing ground water of Chino Basin in any year hereafter in excess of such party's decreed share of Operating Safe Yield, except pursuant to the provisions of the Physical Solution or a storage water agreement.

14. Injunction Against Unauthorized Storage or Withdrawal of Stored Water. Each party, its officers, agents, employees, successors and assigns is and they each are ENJOINED AND RESTRAINED from storing supplemental water in Chino Basin for withdrawal, or causing withdrawal of, water stored by that party, except pursuant to the terms of a written agreement with Watermaster and in accordance with Watermaster regulations. Any supplemental water stored or recharged in the Basin, except pursuant to such a Watermaster agreement, shall be deemed abandoned and not classified as Stored Water. This paragraph has no application, as such, to supplemental water spread or provided in lieu by Watermaster pursuant to the Physical Solution.

IV. CONTINUING JURISDICTION

15. Continuing Jurisdiction. Full jurisdiction, power and authority are retained and reserved to the Court as to all matters contained in this judgment, except:

(a) The redetermination of Safe Yield, as set forth in Paragraph 6, during the first ten (10) years of operation of the Physical Solution;

(b) The allocation of Safe Yield as between the several pools as set forth in Paragraph 44 of the Physical Solution;

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(c) The determination of specific quantitative rights and shares in the declared Safe Yield or Operating Safe Yield herein declared in Exhibits "D" and "E"; and

(d) The amendment or modification of Paragraphs 7(a) and (b) of Exhibit "H", during the first ten (10) years of operation of the Physical Solution, and thereafter only upon affirmative recommendation of at least 67% of the voting power (determined pursuant to the formula described in Paragraph 3 of Exhibit "H"), but not less than one-third of the members of the Appropriative Pool Committee representatives of parties who produce water within CBMWD or WMWD; after said tenth year the formula set forth in said Paragraph 7(a) and 7(b) of Exhibit "H" for payment of the costs of replenishment water may be changed to 100% gross or net, or any percentage split thereof, but only in response to recommendation to the Court by affirmative vote of at least 67% of said voting power of the Appropriative Pool representatives of parties who produce ground water within CBMWD or WMWD, but not less than one-third of their number. In such event, the Court shall act in conformance with such recommendation unless there are compelling reasons to the contrary; and provided, further, that the fact that the allocation of Safe Yield or Operating Safe Yield shares may be rendered moot by a recommended change in the formula for replenishment assessments shall not be deemed to be such a "compelling reason."

Said continuing jurisdiction is provided for the purpose of enabling the Court, upon application of any party, the Watermaster, the Advisory Committee or any Pool Committee, by motion and, upon

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at least 30 days' notice thereof, and after hearing thereon, to make such further or supplemental orders or directions as may be necessary or appropriate for interpretation, enforcement or carrying out of this Judgment, and to modify, amend or amplify any of the provisions of this Judgment.

V. WATERMASTER

A. APPOINTMENT

16. Watermaster Appointment. CBMWD, acting by and through a majority of its board of directors, is hereby appointed Watermaster, to administer and enforce the provisions of this Judgment and any subsequent instructions or orders of the Court hereunder. The term of appointment of Watermaster shall be for five (5) years. The Court will by subsequent orders provide for successive terms or for a successor Watermaster. Watermaster may be changed at any time by subsequent order of the Court, on its own motion, or on the motion of any party after notice and hearing. Unless there are compelling reasons to the contrary, the Court shall act in conformance with a motion requesting the Watermaster be changed if such motion is supported by a majority of the voting power of the Advisory Committee.

B. POWERS AND DUTIES

17. Powers and Duties. Subject to the continuing supervision and control of the Court, Watermaster shall have and may exercise the express powers, and shall perform the duties, as provided in this Judgment or hereafter ordered or authorized by the Court in the exercise of the Court's continuing jurisdiction.

18. Rules and Regulations. Upon recommendation by the

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Advisory Committee, Watermaster shall make and adopt, after public hearing, appropriate rules and regulations for conduct of Watermaster affairs, including meeting schedules and procedures, and compensation of members of Watermaster at not to exceed $25 per member per meeting, or $300 per member per year, whichever is less, plus reasonable expenses related to activities within the Basin. Thereafter, Watermaster may amend said rules from time to time upon recommendation, or with approval of the Advisory Committee after hearing noticed to all active parties. A copy of said rules and regulations, and of any amendments thereof, shall be mailed to each active party.

19. Acquisition of Facilities. Watermaster may purchase, lease, acquire and hold all necessary facilities and equipment; provided, that it is not the intent of the Court that Watermaster acquire any interest in real property or substantial capital assets.

20. Employment of Experts and Agents. Watermaster may employ or retain such administrative, engineering, geologic, accounting, legal or other specialized personnel and consultants as may be deemed appropriate in the carrying out of its powers and shall require appropriate bonds from all officers and employees handling Watermaster funds. Watermaster shall maintain records for purposes of allocation of costs of such services as well as of all other expenses of Watermaster administration as between the several pools established by the Physical Solution.

21. Measuring Devices. Watermaster shall cause parties, pursuant to uniform rules, to install and maintain in good operating condition, at the cost of each party, such necessary measuring

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devices or meters as Watermaster may deem appropriate. Such measuring devices shall be inspected and tested as deemed necessary by Watermaster, and the cost thereof shall constitute an expense of Watermaster.

22. Assessments. Watermaster is empowered to levy and collect all assessments provided for in the pooling plans and Physical Solution.

23. Investment of Funds. Watermaster may hold and invest any and all Watermaster funds in investments authorized from time to time for public agencies of the State of California.

24. Borrowing. Watermaster may borrow from time to time amounts not exceeding the annual anticipated receipts of Watermaster during such year.

25. Contracts. Watermaster may enter into contracts for the performance of any powers herein granted; provided, however, that Watermaster may not contract with or purchase materials, supplies or services from CBMWD, except upon the prior recommendation and approval of the Advisory Committee and pursuant to written order of the Court.

26. Cooperation With Other Agencies. Subject to prior recommendation or approval of the Advisory Committee, Watermaster may act jointly or cooperate with agencies of the United States and the State of California or any political subdivisions, municipalities or districts or any person to the end that the purpose of the Physical Solution may be fully and economically carried out.

27. Studies. Watermaster may, with concurrence of the Advisory Committee or affected Pool Committee and in accordance with Paragraph 54(b), undertake relevant studies of hydrologic

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conditions, both quantitative and qualitative, and operating aspects of implementation of the management program for Chino Basin.

28. Ground Water Storage Agreements. Watermaster shall adopt, with the approval of the Advisory Committee, uniformly applicable rules and a standard form of agreement for storage of supplemental water, pursuant to criteria therefor set forth in Exhibit "I". Upon appropriate application by any person, Watermaster shall enter into such a storage agreement; provided that all such storage agreements shall first be approved by written order of the Court, and shall by their terms preclude operations which will have a substantial adverse impact on other producers.

29. Accounting for Stored Water. Watermaster shall calculate additions, extractions and losses and maintain an annual account of all Stored Water in Chino Basin, and any losses of water supplies or Safe Yield of Chino Basin resulting from such Stored Water.

30. Annual Administrative Budget. Watermaster shall submit to Advisory Committee an administrative budget and recommendation for each fiscal year on or before March 1. The Advisory Committee shall review and submit said budget and their recommendations to Watermaster on or before April 1, following. Watermaster shall hold a public hearing on said budget at its April quarterly meeting and adopt the annual administrative budget which shall include the administrative items for each pool committee. The administrative budget shall set forth budgeted items in sufficient detail as necessary to make a proper allocation of the expense among the several pools, together with Watermaster's proposed allocation. The budget shall contain such additional comparative information

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or explanation as the Advisory Committee may recommend from time to time. Expenditures within budgeted items may thereafter be made by Watermaster in the exercise of powers herein granted, as a matter of course. Any budget transfer in excess of 20% of a budget category during any budget year or modification of such administrative budget during any year shall be first submitted to the Advisory Committee for review and recommendation.

31. Review Procedures. All actions, decisions or rules of Watermaster shall be subject to review by the Court on its own motion or on timely motion by any party, the Watermaster (in the case of a mandated action), the Advisory Committee, or any Pool Committee, as follows:

(a) Effective Date of Watermaster Action. Any action, decision or rule of Watermaster shall be deemed to have occurred or been enacted on the date on which written notice thereof is mailed. Mailing of copies of approved Watermaster minutes to the active parties shall constitute such notice to all parties.

(b) Noticed Motion. Any party, the Watermaster (as to any mandated action), the Advisory Committee, or any Pool Committee may, by a regularly noticed motion, apply to the Court for review of any Watermaster's action, decision or rule. Notice of such motion shall be served personally or mailed to Watermaster and to all active parties. Unless otherwise ordered by the Court, such motion shall not operate to stay the effect of such Watermaster action, decision or rule.

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(c) Time for Motion. Notice of motion to review any Watermaster action, decision or rule shall be served and filed within ninety (90) days after such Watermaster action, decision or rule, except for budget actions, in which event said notice period shall be sixty (60) days.

(d) De Novo Nature of Proceedings. Upon the filing of any such motion, the Court shall require the moving party to notify the active parties, the Watermaster, the Advisory Committee and each Pool Committee, of a date for taking evidence and argument, and on the date so designated shall review *de novo* the question at issue. Watermaster's findings or decision, if any, may be received in evidence at said hearing, but shall not constitute presumptive or prima facie proof of any fact in issue.

(e) Decision. The decision of the Court in such proceeding shall be an appealable supplemental order in this case. When the same is final, it shall be binding upon the Watermaster and all parties.

C. ADVISORY AND POOL COMMITTEES

32. Authorization. Watermaster is authorized and directed to cause committees of producer representatives to be organized to act as Pool Committees for each of the several pools created under the Physical Solution. Said Pool Committees shall, in turn, jointly form an Advisory Committee to assist Watermaster in performance of its functions under this judgment. Pool Committees shall be composed as specified in the respective pooling plans, and the Advisory Committee shall be composed of not to exceed ten (10) voting representatives from each pool, as designated by the

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respective Pool Committee. WMWD, PVMWD and SBVMWD shall each be entitled to one non-voting representative on said Advisory Committee.

33. Term and Vacancies. Members of any Pool Committee, shall serve for the term, and vacancies shall be filled, as specified in the respective pooling plan. Members of the Advisory Committee shall serve at the will of their respective Pool Committee.

34. Voting Power. The voting power on each Pool Committee shall be allocated as provided in the respective pooling plan. The voting power on the Advisory Committee shall be one hundred (100) votes allocated among the three pools in proportion to the total assessments paid to Watermaster during the preceding year; provided, that the minimum voting power of each pool shall be

(a) Overlying (Agricultural) Pool 20,

(b) Overlying (Non-agricultural) Pool 5, and

(c) Appropriative Pool 20.

In the event any pool is reduced to its said minimum vote, the remaining votes shall be allocated between the remaining pools on said basis of assessments paid to Watermaster by each such remaining pool during the preceding year. The method of exercise of each pool's voting power on the Advisory Committee shall be as determined by the respective pool committees.

35. Quorum. A majority of the voting power of the Advisory Committee or any Pool Committee shall constitute a quorum for the transaction of affairs of such Advisory or Pool Committee; provided, that at least one representative of each Pool Committee shall be required to constitute a quorum of the Advisory Committee. No Pool Committee representative may purposely absent himself or

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herself, without good cause, from an Advisory Committee meeting to deprive it of a quorum. Action by affirmative vote of a majority of the entire voting power of any Pool Committee or the Advisory Committee shall constitute action by such committee. Any action or recommendation of a Pool Committee or the Advisory Committee shall be transmitted to Watermaster in writing, together with a report of any dissenting vote or opinion.

36. Compensation. Pool or Advisory Committee members may receive compensation, to be established by the respective pooling plan, but not to exceed twenty-five dollars ($25.00) for each meeting of such Pool or Advisory Committee attended, and provided that no member of a Pool or Advisory Committee shall receive compensation of more than three hundred ($300.00) dollars for service on any such committee during any one year. All such compensation shall be a part of Watermaster administrative expense. No member of any Pool or Advisory Committee shall be employed by Watermaster or compensated by Watermaster for professional or other services rendered to such Pool or Advisory Committee or to Watermaster, other than the fee for attendance at meetings herein provided, plus reimbursement of reasonable expenses related to activities within the Basin.

37. Organization.

(a) Organizational Meeting. At its first meeting in each year, each Pool Committee and the Advisory Committee shall elect a chairperson and a vice chairperson from its membership. It shall also select a secretary, a treasurer and such assistant secretaries and treasurers as may be appropriate, any of whom may, but need not, be members of

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such Pool or Advisory Committee.

(b) Regular Meetings. All Pool Committees and the Advisory Committee shall hold regular meetings at a place and time to be specified in the rules to be adopted by each Pool and Advisory Committee. Notice of regular meetings of any Pool or Advisory Committee, and of any change in time or place thereof, shall be mailed to all active parties in said pool or pools.

(c) Special Meetings. Special meetings of any Pool or Advisory Committee may be called at any time by the Chairperson or by any three (3) members of such Pool or Advisory Committee by delivering notice personally or by mail to each member of such Pool or Advisory Committee and to each active party at least 24 hours before the time of each such meeting in the case of personal delivery, and 96 hours in the case of mail. The calling notice shall specify the time and place of the special meeting and the business to be transacted. No other business shall be considered at such meeting.

(d) Minutes. Minutes of all Pool Committee, Advisory Committee and Watermaster meetings shall be kept at Watermaster's offices. Copies thereof shall be mailed or otherwise furnished to all active parties in the pool or pools concerned. Said copies of minutes shall constitute notice of any Pool or Advisory Committee action therein reported, and shall be available for inspection by any party.

(e) Adjournments. Any meeting of any Pool or Advisory Committee may be adjourned to a time and place specified in the order of adjournment. Less than a quorum may so adjourn

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from time to time. A copy of the order or notice of adjournment shall be conspicuously posted forthwith on or near the door of the place where the meeting was held.

38. Powers and Functions. The powers and functions of the respective Pool Committees and the Advisory Committee shall be as follows:

(a) Pool Committees. Each Pool Committee shall have the power and responsibility for developing policy recommendations for administration of its particular pool, as created under the Physical Solution. All actions and recommendations of any Pool Committee which require Watermaster implementation shall first be noticed to the other two pools. If no objection is received in writing within thirty (30) days, such action or recommendation shall be transmitted directly to Watermaster for action. If any such objection is received, such action or recommendation shall be reported to the Advisory Committee before being transmitted to Watermaster.

(b) Advisory Committee. The Advisory Committee shall have the duty to study, and the power to recommend, review and act upon all discretionary determinations made or to be made hereunder by Watermaster.

[1] Committee Initiative. When any recommendation or advice of the Advisory Committee is received by Watermaster, action consistent therewith may be taken by Watermaster; provided, that any recommendation approved by 80 votes or more in the Advisory Committee shall constitute a mandate for action by Watermaster consistent therewith. If Watermaster is unwilling or unable to act

pursuant to recommendation or advice from the Advisory Committee (other than such mandatory recommendations), Watermaster shall hold a public hearing, which shall be followed by written findings and decision. Thereafter, Watermaster may act in accordance with said decision, whether consistent with or contrary to said Advisory Committee recommendation. Such action shall be subject to review by the Court, as in the case of all other Watermaster determinations.

[2] Committee Review. In the event Watermaster proposes to take any discretionary action, other than approval or disapproval of a Pool Committee action or recommendation properly transmitted, or execute any agreement not theretofore within the scope of an Advisory Committee recommendation, notice of such intended action shall be served on the Advisory Committee and its members at least thirty (30) days before the Watermaster meeting at which such action is finally authorized.

(c) Review of Watermaster Actions. Watermaster (as to mandated action), the Advisory Committee or any Pool Committee shall be entitled to employ counsel and expert assistance in the event Watermaster or such Pool or Advisory Committee seeks Court review of any Watermaster action or failure to act. The cost of such counsel and expert assistance shall be Watermaster expense to be allocated to the affected pool or pools.

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VI. PHYSICAL SOLUTION

A. GENERAL

39. Purpose and Objective. Pursuant to the mandate of Section 2 of Article X of the California Constitution, the Court hereby adopts and orders the parties to comply with a Physical Solution. The purpose of these provisions is to establish a legal and practical means for making the maximum reasonable beneficial use of the waters of Chino Basin by providing the optimum economic, long-term, conjunctive utilization of surface waters, ground waters and supplemental water, to meet the requirements of water users having rights in or dependent upon Chino Basin.

40. Need for Flexibility. It is essential that this Physical Solution provide maximum flexibility and adaptability in order that Watermaster and the Court may be free to use existing and future technological, social, institutional and economic options, in order to maximize beneficial use of the waters of Chino Basin. To that end, the Court's retained jurisdiction will be utilized, where appropriate, to supplement the discretion herein granted to the Wastermaster.

41. Watermaster Control. Watermaster, with the advice of the Advisory and Pool Committees, is granted discretionary powers in order to develop an optimum basin management program for Chino Basin, including both water quantity and quality considerations. Withdrawals and supplemental water replenishment of Basin Water, and the full utilization of the water resources of Chino Basin, must be subject to procedures established by and administered through Watermaster with the advice and assistance of the Advisory and Pool Committees composed of the affected producers. Both the

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quantity and quality of said water resources may thereby be preserved and the beneficial utilization of the Basin maximized.

42. General Pattern of Operations. It is contemplated that the rights herein decreed will be divided into three (3) operating pools for purposes of Watermaster administration. A fundamental premise of the Physical Solution is that all water users dependent upon Chino Basin will be allowed to pump sufficient waters from the Basin to meet their requirements. To the extent that pumping exceeds the share of the Safe Yield assigned to the Overlying Pools, or the Operating Safe Yield in the case of the Appropriative Pool, each pool will provide funds to enable Watermaster to replace such overproduction. The method of assessment in each pool shall be as set forth in the applicable pooling plan.

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B. POOLING

43. Multiple Pools Established. There are hereby established three (3) pools for Watermaster administration of, and for the allocation of responsibility for, and payment of, costs of replenishment water and other aspects of this Physical Solution.

(a) Overlying (Agricultural) Pool. The first pool shall consist of the State of California and all overlying producers who produce water for other than industrial or commercial purposes. The initial members of the pool are listed in Exhibit "C".

(b) Overlying (Non-agricultural) Pool. The second pool shall consist of overlying producers who produce water for industrial or commercial purposes. The initial members of this pool are listed in Exhibit "D".

(c) Appropriative Pool. A third and separate pool shall

consist of owners of appropriative rights. The initial members of the pool are listed in Exhibit "E".

Any party who changes the character of his use may, by subsequent order of the Court, be reassigned to the proper pool; but the allocation of Safe Yield under Paragraph 44 hereof shall not be changed. Any non-party producer or any person who may hereafter commence production of water from Chino Basin, and who may become a party to this physical solution by intervention, shall be assigned to the proper pool by the order of the Court authorizing such intervention.

44. Determination and Allocation of Rights to Safe Yield of Chino Basin. The declared Safe Yield of Chino Basin is hereby allocated as follows:

Pool	Allocation
Overlying (Agricultural) Pool	414,000 acre feet in any five (5) consecutive years.
Overlying (Non-agricultural) Pool.	7,366 acre feet per year.
Appropriative Pool	49,834 acre feet per year.

The foregoing acre foot allocations to the overlying pools are fixed. Any subsequent change in the Safe Yield shall be debited or credited to the Appropriative Pool. Basin Water available to the Appropriative Pool without replenishment obligation may vary from year to year as the Operating Safe Yield is determined by Watermaster pursuant to the criteria set forth in Exhibit "I".

45. Annual Replenishment. Watermaster shall levy and collect assessments in each year, pursuant to the respective pooling plans, in amounts sufficient to purchase replenishment water to replace production by any pool during the preceding year which exceeds that

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pool's allocated share of Safe Yield in the case of the overlying pools, or Operating Safe Yield in the case of the Appropriative Pool. It is anticipated that supplemental water for replenishment of Chino Basin may be available at different rates to the various pools to meet their replenishment obligations. If such is the case, each pool will be assessed only that amount necessary for the cost of replenishment water to that pool, at the rate available to the pool, to meet its replenishment obligation.

46. Initial Pooling Plans. The initial pooling plans, which are hereby adopted, are set forth in Exhibits "F", "G" and "H", respectively. Unless and until modified by amendment of the judgment pursuant to the Court's continuing jurisdiction, each such plan shall control operation of the subject pool.

C. REPORTS AND ACCOUNTING

47. Production Reports. Each party or responsible party shall file periodically with Watermaster, pursuant to Watermaster rules, a report on a form to be prescribed by Watermaster showing the total production of such party during the preceding reportage period, and such additional information as Watermaster may require, including any information specified by the affected Pool Committee.

48. Watermaster Reports and Accounting. Watermaster's annual report, which shall be filed on or before November 15 of each year and shall apply to the preceding year's operation, shall contain details as to operation of each of the pools and a certified audit of all assessments and expenditures pursuant to this Physical Solution and a review of Watermaster activities.

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D. REPLENISHMENT

49. Sources of Supplemental Water. Supplemental water may be obtained by Watermaster from any available source. Watermaster shall seek to obtain the best available quality of supplemental water at the most reasonable cost for recharge in the Basin. To the extent that costs of replenishment water may vary between pools, each pool shall be liable only for the costs attributable to its required replenishment. Available sources may include, but are not limited to:

(a) Reclaimed Water. There exist a series of agreements generally denominated the Regional Waste Water Agreements between CBMWD and owners of the major municipal sewer systems within the basin. Under those agreements, which are recognized hereby but shall be unaffected and unimpaired by this judgment, substantial quantities of reclaimed water may be made available for replenishment purposes. There are additional sources of reclaimed water which are, or may become, available to Watermaster for said purposes. Maximum beneficial use of reclaimed water shall be given high priority by Watermaster.

(b) State Water. State water constitutes a major available supply of supplemental water. In the case of State Water, Watermaster purchases shall comply with the water service provisions of the State's water service contracts. More specifically, Watermaster shall purchase State Water from MWD for replenishment of excess production within CBMWD, WMWD and PVMWD, and from SBVMWD to replenish excess production within SBVMWD's boundaries in Chino Basin, except to the

extent that MWD and SBVMWD give their consent as required by such State water service contracts.

(c) Local Import. There exist facilities and methods for importation of surface and ground water supplies from adjacent basins and watersheds.

(d) Colorado River Supplies. MWD has water supplies available from its Colorado River Aqueduct.

50. Methods of Replenishment. Watermaster may accomplish replenishment of overproduction from the Basin by any reasonable method, including:

(a) Spreading and percolation or Injection of water in existing or new facilities, subject to the provisions of Paragraphs 19, 25 and 26 hereof.

(b) In Lieu Procedures. Watermaster may make, or cause to be made, deliveries of water for direct surface use, in lieu of ground water production.

E. REVENUES

51. Production Assessment. Production assessments, on whatever basis, may be levied by Watermaster pursuant to the pooling plan adopted for the applicable pool.

52. Minimal Producers. Minimal Producers shall be exempted from payment of production assessments, upon filing of production reports as provided in Paragraph 47 of this Judgment, and payment of an annual five dollar ($5.00) administrative fee as specified by Watermaster rules.

53. Assessment Proceeds -- Purposes. Watermaster shall have the power to levy assessments against the parties (other than minimal pumpers) based upon production during the preceding period

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of assessable production, whether quarterly, semi-annually or annually, as may be determined most practical by Watermaster or the affected Pool Committee.

54. Administrative Expenses. The expenses of administration of this Physical Solution shall be categorized as either (a) general Watermaster administrative expense, or (b) special project expense.

(a) General Watermaster Administrative Expense shall include office rental, general personnel expense, supplies and office equipment, and related incidental expense and general overhead.

(b) Special Project Expense shall consist of special engineering, economic or other studies, litigation expense, meter testing or other major operating expenses. Each such project shall be assigned a Task Order number and shall be separately budgeted and accounted for.

General Watermaster administrative expense shall be allocated and assessed against the respective pools based upon allocations made by the Watermaster, who shall make such allocations based upon generally accepted cost accounting methods. Special Project Expense shall be allocated to a specific pool, or any portion thereof, only upon the basis of prior express assent and finding of benefit by the Pool Committee, or pursuant to written order of the Court.

55. Assessments -- Procedure. Assessments herein provided for shall be levied and collected as follows:

(a) Notice of Assessment. Watermaster shall give written notice of all applicable assessments to each party on

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or before ninety (90) days after the end of the production period to which such assessment is applicable.

(b) Payment. Each assessment shall be payable on or before thirty (30) days after notice, and shall be the obligation of the party or successor owning the water production facility at the time written notice of assessment is given, unless prior arrangement for payment by others has been made in writing and filed with Watermaster.

(c) Delinquency. Any delinquent assessment shall bear interest at 10% per annum (or such greater rate as shall equal the average current cost of borrowed funds to the Watermaster) from the due date thereof. Such delinquent assessment and interest may be collected in a show-cause proceeding herein instituted by the Watermaster, in which case the Court may allow Watermaster its reasonable costs of collection, including attorney's fees.

56. Accumulation of Replenishment Water Assessment Proceeds. In order to minimize fluctuation in assessment and to give Watermaster flexibility in purchase and spreading of replenishment water, Watermaster may make reasonable accumulations of replenishment water assessment proceeds. Interest earned on such retained funds shall be added to the account of the pool from which the funds were collected and shall be applied only to the purchase of replenishment water.

57. Effective Date. The effective date for accounting and operation under this Physical Solution shall be July 1, 1977, and the first production assessments hereunder shall be due after July 1, 1978. Watermaster shall, however, require installation of

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meters or measuring devices and establish operating procedures immediately, and the costs of such Watermaster activity (not including the cost of such meters and measuring devices) may be recovered in the first administrative assessment in 1978.

VII. MISCELLANEOUS PROVISIONS

58. Designation of Address for Notice and Service. Each party shall designate the name and address to be used for purposes of all subsequent notices and service herein, either by its endorsement on the Stipulation for Judgment or by a separate designation to be filed within thirty (30) days after Judgment has been served. Said designation may be changed from time to time by filing a written notice of such change with the Watermaster. Any party desiring to be relieved of receiving notices of Watermaster or committee activity may file a waiver of notice on a form to be provided by Watermaster. Thereafter such party shall be removed from the Active Party list. Watermaster shall maintain at all times a current list of active parties and their addresses for purposes of service. Watermaster shall also maintain a full current list of names and addresses of all parties or their successors, as filed herein. Copies of such lists shall be available, without cost, to any party, the Advisory Committee or any Pool Committee upon written request therefor.

59. Service of Documents. Delivery to or service upon any party or active party by the Watermaster, by any other party, or by the Court, of any item required to be served upon or delivered to such party or active party under or pursuant to the Judgment shall be made personally or by deposit in the United States mail, first

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class, postage prepaid, addressed to the designee and at the address in the latest designation filed by such party or active party.

60. Intervention After Judgment. Any non-party assignee of the adjudicated appropriative rights of any appropriator, or any other person newly proposing to produce water from Chino Basin, may become a party to this judgment upon filing a petition in intervention. Said intervention must be confirmed by order of this Court. Such intervenor shall thereafter be a party bound by this judgment and entitled to the rights and privileges accorded under the Physical Solution herein, through the pool to which the Court shall assign such intervenor.

61. Loss of Rights. Loss, whether by abandonment, forfeiture or otherwise, of any right herein adjudicated shall be accomplished only (1) by a written election by the owner of the right filed with Watermaster, or (2) by order of the Court upon noticed motion and after hearing.

62. Scope of Judgment. Nothing in this Judgment shall be deemed to preclude or limit any party in the assertion against a neighboring party of any cause of action now existing or hereafter arising based upon injury, damage or depletion of water supply available to such party, proximately caused by nearby pumping which constitutes an unreasonable interference with such complaining party's ability to extract ground water.

63. Judgment Binding on Successors. This Judgment and all provisions thereof are applicable to and binding upon not only the parties to this action, but also upon their respective heirs, executors, administrators, successors, assigns, lessees and

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licensees and upon the agents, employees and attorneys in fact of all such persons.

64. Costs. No party shall recover any costs in this proceeding from any other party.

Dated: JAN 27 1978.

Howard B. Weiner
Judge

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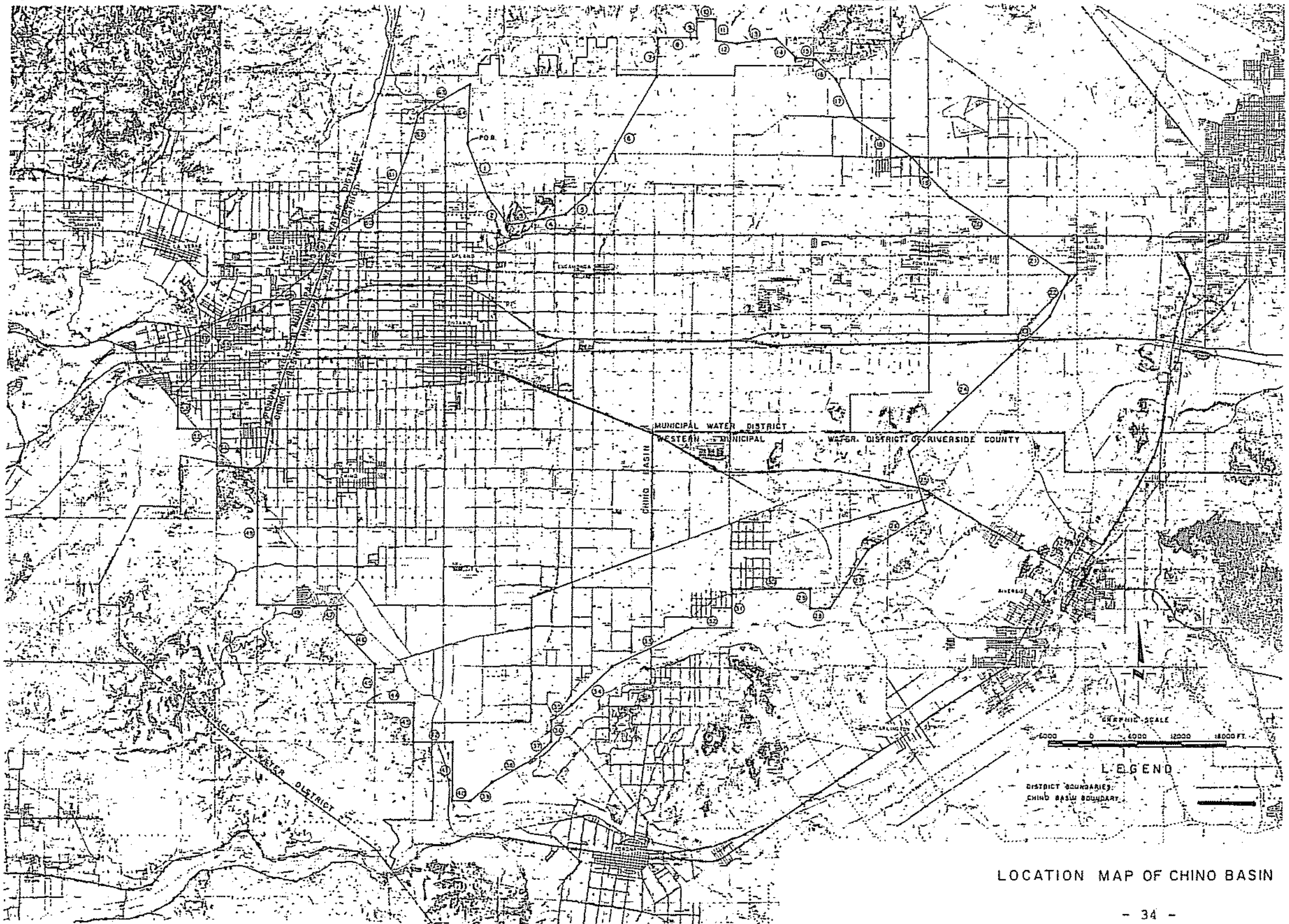
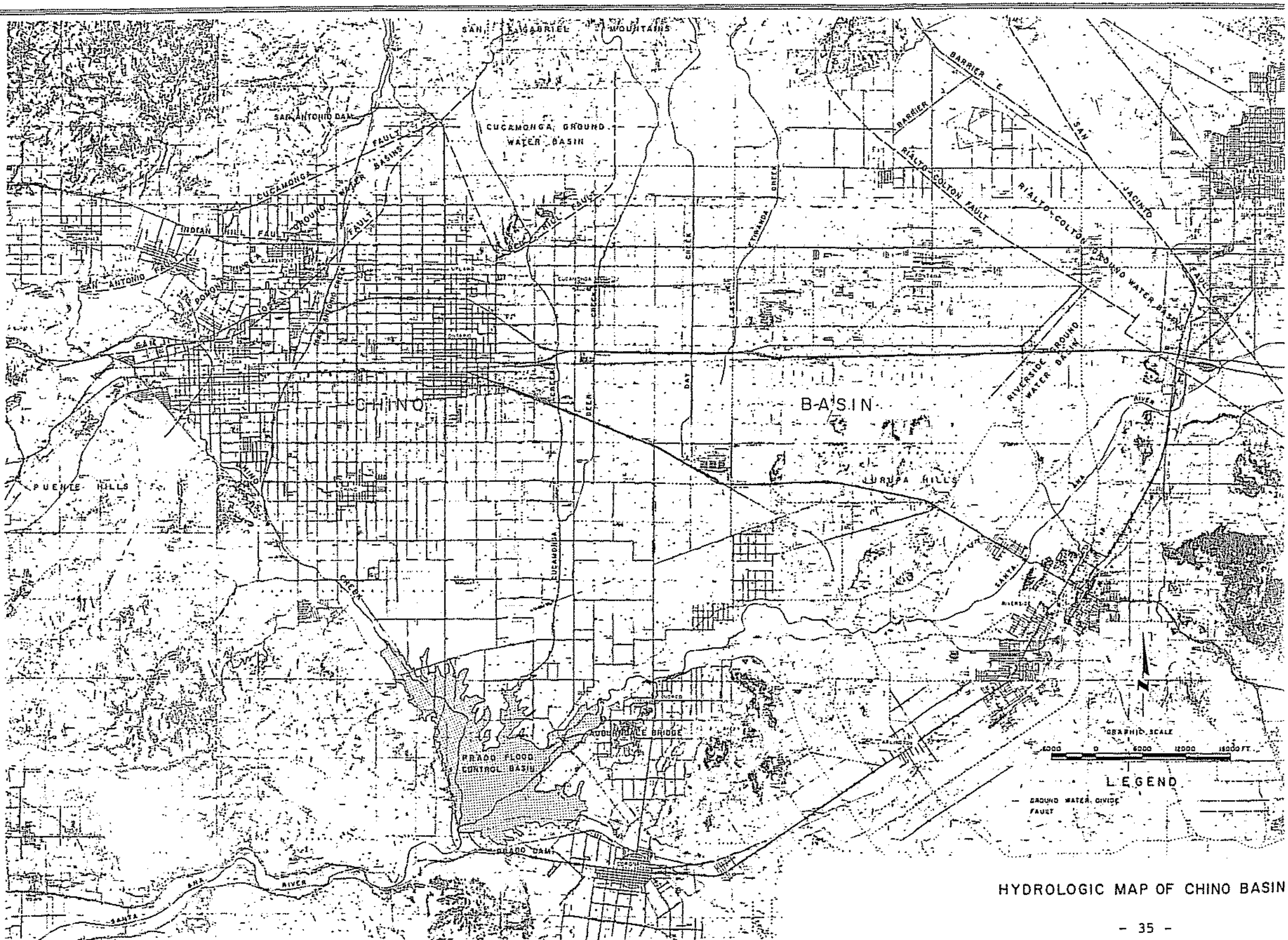


LOCATION MAP OF CHINO BASIN

EXHIBIT A



HYDROLOGIC MAP OF CHINO BASIN

EXHIBIT B

STIPULATING OVERLYING AGRICULTURAL PRODUCERS

STATE OF CALIFORNIA	Aphessetche, Xavier
COUNTY OF SAN BERNARDINO	Arena Mutual Water Assn.
Abacherli Dairy, Inc.	Armstrong Nurseries, Inc.
Abacherli, Frank	Arretche, Frank
Abacherli, Shirley	Arretche, Jean Pierre
Abbona, Anna	Arvidson, Clarence F.
Abbona, James	Arvidson, Florence
Abbona, Jim	Ashley, George W.
Abbona, Mary	Ashley, Pearl E.
Agliani, Amelia H.	Atlas Farms
Agman, Inc.	Atlas Ornamental Iron Works, Inc.
Aguerre, Louis B.	Aukeman, Carol
Ahmanson Trust Co.	Aukeman, Lewis
Akiyama, Shizuye	Ayers, Kenneth C., aka Kelley Ayers
Akiyama, Tomoo	
Akkerman, Dave	Bachoc, Raymond
Albers, J. N.	Baldwin, Edgar A.
Albers, Nellie	Baldwin, Lester
Alewyn, Jake J.	Banbury, Carolyn
Alewyn, Normalee	Bangma Dairy
Alger, Mary D.	Bangma, Arthur
Alger, Raymond	Bangma, Ida
Allen, Ben F.	Bangma, Martin
Allen, Jane F.	Bangma, Sam
Alta-Dena Dairy	Barba, Anthony B.
Anderson Farms	Barba, Frank
Anguiano, Sarah L. S.	Barcellos, Joseph
Anker, Gus	Barnhill, Maurine W.

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Barnhill, Paul
Bartel, Dale
Bartel, Ursula
Bartel, Willard
Barthelemy, Henry
Barthelemy, Roland
Bassler, Donald V., M.D.
Bates, Lowell R.
Bates, Mildred L.
Beahm, James W.
Beahm, Joan M.
Bekendam, Hank
Bekendam, Pete
Bello, Eugene
Bello, Olga
Beltman, Evelyn
Beltman, Tony
Bergquist Properties, Inc.
Bevacqua, Joel A.
Bevacqua, Marie B.
Bidart, Bernard
Bidart, Michael J.
Binnell, Wesley
Black, Patricia E.
Black, Victor
Bodger, John & Sons Co.
Boer, Adrian
Boersma and Wind Dairy

Boersma, Angie
Boersma, Berdina
Boersma, Frank
Boersma, Harry
Boersma, Paul
Boersma, Sam
Boersma, William L.
Bohlander & Holmes, Inc.
Bokma, Peter
Bollema, Jacob
Boonstoo, Edward
Bootsma, Jim
Borba, Dolene
Borba, Dolores
Borba, Emily
Borba, George
Borba, John
Borba, John & Sons
Borba, John Jr.
Borba, Joseph A.
Borba, Karen E.
Borba, Karen M.
Borba, Pete, Estate of
Borba, Ricci
Borba, Steve
Borba, Tom
Bordisso, Alleck
Borges, Angelica M.

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Borges, Bernadette
Borges, John O.
Borges, Linda L.
Borges, Manual Jr.
Borges, Tony
Bos, Aleid
Bos, Gerrit
Bos, John
Bos, John
Bos, Margaret
Bos, Mary
Bos, Mary Beth
Bos, Tony
Bosch, Henrietta
Bosch, Peter T.
Boschma, Betty
Boschma, Frank
Boschma, Greta
Boschma, Henry
Bosma, Dick
Bosma, Florence G.
Bosma, Gerrit
Bosma, Jacob J.
Bosma, Jeanette Thea
Bosman, Frank
Bosman, Nellie
Bosnyak, Goldie M.
Bosnyak, Martin

Bothof, Roger W.
Bouma, Cornie
Bouma, Emma
Bouma, Henry P.
Bouma, Martin
Bouma, Peter G. & Sons Dairy
Bouma, Ted
Bouman, Helen
Bouman, Sam
Bower, Mabel E.
Boys Republic
Breedyk, Arie
Breedyk, Jessie
Briano Brothers
Briano, Albert
Briano, Albert Trustee for
Briano, Albert Frank
Briano, Lena
Brink, Russell N.
Brinkerhoff, Margaret
Brinkerhoff, Robert L.
Britschgi, Florence
Britschgi, Magdalena Garetto
Britschgi, Walter P.
Brommer, Marvin
Brookside Enterprizes, dba
Brookside Vineyard Co.
Brothers Three Dairy

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Brown, Eugene
Brun, Martha M.
Brun, Peter Robert
Buma, Duke
Buma, Martha
Bunse, Nancy
Bunse, Ronnie L.
Caballero, Bonnie L.
Caballero, Richard F.
Cable Airport Inc.
Cadlini, Donald
Cadlini, Jesse R.
Cadlini, Marie Edna
Cambio, Anna
Cambio, Charles, Estate of
Cambio, William V.
Cardoza, Florence
Cardoza, Olivi
Cardoza, Tony
Carnesi, Tom
Carver, Robt M., Trustee
Cauffman, John R.
Chacon Bros.
Chacon, Elvera P.
Chacon, Joe M.
Chacon, Robert M.
Chacon, Virginia L.
Chez, Joseph C.

Chino Corona Investment
Chino Water Co.
Christensen, Leslie
Christensen, Richard G.
Christian, Ada R.
Christian, Harold F.
Christy, Ella J.
Christy, Ronald S.
Cihigoyenetche, Jean
Cihigoyenetche, Leona
Cihigoyenetche, Martin
Clarke, Arthur B.
Clarke, Nancy L.
Clarke, Phyllis J.
Coelho, Isabel
Coelho, Joe A. Jr.
Collins, Howard E.
Collins, Judith F.
Collinsworth, Ester L.
Collinsworth, John E.
Collinsworth, Shelby
Cone Estate (05-2-00648/649)
Consolidated Freightways Corp. of Delaware
Corona Farms Co.
Corra, Rose
Costa, Dimas S.
Costa, Laura

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Costa, Myrtle
Costamagna, Antonio
Costamagna, Joseph
Cousyn, Claus B.
Cramer, Carole F.
Cramer, William R.
Crossroads Auto Dismantlers, Inc.
Crouse, Beatrice I.
Crouse, Roger
Crowley, Juanita C.
Crowley, Ralph
Cucamonga Vintners
D'Astici, Teresa
Da Costa, Cecilia B.
Da Costa, Joaquim F.
Daloisio, Norman
De Berard Bros.
De Berard, Arthur, Trustee
De Berard, Charles
De Berard, Chas., Trustee
De Berard, Helan J.
De Berard, Robert
De Berard, Robert, Trustee
De Bie, Adrian
De Bie, Henry
De Bie, Margaret M.
De Bie, Marvin
De Boer, Fred

De Boer, L. H.
De Boer, Sidney
De Bos, Andrew
De Graaf, Anna Mae
De Graaf, Gerrit
De Groot, Dick
De Groot, Dorothy
De Groot, Ernest
De Groot, Henrietta
De Groot, Jake
De Groot, Pete Jr.
De Haan, Bernadena
De Haan, Henry
De Hoog, Adriana
De Hoog, Joe
De Hoog, Martin
De Hoog, Martin L.
De Hoog, Mitch
De Hoog, Tryntje
De Jager, Cobi
De Jager, Edward D.
De Jong Brothers Dairy
De Jong, Cornelis
De Jong, Cornelius
De Jong, Grace
De Jong, Jake
De Jong, Lena
De Leeuw, Alice

EXHIBIT "C"

De Leeuw, Sam	Dirkse, Catherine
De Soete, Agnes	Dirkse, Charles C.
De Soete, Andre	Dixon, Charles E.
De Vries, Abraham	Dixon, Geraldine A.
De Vries, Case	Doesberg, Hendrica
De Vries, Dick	Doesburg, Theodorus P.
De Vries, Evelyn	Dolan, Marion
De Vries, Henry, Estate of	Dolan, Michael H.
De Vries, Hermina	Dominguez, Helen
De Vries, Jack H.	Dominguez, Manual
De Vries, Jane	Donkers, Henry A.
De Vries, Janice	Donkers, Nellie G.
De Vries, John	Dotta Bros.
De Vries, John J.	Douma Brothers Dairy
De Vries, Neil	Douma, Betty A.
De Vries, Ruth	Douma, Fred A.
De Vries, Theresa	Douma, Hendrika
De Wit, Gladys	Douma, Herman G.
De Wit, Peter S.	Douma, Narleen J.
De Wyn, Evert	Douma, Phillip M.
De Zoete, Hattie V.	Dow Chemical Co.
De Zoete, Leo A.	Dragt, Rheta
Decker, Hallie	Dragt, William
Decker, Henry A.	Driftwood Dairy Farm
Demmer, Ernest	Droogh, Case
Di Carlo, Marie	Duhalde, Marian
Di Carlo, Victor	Duhalde, Lauren
Di Tommaso, Frank	Duits, Henrietta

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Duits, John
Dunlap, Edna Kraemer,
Estate of
Durrington, Glen
Durrington, William F.
Dusi, John, Sr.
Dykstra, Dick
Dykstra, John
Dykstra, John & Sons
Dykstra, Wilma
Dyt, Cor
Dyt, Johanna
E and S Grape Growers
Eaton, Thomas, Estate of
Echeverria, Juan
Echeverria, Carlos
Echeverria, Pablo
Eilers, E. Myrle
Eilers, Henry W.
El Prado Golf Course
Ellsworth, Rex C.
Engelsma, Jake
Engelsma, Susan
Escojeda, Henry
Etiwanda Grape Products Co.
Euclid Ave. Investment One
Euclid Ave. Investment Four
Euclid Ave. Three Investment

Excelsior Farms
F.D.I.C.
Fagundes, Frank M.
Fagundes, Mary
Fernandes, Joseph Jr.
Fernandes, Velma C.
Ferraro, Ann
Ferreira, Frank J.
Ferreira, Joe C. Jr.
Ferreira, Narcie
Filippi, J. Vintage Co.
Filippi, Joseph
Filippi, Joseph A.
Filippi, Mary E.
Fitzgerald, John R.
Flameling Dairy Inc.
Flamingo Dairy
Foss, Douglas E.
Foss, Gerald R.
Foss, Russel
Fred & John Troost No. 1 Inc.
Fred & Maynard Troost No. 2 Inc.
Freitas, Beatriz
Freitas, Tony T.
Gakle, Louis L.
Galleano Winery, Inc.
Galleano, Bernard D.
Galleano, D.
Galleano, Mary M.

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Garcia, Pete
Gardner, Leland V.
Gardner, Lola M.
Garrett, Leonard E.
Garrett, Patricia T.
Gastelluberry, Catherine
Gastelluberry, Jean
Gilstrap, Glen E.
Gilstrap, Marjorie J.
Godinho, John
Godinho, June
Gonsalves, Evelyn
Gonsalves, John
Gorzeman, Geraldine
Gorzeman, Henry A.
Gorzeman, Joe
Govea, Julia
Goyenetche, Albert
Grace, Caroline E.
Grace, David J.
Gravatt, Glenn W.
Gravatt, Sally Mae
Greydanus Dairy, Inc.
Greydanus, Rena
Griffin Development Co.
Haagsma, Dave
Haagsma, John
Hansen, Mary D.

Hansen, Raymond F.
Hanson, Ardeth W.
Harada, James T.
Harada, Violet A.
Haringa, Earl and Sons
Haringa, Herman
Haringa, Rudy
Haringa, William
Harper, Cecilia de Mille
Harrington, Winona
Harrison, Jacqueline A.
Hatanaka, Kenichi
Heida, Annie
Heida, Don
Heida, Jim
Heida, Sam
Helms, Addison D.
Helms, Irma A.
Hermans, Alma I.
Hermans, Harry
Hettinga, Arthur
Hettinga, Ida
Hettinga, Judy
Hettinga, Mary
Hettinga, Wilbur
Heublein, Inc., Grocery Products Group
Hibma, Catherine M.

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Hibma, Sidney

Hicks, Kenneth I.

Hicks, Minnie M.

Higgins Brick Co.

Highstreet, Alfred V.

Highstreet, Evada V.

Hilarides, Bertha as Trustee

Hilarides, Frank

Hilarides, John as Trustee

Hindelang, Tillie

Hindelang, William

Hobbs, Bonnie C.

Hobbs, Charles W.

Hobbs, Hazel I.

Hobbs, Orlo M.

Hoekstra, Edward

Hoekstra, George

Hoekstra, Grace

Hoekstra, Louie

Hofer, Paul B.

Hofer, Phillip F.

Hofstra, Marie

Hogeboom, Jo Ann M.

Hogeboom, Maurice D.

Hogg, David V.

Hogg, Gene P.

Hogg, Warren G.

Hohberg, Edith J.

Hohberg, Harold C.

Hohberg, Harold W.

Holder, Arthur B.

Holder, Dorothy F.

Holmes, A. Lee

Holmes, Frances P.

Hoogeboom, Gertrude

Hoogeboom, Pete

Hoogendam, John

Hoogendam, Tena

Houssels, J. K. Thoroughbred Farm

Hunt Industries

Idsinga, Ann

Idsinga, William W.

Imbach Ranch, Inc.

Imbach, Kenneth E.

Imbach, Leonard K.

Imbach, Oscar K.

Imbach, Ruth M.

Indaburu, Jean

Indaburu, Marceline

Iseli, Kurt H.

Ito, Kow

J & B Dairy Inc.

Jaques, Johnny C. Jr.

Jaques, Mary

Jaques, Mary Lou

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EXHIBIT "C"

Jay Em Bee Farms
Johnson Bro's Egg Ranches, Inc.
Johnston, Ellwood W.
Johnston, George F. Co.
Johnston, Judith H.
Jones, Leonard P.
Jongsma & Sons Dairy
Jongsma, Diana A.
Jongsma, Dorothy
Jongsma, George
Jongsma, Harold
Jongsma, Henry
Jongsma, John
Jongsma, Nadine
Jongsma, Tillie
Jordan, Marjorie G.
Jordan, Troy O.
Jorritsma, Dorothy
Juliano, Albert
Kamper, Cornelis
Kamstra, Wilbert
Kaplan, Lawrence J.
Kasbergen, Martha
Kasbergen, Neil
Kazian, Angelen Estate of
Kingsway Const. Corp.
Klapps Market
Kline, James K.

Knevelbaard, John
Knudsen, Ejnar
Knudsen, Karen M.
Knudsen, Kenneth
Knudson, Robert
Knudson, Darlene
Koel, Helen S.
Koetsier, Gerard
Koetsier, Gerrit J.
Koetsier, Jake
Koning, Fred W.
Koning, Gloria
Koning, J. W. Estate
Koning, James A.
Koning, Jane
Koning, Jane C.
Koning, Jennie
Koning, John
Koning, Victor A.
Kooi Holstein Corporation
Koolhaas, Kenneth E.
Koolhaas, Simon
Koolhaas, Sophie Grace
Koopal, Grace
Koopal, Silas
Koopman, Eka
Koopman, Gene T.
Koopman, Henry G.

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Koopman, Ted	Leck, Arthur A.
Koopman, Tena	Leck, Evelyn M.
Koot, Nick	Lee, Harold E.
Koster, Aart	Lee, Helen J.
Koster, Frances	Lee, Henrietta C.
Koster, Henry B.	Lee, R. T. Construction Co.
Koster, Nellie	Lekkerkerk, Adriana
Kroes, Jake R.	Lekkerkerk, L. M.
Kroeze, Bros	Lekkerkerker, Nellie
Kroeze, Calvin E.	Lekkerkerker, Walt
Kroeze, John	Lewis Homes of California
Kroeze, Wesley	Livingston, Dorothy M.
Kruckenberg, Naomi	Livingston, Rex E.
Kruckenberg, Perry	Lokey, Rosemary Kraemer
L. D. S. Welfare Ranch	Lopes, Candida A.
Labrucherie, Mary Jane	Lopes, Antonio S.
Labrucherie, Raymond F.	Lopez, Joe D.
Lako, Samuel	Lourenco, Carlos, Jr.
Landman Corp.	Lourenco, Carmelina P.
Lanting, Broer	Lourenco, Jack C.
Lanting, Myer	Lourenco, Manual H.
Lass, Jack	Lourenco, Mary
Lass, Sandra L.	Lourenco, Mary
Lawrence, Cecelia, Estate of	Luiten, Jack
Lawrence, Joe H., Estate of	Luiz, John M.
Leal, Bradley W.	Luna, Christine I.
Leal, John C.	Luna, Ruben T.
Leal, John Craig	Lusk, John D. and Son a California corporation

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Lyon, Gregory E.
Lyon, Paula E.
M & W Co. #2
Madole, Betty M.
Madole, Larry B.
Marquez, Arthur
Marquine, Jean
Martin, Lelon O.
Martin, Leon O.
Martin, Maria D.
Martin, Tony J.
Martins, Frank
Mathias, Antonio
Mc Cune, Robert M.
Mc Masters, Gertrude
Mc Neill, J. A.
Mc Neill, May F.
Mees, Leon
Mello and Silva Dairy
Mello and Sousa Dairy
Mello, Emilia
Mello, Enos C.
Mello, Mercedes
Mendiondo, Catherine
Mendiondo, Dominique
Meth. Hosp. - Sacramento
Metzger, R. S.
Metzger, Winifred

Mickel, Louise
Miersma, Dorothy
Meirsma, Harry C.
Minaberry, Arnaud
Minaberry, Marie
Mistretta, Frank J.
Mocho and Plaa Inc.
Mocho, Jean
Mocho, Noeline
Modica, Josephine
Montes, Elizabeth
Montes, Joe
Moons, Beatrice
Moons, Jack
Moramarco, John A. Enterprises
Moreno, Louis W.
Moss, John R.
Motion Pictures Associates, Inc.
Moynier, Joe
Murphy, Frances V.
Murphy, Myrl L.
Murphy, Naomi
Nanne, Martin Estate of
Nederend, Betty
Nederend, Hans
Norfolk, James
Norfolk, Martha
Notrica, Louis

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Nyberg, Lillian M.	Ormonde, Viva
Nyenhuis, Annie	Ortega, Adeline B.
Nyenhuis, Jim	Ortega, Bernard Dino
Occidental Land Research	Osterkamp, Joseph S.
Okumura, Marion	Osterkamp, Margaret A.
Okumura, Yuiche	P I E Water Co.
Oldengarm, Effie	Palmer, Eva E.
Oldengarm, Egbert	Palmer, Walter E.
Oldengarm, Henry	Parente, Luis S.
Oliviera, Manuel L.	Parente, Mary Borba
Oliviera, Mary M.	Parks, Jack B.
Olson, Albert	Parks, Laura M.
Oltmans Construction Co.	Patterson, Lawrence E. Estate of
Omlin, Anton	Payne, Clyde H.
Omlin, Elsie L.	Payne, Margo
Ontario Christian School Assn.	Pearson, Athelia K.
Oord, John	Pearson, William C.
Oostdam, Jacoba	Pearson, William G.
Oostdam, Pete	Pene, Robert
Oosten, Agnes	Perian, Miller
Oosten, Anthonia	Perian, Ona E.
Oosten, Caroline	Petrissans, Deanna
Oosten, John	Petrissans, George
Oosten, Marinus	Petrissans, Jean P.
Oosten, Ralph	Petrissans, Marie T.
Orange County Water District	Pickering, Dora M.
Ormonde, Manuel	(Mrs. A. L. Pickering)
Ormonde, Pete, Jr.	Pierce, John

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Pierce, Sadie
Pietszak, Sally
Pine, Joe
Pine, Virginia
Pires, Frank
Pires, Marie
Plaa, Jeanne
Plaa, Michel
Plantenga, Agnes
Plantenga, George
Poe, Arlo D.
Pomona Cemetery Assn.
Porte, Cecelia, Estate of
Porte, Garritt, Estate of
Portsmouth, Vera McCarty
Ramella, Mary M.
Ramirez, Concha
Rearick, Hildegard H.
Rearick, Richard R.
Reinalda, Clarence
Reitsma, Greta
Reitsma, Louis
Rice, Bernice
Rice, Charlie E.
Richards, Karin
(Mrs. Ronnie Richards)
Richards, Ronald L.
Ridder, Jennie Wassenaar
Righetti, A. T.
Riley, George A.
Riley, Helen C.
Robbins, Jack K.
Rocha, John M.
Rocha, Jose C.
Rodrigues, John
Rodrigues, Manuel
Rodrigues, Manuel, Jr.
Rodrigues, Mary L.
Rodriquez, Daniel
Rogers, Jack D.
Rohrer, John A.
Rohrer, Theresa D.
Rohrs, Elizabeth H.
Rossetti, M. S.
Roukema, Angeline
Roukema, Ed.
Roukema, Nancy
Roukema, Siebren
Ruderian, Max J.
Russell, Fred J.
Rusticus, Ann
Rusticus, Charles
Rynsburger, Arie
Rynsburger, Berdena, Trust
Rynsburger, Joan Adele
Rynsburger, Thomas

S. P. Annex, Inc.	Scott, Frances M.
Salisbury, Elinor J.	Scott, Linda F.
Sanchez, Edmundo	Scott, Stanley A.
Sanchez, Margarita O.	Scritsmier, Lester J.
Santana, Joe Sr.	Serl, Charles A.
Santana, Palmira	Serl, Rosalie P.
Satragni, John B. Jr.	Shady Grove Dairy, Inc.
Scaramella, George P.	Shamel, Burt A.
Schaafsma Bros.	Shelby, Harold E.
Schaafsma, Jennie	Shelby, John A.
Schaafsma, Peter	Shelby, Velma M.
Schaafsma, Tom	Shelton, Alice A.
Schaap, Andy	Sherwood, Robert W.
Schaap, Ids	Sherwood, Sheila J.
Schaap, Maria	Shue, Eva
Schacht, Sharon C.	Shue, Gilbert
Schakel, Audrey	Sieperda, Anne
Schakel, Fred	Sieperda, James
Schmid, Olga	Sigrist, Hans
Schmidt, Madeleine	Sigrist, Rita
Schoneveld, Evert	Silveira, Arline L.
Schoneveld, Henrietta	Silveira, Frank
Schoneveld, John	Silveira, Jack
Schoneveld, John Allen	Silveira, Jack P. Jr.
Schug, Donald E.	Simas, Dolores
Schug, Shirley A.	Simas, Joe
Schuh, Bernatta M.	Singleton, Dean
Schuh, Harold H.	Singleton, Elsie R.

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Sinnott, Jim
Sinnott, Mildred B.
Slegers, Dorothy
Slegers, Hubert J.
Slegers, Jake
Slegers, Jim
Slegers, Lenwood M.
Slegers, Martha
Slegers, Tesse J.
Smith, Edward S.
Smith, Helen D.
Smith, James E.
Smith, Keith J.
Smith, Lester W.
Smith, Lois Maxine
Smith, Marjorie W.
Soares, Eva
Sogioka, Mitsuyoshi
Sogioka, Yoshimato
Sousa, Sam
Southern Pacific Land Co.
Southfield, Eddie
Souza, Frank M.
Souza, Mary T.
Spickerman, Alberta
Spickerman, Florence
Spickerman, Rudolph
Spyksma, John

Staal, John
Stahl, Zippora P.
Stampfl, Berta
Stampfl, William
Stanley, Robert E.
Stark, Everett
Stellingwerf, Andrew
Stellingwerf, Henry
Stellingwerf, Jenette
Stellingwerf, Shana
Stellingwerf, Stan
Stelzer, Mike C.
Sterk, Henry
Stiefel, Winifred
Stiefel, Jack D.
Stigall, Richard L.
Stigall, Vita
Stockman's Inn
Stouder, Charlotte A.
Stouder, William C.
Struikmans, Barbara
Struikmans, Gertie
Struikmans, Henry Jr.
Struikmans, Henry Sr.
Struikmans, Nellie
Swager, Edward
Swager, Gerben
Swager, Johanna

EXHIBIT "C"

Swager, Marion	Terpstra, Theodore G.
Swierstra, Donald	Teune, Tony
Swierstra, Fanny	Teunissen, Bernard
Sybrandy, Ida	Teunissen, Jane
Sybrandy, Simon	Thomas, Ethel M.
Sytsma, Albert	Thommen, Alice
Sytsma, Edith	Thommen, Fritz
Sytsma, Jennie	Tillema, Allie
Sytsma, Louie	Tillema, Harold
Te Velde, Agnes	Tillema, Klaas D.
Te Velde, Bay	Timmons, William R.
Te Velde, Bernard A.	Tollerup, Barbara
Te Velde, Bonnie	Tollerup, Harold
Te Velde, Bonnie G.	Trapani, Louis A.
Te Velde, George	Trimlett, Arlene R.
Te Velde, George, Jr.	Trimlett, George E.
Te Velde, Harm	Tristant, Pierre
Te Velde, Harriet	Tuinhout, Ale
Te Velde, Henry J.	Tuinhout, Harry
Te Velde, Jay	Tuinhout, Hilda
Te Velde, Johanna	Tuls, Elizabeth
Te Velde, John H.	Tuls, Jack S.
Te Velde, Ralph A.	Tuls, Jake
Te Velde, Zwaantina, Trustee	Union Oil Company of California
Ter Maaten, Case	United Dairyman's Co-op.
Ter Maaten, Cleone	Urquhart, James G.
Ter Maaten, Steve	Usle, Cathryn
Terpstra, Carol	Usle, Faustino

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V & Y Properties
Vaile, Beryl M.
Valley Hay Co.
Van Beek Dairy Inc.
Van Canneyt Dairy
Van Canneyt, Maurice
Van Canneyt, Wilmer
Van Dam, Bas
Van Dam, Isabelle
Van Dam, Nellie
Van Den Berg, Gertrude
Van Den Berg, Joyce
Van Den Berg, Marinus
Van Den Berg, Marvin
Van Der Linden, Ardith
Van Der Linden, John
Van Der Linden, Stanley
Van Der Veen, Kenneth
Van Diest, Anna T.
Van Diest, Cornelius
Van Diest, Ernest
Van Diest, Rena
Van Dyk, Bart
Van Dyk, Jeanette
Van Foeken, Martha
Van Foeken, William
Van Hofwegan, Steve
Van Hofwegen, Adrian A.
Van Hofwegen, Clara
Van Hofwegen, Jessie
Van Klaveren, A.
Van Klaveren, Arie
Van Klaveren, Wilhelmina
Van Klaveren, William
Van Leeuwen, Arie C.
Van Leeuwen, Arie C.
Van Leeuwen, Arlan
Van Leeuwen, Clara G.
Van Leeuwen, Cornelia L.
Van Leeuwen, Harriet
Van Leeuwen, Jack
Van Leeuwen, John
Van Leeuwen, Letie
Van Leeuwen, Margie
Van Leeuwen, Paul
Van Leeuwen, William A.
Van Ravenswaay, Donald
Van Ryn Dairy
Van Ryn, Dick
Van Surksum, Anthonetta
Van Surksum, John
Van Veen, John
Van Vliet, Effie
Van Vliet, Hendrika
Van Vliet, Hugo
Van Vliet, Klaas

Vande Witte, George
Vanden Berge, Gertie
Vanden Berge, Gertie
Vanden Berge, Jack
Vanden Berge, Jake
Vanden Brink, Stanley
Vander Dussen, Agnes
Vander Dussen, Cor
Vander Dussen, Cornelius
Vander Dussen, Edward
Vander Dussen, Geraldine Marie
Vander Dussen, James
Vander Dussen, John
Vander Dussen, Nelvina
Vander Dussen, Rene
Vander Dussen, Sybrand Jr.
Vander Dussen, Sybrand Sr.
Vander Dussen Trustees
Vander Eyk, Case Jr.
Vander Eyk, Case Sr.
Vander Feer, Peter
Vander Feer, Rieka
Vander Laan, Ann
Vander Laan, Ben
Vander Laan, Bill
Vander Laan, Corrie
Vander Laan, Henry
Vander Laan, James
Vander Laan, Katie
Vander Laan, Martin Jr.
Vander Laan, Tillie
Vander Leest, Anna
Vander Leest, Ann
Vander Meer, Alice
Vander Meer, Dick
Vander Poel, Hank
Vander Poel, Pete
Vander Pol, Irene
Vander Pol, Margie
Vander Pol, Marines
Vander Pol, William P.
Vander Schaaf, Earl
Vander Schaaf, Elizabeth
Vander Schaaf, Henrietta
Vander Schaaf, John
Vander Schaaf, Ted
Vander Stelt, Catherine
Vander Stelt, Clarence
Vander Tuig, Arlene
Vander Tuig, Sylvester
Vander Veen, Joe A.
Vandervlag, Robert
Vander Zwan, Peter
Vanderford, Betty W.
Vanderford, Claud R.
Vanderham, Adrian

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Vanderham, Cornelius
Vanderham, Cornelius P.
Vanderham, Cory
Vanderham, E. Jane
Vanderham, Marian
Vanderham, Martin
Vanderham, Pete C.
Vanderham, Wilma
Vasquez, Eleanor
Veenendaal, Evert
Veenendaal, John H.
Veiga, Dominick Sr.
Verbree, Jack
Verbree, Tillie
Verger, Bert
Verger, Betty
Verhoeven, Leona
Verhoeven, Martin
Verhoeven, Wesley
Vermeer, Dick
Vermeer, Jantina
Vernola Ranch
Vernola, Anthonietta
Vernola, Anthony
Vernola, Frank
Vernola, Mary Ann
Vernola, Pat F.
Vestal, Frances Lorraine

Vestal, J. Howard
Visser, Gerrit
Visser, Grace
Visser, Henry
Visser, Jess
Visser, Louie
Visser, Neil
Visser, Sam
Visser, Stanley
Visser, Tony D.
Visser, Walter G.
Von Der Ahe, Fredric T.
Von Euw, George
Von Euw, Marjorie
Von Lusk, a limited partnership
Voortman, Anna Marie
Voortman, Edward
Voortman, Edwin J.
Voortman, Gertrude Dena
Wagner, Richard H.
Walker, Carole R.
Walker, Donald E.
Walker, Wallace W.
Wardle, Donald M.
Warner, Dillon B.
Warner, Minnie
Wassenaar, Peter W.
Waters, Michael

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Weeda, Adriana
Weeda, Daniel
Weeks, O. L.
Weeks, Verona E.
Weidman, Maurice
Weidman, Virginia
Weiland, Adaline I.
Weiland, Peter J.
Wesselink, Jules
West, Katharine R.
West, Russel
West, Sharon Ann
Western Horse Property
Westra, Alice
Westra, Henry
Westra, Hilda
Westra, Jake J.
Weststeyn, Freida
Weststeyn, Pete
Whitehurst, Louis G.
Whitehurst, Pearl L.
Whitmore, David L.
Whitmore, Mary A.
Whitney, Adolph M.
Wiersema, Harm
Wiersema, Harry
Wiersma, Ellen H.
Wiersma, Gladys J.

Wiersma, Jake
Wiersma, Otto
Wiersma, Pete
Winchell, Verne H., Trustee
Wind, Frank
Wind, Fred
Wind, Hilda
Wind, Johanna
Woo, Frank
Woo, Sem Gee
Wybenga, Clarence
Wybenga, Gus
Wybenga, Gus K.
Wybenga, Sylvia
Wynja, Andy
Wynja, Iona F.
Yellis, Mildred
Yellis, Thomas E.
Ykema-Harmsen Dairy
Ykema, Floris
Ykema, Harriet
Yokley, Betty Jo
Yokley, Darrell A.
Zak, Zan
Zivelonghi, George
Zivelonghi, Margaret
Zwaagstra, Jake
Zwaagstra, Jessie M.
Zwart, Case

NON-PRODUCER WATER DISTRICTS

Chino Basin Municipal Water District

Chino Basin Water Conservation District

Pomona Valley Municipal Water District

Western Municipal Water District of Riverside County

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DEFAULTING OVERLYING AGRICULTURAL PRODUCERS

Cheryl L. Bain
Warren Bain
John M. Barcelona
Letty Bassler
John Brazil
John S. Briano
Lupe Briano
Paul A. Briano
Tillie Briano
Arnie B. Carlson
John Henry Fikse
Phyllis S. Fikse
Lewellyn Flory
Mary I. Flory
L. H. Glazer
Dorothy Goodman
Sidney D. Goodman
Frank Grossi
Harada Brothers
Ellen Hettinga
Hein Hettinga
Dick Hofstra, Jr.
Benjamin M. Hughey
Frieda L. Hughey
Guillaume Indart
Ellwood B. Johnston, Trustee
Perry Kruckenberg, Jr.
Roy W. Lantis
Sharon I. Lantis
Frank Lorenz
Dagney H. MacDonald
Frank E. Martin
Ruth C. Martin
Connie S. Mello
Naldiro J. Mello
Felice Miller
Ted Miller
Masao Nerio
Tom K. Nerio
Toyo Nerio
Yuriko Nerio
Harold L. Rees
Alden G. Rose
Claude Rouleau, Jr.
Patricia M. Rouleau
Schultz Enterprises
Albert Shaw
Lila Shaw
Cathy M. Stewart
Marvin C. Stewart
Betty Ann Stone
John B. Stone
Vantoll Cattle Co., Inc.
Catherene Verburg

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EXHIBIT "C"

Martin Verburg

Donna Vincent

Larry Vincent

Cliff Wolfe & Associates

Ada M. Woll

Zarubica Co.

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EXHIBIT "D"

OVERLYING NON-AGRICULTURAL RIGHTS

Party	Total Overlying Non-Agricultural Rights (Acre Feet)	Share of Safe Yield (Acre Feet)
Ameron Steel Producers, Inc.	125	97.858
County of San Bernardino	171	133.870
Conrock Company	406	317.844
Kaiser Steel Corporation	3,743	2,930.274
Red Star Fertilizer	20	15.657
Southern California Edison Co.	1,255	982.499
Space Center, Mira Loma	133	104.121
Southern Service Co., dba Blue Seal Linen	24	18.789
Sunkist, Orange Products Division	2,393	1,873.402
Carlsberg Mobile Home Properties, Ltd. '73	593	464.240
Union Carbide Corporation	546	427.446
Quaker Chemical Co.	0	0
Totals	9,409	7,366.000

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EXHIBIT "E"
APPROPRIATIVE RIGHTS

Party	Appropriative Right (Acre Feet)	Share of Initial Operating Safe Yield (Acre Feet)	Share of Operating Safe Yield (Percent)
City of Chino	5,271.7	3,670.067	6.693
City of Norco	289.5	201.545	0.368
City of Ontario	16,337.4	11,373.816	20.742
City of Pomona	16,110.5	11,215.852	20.454
City of Upland	4,097.2	2,852.401	5.202
Cucamonga County Water District	4,431.0	3,084.786	5.626
Jurupa Community Services District	1,104.1	768.655	1.402
Monte Vista County Water District	5,958.7	4,148.344	7.565
West San Bernardino County Water District	925.5	644.317	1.175
Etiwanda Water Company	768.0	534.668	0.975
Felspar Gardens Mutual Water Company	68.3	47.549	0.087
Fontana Union Water Co.	9,188.3	6,396.736	11.666
Marygold Mutual Water Co.	941.3	655.317	1.195
Mira Loma Water Co.	1,116.0	776.940	1.417
Monta Vista Irr. Co.	972.1	676.759	1.234
Mutual Water Company of Glen Avon Heights	672.2	467.974	0.853
Park Water Company	236.1	164.369	0.300
Pomona Valley Water Co.	3,106.3	2,162.553	3.944
San Antonio Water Co.	2,164.5	1,506.888	2.748
Santa Ana River Water Company	1,869.3	1,301.374	2.373
Southern California Water Company	1,774.5	1,235.376	2.253
West End Consolidated Water Company	1,361.3	947.714	1.728
TOTAL	78,763.8	54,834.000	100.000

EXHIBIT "F"
OVERLYING (AGRICULTURAL) POOL
POOLING PLAN

1. Membership in Pool. The State of California and all producers listed in Exhibit "C" shall be the initial members of this pool, which shall include all producers of water for overlying uses other than industrial or commercial purposes.

2. Pool Meetings. The members of the pool shall meet annually, in person or by proxy, at a place and time to be designated by Watermaster for purposes of electing members of the Pool Committee and conducting any other business of the pool. Special meetings of the membership of the pool may be called and held as provided in the rules of the pool.

3. Voting. All voting at meetings of pool members shall be on the basis of one vote for each 100 acre feet or any portion thereof of production from Chino Basin during the preceding year, as shown by the records of Watermaster.

4. Pool Committee. The Pool Committee for this pool shall consist of not less than nine (9) representatives selected at large by members of the pool. The exact number of members of the Pool Committee in any year shall be as determined by majority vote of the voting power of members of the pool in attendance at the annual pool meeting. Each member of the Pool Committee shall have one vote and shall serve for a two-year term. The members first elected shall classify themselves by lot so that approximately one-half serve an initial one-year term. Vacancies during any term shall be filled by a majority of the remaining members of the Pool Committee.

5. Advisory Committee Representatives. The number of

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representatives of the Pool Committee on the Advisory Committee shall be as provided in the rules of the pool from time to time but not exceeding ten (10). The voting power of the pool on the Advisory Committee shall be apportioned and exercised as determined from time to time by the Pool Committee.

6. Replenishment Obligation. The pool shall provide funds for replenishment of any production by persons other than members of the Overlying (Non-agricultural) Pool or Appropriator Pool, in excess of the pool's share of Safe Yield. During the first five (5) years of operations of the Physical Solution, reasonable efforts shall be made by the Pool Committee to equalize annual assessments.

7. Assessments. All assessments in this pool (whether for replenishment water cost or for pool administration or the allocated share of Watermaster administration) shall be in an amount uniformly applicable to all production in the pool during the preceding year or calendar quarter. Provided, however, that the Agricultural Pool Committee, may recommend to the Court modification of the method of assessing pool members, *inter se*, if the same is necessary to attain legitimate basin management objectives, including water conservation and avoidance of undesirable socio-economic consequences. Any such modification shall be initiated and ratified by one of the following methods:

(a) Excess Production. In the event total pool production exceeds 100,000 acre feet in any year, the Pool Committee shall call and hold a meeting, after notice to all pool members, to consider remedial modification of the assessment formula.

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(b) Producer Petition. At any time after the fifth full year of operation under the Physical Solution, a petition by ten percent (10%) of the voting power or membership of the Pool shall compel the holding of a noticed meeting to consider revision of said formula of assessment for replenishment water.

In either event, a majority action of the voting power in attendance at such pool members' meeting shall be binding on the Pool Committee.

8. Rules. The Pool Committee shall adopt rules for conducting meetings and affairs of the committee and for administering its program and in amplification of the provisions, but not inconsistent with, this pooling plan.

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EXHIBIT "G"
OVERLYING (NON-AGRICULTURAL) POOL
POOLING PLAN

1. Membership in Pool. The initial members of the pool, together with the decreed share of the Safe Yield of each, are listed in Exhibit "D". Said pool includes producers of water for overlying industrial or commercial (non-agricultural) purposes, or such producers within the Pool who may hereafter take water pursuant to Paragraph 8 hereof.

2. Pool Committee. The Pool Committee for this pool shall consist of one representative designated by each member of the pool. Voting on the committee shall be on the basis of one vote for each member, unless a volume vote is demanded, in which case votes shall be allocated as follows:

> The volume voting power on the Pool Committee shall be 1,484 votes. Of these, 742 votes shall be allocated on the basis of one vote for each ten (10) acre feet or fraction thereof of decreed shares in Safe Yield. (See Exhibit "D".) The remaining 742 votes shall be allocated proportionally on the basis of assessments paid to Watermaster during the preceding year.*

3. Advisory Committee Representatives. At least three (3) members of the Pool Committee shall be designated by said committee to serve on the Advisory Committee. The exact number of such representatives at any time shall be as determined by the Pool Committee. The voting power of the pool shall be exercised in the

*Or production assessments paid under Water Code Section 72140 et seq., as to years prior to the second year of operation under the Physical Solution hereunder.

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Advisory Committee as a unit, based upon the vote of a majority of said representatives.

4. Replenishment Obligation. The pool shall provide funds for replenishment of any production in excess of the pool's share of Safe Yield in the preceding year.

5. Assessment. Each member of this pool shall pay an assessment equal to the cost of replenishment water times the number of acre feet of production by such producer during the preceding year in excess of (a) his decreed share of the Safe Yield, plus (b) any carry-over credit under Paragraph 7 hereof. In addition, the cost of the allocated share of Watermaster administration expense shall be recovered on an equal assessment against each acre foot of production in the pool during such preceding fiscal year or calendar quarter; and in the case of Pool members who take substitute ground water as set forth in Paragraph 8 hereof, such producer shall be liable for its share of administration assessment, as if the water so taken were produced, up to the limit of its decreed share of Safe Yield.

6. Assignment. Rights herein decreed are appurtenant to the land and are only assignable with the land for overlying use thereon; provided, however, that any appropriator who may, directly or indirectly, undertake to provide water service to such overlying lands may, by an appropriate agency agreement on a form approved by Watermaster, exercise said overlying right to the extent, but only to the extent necessary to provide water service to said overlying lands.

7. Carry-over. Any member of the pool who produces less than its assigned water share of Safe Yield may carry such unexercised

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right forward for exercise in subsequent years. The first water produced during any such subsequent year shall be deemed to be an exercise of such carry-over right. In the event the aggregate carry-over by any pool member exceeds its share of Safe Yield, such member shall, as a condition of preserving such surplus carry-over, execute a storage agreement with Watermaster.

8. Substitute Supplies. To the extent that any Pool member, at the request of Watermaster and with the consent of the Advisory Committee, takes substitute surface water in lieu of producing ground water otherwise subject to production as an allocated share of Safe Yield, said party shall nonetheless remain a member of this Pool.

9. Rules. The Pool Committee shall adopt rules for administering its program and in amplification of the provisions, but not inconsistent with, this pooling plan.

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EXHIBIT "H"
APPROPRIATIVE POOL
POOLING PLAN

1. Qualification for Pool. Any city, district or other public entity and public utility -- either regulated under Public Utilities Commission jurisdiction, or exempt therefrom as a non-profit mutual water company (other than those assigned to the Overlying [Agricultural] Pool) -- shall be a member of this pool. All initial members of the pool are listed in Exhibit "E", together with their respective appropriative rights and acre foot allocation and percentage shares of the initial and subsequent Operating Safe Yield.

2. Pool Committee. The Pool Committee shall consist of one (1) representative appointed by each member of the Pool.

3. Voting. The total voting power on the Pool Committee shall be 1,000 votes. Of these, 500 votes shall be allocated in proportion to decreed percentage shares in Operating Safe Yield. The remaining 500 votes shall be allocated proportionally on the basis of assessments paid to Watermaster during the preceding year.* Routine business of the Pool Committee may be conducted on the basis of one vote per member, but upon demand of any member a weighted vote shall be taken. Affirmative action of the Committee shall require a majority of the voting power of members in attendance, provided that it includes concurrence by at least one-third of its total members.

4. Advisory Committee Representatives. Ten (10) members of

*Or production assessments paid under Water Code Section 72140 et seq., as to years prior to the second year of operation under the Physical Solution hereunder.

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the Pool Committee shall be designated to represent this pool on the Advisory Committee. Each major appropriator, i.e., the owner of an adjudicated appropriative right in excess of 3,000 acre feet, shall be entitled to one representative. The remaining members representing the Appropriative Pool on the Advisory Committee shall be elected at large by the remaining members of the pool. The voting power of the Appropriative Pool on the Advisory Committee shall be apportioned between the major appropriator representatives in proportion to their respective voting power in the Pool Committee. The remaining two representatives shall exercise equally the voting power proportional to the Pool Committee voting power of all remaining appropriators; provided, however, that if any representative fails to attend an Advisory Committee meeting, the voting power of that representative shall be allocated among the representatives of the Appropriator Pool in attendance in the same proportion as their own respective voting powers.

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5. Replenishment Obligation. The pool shall provide funds for purchase of replenishment water to replace any production by the pool in excess of Operating Safe Yield during the preceding year.

6. Administrative Assessment. Costs of administration of this pool and its share of general Watermaster expense shall be recovered by a uniform assessment applicable to all production during the preceding year.

7. Replenishment Assessment. The cost of replenishment water required to replace production from Chino Basin in excess of Operating Safe Yield in the preceding year shall be allocated and recovered as follows:

(a) For production, other than for increased export, within CBMWD or WMWD:

(1) Gross Assessment. 15% of such replenishment water costs shall be recovered by a uniform assessment against all production of each appropriator producing in said area during the preceding year.

(2) Net Assessment. The remaining 85% of said costs shall be recovered by a uniform assessment on each acre foot of production from said area by each such appropriator in excess of his allocated share of Operating Safe Yield during said preceding year.

(b) For production which is exported for use outside Chino Basin in excess of maximum export in any year through 1976, such increased export production shall be assessed against the exporting appropriator in an amount sufficient to purchase replenishment water from CBMWD or WMWD in the amount of such excess.

(c) For production within SBVMWD or PVMWD:

By an assessment on all production in excess of an appropriator's share of Operating Safe Yield in an amount sufficient to purchase replenishment water through SBVMWD or MWD in the amount of such excess.

8. Socio-Economic Impact Review. The parties have conducted certain preliminary socio-economic impact studies. Further and more detailed socio-economic impact studies of the assessment formula and its possible modification shall be undertaken for the Appropriator Pool by Watermaster no later than ten (10) years from the effective date of this Physical Solution, or whenever total

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production by this pool has increased by 30% or more over the decreed appropriative rights, whichever is first.

9. Facilities Equity Assessment. Watermaster may, upon recommendation of the Pool Committee, institute proceedings for levy and collection of a Facilities Equity Assessment for the purposes and in accordance with the procedures which follow:

(a) Implementing Circumstances. There exist several sources of supplemental water available to Chino Basin, each of which has a differential cost and quantity available. The optimum management of the entire Chino Basin water resource favors the maximum use of the lowest cost supplemental water to balance the supplies of the Basin, in accordance with the Physical Solution. The varying sources of supplemental water include importations from MWD and SBVMWD, importation of surface and ground water supplies from other basins in the immediate vicinity of Chino Basin, and utilization of reclaimed water. In order to fully utilize any of such alternate sources of supply, it will be essential for particular appropriators having access to one or more of such supplies to have invested, or in the future to invest, directly or indirectly, substantial funds in facilities to obtain and deliver such water to an appropriate point of use. To the extent that the use of less expensive alternate sources of supplemental water can be maximized by the inducement of a Facilities Equity Assessment, as herein provided, it is to the long-term benefit of the entire basin that such assessment be authorized and levied by Watermaster.

(b) Study and Report. At the request of the Pool

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Committee, Watermaster shall undertake a survey study of the utilization of alternate supplemental supplies by members of the Appropriative Pool which would not otherwise be utilized and shall prepare a report setting forth the amount of such alternative supplies being currently utilized, the amount of such supplies which could be generated by activity within the pool, and the level of cost required to increase such uses and to optimize the total supplies available to the basin. Said report shall contain an analysis and recommendation for the levy of a necessary Facilities Equity Assessment to accomplish said purpose.

(c) Hearing. If the said report by Watermaster contains a recommendation for imposition of a Facilities Equity Assessment, and the Pool Committee so requests, Watermaster shall notice and hold a hearing not less than 60 days after distribution of a copy of said report to each member of the pool, together with a notice of the hearing date. At such hearing, evidence shall be taken with regard to the necessity and propriety of the levy of a Facilities Equity Assessment and full findings and decision shall be issued by Watermaster.

(d) Operation of Assessment. If Watermaster determines that it is appropriate that a Facilities Equity Assessment be levied in a particular year, the amount of additional supplemental supplies which should be generated by such assessment shall be estimated. The cost of obtaining such supplies, taking into consideration the investment in necessary facilities shall then be determined and spread equitably among the producers within the pool in a manner so that those

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producers not providing such additional lower cost supplemental water, and to whom a financial benefit will result, may bear a proportionate share of said costs, not exceeding said benefit; provided that any producer furnishing such supplemental water shall not thereby have its average cost of water in such year reduced below such producer's average cost of pumping from the Basin. In so doing, Watermaster shall establish a percentage of the total production by each party which may be produced without imposition of a Facilities Equity Assessment. Any member of the pool producing more water than said percentage shall pay such Facilities Equity Assessment on any such excess production. Watermaster is authorized to transmit and pay the proceeds of such Facilities Equity Assessment to those producers who take less than their share of Basin water by reason of furnishing a higher percentage of their requirements through use of supplemental water.

10. Unallocated Safe Yield Water. To the extent that, in any five years, any portion of the share of Safe Yield allocated to the Overlying (Agricultural) Pool is not produced, such water shall be available for reallocation to members of the Appropriative Pool, as follows:

(a) Priorities. Such allocation shall be made in the following sequence:

(1) to supplement, in the particular year, water available from Operating Safe Yield to compensate for any reduction in the Safe Yield by reason of recalculation thereof after the tenth year of operation hereunder.

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(2) pursuant to conversion claims as defined in Subparagraph (b) hereof.

(3) as a supplement to Operating Safe Yield, without regard to reductions in Safe Yield.

(b) Conversion Claims. The following procedures may be utilized by any appropriator:

(1) Record of Land Use Conversion. Any appropriator who undertakes, directly or indirectly, during any year, to permanently provide water service to lands which during the immediate preceding five (5) consecutive years was devoted to irrigated agriculture may report such change in land use or water service to Watermaster. Watermaster shall thereupon verify such change in water service and shall maintain a record and account for each appropriator of the total acreage involved and the average annual water use during said five-year period.

(2) Establishment of Allocation Percentage. In any year in which unallocated Safe Yield water from the Overlying (Agricultural) Pool is available for such conversion claims, Watermaster shall establish allocable percentages for each appropriator based upon the total of such converted acreage recorded to each such appropriator's account.

(3) Allocation and Notice. Watermaster shall thereafter apply the allocated percentage to the total unallocated Safe Yield water available for special allocation to derive the amount thereof allocable to

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each appropriator; provided that in no event shall the allocation to any appropriator as a result of such conversion claim exceed 50% of the average annual amount of water actually applied to the areas converted by such appropriator prior to such conversion. Any excess water by reason of such limitation on any appropriator's right shall be added to Operating Safe Yield. Notice of such special allocation shall be given to each appropriator and shall be treated for purposes of this Physical Solution as an addition to such appropriator's share of the Operating Safe Yield for the particular year only.

(4) Administrative Costs. Any costs of Watermaster attributable to administration of such special allocations and conversion claims shall be assessed against appropriators participating in such reporting.

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11. In Lieu Procedures. There are, or may develop, certain areas within Chino Basin where good management practices dictate that recharge of the basin be accomplished, to the extent practical, by taking surface supplies of supplemental water in lieu of ground water otherwise subject to production as an allocated share of Operating Safe Yield.

(a) Method of Operation. Any appropriator producing water within such designated in lieu area who is willing to abstain for any reason from producing any portion of such producer's share of Operating Safe Yield in any year may offer such unpumped water to Watermaster. In such event, Watermaster shall purchase said water in place, in lieu of spreading replenishment water, which is otherwise required to

make up for over production. The purchase price for in lieu water shall be the lesser of:

(1) Watermaster's current cost of replenishment water, whether or not replenishment water is currently then obtainable, plus the cost of spreading; or

(2) The cost of supplemental surface supplies to the appropriator, less

a. said appropriator's average cost of ground water production, and

b. the applicable production assessment were the water produced.

Where supplemental surface supplies consist of MWD or SBVMWD supplies, the cost of treated, filtered State water from such source shall be deemed the cost of supplemental surface supplies to the appropriator for purposes of such calculation.

In any given year in which payments may be made pursuant to a Facilities Equity Assessment, as to any given quantity of water the party will be entitled to payment under this section or pursuant to the Facilities Equity Assessment, as the party elects, but not under both.

(b) Designation of In Lieu Areas. The first in lieu area is designated as the "In Lieu Area No. 1" and consists of an area wherein nitrate levels in the ground water generally exceed 45 mg/l, and is shown on Exhibit "J" hereto. Other in lieu areas may be designated by subsequent order of Watermaster upon recommendation or approval by Advisory Committee. Said in lieu areas may be enlarged, reduced or

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eliminated by subsequent orders; provided, however, that designation of In Lieu Areas shall be for a minimum fixed term sufficient to justify necessary capital investment. In Lieu Area No. 1 may be enlarged, reduced or eliminated in the same manner, except that any reduction of its original size or elimination thereof shall require the prior order of Court.

12. Carry-over. Any appropriator who produces less than his assigned share of Operating Safe Yield may carry such unexercised right forward for exercise in subsequent years. The first water produced during any such subsequent year shall be deemed to be an exercise of such carry-over right. In the event the aggregate carry-over by any appropriator exceeds its share of Operating Safe Yield, such appropriator shall, as a condition of preserving such surplus carry-over, execute a storage agreement with Watermaster. Such appropriator shall have the option to pay the gross assessment applicable to such carry-over in the year in which it accrued.

13. Assignment, Transfer and Lease. Appropriative rights, and corresponding shares of Operating Safe Yield, may be assigned or may be leased or licensed to another appropriator for exercise in a given year. Any transfer, lease or license shall be ineffective until written notice thereof is furnished to and approved as to form by Watermaster, in compliance with applicable Watermaster rules. Watermaster shall not approve transfer, lease or license of a right for exercise in an area or under conditions where such production would be contrary to sound basin management or detrimental to the rights or operations of other producers.

14. Rules. The Pool Committee shall adopt rules for

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administering its program and in amplification of the provisions, but not inconsistent with, this pooling plan.

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EXHIBIT "I"

ENGINEERING APPENDIX

1. Basin Management Parameters. In the process of implementing the physical solution for Chino Basin, Watermaster shall consider the following parameters:

(a) Pumping Patterns. Chino Basin is a common supply for all persons and agencies utilizing its waters. It is an objective in management of the Basin's waters that no producer be deprived of access to said waters by reason of unreasonable pumping patterns, nor by regional or localized recharge of replenishment water, insofar as such result may be practically avoided.

(b) Water Quality. Maintenance and improvement of water quality is a prime consideration and function of management decisions by Watermaster.

(c) Economic Considerations. Financial feasibility, ecnomic impact and the cost and optimum utilization of the Basin's resources and the physical facilities of the parties are objectives and concerns equal in importance to water quantity and quality parameters.

2. Operating Safe Yield. Operating Safe Yield in any year shall consist of the Appropriative Pool's share of Safe Yield of the Basin, plus any controlled overdraft of the Basin which Watermaster may authorize. In adopting the Operating Safe Yield for any year, Watermaster shall be limited as follows:

(a) Accumulated Overdraft. During the operation of this Judgment and Physical Solution, the overdraft accumulated from and after the effective date of the Physical

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Solution and resulting from an excess of Operating Safe Yield over Safe Yield shall not exceed 200,000 acre feet.

(b) Quantitative Limits. In no event shall Operating Safe Yield in any year be less than the Appropriative Pool's share of Safe Yield, nor shall it exceed such share of Safe Yield by more than 10,000 acre feet. The initial Operating Safe Yield is hereby set at 54,834 acre feet per year. Operating Safe Yield shall not be changed upon less than five (5) years' notice by Watermaster.

Nothing contained in this paragraph shall be deemed to authorize, directly or indirectly, any modification of the allocation of shares in Safe Yield to the overlying pools, as set forth in Paragraph 44 of the Judgment.

3. Ground Water Storage Agreements. Any agreements authorized by Watermaster for storage of supplemental water in the available ground water storage capacity of Chino Basin shall include, but not be limited to:

(a) The quantities and term of the storage right.

(b) A statement of the priority or relation of said right, as against overlying or Safe Yield uses, and other storage rights.

(c) The procedure for establishing delivery rates, schedules and procedures which may include

[1] spreading or injection, or

[2] in lieu deliveries of supplemental water for direct use.

(d) The procedures for calculation of losses and annual accounting for water in storage by Watermaster.

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(e) The procedures for establishment and administration of withdrawal schedules, locations and methods.

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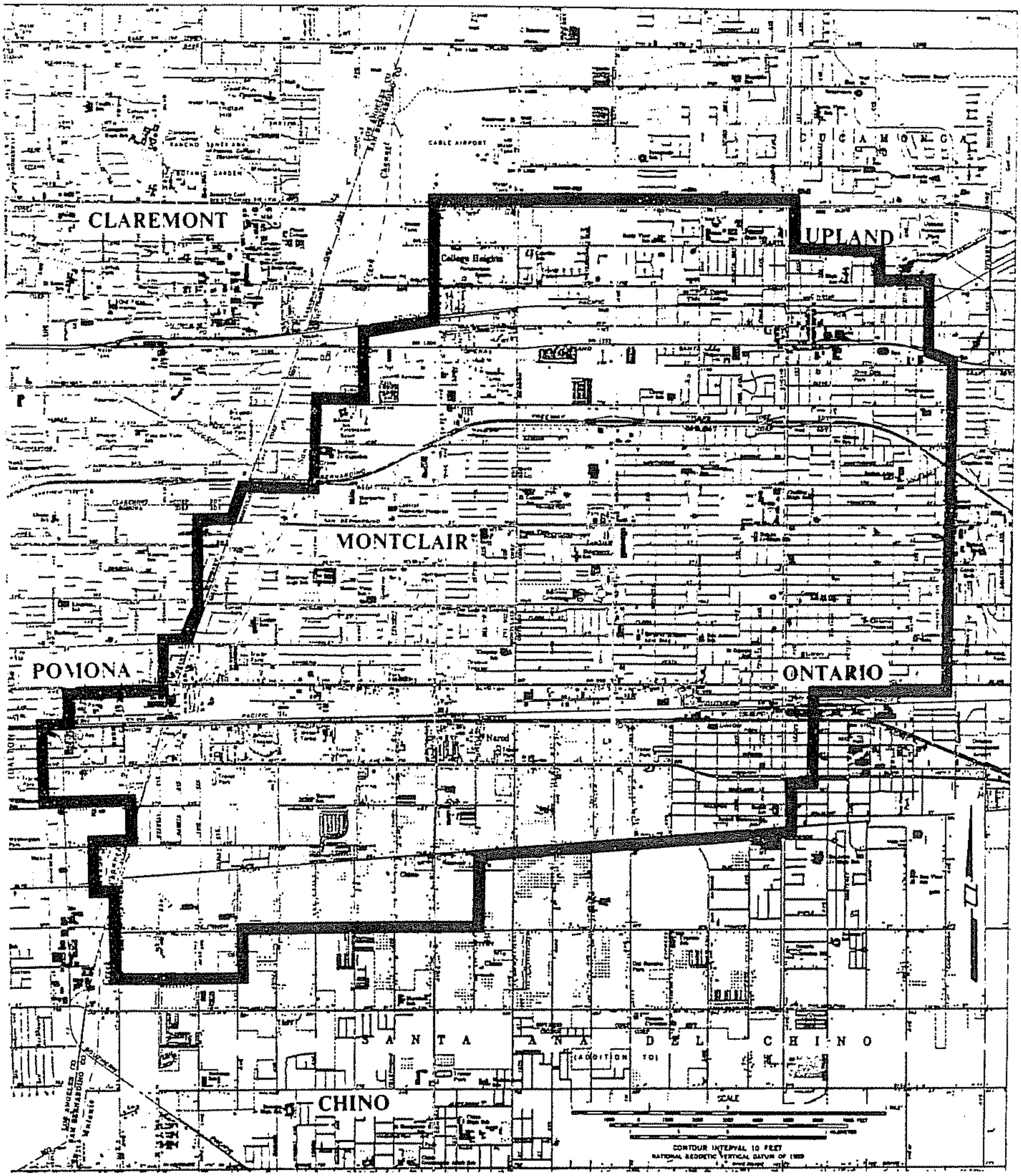

CHINO BASIN

IN LIEU AREA NO. 1

EXHIBIT "J"

LEGAL DESCRIPTION

OF CHINO BASIN

Preamble

All of the townships and ranges referred to in the following legal description are the San Bernardino Base and Meridian. Certain designated sections are implied as the System of Government Surveys may be extended where not established. Said sections are identified as follows:

Section 20, T1N, R8W is extended across Rancho Cucamonga;

Section 36, T1N, R8W is extended across the City of Upland;

Sections 2, 3, and 4, T1S, R7W are extended across Rancho Cucamonga;

Section 10, T1S, R8W is extended across the City of Claremont;

Sections 19, 20, 21, 30, 31 and 32, T1S, R8W are extended across the City of Pomona;

Sections 4, 5, and 28, T2S, R8W are extended across Rancho Santa Ana Del Chino;

Sections 15 and 16, T3S, R7W are extended across Rancho La Sierra; and

Sections 17 and 20, T3S, R7W are extended across Rancho El Rincon.

Description

Chino Basin is included within portions of the Counties of San Bernardino, Riverside and Los Angeles, State of California, bounded by a continuous line described as follows:

BEGINNING at the Southwest corner of Lot 241 as shown on Map of Ontario Colony Lands, recorded in Map Book 11, page 6, Office of the County Recorder of San Bernardino County, said corner being the Point of Beginning;

1. Thence Southeasterly to the Southeast corner

of Lot 419 of said Ontario Colony Lands;

2. Thence Southeasterly to a point 1300 feet North of the South line and 1300 feet East of the West line of Section 4, T1S, R7W;

3. Thence Easterly to a point on the East line of Section 4, 1800 feet North of the Southeast corner of said Section 4;

4. Thence Easterly to the Southeast corner of the Southwest quarter of the Northeast quarter of Section 3, T1S, R7W;

5. Thence Northeasterly to a point on the North line of Section 2, T1S, R7W, 1400 feet East of the West line of said Section 2;

6. Thence Northeasterly to the Southwest corner of Section 18, T1N, R6W;

7. Thence Northerly to the Northwest corner of said Section 18;

8. Thence Easterly to the Northeast corner of said Section 18;

9. Thence Northerly to the Northwest corner of the Southwest quarter of Section 8, T1N, R6W;

10. Thence Easterly to the Northeast corner of said Southwest quarter of said Section 8;

11. Thence Southerly to the Southeast corner of said Southwest quarter of said Section 8;

12. Thence Easterly to the Northeast corner of Section 17, T1N, R6W;

13. Thence Easterly to the Northeast corner of Section 16, T1N, R6W;

14. Thence Southeasterly to the Northwest corner of the Southeast quarter of Section 15, T1N, R6W;

15. Thence Easterly to the Northeast corner of said Southeast quarter of said Section 15;

16. Thence Southeasterly to the Northwest corner of the Northeast quarter of Section 23, T1N, R6W;

17. Thence Southeasterly to the Northwest corner

of Section 25, T1N, R6W;

18. Thence Southeasterly to the Northwest corner of the Northeast quarter of Section 31, T1N, R5W;

19. Thence Southeasterly to the Northeast corner of the Northwest quarter of Section 5, T1S, R5W;

20. Thence Southeasterly to the Southeast corner of Section 4, T1S, R5W;

21. Thence Southeasterly to the Southeast corner of the Southwest quarter of Section 11, T1S, R5W;

22. Thence Southwesterly to the Southwest corner of Section 14, T1S, R5W;

23. Thence Southwest to the Southwest corner of Section 22, T1S, R5W;

24. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 6, T2S, R5W;

25. Thence Southeasterly to the Northeast corner of Section 18 T2S, R5W;

26. Thence Southwesterly to the Southwest corner of the Southeast quarter of Section 13, T2S, R6W;

27. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 26, T2S, R6W;

28. Thence Westerly to the Southwest corner of the Northwest quarter of said Section 26;

29. Thence Northerly to the Northwest corner of said Section 26;

30. Thence Westerly to the Southwest corner of Section 21, T2S, R6w:

31. Thence Southerly to the Southeast corner of Section 29, T2S, R6W;

32. Thence Westerly to the Southeast corner of Section 30, T2S, R6W;

33. Thence Southwesterly to the Southwest corner of Section 36, T 2 S, R 7 W;

34. Thence Southwesterly to the Southeast corner

of Section 3, T3S, R7W;

35. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 10, T3S, R7W;

36. Thence Southerly to the Northeast corner of the Northwest quarter of Section 15, T3S, R7W;

37. Thence Southwesterly to the Southeast corner of the Northeast quarter of Section 16, T3S, R7W;

38. Thence Southwesterly to the Southwest corner of said Section 16;

39. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 20, T3S, R7W;

40. Thence Westerly to the Southwest corner of the Northwest quarter of said Section 20;

41. Thence Northerly to the Northwest corner of Section 17, T3S, R7W;

42. Thence Westerly to the Southwest corner of Section 7, T3S, R7W;

43. Thence Northerly to the Southwest corner of Section 6, T3S, R7W;

44. Thence Westerly to the Southwest corner of Section 1, T3S, R8W;

45. Thence Northerly to the Southeast corner of Section 35, T2S, R8W;

46. Thence Northwesterly to the Northwest corner of said Section 35;

47. Thence Northerly to the Southeast corner of Lot 33, as shown on Map of Tract 3193, recorded in Map Book 43, pages 46 and 47, Office of the County Recorder of San Bernardino County;.

48. Thence Westerly to the Northwest corner of the Southwest quarter of Section 28, T2S, R8W;

49. Thence Northerly to the Southwest corner of Section 4, T2S, R8W;

50. Thence Westerly to the Southwest corner of Section 5, T2S, R8W;

51. Thence Northerly to the Southwest corner of Section 32, T1S, R8W;

52. Thence Westerly to the Southwest corner of Section 31, T1S, R8W;

53. Thence Northerly to the Southwest corner of Section 30, T1S, R8W;

54. Thence Northeasterly to the Southwest corner of Section 20, T1S, R8W;

55. Thence Northerly to the Northwest corner of the Southwest quarter of the Southwest quarter of said Section 20;

56. Thence Northwesterly to the Northeast corner of the Southeast quarter of the Southeast quarter of the Northwest quarter of Section 19, T1S, R8W;

57. Thence Easterly to the Northwest corner of Section 21, T1S, R8W;

58. Thence Northeasterly to the Southeast corner of the Southwest quarter of the Southwest quarter of Section 10, T1S, R8W;

59. Thence Northeasterly to the Southwest corner of Section 2, T1S, R8W;

60. Thence Northeasterly to the Southeast corner of the Northwest quarter of the Northwest quarter of Section 1, T1S, R8W;

61. Thence Northerly to the Northeast corner of the Northwest quarter of the Northeast quarter of Section 36, T1N, R8W;

62. Thence Northerly to the Southeast corner of Section 24, T1N, R8W;

63. Thence Northeasterly to the Southeast corner of the Northwest quarter of the Northwest quarter of Section 20, T1N, R7W; and

64. Thence Southerly to the Point of Beginning.

Sections Included

Said perimeter description includes all or portions of the following Townships, Ranges and Sections of San Bernardino Base and Meridian:

T1N, R5W - Sections:	30, 31 and 32
T1N, R6W - Sections:	8, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36
T1N, R7W - Sections:	19, 20, 24, 25, 26, 29, 30, 31, 32, 35 and 36
T1N, R8W - Sections:	25 and 36
T1S, R5W - Sections:	4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 28, 29, 30, 31 and 32.
T1S, R6W - Sections:	1 through 36, inclusive
T1S, R7W - Sections:	1 through 36, inclusive
T1S, R8W - Sections:	1, 2, 10, 11, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36
T2S, R5W - Sections:	6, 7 and 18
T2S, R6W - Sections:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 29, 30 and 31
T2S, R7W - Sections:	1 through 36, inclusive
T2S, R8W - Sections:	1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 35 and 36
T3S, R7W - Sections:	2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17 and 20
T3S, R8W - Section:	1.

THE DOCUMENT TO WHICH THIS CERTIFICATION IS ATTACHED IS A FULL, TRUE AND CORRECT COPY OF THE ORIGINAL ON FILE AND OF RECORD IN MY OFFICE.

ATTEST OCT 29 2002

Clerk of the Superior Court of the State of California, in and for the County of San Bernardino

By [signature] Deputy

Terry Wittenborn

92 pages

APPENDIX E

SAN BERNARDINO COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

SAN BERNARDINO COUNTY

SAN BERNARDINO COUNTY

MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

FEMA Approved: July 13, 2017

San Bernardino County Unincorporated Area
San Bernardino County Fire Protection District
San Bernardino County Flood Control District
San Bernardino County Special Districts Department

This document was supported by HSGP Grant No. 2015-0078 awarded by the U.S. Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA). Points of view, opinions, findings, and conclusions expressed in this document are those of the authors and do not necessarily represent the official position of policies of FEMA or DHS. DHS/FEMA reserves a royalty-free, non-exclusive, and irrevocable license to reproduce, publish, and use these materials and to authorize others to do so.

2017

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COUNTY OF SAN BERNARDINO - Hazard Mitigation Plan Update

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RESOLUTION NO. 2017-_____

A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ADOPTING THE SAN BERNARDINO COUNTY UNINCORPORATED AREA MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN DATED MARCH 2017, AND AUTHORIZING FUTURE NON-SUBSTANTIVE AMENDMENTS TO THE PLAN

On Tuesday, ____________, 2017, on motion of Supervisor ________________, duly seconded by Supervisor ____________ and carried, the following resolution is adopted by the Board of Supervisors of San Bernardino County, State of California.

WHEREAS, the preservation of life and property is an inherent responsibility of local, state and federal government, including the County of San Bernardino, and the San Bernardino County Office of Emergency Services, to prepare a local Multi-Jurisdictional Hazard Mitigation Plan (HMP) for the unincorporated area of San Bernardino County to define hazard mitigation measures to reduce or eliminate loss of life and/or property; and

WHEREAS, this HMP represents a comprehensive description of the County's commitment to reducing, preventing or eliminating potential impacts of disasters caused by natural hazards; and

WHEREAS, the HMP is a Federal requirement under the Disaster Mitigation Act of 2000 for the County to be eligible to apply for federal funds for disaster recovery and mitigation assistance; and

WHEREAS, the HMP established a coordinated effort to support mitigation activities, identifies measures to combat natural hazards within our County; and

WHEREAS, the HMP is an extension of the State of California Multi-Hazard Mitigation Plan, and will be reviewed periodically and revised as necessary to meet changing conditions; and

WHEREAS, the Board of Supervisors agrees to adopt this HMP and urges all officials, employees, public and private organizations, and citizens, individually and collectively, to do their share in furthering the preparation of hazard mitigation within the County of San Bernardino;

NOW, THEREFORE, BE IT RESOLVED THAT:

The Board of Supervisors of the County of San Bernardino, a public entity established under the laws of the State of California, hereby authorizes this HMP to be adopted, that the San Bernardino County Fire Protection District Office of Emergency Services Division Manager is hereby authorized to implement future non-substantive amendments, recommended by the Federal Emergency Management Agency upon their review, to the HMP, that a copy of the Board of Supervisors' approved San Bernardino County Unincorporated Area Hazard Mitigation Plan be forwarded to the Federal Emergency Management Agency and CalOES, that once approved the HMP will be considered to be incorporated into the County's General Plan, and this plan become effective immediately.

PASSED AND ADOPTED by the Board of Supervisors of the County of San Bernardino, State of California, by the following vote:

AYES: SUPERVISORS:

NOES: SUPERVISORS:

ABSENT: SUPERVISORS:

* * * * *

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

I, **LAURA H. WELCH,** Clerk of the Board of Supervisors of the County of San Bernardino, State of California, hereby certify the foregoing to be a full, true and correct copy of the record of the action taken by the Board of Supervisors, by vote of the members present, as the same appears in the Official Minutes of said Board at its meeting of ____________, 2017.

LAURA H. WELCH
Clerk of the Board of Supervisors

By ___________________________
Deputy

RESOLUTION NO. 2017-_____

A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT, STATE OF CALIFORNIA, ADOPTING THE SAN BERNARDINO COUNTY UNINCORPORATED AREA MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN DATED MARCH 2017, AND AUTHORIZING FUTURE NON-SUBSTANTIVE AMENDMENTS TO THE PLAN

On Tuesday, ____________, 2017, on motion of Supervisor ___________, duly seconded by Supervisor ________________ and carried, the following resolution is adopted by the Board of Supervisors of the San Bernardino County Flood Control District, State of California.

WHEREAS, the preservation of life and property is an inherent responsibility of local, state and federal government, including the County of San Bernardino, and the San Bernardino County Office of Emergency Services, to prepare a local Multi-Jurisdictional Hazard Mitigation Plan (HMP) for the unincorporated area of San Bernardino County to define hazard mitigation measures to reduce or eliminate loss of life and/or property; and

WHEREAS, this HMP represents a comprehensive description of the County's commitment to reducing, preventing or eliminating potential impacts of disasters caused by natural hazards; and

WHEREAS, the HMP is a Federal requirement under the Disaster Mitigation Act of 2000 for the County to be eligible to apply for federal funds for disaster recovery and mitigation assistance; and

WHEREAS, the HMP established a coordinated effort to support mitigation activities, identifies measures to combat natural hazards within our County; and

WHEREAS, the HMP is an extension of the State of California Multi-Hazard Mitigation Plan, and will be reviewed periodically and revised as necessary to meet changing conditions; and

WHEREAS, the Board of Supervisors agrees to adopt this HMP and urges all officials, employees, public and private organizations, and citizens, individually and collectively, to do their share in furthering the preparation of hazard mitigation within the County of San Bernardino

NOW, THEREFORE, BE IT RESOLVED THAT:

The Board of Supervisors of the San Bernardino County Flood Control District, a public entity established under the laws of the State of California, hereby authorizes this HMP to be adopted, that the San Bernardino County Fire Protection District Office of Emergency Services Division Manager is hereby authorized to implement future non-substantive amendments, recommended by the Federal Emergency Management Agency upon their review, to the HMP, that a copy of the Board of Supervisors' approved San Bernardino County Unincorporated Area Hazard Mitigation Plan be forwarded to the Federal Emergency Management Agency and the CalOES, that once

approved the HMP will be considered to be incorporated into the County's General Plan, and this plan become effective immediately.

PASSED AND ADOPTED by the Board of Supervisors of the San Bernardino County Flood Control District, State of California, by the following vote:

AYES: SUPERVISORS:

NOES: SUPERVISORS:

ABSENT: SUPERVISORS:

* * * * *

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

I, **LAURA H. WELCH,** Clerk of the Board of Supervisors of the San Bernardino County Flood Control District, State of California, hereby certify the foregoing to be a full, true and correct copy of the record of the action taken by the Board of Supervisors, by vote of the members present, as the same appears in the Official Minutes of said Board at its meeting of _____________, 2017.

LAURA H. WELCH
Clerk

By ___________________________
Deputy

RESOLUTION NO. 2017-

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE BOARD GOVERNED COUNTY SERVICE AREAS ADOPTING THE SAN BERNARDINO COUNTY UNINCORPORATED AREA MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN DATED MARCH 2017, AND AUTHORIZING FUTURE NON-SUBSTANTIVE AMENDMENTS TO THE PLAN

On Tuesday, , 2017, on motion of Director , duly seconded by Director and carried, the following resolution is adopted by the Board of Directors of the Board Governed County Service Areas and their Zones.

WHEREAS, the preservation of life and property is an inherent responsibility of local, state and federal government, including the County of San Bernardino, and the San Bernardino County Office of Emergency Services, to prepare a local Multi-Jurisdictional Hazard Mitigation Plan (HMP) for the unincorporated area of San Bernardino County to define hazard mitigation measures to reduce or eliminate loss of life and/or property; and

WHEREAS, this HMP represents a comprehensive description of the County's commitment to reducing, preventing or eliminating potential impacts of disasters caused by natural hazards; and

WHEREAS, the HMP is a Federal requirement under the Disaster Mitigation Act of 2000 for the County to be eligible to apply for federal funds for disaster recovery and mitigation assistance; and

WHEREAS, the HMP established a coordinated effort to support mitigation activities, identifies measures to combat natural hazards within our County; and

WHEREAS, the HMP is an extension of the State of California Multi-Hazard Mitigation Plan, and will be reviewed periodically and revised as necessary to meet changing conditions; and

WHEREAS, the Board of Directors agrees to adopt this HMP and urges all officials, employees, public and private organizations, and citizens, individually and collectively, to do their share in furthering the preparation of hazard mitigation within the County of San Bernardino;

NOW, THEREFORE, BE IT RESOLVED THAT:

The Board of Directors of the Board Governed County Service Areas and their Zones, a public entity established under the laws of the State of California, hereby authorizes this HMP to be adopted, that the San Bernardino County Fire Protection District Office of Emergency Services Division Manager is hereby authorized to implement future non-substantive amendments, recommended by the Federal Emergency Management Agency upon their review, to the HMP, that a copy of the Board of Directors' approved San Bernardino County Unincorporated Area Hazard Mitigation Plan be forwarded to the Federal Emergency Management Agency and CalOES, that

once approved the HMP will be considered to be incorporated into the County's General Plan, and this plan become effective immediately.

PASSED AND ADOPTED by the Board of Directors of the Board Governed County Service Areas and their Zones by the following vote:

AYES: DIRECTORS:

NOES: DIRECTORS:

ABSENT: DIRECTORS:

* * * * *

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

I, **LAURA H. WELCH,** Secretary of Board of Directors of the Board Governed County Service Areas and their Zones, hereby certify the foregoing to be a full, true and correct copy of the record of the action taken by the Board of Directors, by vote of the members present, as the same appears in the Official Minutes of said Board at its meeting of Tuesday, , 2017.

LAURA H. WELCH
Secretary

By ____________________________
Deputy

RESOLUTION NO. 2017-

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE SAN BERNARDINO COUNTY FIRE PROTECTION DISTRICT ADOPTING THE SAN BERNARDINO COUNTY UNINCORPORATED AREA MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN DATED MARCH 2017, AND AUTHORIZING FUTURE NON-SUBSTANTIVE AMENDMENTS TO THE PLAN

On Tuesday, , 2017, on motion of Director , duly seconded by Director and carried, the following resolution is adopted by the Board of Directors of San Bernardino County Fire Protection District.

WHEREAS, the preservation of life and property is an inherent responsibility of local, state and federal government, including the County of San Bernardino, and the San Bernardino County Office of Emergency Services, to prepare a local Multi-Jurisdictional Hazard Mitigation Plan (HMP) for the unincorporated area of San Bernardino County to define hazard mitigation measures to reduce or eliminate loss of life and/or property; and

WHEREAS, this HMP represents a comprehensive description of the County's commitment to reducing, preventing or eliminating potential impacts of disasters caused by natural hazards; and

WHEREAS, the HMP is a Federal requirement under the Disaster Mitigation Act of 2000 for the County to be eligible to apply for federal funds for disaster recovery and mitigation assistance; and

WHEREAS, the HMP established a coordinated effort to support mitigation activities, identifies measures to combat natural hazards within our County; and

WHEREAS, the HMP is an extension of the State of California Multi-Hazard Mitigation Plan, and will be reviewed periodically and revised as necessary to meet changing conditions; and

WHEREAS, the Board of Directors agrees to adopt this HMP and urges all officials, employees, public and private organizations, and citizens, individually and collectively, to do their share in furthering the preparation of hazard mitigation within the County of San Bernardino;

NOW, THEREFORE, BE IT RESOLVED THAT:

The Board of Directors of the San Bernardino County Fire Protection District, a public entity established under the laws of the State of California, hereby authorizes this HMP to be adopted, that the San Bernardino County Fire Protection District Office of Emergency Services Division Manager is hereby authorized to implement future non-substantive amendments, recommended by the Federal Emergency Management Agency upon their review, to the HMP, that a copy of the Board of Directors' approved San Bernardino County Unincorporated Area Hazard Mitigation Plan be forwarded to the Federal Emergency Management Agency and CalOES, that once approved

the HMP will be considered to be incorporated into the County's General Plan, and this plan become effective immediately.

PASSED AND ADOPTED by the Board of Directors of the San Bernardino County Fire Protection District by the following vote:

AYES: DIRECTORS:

NOES: DIRECTORS:

ABSENT: DIRECTORS:

* * * * *

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

I, **LAURA H. WELCH,** Secretary of Board of Directors of the San Bernardino County Fire Protection District, hereby certify the foregoing to be a full, true and correct copy of the record of the action taken by the Board of Directors, by vote of the members present, as the same appears in the Official Minutes of said Board at its meeting of Tuesday, , 2017.

LAURA H. WELCH
Secretary

By ____________________________
Deputy

Section 1. Introduction

The Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update is a “living document” that should be reviewed, monitored, and updated to reflect changing conditions and new information. As required, the MJHMP must be updated every five (5) years to remain in compliance with regulations and Federal mitigation grant conditions. In that spirit, this MJHMP is an update of the San Bernardino County Unincorporated Area MJHMP approved by FEMA on October 11, 2011. This MJHMP presents updated information regarding hazards being faced by the County, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and those Board-governed Special Districts administered by the San Bernardino County Special Districts Department.

These Board-Governed Special Districts were formed by the Board of Supervisors to provide a specific service for a specific area of San Bernardino County. Additionally, these Special Districts are treated as an all-inclusive County Organization, not as separate or independent entities. Each Special District is governed cooperatively by the San Bernardino County Board of Supervisors acting as the Board of Supervisors for each of the individual districts.

The County of San Bernardino is governed by five (5) Supervisors; one for each supervisorial district who collectively make up the County Board of Supervisors. The Board of Supervisors is responsible for the County department and agencies, including Board Governed Special Districts, providing services to the unincorporated area.

The Board of Supervisors acts as the Board of Directors for the County Fire Protection District, the County Flood Control District, and the Special Districts Department as part of their responsibilities as an elected member of the County of San Bernardino Board of Supervisors.

The San Bernardino County Organizational Chart clearly shows the relationships between these Board-governed Special Districts and other County departments as one of equal relationship Departments/Districts. See Figure 1-1.

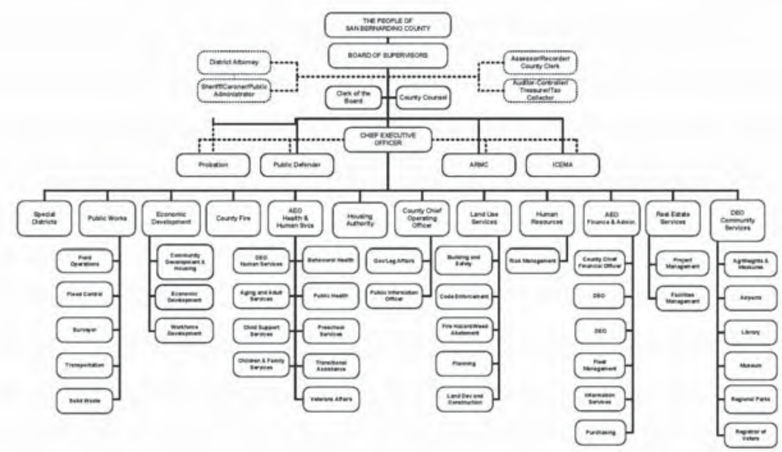

Figure 1-1: Organizational Chart for San Bernardino County

1.1 San Bernardino County Unincorporated Area

The Unincorporated Area of San Bernardino County has a population of 309,759 persons (14.48%) of the entire County Population) and covers 19,233 square miles (95.67% of the entire County land area). There are approximately 61 unincorporated communities within the unincorporated County. San Bernardino County is the largest County in the continental United States. San Bernardino County provides basic services to the residents and citizens of the unincorporated areas. These services include Law Enforcement, Fire Protection, Building and Safety Services, Public Health Services, Library, and Human Services (social services). Five Interstate Highways and four inter-continental railroad lines cross the County, providing vital transportation links from southern California to the remainder of the United States.

1.1.1 San Bernardino County Fire Protection District

San Bernardino County Fire Protection District is a community based all-risk emergency services organization dedicated to the health and well-being of the citizens of San Bernardino County through a balance of regionalized services delivery and accountability to the local community. On July 1, 2008, twenty-seven separate fire districts were merged into one single board governed fire protection district with four regional service zones. The reorganization was not only an administrative advancement but also a significant advancement in operations and delivery of emergency response services.

It has resulted in simplified budgeting and fiscal operations, greater flexibility in the use in the use of department resources and assets and more effective use of day-to-day operations. The reorganization will continue to improve the delivery of fire services and overall operating efficiency.

The San Bernardino County Fire Protection District (County Fire) covers 19,278 square miles, operates 85 fire stations and facilities within 6 Regional Service Zones (Mountain, North Desert, South Desert, High Desert, West Valley and East Valley), and serves 64 unincorporated communities, the City of Grand Terrace, and the Town of Yucca Valley. There are also 6 ambulance enterprise operations that provide service within these Regional Service Zones. In addition, 7 cities are Independent Fire Protection Districts that contract with County Fire: Adelanto, Fontana, Hesperia, Needles, Twentynine Palms, San Bernardino and Victorville. County Fire's executive management is provided by the Fire Chief/County Fire Warden, Deputy Chief, Assistant Chief of Operations as well as Division Managers and Division Chiefs.

County Fire is an all-risk department providing emergency mitigation and management for fire suppression, emergency medical services (paramedic and non-paramedic), ambulance services, HAZMAT response, arson investigation, technical rescue including water borne, flooding and mudslide, winter rescue operations, terrorism and weapons of mass destruction. As part of disaster preparation, response, and mitigation, the department's Office of Emergency Services specifically provides support and assistance to the 24 cities and towns, as well as, all the unincorporated portions of the county. The field functions are supported by a countywide management system that includes organizational business practices, human resources, financial and accounting services, vehicles services and support, and equipment warehousing and distribution. County Fire also provides for the management of community safety services such as: fire prevention, building construction plans and permits, household hazardous waste, Local Oversight Program for hazardous materials, HAZMAT facility inspections, planning and engineering, and public education and outreach.

Figure 1-2: San Bernardino County Fire Protection District

1.1.2 San Bernardino County Flood Control District

1.1.2.1 Description of Major Services

The San Bernardino County Flood Control District (District) was created in 1939 under special state legislation. Since its inception, the District has developed a very extensive system of flood control and water conservation facilities, including dams, conservation basins, debris basins, channels and storm drains. The purpose of these facilities is to intercept and convey flood flows through and away from developed areas of the county, as well as to promote water conservation and improved water quality.

The District covers the entire county, including all of the incorporated cities. The District is divided into six geographic flood zones (in recognition of the different characteristics and flood control needs in various areas).

- Zone 1 encompasses the county's West End, from the Los Angeles and Riverside County lines to West Fontana.
- Zone 2 encompasses the central area of the San Bernardino Valley easterly of Zone 1 to approximately the Santa Ana River and City Creek demarcations.
- Zone 3 covers the east end of San Bernardino valley, east of Zone 2.

- Zone 4 covers the Mojave River valley region, from the San Bernardino Mountains to Silver Lakes.
- Zone 5 primarily includes the San Bernardino Mountains.
- Zone 6 encompasses the remainder of the county not covered by other zones.

The District has also established a countywide administrative zone (Zone 7)

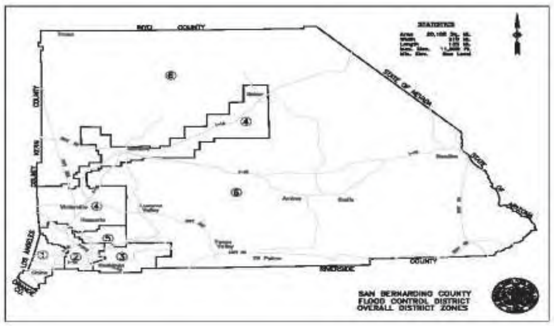

Figure 1-3: Map of San Bernardino County Flood Control District

The District's funding is primarily derived from property taxes, federal and state aid on specific projects, subdivision and permit fees, rents and royalties, and revenue from local water agencies for water spreading services. The District's principal functions are as follows:

- **Flood Protection on Major Streams:** In cooperation with the federal government, the District conducts programs for channel and levee construction, floodwater retention, and debris basin maintenance. Programs or projects are often done in cooperation with the incorporated cities, the U.S. Army Corps of Engineers, and the U.S. Bureau of Reclamation.

- **Water Conservation:** The District operates and maintains water conservation basins and spreading grounds. Water from the local mountains and northern California is spread and percolated into the groundwater basins underlying the county. The District has numerous joint use agreements with water districts allowing use of District facilities for groundwater recharge.

- **Storm Drain Construction:** The District is active in comprehensive storm drain master

planning/construction and cooperates with incorporated cities and other agencies in storm drain projects.

- **Facility Maintenance:** The District has a proactive maintenance program for its facilities. Regular inspections of the storm drains, channels, and basins are made as required by various state and federal agencies.

- **National Pollution Discharge Elimination System (NPDES):** The District is the lead permittee in the San Bernardino valley area-wide NPDES permit with 16 cities as co-permittees. The NPDES program, through the State Water Quality Management Board, regulates storm water quality through very detailed and complex permits, which affect everyone within the Santa Ana River Watershed and is expanding into the high desert area of the Victor Valley under Phase II of the permit.

- **State Water Quality Management Board:** regulates storm water quality through very detailed and complex permits, which affect everyone within the Santa Ana River Watershed and is expanding into the high desert area of the Victor Valley under Phase II of the permit.

- **Flood Operations:** During the flood season, the District maintains telemetry systems for monitoring rainfall and runoff and dispatches storm patrols as dictated by the projected severity of a storm. The District has access to a weather satellite data delivery system to provide state-of-the-art weather information. The system provides advance warning of major storm activity.

- **Flood Area Safety Task Force (FAST):** As a result of the October/November fires of 2003, the FAST organization was created. The District is a key component of this task force, which is meant to respond to the elevated flood risk associated with the aftermath of these devastating fires.

1.1.3 Special Districts Department

The Special Districts Department promotes safe, healthy, enjoyable and dynamic communities by providing essential programs and municipal services that meet the current and future needs of the communities served.

The San Bernardino County Board of Supervisors is the governing body for all Board governed Districts, County Service Areas (CSA), and Improvement Zones. The day-to-day management and administration is done through the Special Districts Department. The County Board of Supervisors and the Special Districts Department depend quite heavily on input from the community. The successful operation of a District, CSA and Improvement Zone is a team effort between County staff and property owners. Where needed, the Board of Supervisors will set up a property owner Advisory Commission or Municipal Advisory Council (MAC) to work with and make recommendations to the Board and County staff.

The formation process begins with a request from property owners and then involves a feasibility study performed by the Special District Department with the assistance of many other County Departments. The final approval of the District, CSA and Improvement Zone is done by the County Board of Supervisors at a public hearing. Depending on the complexity of the issues, the process can take from three (3) months to one (1) year to complete.

There are various forms of financial mechanisms that can be used to fund services such as fees, special taxes, assessments, etc. Prior to a new funding source being implemented, it must receive approval from either the property owners or the registered voters in the area. It is important to understand that all funding is generated through the Districts, CSAs, and Improvement Zones. No County general funds are used or are available.

Special Districts Department is responsible for operating the Board-governed Special Districts within San Bernardino County. There are 102 special districts managed by the Special Districts Department:

Table 1-1: Special Districts Department District Listing

	District Type	Number
1	Special Revenue Districts	11
2	Enterprise Funds (Airport and Refuse)	3
3	Parks Districts	19
4	Road Districts	41
5	Enterprise Funds (Sewer)	9
6	Street Light Districts	11
7	Enterprise Funds (Water)	8
Total Special Districts		102

- **Special Revenue Districts** were created to provide a service to the property owners within the Special Revenue District.
- **Enterprise Funds Districts** derive their funds through fees collected for delivery of a service or good such as water, sewer, refuse or airport fees from the users within the individual District.
- **Parks Districts** derive their funds through property taxes levied on property owners

COUNTY OF SAN BERNARDINO - Hazard Mitigation Plan Update

within the individual Park District.
- **Road Districts** derive their funds through property taxes levied on property owners within the Road District.
- **Street Light Districts** derive their funds through property taxes levied on property owners within the Street Light District.

The two Special Districts listed below were formed differently than the other special districts listed above managed by the Special Districts Department. These two districts were formed with a Board of Directors. (San Bernardino County Board of Supervisors) and are not independently elected. All governance actions are by the elected members of the Board of Supervisors acting as the Board of Directors for the Recreation and Park District.

Big Bear Valley Recreation and Parks District

Big Bear Valley Recreation and Park District currently maintains 6 developed parks, 2 undeveloped parks, several community buildings including the Big Bear Valley Senior Center, 3 ball fields, and a swim beach. Moonridge Animal Park is administered by the Big Bear Valley Recreation and Park District. The Zoo is open year round for visitors to see alpine species on exhibit. The Zoo receives approximately 99,600 visitors annually.

Bloomington Recreation and Parks District

Bloomington Recreation and Park District maintains two community parks, an equestrian arena, sports fields, and a community center.

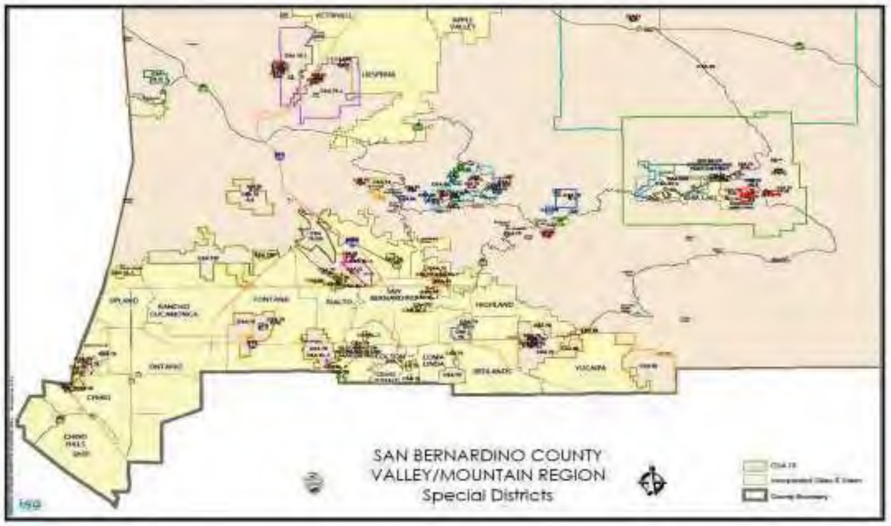

Figure 1-4: Map of Special District Department Districts

Figure 1-5: Special Districts Valley/Mountain Region

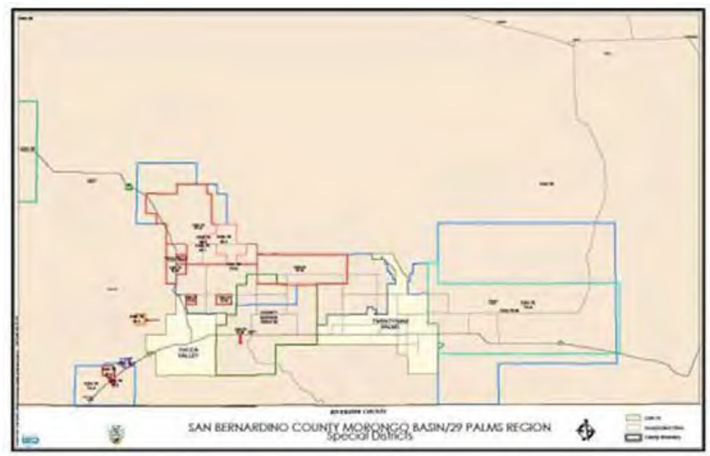

Figure 1-6: Morongo Basin/Twentynine Palms Region

Figure 1-7: Special Districts Victor Valley/Barstow Region

1.2 Purpose of the Plan

The intent of hazard mitigation is to reduce and/or eliminate loss of life and property. Hazard mitigation is defined by FEMA as "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." A "hazard" is defined by FEMA as "any event or condition with the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, environmental damage, business interruption, or other loss."

The purpose of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) is to demonstrate the plan for reducing and/or eliminating risk in the unincorporated area of the County and within areas overseen or managed by the Flood Control District, Fire District and Special Districts Department. The MJHMP process encourages communities within the unincorporated county to develop goals and projects that will reduce risk and build a more disaster resilient community by analyzing potential hazards. By cooperatively and jointly together as a Multi-Jurisdictional Planning team, the partners were able to develop common goals and objectives for mitigation efforts. The individual stakeholders can then take the goals and objectives back to their individual Special Districts for discussion, ranking and project development, and then bring the resulting projects back to the Multi-Jurisdictional Planning Team. The Multi-Jurisdictional Planning Team can then

integrate all projects into the appropriate project listing to be acted upon by the most appropriate managing department or district for the listed projects.

After disasters, repairs and reconstruction are often completed in such a way as to simply restore to pre-disaster conditions. Such efforts expedite a return to normalcy; however, the restoring of things to pre-disaster conditions sometimes result in feeding the disaster cycle; damage, reconstruction, and repeated damage. Mitigation is one of the primary phases of emergency management specifically dedicated to breaking the cycle of damage. Hazard mitigation is distinguished from other disaster management functions by measures that make County development and the natural environment safer and more disaster resilient. Mitigation generally involves alteration of physical environments, significantly reducing risks and vulnerability to hazards by altering the built environment so that life and property losses can be avoided or reduced. Mitigation also makes it easier and less expensive to respond to and recover from disasters.

1.3 Authority

In 2000, FEMA adopted revisions to the Code of Federal Regulations. This revision is known as "Disaster Mitigation Act (DMA)." DMA 2000, Section 322 (a-d) requires that local governments, as a condition of receiving federal disaster mitigation funds, have a Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) that describes the process for assessing hazards, risks and vulnerabilities, identifying and prioritizing mitigation actions, and engaging/soliciting input from the community (public), key stakeholders, and adjacent jurisdictions/agencies.

With an approved (and adopted) MJHMP, the County and participating jurisdictions are eligible for federal disaster mitigation funds/grants (Hazard Mitigation Grant Program, Pre-Disaster Mitigation, and Flood Management Assistance) aimed to reduce and/or eliminate risk.

1.4 What's New

The 2011 San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) contained a detailed description of the planning process, a risk assessment of identified hazards for the San Bernardino County Planning Area and an overall mitigation strategy for reducing the risk and vulnerability from these hazards. Since approval of the plan by FEMA, much progress has been made by San Bernardino County and the participating County Districts on implementation of the mitigation strategy. As part of this 2016 MJHMP Update, a thorough review and update of the 2011 plan was conducted to ensure that this update reflects current community conditions and priorities in order to realign the overall mitigation strategy for the next five-year planning period. This section of the plan includes the following:

- **What's New in the Plan Update** This section provides an overview of the approach to updating the plan and identifies new analyses, data and information included in this Plan Update to reflect current community conditions. This includes a summary of new hazard and risk assessment data as it relates to the San Bernardino Planning Area as well as information on current and future development trends affecting community vulnerability and related issues. The actual updated data, discussions, and associated analyses are contained in their respected sections within this 2016 MJHMP Update.

- **Summary of Significant Changes to Current Conditions and Hazard Mitigation Program Priorities.** This section provides a summary of significant changes in current conditions, changes in vulnerability, and any resulting modifications to the community's mitigation program priorities.

- **2011 Mitigation Strategy Status and Successes.** This section provides a description of the status of mitigation actions from the 2011 plan and also indicates whether a project is no longer relevant or is recommended for inclusion in the updated 2016 mitigation strategy. This section also highlights key mitigation success stories of the County and participating jurisdictions since the 2011 MJHMP.

This What's New section provides documentation of San Bernardino County Planning Area's progress or changes in their risk and vulnerability to hazards and their overall hazard mitigation program. Completion of this 2016 MJHMP Update further provides documentation of the San Bernardino County community's continued commitment and engagement in the mitigation planning process.

1.4.1 Updates to the Current Plan

This MJHMP update involved a comprehensive review and update of each section of the 2011 plan and includes an assessment of the success of the participating County Districts in evaluating, monitoring and implementing the mitigation strategy outlined in the initial plan. Only the information and data still valid from the 2011 plan was carried forward as applicable into this MJHMP update. In fact, based in part on the issuance of new 2011 and 2013 planning guidance, this 2016 plan has been significantly updated and rewritten.

The San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan (2011) focused on integrating the MJHMP with the County General Plan goals and policies as well as incorporating specific flood mitigation projects that were programmed for completion over the five (5) year period. The Plan did not clearly identify mitigation projects the County would focus on for all priority hazards identified in the plan. However, the County has been very active and engaged in implementing and supporting projects and programs designed to reduce and/or eliminate risk in the County. The list of successful projects in this section represents the activities that the County has undertaken and/or supported to reduce the risks from Wildfire, Earthquake, Flood, Drought, Terrorism, and Climate Change.

1.4.2 New Jurisdictional Annexes

Newly refined and reconfigured Jurisdictional Annexes detail the hazard mitigation planning elements specific to the participating jurisdiction to the San Bernardino County MJHMP Update.

The Annexes are not intended to be a standalone document, but appends to and supplements the information contained in the 2016 base plan document. As such, all sections of the base plan, including the planning process and other procedural requirements apply to and were met by the participating jurisdictions. The newly refined Jurisdictional Annexes provide additional information specific to county participating special district or departments, with a focus on providing additional details on the mitigation strategies for the Fire Protection District, Flood Control District and Special Districts Department. The three annexes provide more detail on mitigation strategies, mitigation projects and existing implementation mechanism for each participating jurisdiction.

The 2011 MJHMP included the Big Bear Valley Recreation and Parks District and Bloomington Recreation and Parks District as standalone jurisdictions. For purposes of this 2016 plan update, Big Bear Valley Recreation and Parks District, and Bloomington Recreation and Parks District hazard mitigation planning efforts are included under the supervision of the Special Districts hazard mitigation planning efforts.

1.4.3 New Risk Assessment

As part of its comprehensive review and update of each section of the plan, San Bernardino County and participating jurisdictions recognized that updated data, if available, would enhance the analysis presented in the risk assessment and utilized in the development of the updated mitigation strategy. Highlights of new data used for this Plan Update is identified below in this Section and is also sourced in context within Chapter 4, Risk Assessment. Specific data used is sourced throughout this plan document. This new data and associated analysis provided valuable input for the development of the mitigation strategy presented in Chapter 5 of this plan. A highlight of new information and analyses contained in this plan update includes the following:

- A new assessment of updated hazards affecting the San Bernardino Planning Area was completed resulting in additional hazards added to planning documents the new hazards include climate change, drought and terrorism.

- The drought hazard was expanded to include water shortage impacts to the County, to better align with the State of California Hazard Mitigation Plan and to reflect the significant issues related to drought conditions resulting from the current and ongoing drought within the County and State of California.

- The climate change hazard was added to include to comply and align with the State of California Hazard Mitigation Plan and to reflect recent SB 379 initiatives. Climate change is affecting and will continue to affect the frequency and severity of natural hazard events, a trend that is of concern across the United States.

- An entire rework of the risk assessment for each identified hazard. This included reworking the hazard profile and adding new hazard event occurrences; redoing the entire vulnerability analysis to add items identified below and updating the vulnerability assessment based on more recent hazard data as well as using the most current parcel and assessor data for the existing built environment.

- An update of the flood hazard analysis to include an updated analysis of the 100-year flood, an analysis of the 500-year flood, including the use the new and updated DFIRMs.
- Utilizing updated critical facility GIS mapping for the Planning Area to provide an updated inventory of critical facilities by jurisdiction (including all municipalities) and a GIS analysis of critical facilities vulnerable to hazards with spatial footprints which include: flood, wildfire, and earthquake.
- An enhanced vulnerability assessment which added a GIS analysis of updated future development areas in the Planning Area and specific to each of the mapped hazards.
- Incorporation and analysis of the new 2010 Census data was utilized for this LHMP update. Census data was used in an intersect analysis to determine how much of the population is exposed to flood, wildfire and earthquake hazards.
- Also, as required by current FEMA planning guidance, an analysis of the County's ongoing and continued compliance with the NFIP is included in the Flood Hazard profile.
- Terrorism is now a reoccurring possibility within the United States, due to the terror attack in San Bernardino County in December of 2015, a hazard profile on this matter has been added to this plan.

1.4.4 Successful Wildfire Mitigation Implementation

1.4.4.1 Fire Safe Councils (FSC) Fuel Reduction Program Success

Fire Safe Councils have received and implemented millions of dollars in grant money for fuels reduction and for public education. Of note recently the Arrowhead Communities FSC developed a grant that did fuels reduction but used the existing staff at the County Tree Removal Program rather than pay additional consultants to do the same work. The benefit of this is that the FSC was able to maximize their expenditure and give the contractor a check upon completion of the project. This way 100% of their grant money went directly to the contractor and none went to administrative overhead.

1.4.4.2 Red Cross Grant Fuel Reduction Success

Although this grant was just recently started, the ARC has successfully removed and reduced fuels on several properties. They have also met with County Roads Sign Division and created the correct number of evacuation directional signs. Fifty signs will be posted in the Moon Ridge area of Big Bear Lake in 2010 and 2011. During an emergency, these directional signs will direct people out of a very confusing network of streets.

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1.4.4.3 USFS Grants ARRA and Otherwise and Chipping Program Success

San Bernardino County and its Special Districts were successful in obtaining $3 million in American Recovery and Reinvestment Act funding to support ongoing fuel reduction programs and to create new jobs for the recovering economy. The USFS also funded an additional $13 million to carry on after the NRCS projects were closed out.

Project design, contracting and operations are managed by the County's Public Works Department but the priorities are set by local fire chiefs in monthly MAST Operations Meetings. It is the oldest and most significant program for reducing wildfire threat on a mountain wide basis. Table 1-2 shows current and planned fuels reduction Projects for the San Bernardino County Mountain areas.

Table 1-2: Hazardous Tree Removal Project and Fuel Modification Projects

Project Name	Contract No	Funding	Cost	Project Stage
Mojave view	FM179USFS	USFS	$23,840.00	Complete 2013
Strawberry Lodge	n/a	USFS	n/a	Complete 2013
Harich	n/a	USFS	n/a	Complete 2013
Camp Oaks	n/a	USFS	n/a	Complete 2013
Swinson/Arrowbear	n/a	USFS	n/a	Complete 2013
Osito Rancho/Cedar	n/a	USFS*	n/a	Complete 2013
BBV286SP	n/a	USFS	n/a	Complete 2013
BBV287SP	n/a	USFS	n/a	Complete 2013
BBV280SP	n/a	USFS	n/a	Complete 2013
FF288SP	n/a	USFS	n/a	Complete 2013
LA291SP	n/a	USFS	n/a	Complete 2013
RS292SP	n/a	USFS	n/a	Complete 2013
GVL293SP	n/a	USFS	n/a	Complete 2013
AB294SP	n/a	USFS	n/a	Complete 2013
BBV295SP	n/a	USFS	n/a	Complete 2013
Green Briar	FM100ARRA	ARRA**	$88,000.00	Complete 2013
West Hook Creek	n/a	ARRA	$14,700.00	Complete 2013
Silverwood Lake	n/a	ARRA	$21,000.00	Complete 2013
Weesha	n/a	ARRA	n/a	Complete 2013
Erwin Lake	n/a	ARRA	n/a	Complete 2013
Wrightwood	n/a	ARRA	n/a	Complete 2013
Camp Tahquitz	n/a	ARRA	n/a	Complete 2013

Project Name	Contract No	Funding	Cost	Project Stage
West Cajon	n/a	ARRA	n/a	Complete 2013
LA285SP	n/a	ARRA	n/a	Complete 2013
WW290SP	n/a	ARRA	n/a	Complete 2013
CL289SP	n/a	ARRA	n/a	Complete 2013
Rob Roy	n/a	ARRA	n/a	Complete 2013
Santa's Village	n/a	ARRA	n/a	Complete 2013
Saw Pitt II	n/a	ARRA	n/a	Complete 2013
Oak Hills	n/a	ARRA	n/a	Complete 2013
Fawnskin	n/a	ARRA	n/a	Complete 2013
Heaps Peak	n/a	ARRA	n/a	Complete 2013
Houston	n/a	ARRA	n/a	Complete 2013
Calvary	n/a	ARRA	n/a	Complete 2013
WW298SP	n/a	ARRA	n/a	Complete 2013
LG299SP	n/a	ARRA	n/a	Complete 2013
Project Name	**Contract No**	**Funding**	**Cost**	Complete 2013
Waterman Canyon	n/a	ARRA	n/a	Complete 2013
Willow Creek	FM6501AFSC	ACFSC***	$11,900.00	Complete 2013
LA191EVA	EVA191AFSC	ACFSC	n/a	Complete 2013
NorthBay	FM192AFCS	ACFSC	n/a	Complete 2013
LA215EVA	**n/a**	**ACFSC**	**n/a**	**Complete 2013**

** Funded by United States Forest Service*
*** Funder by American Reinvestment and Recovery Act of 2009*
**** Funded by Arrowhead Communities Fire Safe Council*

1.4.4.4 NRCS Fuel Reduction Project Success

San Bernardino County was the recipient of 72 million dollars that were granted from the National Resource Conservation Service (NRCS) to San Bernardino County Fire Protection District to reduce the amount of fuel and the potential for ignitability. In February of 2010, the grant was successfully closed out one month in advance of the target date. The $72,000,000 provided for almost 1,000 projects substantially reducing heavy fuels on tens of thousands of properties at risk across all mountain communities. Within that grant, $6.7million was provided to the USFS to conduct fuel modifications on Federal land and $7.2 million was provided to Cal Trans to remove fuels along evacuation routes. An additional $2 million was forwarded to San Diego to assist them. The activities funded under this program represent the first of their kind to be accomplished by local/state governments with federal grant funding.

To date the Fuel Management Program has removed over 450,000 trees, improving the overall health of the forested areas in the San Bernardino Mountains and reduced the overall fire threat. On several occasions completed projects have resulted in assisting fire suppression efforts and allowing fire to be contained before it threatens a local community, including Deer Lodge Park in Lake Arrowhead and Nob Hill in Running Springs during the Grass Valley and Slide Fires of 2007.

1.4.5 Flood Hazard Mitigation Success

1.4.5.1 2011 General Plan Amendments

A General Plan Amendment to the Safety Element of the County of San Bernardino 2007 General Plan amended the Flood Plain Overlay District, which became effective on March 11, 2010. The Safety Element includes several layers of hazard overlays that are included in the General Plan mapping system to inform the public of potential hazards to development of property within certain areas of the County and to enable the County to mitigate the risks presented to property owners by these hazards. These overlays include potential flood hazards. Over the past twenty years, certain federal and state agencies have been in the process of digitizing much of this hazard data. The digitization of this data has allowed for greater accuracy as well as more timely updates. In recognition of the new data from various federal and state agencies, the County updated the Flood Hazard Overlay Maps contained within the Safety Element of the General Plan. The Flood Plain Safety Overlay District is amended to incorporate revised FEMA (Federal Emergency Management Agency) Flood Plain data, modifying 47 detail and seven regional General Plan Quad Maps. The FEMA Digital Flood Insurance Rate Map database was adopted in the General Plan Amendment as released by FEMA as it exists as of February 9, 2010 and will updated in the future for the County, by integrating automatic map updates as new data is published by FEMA.

Below is a list of the updated Flood Plain Safety Overlay District Maps effective March 11, 2010.

Map	Quad Name	Map #	Quad Name	Map	Quad Name
DI16B	Baker	FH12B	Telegraph Peak	FH21	Devore
EH07	Hinkley	FH13B	Cajon	FH22	San Bernardino N.
EH14	Wild Crossing	FH14B	Silverwood Lake	FH23	Harrison Mtn.
EH15	Hodge	/FJ B	S Portion of County	FH28	Guasti
EH16	Barstow SE	FH11B	Mt. San Antonio	FH29	Fontana
EH22	Helendale	CK/DK	NE Portion of County	FH30	San Bernardino S.
EH29	Adelanto	EH/FH	SW Portion of County	FH31	Redlands
EH30	Victorville	EI/FI B	S Portion of County	FH32	Yucaipa
EH31	Apple Valley N.	EK/FK B	SW Portion of County	FI09B	Fawnskin
EI01B	Nebo	FH06B	Hesperia	FI10B	Big Bear City
EI02B	Yermo	FH07B	Apple Valley S.	FI17B	Big Bear Lake

Map	Quad Name	Map #	Quad Name	Map	Quad Name
EI03B	Harvard Hill	CH/DH	NW Portion of County	FI18B	Moonridge
EI04B	Manix	CI/DI B	N Portion of County	FH15	Lake Arrowhead
EI09B	Daggett	FH03B	Mescal Creek	FH19	Mt. Baldy
EK03	Needles NW	FH04B	Phelan	FH20	Cucamonga Peak
EK11	Needles SW	FI30B	Joshua Tree S.	FI23B	Sunfair
EK12	Needles	FI32B	Queen Mountain	FI25B	Forest Falls
EK20	**Whale Mountain**	**FI28B**	**Morongo Valley**		

Completed Flood Control Projects with Mitigation Characteristics

Table 1-3: Completed Flood Control Projects

Project Number	Completion Date	Total Cost	Total Funding
F02527	2016	$392,885	$392,885
F00282	2016	$4,100,000	$4,100,000
1-	2010	$7,770,000	$7,700,000
F01761	2016	$4,000,000	$4,000,000
F02234	2016	$1,100,000	$1,100,000
F01767	2014	$3,700,000	$3,700,000
F01389-	2008	$1,300,000	$1,300,000
F01545	2009	$1,500,000	$1,500,000
F01566-	2010	$3,300,000	$3,300,000

1.4.5.2 F02527 29TH Street Basin Levee Certification Restoration Project - Completed

Ensure that the surrounding residential and commercial areas will not be re-mapped as floodplain areas.
Status: Completed
Completion Date: March 2016
Local Priority: High
Total Cost: $392,885
Funding Description: From Flood Control District Budget through Property Tax
Project Selected for: Public safety: history of flood damage at this location
Hazard Mitigated: Potential flooding
Resources to Implement: High

Cost to Implement: High
Time to Implement: High

1.4.5.3 F00282 Alabama at City Creek - Completed

Construct RCB and channel improvements to increase capacity and minimize the possibility of road closures and flood damage.
Status: Completed
Completion Date: January 2016
Local Priority: High
Total Cost: $4.1 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public safety & convenience
Hazard Mitigated: Flooding, flood damage, road closures and road damage
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Medium

1.4.5.1 F02234 Wilson Creek - Completed

Status: Completed June, 2016
Local Priority: Low
Total Cost: $1.1 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Yucaipa
Project Selected for: public safety and infrastructure protection
Hazard Mitigated: attenuation of high velocities (50 fps); slope protection
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

1.4.5.2 F01767 Lytle Cajon – Completed

Replacement of damaged concrete invert
Status: completed
Completion Date: 2014
Local Priority: High
Total Cost: $3.7million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and to prevent additional channel damage
Hazard Mitigated: Additional damage to invert and walls; potential flooding and washouts of nearby area
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

1.4.5.3 F01761 Kitchen Wash – Completed

To intercept flows upstream of Rimrock Road to capture headwaters and re-route them to the Mojave River
Status: In preliminary design process
Completion Date: Estimated 2017/2018
Local Priority: Low
Total Cost: $4.0 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public safety; protection of commercial center
Hazard Mitigated: local flooding, road damage
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

1.4.5.4 Successful "Finalization" of Drainage Feasibility Study Report

The final Drainage Feasibility Study has been completed to evaluate the continuing landslide hazard within Rimforest and the role of concentrated storm runoff in propagating slope failure. The village of Rimforest has eroding cliff-side property and bluff retreat in the Southern part of the village.

This problem is primarily caused by storm runoff from either rainstorms or snowmelt after winter storms. The runoff flows to the south side of Rimforest and is discharged over the cliff at two principal locations. This study report evaluated a number of options to re-direct the majority of the runoff to other discharge locations for the purpose of reducing and mostly eliminating the cliff-side erosion. Two options presented the study appear to be feasible if new conventional storm drain systems are installed. One of the options is now included as potential future mitigation action presented in Section 6 of this plan.

1.4.6 Geologic Hazard Mitigation Success

1.4.6.1 Successful Geologic Hazard Prevention General Plan Amendments

Twenty two overlay maps were completed as part of the 2007 General Plan Amendment which became effective on March 11th, 2010. For more information on the overlay maps, see Section 6.2.2.3.

1.4.6.2 Amendment to Title 6 County Code to Adopt by Reference the 2010 Editions of the California Building Standards Codes

An amendment to Title 6 of the County of San Bernardino Code to adopt by reference the 2010 Editions of the California Building Standards Codes went before the Board of Supervisors on November 2, 2010 and was continued for a second reading on November 16, 2010 and approved unanimously. The amendment became effective on January 1, 2011.

The County of San Bernardino amendment to Title 6 of the County Code to adopt by reference the 2010 Editions of the California Building Standards Codes repealed the current chapters of Division 3 of Title 6 that reflect the 1994/1995 editions of the California Building Standards Codes and adopt the 2010 editions of these codes by reference.

The California Building Standards Commission approved the California Building Standards Code (Code) for a statewide effective date of January 1, 2011 and requires this Code apply in all parts of the state. This Code consists of the California Building, Residential, Plumbing, Mechanical, Electrical, Energy, Historical Buildings, Existing Building (Unreinforced Masonry) and the Green Building Standards Codes. Since this 2010 Edition was adopted by local ordinance, the prior editions of this code will be repealed and the most recent editions of the codes with applicable amendments requiring express findings and certain appendices necessary for the health and safety of the citizens of this County will be in effect within the unincorporated areas of San Bernardino County. The benefit of adopting this Code is that it provides consistency and clarification for the building community as well as building inspectors and plans examiners. State law (Health & Safety Code 18941.5 and 17958.7) requires the local government make express findings in order to amend building standards and the amendments must be necessary due to local climatic, geological, or topographical conditions.

Those amendments and findings are included in the County's ordinance and were filed with the California Building Standards Commission.

The recommended modifications not requiring express findings are administrative or procedural in nature and concern the local implementation issues that are not covered by building standards.

An example of this type of modification is to the California Residential Code, Section R105.3.1.1 which requires the Board of Appeals to confirm substantial valuations in the flood plain. The traditional purpose of the Board of Appeals has been reserved for a contested decision of the Building Official, and it is felt that it should remain as such.

With respect to grading and excavation regulations found in Appendix J of the 2010 State published code, the 2001 California Building Code dealt with grading with more clarity in regards to what activities require a permit and set forth rules to ensure large grading projects are scrutinized in greater detail than smaller projects by requiring more reporting and inspection of such work. The grading chapter in the 2001 Code has been trusted and in use in its primary form for years. The 2010 Appendix J grading chapter needs substantial amendment and modification to address all grading issues and is not recommended for adoption in its present form. The Board adopted the 2001 Appendix Chapter 33 regulations as part of this proposed ordinance. Relocation permit requirements have been moved to a new section of the Code, and it retains specific standards for relocation procedures in details not found in the 2010 State-published code. Clarification of the types of buildings affected by the new regulations has also been made.

Administrative changes to the 2010 California Existing Building Code (Part 10 of Title 24) were approved to outline the procedures required to set allowable time limits for the retrofit and repair of unreinforced masonry buildings. Staff is also recommending that authorization be given to the Building and Safety Division of the Land Use Services Department to issue Administrative Citations as an alternative means of enforcement of the County Code provisions.

Express findings are made for changes to the California Plumbing Code, Appendix K regarding the soil conditions that exist in this county. These changes are supported by the Environmental Health Division. These express findings are iterated in the ordinance and will be filed with the Building Standards Commission as required by law in order to become effective.

1.5 Community Profile

1.5.1 Physical Setting

The County is bounded by the states of Arizona and Nevada on the east, Inyo County on the north, Kern and Los Angeles Counties on the west, and Orange and Riverside Counties on the south.

San Bernardino County covers 20,102 square miles and is geographically the largest county in the continental United States. The States of Hawaii, Connecticut, Delaware, and Rhode Island and the District of Columbia could all fit inside the County boundary at the same time. The unincorporated area of San Bernardino County covers approximately 19,848 square miles; this is 98.7% of the entire County.

The remaining 1.3% of acreage (254 square miles) is under the jurisdiction of incorporated cities or towns. Figure 7 displays the unincorporated area and the cities/towns. The cities/towns on the map are concentrated in the south/west portion of the county and are color-coded.

San Bernardino County is characterized by three (3) distinct geographic areas: Valley, Mountains, and Desert: the Valley Region contains the majority of the county's incorporated areas and is the most populous region; the

Mountain Region is primarily comprised of public lands owned and managed by federal and state agencies; and, the Desert Region is the largest region (over 93% of the county's land area) and includes parts of the Mojave Desert.4 Aside from open or undeveloped land, the largest land use in the county is for military purposes.

The mountains stretch across the south end of the county. The mountain elevations range from 2,000 feet along the foothills to the 11,502-foot summit of Mount San Gorgonio, the highest peak in Southern California. Figure 8 displays the terrain/topographic features throughout San Bernardino County.

The San Bernardino Mountains feature four (4) large lakes (Big Bear Lake, Silverwood Lake, Lake Arrowhead, and Lake Gregory), and many smaller lakes. The majority of the lakes are the headwaters of the Santa Ana River and the Mojave River.

The Santa Ana River originates in the San Bernardino Mountains and flows southwest to the ocean. The Santa Ana Watershed includes streams flowing south from the San Gabriel Mountains and streams flowing north and west from the San Jacinto Mountains in Riverside County.

The desert area contains low mountains, valleys, and dry lakebeds. The elevations within the valley range of the County is from about 500 feet on the valley floor to 1,700 feet in Live Oak Canyon, and to about 5,400 feet in the hills in Yucaipa. The desert area is an assemblage of mountain ranges interspersed with long, broad valleys that often contain dry lakes. Many of these mountains rise from 1,000 to 4,000 feet above the valleys. Due to the persistent winds that blow throughout the year, large portions of the desert surface have been modified into a mosaic of pebbles and stones known as desert pavement.

A major physical resource of the desert area is the Mojave River, a critical water source for many of its residents. Among the few rivers that both flow north and do not empty into an ocean, the Mojave River travels north and east away from its watershed in the San Bernardino Mountains. The major part of it is over 100-mile length is marked by a dry riverbed that only on occasion reveals the water within it. Except in exceedingly wet years, the Mojave River ends its flow at Soda Dry Lake near Baker. The Colorado River, at the California and Arizona border, borders the County on the east. Streams in the eastern areas of the County area flow into the Colorado River which eventually ends at the Gulf of California.

The densely urban southern part of the County is at the headwaters of the Santa Ana River with its tributaries crossing the valley floor. With the construction of the Seven Oaks Dam the main river source has been controlled. However, Mill Creek, City Creek, Lytle Creek, and Cajon Creek still have the potential to flood areas of the valley if levees fail. A similar potential occurs with the high desert portion of the County with the Mojave River, which is controlled by the Mojave River Falls Dam that flows north from the San Bernardino Mountains to the city of Barstow. The San Antonio Dam on the southwest side of the county provides more than 100-year flood protection to the west end of the San Bernardino Valley. The Colorado River is on the eastern border of the County. The dams along the river have controlled the flow but bank erosion and damage to roads in the area have been experienced during periods of high water.

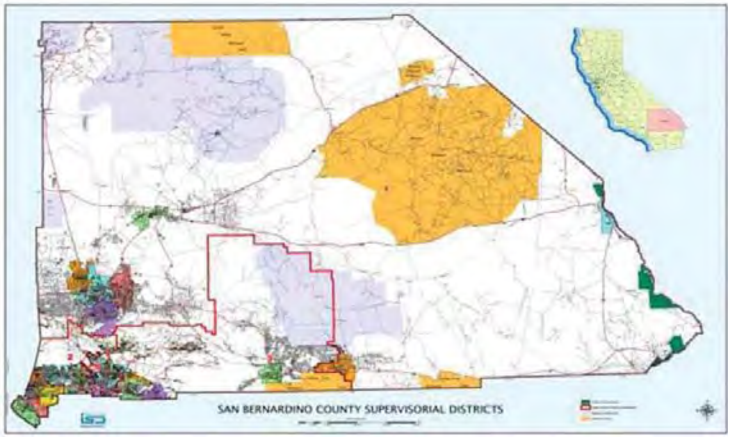

Figure 1-8: Unincorporated and Corporate Areas in San Bernardino County

Figure 1-9: Topographic Features in San Bernardino County

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1.5.2 History

Paleo-Indian sites dating from c. 10,000 BC show that the San Bernardino County area has been inhabited for at least 12,000 years. Artifacts in the Calico area suggest much earlier human occupation, but this has not been confirmed. In the past three thousand years, various Indian tribes flourished in the area: the Gabrielenos occupied the West Valley; the Serranos lived in the foothills of the San Bernardino Mountains; the Vanyumes lived along the Mojave River; the Mohave lived along the Colorado River; and the Chemehuevi occupied the Mojave Desert.

The first European explorers to enter the area were Pedro Fages, Military Commander of California, in 1772 and Fr. Francisco Garces, a missionary priest, in 1774. On May 20, 1810, Franciscan missionary Francisco Dumatz, of the San Gabriel Mission, led his company into a valley. In observance of the feast day of St. Bernardine of Siena, Dumatz named the valley San Bernardino. This name was later given to the nearby mountain range, and later the city and county.

In 1842 the Lugo family was granted the Rancho San Bernardino, a holding of 37,700 acres encompassing the entire San Bernardino Valley. Captain Jefferson Hunt, of the Mormon Battalion, led a group of settlers into San Bernardino and founded a Mormon Colony. In 1851 the Mormon Colony purchased the Rancho from the Lugo family.

In 1850 California was admitted into the United States. On April 26, 1853, San Bernardino County was created from parts of Los Angeles, San Diego, and Mariposa Counties. In 1854 the City of San Bernardino was incorporated as the county seat.
In 1857, three orange trees were set out on a farm in Old San Bernardino. By 1882 a rail car load of oranges and lemons grown in the East Valley was shipped to Denver, Colorado. As early as the 1840s, vineyards were planted in the Cucamonga area and in the 1870 census; San Bernardino County was credited with producing 48,720 gallons of wine.

In 1860, gold was discovered in Holcomb and Bear Valleys in the San Bernardino Mountains, and placer mining began in Lytle Creek. Silver was being mined at Ivanpah in 1870, and the rich silver mines of the Calico district were developed in the 1880s. Borax was first discovered in 1761 at Searles Dry Lake near Trona, and transported out by twelve-, eighteen- or twenty-mule team wagons.

As a county, San Bernardino has been uniquely endowed with rich mineral deposits. Large deposits of gold have been mined at Stedman and Vanderbilt, with smaller but still important deposits at Alvord, Oro Grande, Old Dad Mountain, Dale and Nantan, Calico, Ivanpah, Waterman and Providence were the largest silver deposits, with lesser, but important deposits in the Mescal Mountains and at the Death Valley Mine. The most important copper mines are the Copper World and the Bagdad Chase (known usually for its gold production).

Except for a brief period after World War I when silver prices were high, low metal prices and inflation put a damper on mining in the 1920s. However, with the Great Depression of the 1930's and an increase in the price of gold by nearly $15 an ounce, many small operators reactivated old mines. The region around Barstow, Vanderbilt, Stedman, and Dale were the principal centers of mining activity until World War II.

During World War II, iron was extracted from the Vulcan Mine in the Providence Mountains, and the Bagdad Chase Mine remained active. Since the war, there has been sporadic mining of gold, silver, and tungsten in the county. A major new mine opened during the 1950s, the Mountain Pass rare earth mine. Recently, exploration has outlined potential large tonnage molybdenum properties in the New York and Ord Mountains, copper in the Cooper Basin area of the Whipple Mountains and gold in the Clark Mountains.

After World War II, the citrus industry slowly declined. However, dairies relocating out of Los Angeles County settled in the Chino Valley area, creating a robust dairy industry in San Bernardino County.

Elsewhere in the Valley region, suburbs grew as moderate priced housing developments were built. By the late 1980's, the county had grown into bedroom communities and warehousing for southern California.

1.5.3 Climate

The valleys between mountain ranges experience very high temperatures, while the adjacent mountains often experience much cooler temperatures, particularly at their summits. Rainfall and humidity are low. The annual average precipitation for the area is approximately 30 inches. The differences in elevation and topography are in part responsible for variations in temperature and precipitation from the Valley and Desert areas.

Winter temperatures in some areas of the Desert range near zero, the cold often compounded by the wind-chill factor. In the summer, temperatures can reach as high as 134°F in the lower elevations and along the Colorado River area. Temperatures in the San Bernardino valley area range from an average high of 80ºF and an average low of 53ºF. The record high for the area is 117ºF and the record low is 17ºF. The annual average rainfall for the area is 15.6 inches. During the fall and winter months, strong "Santa Ana" winds blow across the area.

The mountains experience a four-season climate. Temperatures in the Mountain area range from an average high of 62ºF and an average low of 36ºF. The record high for the area is 106ºF and the record low is -25ºF. With the possible exception of some of the higher elevations in the mountains, precipitation throughout the Desert area is less than four inches per year, usually of short duration and high intensity. The resulting flash floods rapidly modify the terrain that is exposed to the erosive surface runoff. Unusually heavy or persistent rains often result in the temporary filling of a number of dry lakes until the surface water evaporates or infiltrates the soil. Persistent winds blow throughout the year

1.5.4 Demographics

The total population of San Bernardino County is approximately 2,139,570 people *(State of California, Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2016, with 2010 Census Benchmark. Sacramento, California, May 2016)*. Most of the County's population is in the valley areas located in the south west portion of the County. The County's population has grown by 4.13%, 84,835 people, since 2011 (population in 2011 was 2,054,735 people).

The population of the unincorporated area of the County in 2011 was 294,753 people. In 2016, the population is 309,759; an increase of 14,976 persons (or 1.05%) *(State of California, Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2016, with 2010 Census Benchmark. Sacramento, California, May 2016)*

Population Growth 2011 - 2016

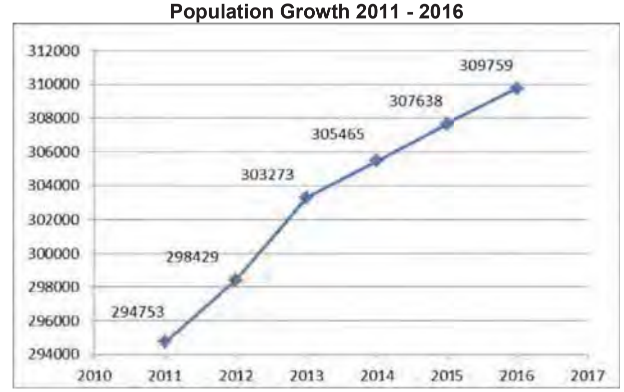

Figure 1-10: San Bernardino County Unincorporated Area Population Changes 2011 - 2016

Source: California Department of Finance E-4

Ethnic composition includes Hispanics (48%) who form the largest share of the County's population, followed by Whites (34%). Blacks (9%) and Asians (5%) form a relatively lower share of the total population. It should be noted that the Hispanic population is growing at the fastest rate among all ethnic groups. From 2000 to 2010, the Hispanic population increased by 44%. This trend is consistent with that of the neighboring counties of Riverside and Orange, where the

Latino population grew by 63% and 24%, respectively. During this period, the Asian population grew by 38%, whereas the Black population grew by 15%. The population of Whites declined in all the six counties in Southern California; San Bernardino County experienced a decline of 7% in its White population. Changes in Ethnicity are from the California Department of Finance, Demographics Unit.

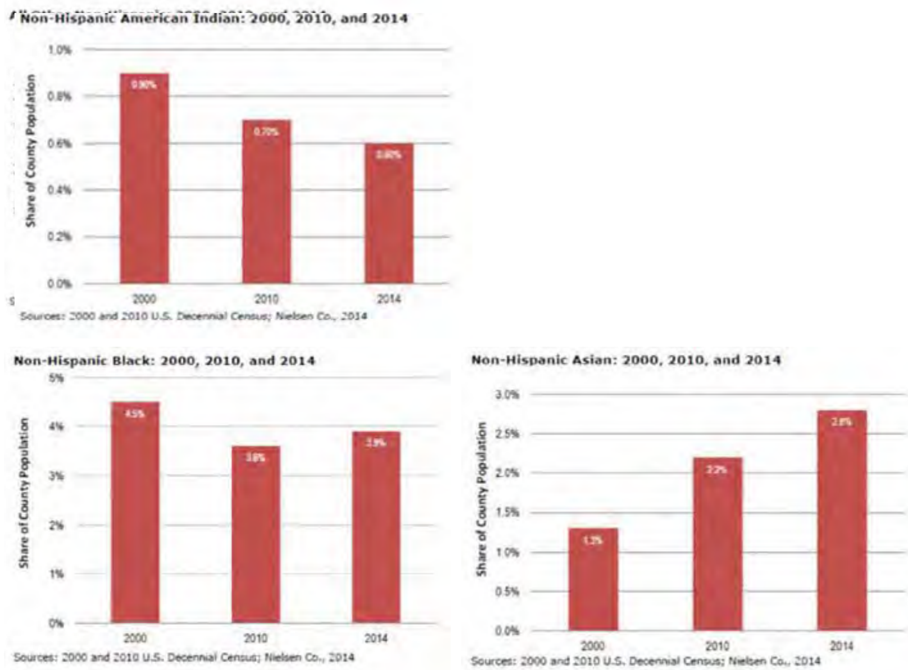

Figure 1-11: San Bernardino County Unincorporated Area 2014 Population by Ethnicity

1.5.5 Existing Land Use

The County has adopted a “one-map approach.” The “one-map approach” permits the use of a single map showing both General Plan land use designations and zoning classifications. The one-map approach assures that there will always be land use consistency between the County's General Plan and its Zoning Code.

There are 18 land use zoning districts that apply only to privately owned lands in the County and not to the lands controlled by other jurisdictions. Lands that are controlled by other jurisdictions, including lands controlled by federal and state agencies as well as incorporated cities, are mapped to identify the public agencies that control them. The 18 land use zoning districts are as follows:

- Resource Conservation (RC)
- Agriculture (AG)
- Rural Living (RL),
- Single Residential (RS),
- Multiple Residential (RM),
- Office Commercial (CO),
- Neighborhood Commercial (CN),
- Rural Commercial (CR),
- Highway Commercial (CH),
- General Commercial (CG),
- Service Commercial (CS),
- Community Industrial (IC),
- Regional Industrial (IR),
- Institutional (IN),
- Special Development (SD),
- Floodway (FW),
- Specific Plan (SP), and
- Open Space (OS).

Resource Conservation (RC) comprises the majority (55.98 percent) of the designated land uses in the County. This land use designation covers over 1 million acres, or about 1,500 square miles of land. Most of the land within this designation is publicly owned (federal and state) and includes national parks, military bases, conservation areas, and lands owned by other federal and state agencies. The County has designated approximately 681,500 acres or 1,065 square miles (37.92 percent) for residential uses. Out of this, about 587,535 acres (32.76 percent of total unincorporated area) are designated Rural Living, 67,691 acres are designated Single Residential, while 4,986 acres are designated Multiple Residential.

Commercial land use zoning districts (Office Commercial, Neighborhood Commercial, Rural Commercial, Highway Commercial, General Commercial, and Service Commercial) occupy a total of 12,177 acres or 0.68 percent of the total unincorporated area. Industrial land use zoning districts (including Community Industrial and Regional Industrial) occupy 21,834 acres or 1.21

percent of the total unincorporated area. Other land use designations include Agriculture occupying 41,793 acres (2.32 percent), Institutional occupying 8,567.51 acres (0.48 percent), Floodway occupying 20,281 acres (1.13 percent), and Specific Plan occupying 4,861.37 acres (0.27 percent).

Because of the size of the County, the San Bernardino County General Plan divides the county into 8 quadrants (Figure 1-12). The "one-map approach" allows the quadrant maps to be used for many different planning and development purposes. Figure 1-13 presents the Land Use Zoning for each quadrant. The Land Use Zoning identifies the type of construction and growth that exists or may occurs in area.

County designated Land Use Zoning Districts do not apply to Federal, State, or incorporated owned property.

The County's General Plan can be found at: http://countywideplan.com/home/about/

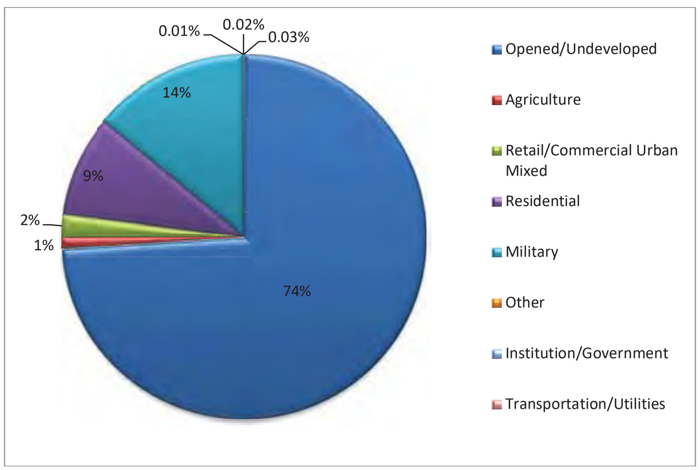

Figure 1-12: San Bernardino County Land Use

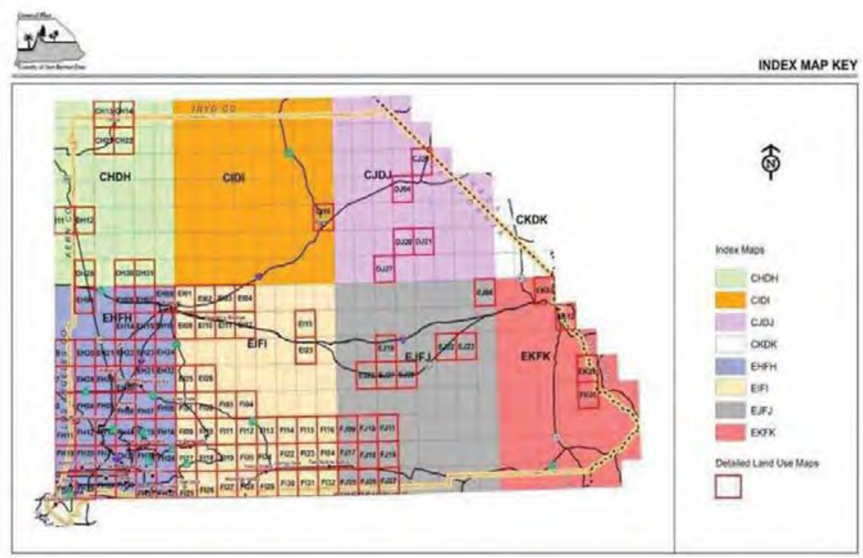

Figure 1-13: San Bernardino County Land Use Map

1.5.6 Development Trends

No major developments occurred in the unincorporated area of the county since the 2010 MJHMP was adopted. The limited development that did occur was scattered throughout the unincorporated area; with no one area being singled out. All development was in accordance with the pre-designated Land Use Zones development zones and complied with all Fire, Flood, and Seismic codes of the County and State at the time of development. This includes commercial, industrial, and residential developments.

The County is optimistic about the potential for future development. The High Desert area of San Bernardino County is one of the best places in the world for solar energy development because of its high altitude, the number of sunny days each year and existing power infrastructure.

- Many large solar energy projects are being proposed in California's desert area on federal Bureau of Land Management (BLM) land. BLM has received right-of-way requests encompassing more than 300,000 acres for the development of approximately 34 large solar thermal power plants totaling approximately 24,000 megawatts. This number of projects has not yet reached the stage of an Application for Certification (AFC) with the California Energy Commission.
- California's electric utility companies are required to use renewable energy to produce 20 percent of their power by 2010 and 33 percent by 2020. A main source of renewable power will be solar energy. Within the County of San Bernardino a Hybrid Power Project has been approved in the Victor Valley area. As of August 2010, three large Solar Projects to be placed in the County are in review by the California Energy Commission.

Once built, these projects will not impact the area to a great extent. Minimal staffing is required to operate these facilities and their very nature places them in remote locations of the County.

Additionally, with the completion of the Alameda Corridor and the emergence of the Ports of Los Angeles and Long Beach as the largest ports in the U.S., shipping trans-Pacific goods from the booming Asian economies, San Bernardino County has evolved as the logistics and distribution hub for the 20 million resident Southern California market and into the rest of the nation. As the international economy recovers amidst tightening land availability for warehousing and transit, San Bernardino County is better positioned than other areas in the region to harness the opportunity to become an even more important logistics hub.

The County has also started development of a bullet train. The bullet train will connect Victorville, CA and Las Vegas NV generally following the I-15 corridor (NOTE: There are discussions of additional bullet trains connecting San Bernardino with Los Angeles and San Diego and San Bernardino County and San Francisco/Sacramento).

While all of these development trends may not be recognized over the next 5 years, all future development that will take place is planned to occur in accordance with the General Plan Land Use Zones and will consider all potential hazards identified within this plan. Additionally, all development will be in compliance with all Fire, Flood, and Seismic codes of the County and State at the time of development.

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Section 2. Plan Adoption

2.1 Adoption by Local Governing Body

The San Bernardino County Board of Supervisors created "districts" to provide a specific service to an area / population of San Bernardino County. These Districts are Board Governed in that the Board of Supervisors has direct control and legislative oversight of the Districts. The Board of Supervisors acts on behalf of each District whenever governance items are necessary. The participating jurisdictions listed in this plan are separate legal entities from the County of San Bernardino. For tax/revenue purposes the Board of Supervisors, acting as the Board of Directors for each participating jurisdiction or "District", will be adopting the Multi-Jurisdictional Hazard Mitigation Plan on behalf of each District. The Districts are not independent from San Bernardino County but are controlled and administered as any other County Department is administered.

This plan represents mitigation efforts for the unincorporated portions of the County and the efforts of three jurisdictions participating in this Multi-Jurisdictional Hazard Mitigation planning effort. The participating jurisdictional special districts include:

San Bernardino County Fire District
San Bernardino County Flood Control District
San Bernardino County Special Districts Department

San Bernardino County Board of Supervisors is responsible for the review, approval, and adoption of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update for the unincorporated area of San Bernardino County, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and for the County's Board Governed Special Districts Department. It is also the intent of the San Bernardino County Board of Supervisors to take appropriate actions to incorporate the MJHMP update into the San Bernardino County General Plan.

2.2 Promulgation Authority

The Promulgator Authority for the adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the unincorporated area of San Bernardino County, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and for the County's Board Governed Special Districts Department and incorporation of the MJHMP into the San Bernardino County General Plan is:

- Chairman Robert A. Lovingood First District
- Janice Rutherford Second District Supervisor
- James Ramos Third District Supervisor
- Vice Chairman Curt Hagman Fourth District Supervisor
- Josie Gonzales Fifth District Supervisor

The Point of Contact for information regarding this MJHMP is:

Michael Antonucci, Emergency Services Manager
San Bernardino County Fire
Office of Emergency Services
1743 Miro Way
Rialto, CA 92376
(909) 356-3998

Section 3. Planning Process

3.1 Preparing the Plan

Multi-Jurisdictional Hazard Mitigation Planning is a process State, Tribal, and local governments use to identify risks and vulnerabilities associated with natural disasters, and to develop long-term strategies for protecting people and property from future hazard events.

Planning creates a way to solicit and consider input from diverse interests. Involving stakeholders is essential to building community-wide support for the plan. In addition to emergency managers, the planning process involves other government agencies (e.g., zoning, floodplain management, public works, community, and economic development), businesses, civic groups, environmental groups, and schools.

To assist with the updating of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), a Multi-Jurisdictional Planning Team (Planning Team) was established. The Planning Team was the lynchpin for all activities to update the MJHMP. The Planning Team was established to define and identify the strategies, goals, activities, and development of the MJHMP. The Planning Team represents a comprehensive team of subject matter experts from a range of areas that the team felt was affected by the plan or could provide great benefit to the team. Members of the Planning Team were drawn from San Bernardino County Departments, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and the San Bernardino County Special Districts Department.

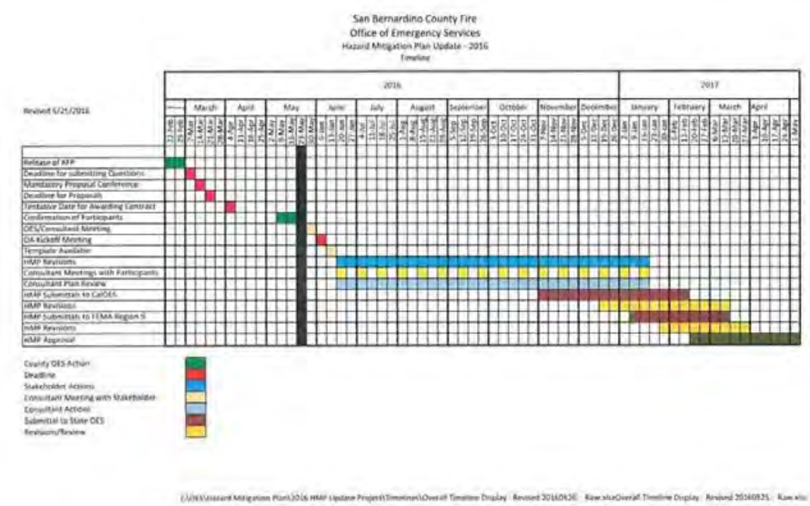
The Multi-Jurisdictional Planning Team members worked together to jointly determine and rank the risks facing the six participating agencies, develop goals and objectives to mitigate the risks, and identify which of the participating jurisdictions would be most appropriate for leading any particular project area identified by the Multi-Jurisdictional Planning Team. The individual Planning Team members then returned to their respective Special Districts where discussions were held, input sought, and potential projects developed and ranked for each of the Planning Team identified risks and projects relevant to the Special District. The Planning Team members then returned to the Multi-Jurisdictional Planning Team and provided the Planning Team with their vetted, prioritized list of potential projects and budgets to include in the Multi-Jurisdictional Hazard Mitigation Plan. These projects and budgets were integrated into the Multi-Jurisdictional Hazard Mitigation Plan. Upon approval, each participating jurisdiction would then be able to apply for grant funding for their prioritized projects without interference from another participating jurisdiction as funding became available.

The Planning Team was led by a representative from the San Bernardino County Fire Protection District-Office of Emergency Service. This representative took on the responsibilities of a Project Manager and facilitated and coordinated activates.

The Project Manager also represented the Unincorporated County at the San Bernardino County Operational Area (OA) Stakeholder meetings. San Bernardino County OES led the effort to coordinate Stakeholder in the Operational Area update their local MJHMP. This effort included: proving technical support, establishing a platform to encourage the exchange of ideas, and help coordination among neighboring stakeholders. The Project Manager was responsible for attending these meetings and incorporating the material into their planning process. One of the resource materials provided through the OA Stakeholder meetings was a suggested Table of Contents (TOC) the purpose of the TOC was to ensure all aspect of the MJHMP requirements were being met and could be found in similar sections in each of the Stakeholders updated MJHMPs.

This sample TOC was reviewed by the Planning Team and incorporated into the unincorporated county's MJHMP update efforts. Using the TOC, the Planning Team decided to conduct a section by section; page by page review of the 2016 MJHMP. To assist with this effort, a proposed project timeline was developed. The proposed Project Timeline illustrates the windows when each section of the 2016 MJHMP will be reviewed and the section revised.

Table 3-1: Proposed Project Timeline



Based on the TOC, the Planning Team divided the update process into seven (7) phases; one for each section of the TOC. This approach allowed for a much focused review of the material and provided an organized method to introduce new or updated material. The Project Manager led the discussion, solicited comments, took notes, and incorporated results in the MJHMP. Additionally, the Project Manager collected and summarized material provide by Planning Team members. During the Planning Team meetings some members were assigned tasks or action items which were to be completed prior to the next meeting.

Staff assigned to the MJHMP Update reviewed the 2016 MJHMP and provided comments referencing updated information such as current population statistics, new HAZUS-MH MR3 analysis of floods and earthquakes, and provide suggestions for updating the MJHMP. The Planning Team then reviewed the update information and validated/identified Goals, Objectives, and Projects. This step included discussion of how the projects would be prioritized.

3.1.1 Project Prioritization Involved Comprehensive Consideration of Criteria/Factors

While there is not a standard process followed by each of San Bernardino County Departments, and Districts; they all considered social, technological, administrative, political, legal, economic, and environmental factors. The County and each district participated on the Planning Team, and then took the risks, goals, objectives and projects back to their respective jurisdiction for discussion and vetting. After vetting, the individual Planning Team members returned to the Multi-Jurisdictional Planning Team where the individual materials were combined into a single Multi-Jurisdictional Hazard Mitigation Plan. This Multi-Jurisdictional effort resulted in goals, objectives and projects for all participants being listed under the appropriate hazard sections and not by individual participants. This reflects the overall County philosophy of allowing the department/district with the most expertise to suggest and/or manage a project that may affect another participant who does not have expertise in the hazard.

3.1.2 Planning Team

Much of the Planning Team is composed of representatives who were part of the development of the 2010 Unincorporated Area County MJHMP. This provided added value to the team in that they were familiar with the process and provided continuity in the updating of the 2010 MJHMP.

The Planning Team is comprised of representatives from San Bernardino County Departments, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and the San Bernardino County Special Districts Department who specialize in mitigation type activities/planning.

The Planning Team members represented select aspects of the community and were thought of as liaisons to the greater community. Each Planning Team member was responsible for communicating the direction and status of the planning effort to their outside members and in return they are expected to bring to the team outside perspectives. Additionally, the individual Planning Team members acted as liaisons for their respective Special Districts and were responsible for ensuring that the Special Districts provide appropriate input from their respective internal planning processes. Potential projects/budget meetings were held where alternative mitigation actions were discussed and potential mitigation projects were developed and prioritized along with budget development for the individual participating Special Districts and Departments. Additional prioritization after budgets were developed to ensure proper Benefit Cost Analysis (BCA) techniques were applied.

Representation was present on the Multi-Jurisdictional Planning Team from various County Departments and the three participating jurisdictional departments. Planning Team included representatives from all the participating San Bernardino County Special Districts and Departments. See Table 3-2 and Table 3-3.

Table 3-2: Multi-Jurisdictional Planning Team

Multi-Jurisdictional Planning Team Members	Title / Role
Unincorporated County	
Suzanne Peterson	*Countywide Plan Coordinator / Land Use Services / Mitigation Review*
Jerry Blum	*Countywide Plan Coordinator /*
Brent Rolf	*County GIS / Hazus Data Coordinator / Information Services*
Frank Jordan	*Land Use Services / Mitigation Review*
Jim Sowers	*Building and Safety / Risk Assessment Review and Mitigation Action Plan Development*
Patricia Cole	*Economic Development Agency / Implementation and Funding Review*
Carl Alban	*Architecture and Engineering Department*
John Amrhein	*Sherriff's Corner Department Rep. / Mitigation Action Review*
Mazin Kasey	*Public Works Dept. /Transportation Division*
Art Rivera	*Solid Waste Management Division*
Norma Spencer	*Superintendent of Schools*
Fire Protection District	
Michael Antonucci	*OES Director / MJHMP Plan Representative*
Cindy Serrano,	*Project Manager for Planning Process*
Miles Wagner	*Emergency Services Officer, GIS Representative and Stakeholder Coordination.*
David Davis	*Emergency Services Officer / Fire District Representative and Technical Writer*
Mary Barnett	*Technical Writer / Plan Update and Edits*

Multi-Jurisdictional Planning Team Members	Title / Role
Cheryl Nagy	Emergency Services Officer
Carrie Cruz	Emergency Services Officer
Elli Maldonado	Elli Maldonado – Office Assistant
Michael Horton	Michael Horton – Fire Marshal
Flood Control District	
Kevin Blakeslee, Deputy Director – Flood Control	Deputy Director – Flood Control
Kenneth Eke, Chief, Flood Control Planning/ Water Resources Division	Chief, Flood Control Planning/ Water Resources Division
Michael Fam	Flood Control Planning
Mona Sadek	Flood Control Planning
Marjorie Schrage	Flood Control Planning
Special Districts Department	
Jeff Rigney	Special Districts Dept. Director
Steve Samaras	Special Districts Dept. Acting Deputy Director
Erin Opliger	Big Bear Valley Recreation and Parks District Rep.
Erin Opliger	Bloomington Recreation and Parks District Rep.

Table 3-3: Stakeholder List

Stakeholder Members	Name	Title / Role
Municipal Partners		
City of Barstow	Jamie Williams	Fire Chief
City of San Bernardino	Eric Fyvie	Sergeant
City of Chino	Chris Wolff	Administrative Services Manager
City of Chino Hills	Bonnie Michaels	Emergency Services Analyst
City of Colton	Shannon Kendall	Emergency Services Coordinator
City of Fontana	Cheryl Nagy/ Mary	Emergency Services Officer
City of Grand Terrace	Haide Aguirre	Management Analyst
City of Hesperia	Rachel Molina	Public Information Officer
City of Loma Linda	Shannon Kendall	Emergency Services Coordinator
City of Montclair	Angelic Bird	Emergency Services Coordinator
City of Ontario	Raymond Cheung	New Emergency Manager
City of Rancho Cucamonga	Breanna Medina/ Denise School	Emergency Manager
City of Redlands	Fay Glass/ Wanda Viser	Emergency Operations Manager

COUNTY OF SAN BERNARDINO - Hazard Mitigation Plan Update

Stakeholder Members	Name	Title / Role
City of Rialto	Art Podeska	Battalion Chief
City of Upland	Angelic Bird	Emergency Services Coordinator
City of Victorville	Dana Wellborn	Emergency Services Manager
Town of Apple Valley	Joseph Ramos	Emergency Services Officer
Town of Yucca Valley	Jessica Rice	Management Analyst
School District Partners		
Apple Valley Unified School District	Janet Gould	Director, Risk Management
Chino Valley Unified School District	Dr. Grace Park	Assistant Superintendent
San Bernardino County Superintendent of Schools	Norma Spencer	Risk Management Analyst
Snowline Joint Unified School District	Robert Chacon	Director of Risk Management
Special District Partners		
Inland Empire Utilities Agency District Headquarters	Claudia Neighbors/ Tony Arellano	Safety Officer
Newberry Community Services District	Stephen Miller	Fire Chief- Barstow Fire Protection District
Omnitrans	Mark Crosby	Security and Emergency Preparedness Coordinator
Santa Ana Watershed Project Authority	Richard Haller/ Carlos Quintero	Exec. Manager of Engineering and Operations
Water District Partners		
Crestline Village Water District	Larrie Ann Davis	Office Manager
Cucamonga Valley Water District	Rosanna Ammari / Maria Kennedy	Maria Kennedy Consultant Representative
East Valley Water District	Cecilia Contreras / Gary Sturdivan	Administrative Assistant
Monte Vista Water District	Jonathon Dizon	Engineering Technician
San Bernardino Valley Municipal Water District	Dan Borrell/ Brent Adair	Project manager- Construction
Twenty-nine Palms Water District	Gary Sturdivan	Consultant Rep.
Yucaipa Valley Water District	John Hull	Public Works Management
CERT Teams		
Wrightwood		CERT Citizens
Phelan/Pinion Hills		CERT Citizens
Angelus Oaks		CERT Citizens
Big Bear Valley		CERT Citizens
Helendale		CERT Citizens
Lucerne Valley		CERT Citizens
Lytle Creek		CERT Citizens
Mill Creek Canyon		CERT Citizens

Stakeholder Members	Name	Title / Role
Morongo Basin		*CERT Citizens*
Mountain		*CERT Citizens*
Oak Hills		*CERT Citizens*
Rosena Ranch		*CERT Citizens*
San Antonio Heights		*CERT Citizens*
Silver Valley		*CERT Citizens*
Public Representatives		
-	*Destiny Davis*	*Interested Citizen*
-	*John Ferdon*	*Interested Citizen*
Other Partner Agencies		
San Manuel Band of Mission Indians	*Michael Russ*	*Disaster Services Manager*
Arrowhead Regional Medical Center	*Weston Scott Smith*	*Emergency Preparedness*
United States Forest Service	*Marc Stamer*	*San Bernardino National Forest and Angeles National Forest Rep.*
Wrightwood Fire Safe Council	*John Aziz*	*Fire Safe Council*
Rim of the World Mountain Mutual Aid Association	*Aaron Scullin*	*President*

There were a series of meetings held with the Planning Team. Each meeting had a primary focus and provided an opportunity to discuss updates and exchange ideas. Below is a list of the Planning Team meetings:

Table 3-4: Planning Team Meetings

Date	Activity
February 4, 2016	In person meeting to discuss revisions and additions to the Planning Process, Risk Assessment, Community Capability Assessment, Mitigation Strategies, Plan Maintenance, Fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion into the plan.
June 23, 2016	Organizational Meeting for County Unincorporated Area Planning team. Planning Team members were introduced to the project and assigned to review 2016 MJHMP and update risks and mitigation projects as needed.
July 19,2016	Conference Call with participants to discuss revisions and additions to the Planning Process, risk Assessment, Community capability Assessment, Mitigation Strategies, Plan maintenance, fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion into the plan.

August 4, 2010	In person meeting to discuss revisions and additions to the Planning Process, risk Assessment, Community capability Assessment, Mitigation Strategies, Plan maintenance, fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion into the plan
August 30, 2016	In person meeting to discuss revisions and additions to the Planning Process, risk Assessment, Community Capability Assessment, Mitigation Strategies, Plan Maintenance, Fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion in the plan.
September 14, 2016	In Person meeting of the Morongo Basin COAD Community Organizations Active in Disaster. Hazard Mitigations Plan Discussion and outreach for public input on the update of the Hazard Mitigation Plan, and contact information given to the public.
September 20, 2016	In person meeting to discuss changes suggestions with the Fire Safe Council for the following communities: Wrightwood, Phelan, Pinion hills, West Cajon Valley, and Baldy Mesa. The first item on the agenda was the discussion of the LHMP update and explained how to review the current HMP and instructions were given on who and how to contact OES and about 79 persons of the public were present
September 21, 2016	Rim of the World Mountains Mutual Aid Association in Person meeting to discuss Planning Team Goals and Objectives, and any public concerns and contact information was given and it was the first item on the agenda for the meeting. And continuing fire fuel thinning programs (MAST) and Bark Beetle tree removal.
September 24, 2016	In Person meeting of CERT Training on Terrorism, The hazard Mitigation Plan was brought up and discussed and contact information given to the public, a few topics and subjects were brought up.

3.2 Coordination with Other External Jurisdictions, Agencies and Organizations

3.2.1 Internal Coordination

Because of the size and geographical location of Unincorporated County area, there are many jurisdictions, agencies, and organizations that are affected by or have influence on the county and the mitigation planning process. As part of the planning process, the Planning Team, and particularly the Project Manager, took great efforts to engage and include as many members as possible. These members were drawn from San Bernardino County Departments, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, and the San Bernardino County Special Districts Department.

One of the first efforts that were made was when the Planning Team was being established. The Planning Team members gave special considerations as to what they thought needed to be in the MJHMP and attempted to identify a person who could representative that area. This consideration went beyond the county departments.

As mentioned above, in addition to being required to participate in the Planning Team meetings, the Planning Team members were also required to liaison with other groups including their own department/districts planning and project staff and with cooperating agencies to provide updates on the project and to bring to the team the different perspectives and comments. The Planning Team conducted a very extensive outreach effort.

This was done mostly through leveraging of existing meetings and efforts. In this liaison role, the Planning Team members coordinated with CalFire; the United States Forest Service, San Bernardino National Forest and Angeles National Forest; Natural Resource Conservation Service, Special Districts, and the 24 cities and towns within the County. This allowed for the Planning Team to capture a larger perspective; while keeping the Planning Team at a manageable level. The information was then brought back to the Multi-Jurisdictional Planning Team by the individual Planning Team members. At these meeting, potential cooperative projects were discussed, categorized, and prioritized for inclusion in the Multi-Jurisdictional Hazard Mitigation Plan.

As previously mentioned, the Unincorporated County and special districts were also active members of the San Bernardino OA Stakeholder Group meetings. These meetings provided an opportunity to coordinate with all cities/towns and special districts in the county. Through this venue, the Planning Team and the Project Manager reached out to adjacent jurisdictions and associated special districts to ensure that their efforts and findings were not in conflict. Stakeholder Meetings include the primary, alternate, and any consultants for all the participating jurisdictions.

As part of this effort, an OA Stakeholder Web Portal was developed to assist the jurisdictions update their MJHMPs, and encouraged sharing information, resources, and ideas necessary to complete the update process. Meetings, attended by the County Project Manager, were both in person and by conference call; many including a webinar. The Project Manager then brought the materials and discussions held at these meetings back to the Planning Team for review and action wherever applicable to the MJHMP effort. Participating Stakeholders are listed in Annex 5. A list of the OA Stakeholder Meetings is listed below:

- September 21, 2016
  Stakeholders Conference Call/Webinar at OES Headquarters
  1:30 p.m. to 2:30 p.m.

  8 participants in MJHMP Update Project Portal Rollout participated in the Conference Call and Webinar to introduce MJHMP Update Portal. Portal has public and stakeholder sections. During this conference call participants were shown the portal and walked through the log-in process to access the stakeholders' side of the website. Also discussed having weekly and some occasions office calls to update plan progress and needs for information.

- September 28, 2016
  Production team conference call OES Headquarters
  1:30 p.m. to 2:30 p.m.

  This meeting presented the website updates, progress chart and needs from other stakeholder departments to provide data such as proposed, in progress and completed hazard mitigating projects. The MJHMP Resource material was also reviewed. The tentative schedule of Production group meetings was reviewed.

- October 5, 2016
  Production Group Conference Call
  1:30 p.m. to 2:30 a.m.

  Stakeholders discussed MJHMP progress of the MJHMP updates. Revised timelines for updates were presented. New Reference Materials now available on the Web Portal were presented. Questions from the participants were discussed and answered.

- October 12, 2016
  Production team conference call
  OES Headquarters
  1:30 p.m. to 2:30 p.m.

  This meeting presented the website updates, progress chart and needs from other stakeholder departments to provide data such as proposed, in progress and completed hazard mitigating projects. The MJHMP Resource material was also reviewed. The tentative schedule of Production group meetings was reviewed.

- October 19, 2016
  OES Headquarters
  1:30 p.m. to 2:30 p.m.

  This meeting presented the website updates, progress chart and needs from other stakeholder departments to provide data such as proposed, in progress and completed hazard mitigating projects. The MJHMP Resource material was also reviewed. The tentative schedule of Production group meetings was reviewed.

- October 26, CISN
  Project Management Team Meeting
  San Bernardino County Government Center Community Room,
  10:00 a.m. to 12:00 a.m.

  This meeting was with 12 county members and any public to go over changes in the general plan and updates the County Hazard Mitigation plan with current and proposed and approved projects as well as code updates and ordinance changes and draft safety proposals.

- October 26, 2016
  Entire project Teams representatives via in person or video and voice call in
  Video Conference Call
  2 p.m. to 4 p.m.

  All project team stakeholder representatives discussed progress of the MJHMP updates. And timelines were discussed. Questions from the participants were discussed and answered. Also a live meeting in conjunction with Land Use representatives and Fire also consultant staff. 32 in attendance and 108 called in or video linked. Internal and External groups

3.2.2 External Coordination

The unincorporated county also had representation on the OA Working Group team. The Working Group is a small group of OA Stakeholders with experience in developing Multi-Jurisdictional Hazard Mitigation Plans. Members are drawn from the 24 cities/towns, 33 special districts, and the County. The goal of the Working Group is to vet the direction and material being provided to the larger Stakeholder Group such as crosswalk, Web Portal, use of maps, and a method to prioritize and rank the existing and any new hazards. The Working Group also discusses problems and solutions that arise during the MJHMP update process. Meetings were either in person or by conference call.

- June 23, 2016
  Stakeholders Meeting
  San Bernardino Unified School District Community Room, San Bernardino, CA
  2:00 p.m. to 4:00 p.m.

  54 Participants representing 24 cities/towns, 30 special districts, and the unincorporated area of participated. This Stakeholders Meeting introduced the Web Portal and the process to develop a current MJHMP from the 2010 MJHMP. Timelines were presented as well as templates for use in updating the project. Copies of the 2010 MJHMP for the jurisdictions were made available on the Web Portal to use as a starting point in the update process.

- August 30, 2016
  Stakeholders Meeting at OES Headquarters 1:30 p.m. to 2:30 p.m.

  In person meeting to discuss revisions and additions to the Planning Process, risk Assessment, Community capability Assessment, Mitigation Strategies, Plan maintenance, fiscal Resources, and Public Outreach. Each section was reviewed and discussed by the Team. Additions and corrections will be forwarded to OES for inclusion in the plan.

- October 26, 2016
  Entire project Teams representatives via in person, video or voice call in
  Video Conference Call
  2 p.m. to 4 p.m.

  All project team stakeholder representatives discussed progress of the MJHMP updates. Timelines were discussed.
  Questions from the participants were discussed and answered. Also a live meeting in conjunction with Land Use representatives and Fire also consultant staff. 32 in attendance and 108 called in or video linked.

3.3 Public Involvement/Outreach

Public involvement was solicited throughout the process. Since the 2016 MJHMP approval, the County and its special districts have taken several steps to educate the public on the hazards facing the county and had several public forums where mitigation projects were discussed and identified. At all events, public opinion and comments are solicited.

The Planning Team also considered the possibility of including public members on the Planning Team. However, because of the vast size of the county and the volume of possibilities, it was determined that having the Planning Team members liaison with the public would better serve and capture the public interest.

During this process, the County and Special Districts also used several platforms to reach out and inform the public of the MJHMP update. Wherever possible, a joint effort was made by the Planning Team members to include discussion for each participating jurisdictions hazards, goals, and objectives. These joint meetings of the Special Districts and County resulted in joint leverage of the planning effort and a resulting joint benefit of goals/objectives, and project development for the MJHMP development. Public Involvement consisted of meetings for County Departments or Special Districts which gave the public the direct opportunity to comment on the County Unincorporated Area MJHMP, meetings of County Department or Special District advisory committees where hazard specific information and possible projects were discussed, updates on the County website, press releases regarding the MJHMP, and public hearing regarding the MJHMP. All participants collectively supported the following public outreach meetings. Below is a summary list of the public outreach:

3.3.1 Public Meetings

- Wrightwood Fire Safe Council
  Wrightwood Museum, Wrightwood, CA
  July 19, 2016
  7:00 p.m. to 9:00 p.m.

17 community members and 7 Wrightwood Fire Safe Council members attended. A demonstration of Thermo-Gel and various application methods was demonstrated by a private vendor.

Reports of activities were given by the Angeles National Forest and the San Bernardino National Forest.
San Bernardino County Fire Protection District Office of Emergency Services presented a PowerPoint presentation on the effort to update the MJHMP for the unincorporated area of the County. A copy of this PowerPoint is in Annex 9 of the MJHMP.

- Rim of the World Mutual Aid Association
  100 W. Meadow Lane, Big Bear City, CA
  August 21, 2016
  6:00 p.m. to 7:30 a.m.

  24 representatives of local agencies, special districts, utilities, and the public in the Big Bear Valley attended the meeting. The City of Big Bear Lake and the Big Bear City CSD reported on the status of their MJHMP Update efforts. Both are proceeding with the goal of submitting the plan following the Group 1 timelines. Both agencies made presentations to their residents explaining the MJHMP Update Process, public involvement, and timelines.

  San Bernardino County Fire Protection District Office of Emergency Services presented a PowerPoint presentation on the effort to update the MJHMP for the unincorporated area of the County.

- Morongo Basin COAD Community Organizations Active in Disasters
  September 14, 2016
  10:00 a.m. to 12:00 p.m.

  This was a public meeting to discuss volunteers in disasters and the Local Hazard Mitigation Plan and the future of volunteer organizations in active disasters in the areas of Morongo and the entire county of San Bernardino County.

- Wrightwood Fire Safe Council
  Wrightwood Elementary School, Wrightwood, Ca
  September 20, 2016

  Community meeting of the fire safe council for the communities of Wrightwood, Pinion Hills, Phelan, West Cajon Valley, Baldy mesa the meeting covered topics of Emergency Alert System and notifications, repopulation and evacuation pans as well as the Local Hazard Mitigation Plan Update

- Rim of the World Mountain Mutual Aid Association
  September 21, 2016

  Rim of the World Mountains Mutual Aid Association in Person meeting to discuss Planning Team Goals and Objectives, and any public concerns and contact information was given and it was the first item on the agenda for the meeting; continuing on with fire fuel thinning programs (MAST) and Bark Beetle tree removal.

- CERT Terrorism Meeting/Training
  Victoria Gardens Community Center Rancho Cucamonga, CA
  September 24, 2016
  8:00 a.m. to 4:00 p.m.

  This was a CERT Symposium on Terrorism that covered the December 2nd Terror Attack and mass shooting incidents and how to react. An Active Shooter Awareness Course and discussion on the Local Hazard Mitigation Plan Update and Counter Terrorism Awareness courses were all presented to 100 CERT Members and public attendees.

3.3.2 Ready SB County Preparedness App Message/Web Postings

An App message was sent out to alert the public about the hazard mitigation process. The message was sent to over 15,000 people via the SB County Preparedness Mobile App and it is attached to the San Bernardino County Fire Website https://sbcfire.org as referenced in Annex 6. Ready SB County Preparedness Mobile App can be used on either an Android or iPhone. This app provides multiple resources for our residents that will assist them in preparing for a disaster and enhancing the recovery process. Protect yourself and your loved ones before, during and after a disaster.

In addition to hazard mitigation plan updates the public can get the Latest News from SBCounty.gov, CalTrans, National Weather Service, and San Bernardino County Fire Office of Emergency Services. This app provides the public with emergency supply kit lists, grocery lists and checklists tailored to an individual. The public can access and update preparedness plans as needed. Learn all you need to plan for and respond to natural disasters, terrorism and pandemic flu in San Bernardino County.

3.3.3 CERT Teams

The Press Release and Executive Summary were forwarded to the CERT Team leaders for those CERT Teams located in the unincorporated County area. The Team Leaders forwarded the MJHMP Press Release and Executive summary to their team members with the request for comments on the MJHMP. The fourteen (14) CERT Teams within the unincorporated County include:

Angelus Oaks CERT	Big Bear Valley CERT	Helendale CERT
Lucerne Valley CERT	Lytle Creek CERT	Mill Creek Canyon CERT
Morongo Basin CERT	Mountain CERT	Oak Hills CERT
Phelan/Pinon Hills CERT	Rosena Beach CERT	San Antonio Heights CERT
Silver Valley CERT	Wrightwood CERT	

3.3.4 Public Hearing Process (to be completed upon FEMA Approval)

Once FEMA "approval pending adoption" notification is received, the Board of Supervisors reviewed, approved, and adopted the Unincorporated Area Multi-Jurisdictional Hazard Mitigation Plan for the County and its Special Districts at the Public Hearing meeting **(date to be determined)**. The Board of Supervisors issued a Letter of Promulgation and Resolution denoting approval of the Multi-Jurisdictional Hazard Mitigation Plan for the County and its special Districts.

Prior to the Public Adoption Hearing Date (date to be determined), the Plan will be posted on the San Bernardino County website as part of the Agenda for the meeting. The Agenda with all attachments is posted the Wednesday prior to the hearing date as a public review requirement. Members of the public were invited to review and make comments at the meeting on (date to be determined). The Multi-Jurisdictional Hazard Mitigation Plan for the County and its Special Districts was on the Board of Supervisors agenda for review and adoption at their regularly scheduled meeting on (date to be determined).Residents of the County were requested to make comments or request information on the Multi-Jurisdictional Hazard Mitigation Plan during the regularly scheduled meeting. After the public had an opportunity to review and comment on the Plan the Board of Supervisors took action on the Board Agenda items.

3.4 Planning Process

As discussed, the planning process followed FEMA How to guides which includes; organizing resources, conducting the risk assessment, developing a capabilities assessment, developing a mitigation strategy and providing implementation measures for continued mitigation success, The Risk Assessment process includes four (4) basic step; 1) hazard identification and screening; 2) hazard profiling; 3) hazard exposure; and, 4) hazard vulnerability. The Project Manager, working with the Planning Team, facilitated discussions around these steps.
The first step in this process was to identify all natural hazards present in the community. The Planning Team started with the 2010 MJHMP and augmented as necessary. This augmentation

considered both adding and removing of hazards to develop a list of potential natural hazards in the community. The Planning Team utilized several sources to ensure they were considering all potential hazards. Material reviewed included the following: 2010 San Bernardino County Operational Area MJHMP, State of California MJHMP, FEMA "How-to Guides," and several surround community MJHMPs. After the list of potential hazards in the community is generated, the hazards were screened. For a full listing of documents see Section 5.1.1

3.4.1 Hazard Screening

The intent of screening hazards is to help prioritize which hazard creates the greatest concern in the community. In 2010, the MJHMP process used Critical Priority Risk Index (CPRI) software to evaluate hazards. In 2016 an alternative approach was implemented. The Planning Team agreed to utilize a non-numerical ranking system for the MJHMP update process. This process consists of generating a qualitative ranking (High, Medium, or Low) rating for: 1) probability; and, 2) impact from each hazard. To further assist with the process, the following definition of "High", "Medium", and "Low" probability and impacts are being provided (NOTE: these definitions we utilized in the 2010 MJHMP process):

Probability
High-Highly Likely/Likely
Medium-Possible
Low-Unlikely
Impact
High-Catastrophic/Critical
Medium-Limited
Low-Negligible

The hazards were then placed into a matrix with the appropriate/corresponding box/cell. The table below is an example of how the process will capture the results.

		Impact		
		High	Medium	Low
Probability	High			
	Medium			
	Low			

After all hazards had been analyzed, the Planning Team then determined which Probability and Impact category (i.e., High Impact; High Probability, Medium Impact) the community will focus on over the next five (5) years. An example of how the hazards may be prioritized is below (Red equaling high priority):

		Impact		
		High	Medium	Low
Probability	High			
	Medium			
	Low			

After identifying the “higher” priority hazards in the community, each of the “high” priority hazards were profiled. The hazard profiling include the incorporation of all new information, material, and reports to better help the Planning Team and the community understand the hazard.

Additionally, for each of the profiled hazards, the Planning Team then analyzed the community’s exposure to each hazard (inventory of assets) and the potential impact under scenario events. The Planning Team used HAZUS and hazards intersect analyses recently completed within San Bernardino County to produce this information. See Section 4 for more information.

3.4.2 Set Goals

Goal setting was approached by the Planning Team as a two layered process. The first layer involved the stakeholders acting together as the Planning Team. The second layer involved the individual Special Districts working internally to coordinate those goals identified by the Planning Team with the goals identified internally by the Special Districts. The Planning Team validated and identified new Goals and Objectives for the MJHMP update in 2016. The Planning Team reviewed the hazard exposure and scenario impacts developed during the Risk Assessment portion of the process. With a firm understanding of the risk the community is potentially facing, the Planning Team then re-evaluated the 2010 Multi-Jurisdictional Hazard Mitigation Plan Goals and Objectives; assessed their status and effectiveness in meeting the 2010 Mitigation Measures and identified new Goals and Objectives.

As part of this process, the Planning Team also reviewed the County’s General Plan, the State of California MJHMP, Floodplain Management Plans, Task Force After Action, and/or documents, and adjacent local jurisdiction MJHMPs to ensure the Goals and Objectives were comprehensive and compatible with those outlined in this plan.

3.4.3 Review and Propose Mitigation Measures

After the Goals and Objectives were established, the Planning Team then turned to identifying projects under each Goal and Objective that could be implemented to help reduce and/or eliminate the impacts from the priority hazards. As part of this process, the Planning Team reviewed the projects in the 2010 MJHMP to determine which are completed, which are ongoing, and which were deferred. For projects that were not completed the Planning Team validated whether or not the project was necessary.

With a firm understanding of past accomplishments and a good understanding of the potential exposure and scenario impacts from the Risk Assessment section, the Planning Team then started to identify projects that will help reduce and/or eliminate the risk for the high priority hazards. Again, a two-layer approach was used. The Planning Team as a whole identified common projects. These common projects were then coordinated internally by the Special Districts and the County to develop a common list of projects. After a list of all possible projects has been identified, the Planning Team then went through the process of prioritizing the projects.

To assist with this effort the Planning Team adopted the STAPLEE methodology. STAPLEE stands for:

- Social - The public must support the overall implementation strategy and specific mitigation actions. Therefore, the projects will have to be evaluated in terms of community acceptance.
- Technology - It is important to determine if the proposed action is technically feasible, will help to reduce losses in the long term, and has minimal secondary impacts. Determine whether the alternative action is a whole or partial solution, or not a solution at all.
- Administrative - Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to determine if the jurisdiction/special district has the personnel and administrative capabilities necessary to implement the action or whether outside help will be needed
- Political - Understanding how your current community and State political leadership feel’s about issues related to the environment, economic development, safety, and emergency management. This will provide valuable insight into the level of political support you may have for the mitigation activities and programs. Proposed mitigation objectives sometimes fail because of a lack of political acceptability.
- Legal - Without the appropriate legal authority, the action cannot lawfully be undertaken. When considering this criterion, determine whether your jurisdiction has the legal authority at the State, or local level to implement the action, or whether the jurisdiction must pass new laws or regulations. Each level of government operates under a specific source of delegated authority. As a general rule, most local governments operate under enabling legislation that gives them the power to engage in different activities. Identify the unit of government undertaking the mitigation action, and include an analysis of the interrelationships between local, regional, State, and Federal governments. Legal authority is likely to have a significant role later in the process when your State, or community will

have to determine how mitigation activities can best be carried out, and to what extent mitigation policies and programs can be enforced.

- Economic - Every local government experiences budget constraints at one time or another. Cost effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented than mitigation actions requiring general obligation bonds or other instruments that would incur long-term debt to a community. Local communities with tight budgets or budget shortfalls may be more willing to undertake a mitigation initiative if it can be funded, at least in part, by outside sources. "Big ticket" mitigation actions, such as large-scale acquisitions and relocation, are often considered for implementation in a post-disaster scenario when additional Federal and State funding for mitigation is available.
- Environmental - Impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities and the many statutory considerations, such as NEPA, to keep in mind when using Federal funds. The Planning Team needed to evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets such as threatened and endangered species, wetlands, and other protected natural resources.

In addition to the STAPLEE methodology, the Planning Team incorporated other criteria/factor questions into the process to help engage and solicit input from members. Examples of these criteria/factor questions are:

- Does the Action:
  - Solve the problem?
  - Address Vulnerability Assessment?
  - Reduce the exposure or vulnerability to the highest priority hazard?
  - Address multiple hazards?
  - Address more than one (1) Goal/Objective?
  - Benefits equal or exceed costs?

- Can the Action:
  - Be implemented with existing funds?
  - Be implemented by existing state or federal grant programs?
  - Be completed within the 5-year life cycle of the LMJHMP?
  - Be implemented with currently available technologies?

- Will the Action:
  - Be accepted by the community?
  - Be supported by community leaders?
  - Adversely impact segments of the population or neighborhoods?
  - Require a change in local ordinances or zoning laws?
  - Result in legal action such as a lawsuit?
  - Positively or negatively impact the environment?
  - Comply with all local, state, and federal environmental laws and regulations?

- Is there:
  - Sufficient staffing to undertake the project?
  - Existing authority to undertake the project?

After going through the above mentioned process for each project, the Planning Team identified higher priority projects.

3.4.4 Draft the Multi-Jurisdictional Hazard Mitigation Plan

The Multi-Jurisdictional Hazard Mitigation Plan Update was drafted by the Project Manager, based on input and comments provided by the Planning Team. As indicated previously, the Planning Team used the 2010 MJHMP as a starting point but revised it to reflect updated information). The 2016 MJHMP format and is similar to the 2010 plan with slight heading changes and differences in content. In addition to the heading changes and improved risk assessment information, the Planning Team also uses the FEMA Guidance and materials provided by the consultant hired to coordinate the Operational Area MJHMP and Stakeholder groups. This material aided in the Planning Team's understanding of the level of detail and type of information that is excepting in each section.

This process started with the Special Districts and County providing information to the Planning Team through their liaison on the planning team. After the Planning Team ranked and prioritized the materials, the liaisons returned to their respective Special Districts to vet the Planning Team's work. The Planning Team then worked together with the vetted materials to produce the draft MJHMP. As mentioned earlier, each section was reviewed and updated as necessary. While some Planning Team members are responsible for the updating select sections, all members are responsible for reviewing and commenting on the entire MJHMP. The Planning Team Project Manager was responsible for version control and distribution of the final MJHMP for review.

Once the MJHMP update was drafted, the Planning Team provided opportunities for the public to review and comment on the plan. After the public comment period was closed, the Planning Team finalized the plan and forwarded to Cal EMA and FEMA for approval.

3.4.5 Adopt the Plan

The San Bernardino County Board of Supervisors created each of the Special Districts to provide a specific service to a particular area/population of San Bernardino County. These Special Districts are Board Governed in that the Board of Supervisors has direct control and legislative oversight of the Special Districts. The Board of Supervisors takes action on behalf of each Special District whenever governance items are necessary. As the Five special districts are separate legal entities from the County of San Bernardino for tax/revenue purposes the Board of supervisors, acting as the Board of Directors for each Special District, will be adopting the Multi-

Jurisdictional Hazard Mitigation Plan on behalf of each Special District. The Special Districts are not independent from San Bernardino County but are controlled and administered as any other County Department is administered. In order to comply with legal requirement for each of the five Special Districts, separate resolutions are required. Copies of these resolutions are attached at the front of this MJHMP.

San Bernardino County Board of Supervisors is responsible for the review, approval, and adoption of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update for the unincorporated area of San Bernardino County, the San Bernardino County Fire Protection District, the San Bernardino County Flood Control District, the Big Bear Valley Recreation and Park District, Bloomington Recreation and Park District and for the County's board governed Special Districts Department. It is also the intent of the San Bernardino County Board of Supervisors to take appropriate actions to incorporate the MJHMP update into the San Bernardino County General Plan.

After Cal EMA and FEMA have approved the HMP update, it will be adopted by the San Bernardino County Board of Supervisors. Currently, the adoption process is scheduled for **(date to be determined)**. The item will be part of the consent calendar subject to a public hearing if necessary. The HMP will be listed on the agenda with the plan being made available electronically to the general public for at least three (3) business days prior to the Board of Supervisor's meeting date. Any member of the public can make comments on the Plan during the meeting prior to any action by the Board of Supervisors.

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Section 4. Risk Assessment

The goal of mitigation is to reduce and/or eliminate the future impacts of a hazard including property damage, disruption to local and regional economies, and the amount of public and private funds spent to assist with recovery. However, mitigation should be based on an assessment of the risk.

This Risk Assessment Section evaluates the potential loss from a hazard event by assessing the vulnerability of buildings, infrastructure, and people. It identifies the characteristics and potential consequences of hazards, how much of the unincorporated areas of the County could be affected by a hazard, and the impact on unincorporated County area assets. The Risk Assessment approach consists of three (3) components:

- ***Hazard Identification*** – *Identification and screening of hazards (Section 4.1)*
- ***Hazard Profiles*** – *Review of historic occurrences and assessment of the potential for future events (Section 4.2)*
- ***Vulnerability Assessment*** – *Determination of potential losses or impacts to buildings, infrastructure and population (Section 4.3)*

4.1 Hazard Identification

4.1.1 Hazard Screening Criteria

Per FEMA Guidance, the first step in developing the Risk Assessment is identifying the hazards. The County's HMP Planning Team reviewed a number of previously prepared hazard mitigation plans and other relevant documents to determine the universe of natural hazards that have the potential to affect the County and the nearby region. Table 4-1 provides a crosswalk of hazards identified in the 2010 San Bernardino County Multijurisdictional Hazard Mitigation Plan Update, the County of San Bernardino 2007 General Plan Safety Element, Single Jurisdictional Plans and the 2013 CA State Hazard Mitigation Plan. Seventeen different hazards were identified based on a thorough document review. The crosswalk was used to develop a preliminary hazards list providing a framework for County HMP Planning Team members to evaluate which hazards were truly relevant to the County and which ones are not. For example, volcanic activity was considered to be of little relevance to the County, while earthquake, flooding, and wildfire were indicated in almost all hazard documentation.

Table 4-1: Document Review Crosswalk

Hazards	2010 San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan	County of San Bernardino 2007 General Plan Safety Element	Single Jurisdictional Plans	2013 CA State Hazard Mitigation Plan
Climate Change				■
Dam Inundation			■	■
Drought			■	■
Earthquake/ Geologic Hazards	■	■	■	■
Extreme Heat				■
Extreme Cold				■
Flood	■	■	■	■
Hazardous Waste		■	■	■
High Winds/ Straight Line Winds		■	■	
Hail				
Infestation				
Lightning				
Terrorism			■	■
Tornado				
Volcanic Activity		■		■
Wildfire	■	■	■	■
Winter Storm (Heavy Snowfall)				■

In addition to a document review, previous hazard occurrences were used to identify hazards for this hazard mitigation plan. Previous hazard occurrences provide a historical view of hazards that have affected the County in the past, and thus provide a window into the potential hazards that can affect the County in the future. Information about federal and state disaster declarations in San Bernardino County (declarations are declared by County) was compiled from FEMA and Cal EMA's databases, as shown in Table 4-2. Though not a complete snapshot of hazard incidences in the County (since not all hazard events are federally or state declared), Table 4-2 provided the County HMP Planning Team with solidified accounts of the types and extent of disasters that have affected the County dating back to 1965 when flooding affected entire regions of San Bernardino County. As indicated in Table 4-2 large regional incidents have affected San Bernardino County, including the California Wildfires of 1999. Most recently, disasters for terrorist attacks (2015), flood (2011) and severe storms (2010) were declared in San Bernardino County. The disaster declarations in Table 4-2 provide a baseline for consideration in the hazard prioritization process.

Table 4-2: Federal, State and County Declared Disasters

Disaster Number	Declaration Date	Disaster Type	Incident Type	Title
Federal Declarations				
Major Disaster Declarations				
1952	1/26/2011	DR	Flood	Severe Winter Storms, Flooding, and Debris and Mud Flows
1884	3/8/2010	DR	Severe Storm(s)	Severe Winter Storms, Flooding, and Debris and Mud Flows
1731	10/24/2007	DR	Fire	Wildfires, Flooding, Mud Flows, and Debris Flows
1689	3/13/2007	DR	Freezing	Severe Freeze
1585	4/14/2005	DR	Severe Storm(s)	Severe Storms, Flooding, Landslides, and Mud and Debris Flows
1577	2/4/2005	DR	Severe Storm(s)	Severe Storms, Flooding, Debris Flows, and Mudslides
1498	10/27/2003	DR	Fire	Wildfires, Flooding, Mudflow and Debris Flow Directly Related T
1203	2/9/1998	DR	Severe Storm(s)	Severe Winter Storms and Flooding
1046	3/12/1995	DR	Severe Storm(s)	Severe Winter Storms, Flooding Landslides, Mud Flow
1044	1/10/1995	DR	Severe Storm(s)	Severe Winter Storms, Flooding, Landslides, Mud Flows
1005	10/28/1993	DR	Fire	Fires, Mud/Landslides, Flooding, Soil Erosion
979	2/3/1993	DR	Flood	Severe Winter Storm, Mud & Land Slides, & Flooding
947	7/2/1992	DR	Earthquake	Earthquake & Aftershocks
935	2/25/1992	DR	Flood	Rain/Snow/Wind Storms, Flooding, Mudslides
894	2/11/1991	DR	Freezing	Severe Freeze
872	6/30/1990	DR	Fire	Fires
690	9/22/1983	DR	Flood	Flash Flooding
687	7/1/1983	DR	Flood	Flooding
677	2/9/1983	DR	Coastal Storm	Coastal Storms, Floods, Slides & Tornadoes
635	11/27/1980	DR	Fire	Brush & Timber Fires
615	2/21/1980	DR	Flood	Severe Storms, Mudslides & Flooding
547	2/15/1978	DR	Flood	Coastal Storms, Mudslides & Flooding
521	9/21/1976	DR	Flood	Flooding, Tropical Storm Kathleen
295	9/29/1970	DR	Fire	Forest & Brush Fires
253	1/26/1969	DR	Flood	Severe Storms & Flooding
223	1/2/1967	DR	Flood	Severe Storms & Flooding
211	12/7/1965	DR	Flood	Heavy Rains & Flooding
Fire Management Assistance Declarations				
2955	9/2/2011	FM	Fire	Hill Fire
2841	10/4/2009	FM	Fire	Sheep Fire
2836	9/1/2009	FM	Fire	Pendleton Fire
2833	8/31/2009	FM	Fire	Oak Glen Fire
2792	11/15/2008	FM	Fire	Freeway Fire Complex
3279	10/23/2007	EM	Fire	Wildfires
2738	10/22/2007	FM	Fire	Grass Valley Fire
2728	9/15/2007	FM	Fire	Butler 2 Fire
2653	7/12/2006	FM	Fire	Sawtooth Fire Complex

Disaster Number	Declaration Date	Disaster Type	Incident Type	Title
3248	9/13/2005	EM	Hurricane	Hurricane Katrina Evacuation
2503	10/25/2003	FM	Fire	Old Fire
2501	10/23/2003	FM	Fire	Ca-Grand Prix Fire-10-23-2003
2497	9/6/2003	FM	Fire	Ca-Bridge Fire-09-05-2003
2491	8/19/2003	FM	Fire	Ca-Locust Wildfire-08-19-2003
Emergency Declarations				
3140	9/1/1999	EM	Fire	Ca-Wildfires-08/25/1999
CALOES Emergency and Disaster Proclamations/ Executive Orders				
Other Disasters				
2464	9/24/2002	FS	Fire	Williams Fire
2433	6/27/2002	FS	Fire	Louisiana Fire
2425	6/17/2002	FS	Fire	Blue Cut Fire
###	12/18/2015	EM	Terrorist Attack	Mass Shooting
State Declarations				
145	2/14/1963		Severe Storms	California Severe Storms, Heavy Rains, & Flooding
47	12/22/1955		Flood	California Flood
15	2/5/1954		Flood	California Flood & Erosion
County Declarations				
	3/13/1990		Earthquake	Upland Earthquake
	10/31/1988		Fire	Texas Fire (Watershed Damage)
	9/3/1987		Fire	Wildland Fires
	7/13/1984		Weather	Unstable Weather Conditions (City of Big Bear Lake, CSD, Co. Flood Control, Victor Valley Waste Water Authority, Juniper Riviera County Water District)
	9/29/1979		Gasoline Shortage	Gasoline Shortage Emergency
	6/28/1979		Water Shortage	Water Shortage (Lake Gregory)
	7/22/1960		Fire	Major and Widespread Fires

4.1.2 Hazard Prioritization

The Planning Team determined that the County and its Special Districts should focus over the next five (5) years on hazards that fell within the HIGH and MEDIUM "Probability" and "Impact" categories. While all the hazards present a potential problem in the County, the Planning Team felt that if they were able to reduce or eliminate the risk from these hazards, it would provide a greater service to the people within the jurisdiction. Table 4-3 illustrates how the final prioritization of the hazard; the "Green" colored box represents the highest priority hazards; and the "White" colored boxes represent lower (second and third tier) priority hazards.

		Impact		
		High	Medium	Low
Probability	High	Wildfire Flood Earthquake/ Geologic Hazards	Drought	
	Medium	Terrorism	Climate Change (Extreme Heat and other)	Hail Infestation
	Low		Dam Inundation	Tornado High Winds Winter Storm Lightning Extreme Cold

Table 4-3: Prioritized Hazard Assessment Matrix

4.2 Hazard Profiles

Although the County faces the risk of experiencing many natural and manmade hazards, this section profiles only the County's highest priority natural hazards the unincorporated County areas and Special District areas are expected to experience; earthquake, wildfire, flood, drought, terrorism and climate change. The priority hazards are based on the Calculated Priority Risk Index (CPRI) explained in Section 4.1.2.

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4.3 Earthquake Geologic Hazards

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the earth as the huge plates that form the earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free, causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates.

Ground shaking from earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill and other unstable soil, and trailers and homes not tied to their foundations are at risk because they can be shaken off their mountings during an earthquake. When an earthquake occurs in a populated area, it may cause deaths and injuries and extensive property damage. Earthquakes can strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night. On a yearly basis, 70 to 75 damaging earthquakes occur throughout the world.

4.3.1 Regulatory Environment

The Alquist-Priolo Earthquake Fault Zoning (AP) Act was passed into law following the destructive February 9, 1971 San Fernando earthquake. The AP Act provides a mechanism for reducing losses from surface fault rupture on a statewide basis. The intent of the AP Act is to ensure public safety by prohibiting the siting of most structures for human occupancy across traces of active faults that constitute a potential hazard to structures from surface faulting or fault creep.

The 2013 California Building Standards Code (also known as Title 24) became effective for the County on January 1st, 2014. Title 24 includes CBC Section 3417: Earthquake Evaluation and Design for Retrofit of Existing Buildings which can be viewed at http://www.bsc.ca.gov/codes.aspx

Changes or additions to the seismic provisions come from many different sources, including new research results and documentation of performance in past earthquakes. A primary resource is the National Earthquake Hazard Reduction Program (NEHRP) Recommended Seismic Provisions for New Buildings and Other Structures (FEMA P-750: http://www.fema.gov/media-library/assets/documents/18152). FEMA's companion document Earthquake Resistant Design

Concepts (FEMA P-749: http://www.fema.gov/media-library/assets/documents/21866) provides a nontechnical background explanation.

4.3.2 Past Occurrences

Table 4-4 shows earthquakes greater than Magnitude 4.0 that have been felt within the San Bernardino County area in the last five years.

Table 4-4: Earthquakes: 2010-2015 San Bernardino County

Date	Name
9/14/2011	Calimesa 4.1
1/15/2014	Fontana 4.4
7/5/2014	Running Springs 4.6
3/29/2014	Brea 5.1
7/25/2015	Fontana 4.2
9/16/15	Big Bear Lake 4.0
12/30/2015	Muscoy 4.4
1/6/2016	Banning 4.4

There are hundreds more small (M<4.0) earthquakes that have occurred within San Bernardino County during this same time frame. Those with a magnitude of below 4.0 are not listed.

4.3.3 Location/Geographic Extent

Figure 4-1 shows the locations of major faults in California, including the four (4) major faults in Southern California in relation to San Bernardino County. These faults are the Southern San Andreas, the San Jacinto, the Elsinore, and the Garlock Faults. There are also many smaller faults within San Bernardino County capable of producing significant earthquakes. However, these four faults are considered by the United States Geological Survey (USGS) and the California Geological Survey (CGS) to be the most dangerous in the County. (California Geological Survey Special Publication 42, Interim Revision 2007, "Fault-Rupture Hazard Zones in California" - Alquist-Priolo Earthquake Fault Zoning Act). Other geologic hazards include liquefaction and landslides. Both occur during and after earthquakes.

Figure 4-1: Major California Faults

Liquefaction of the ground occurs when the groundwater table is high and soil conditions are favorable. Liquefaction Susceptibility Zones as mapped by the USGS for the 2008 ShakeOut Scenario1 shows areas of the County susceptible to liquefaction during an earthquake. See Figure 4-2

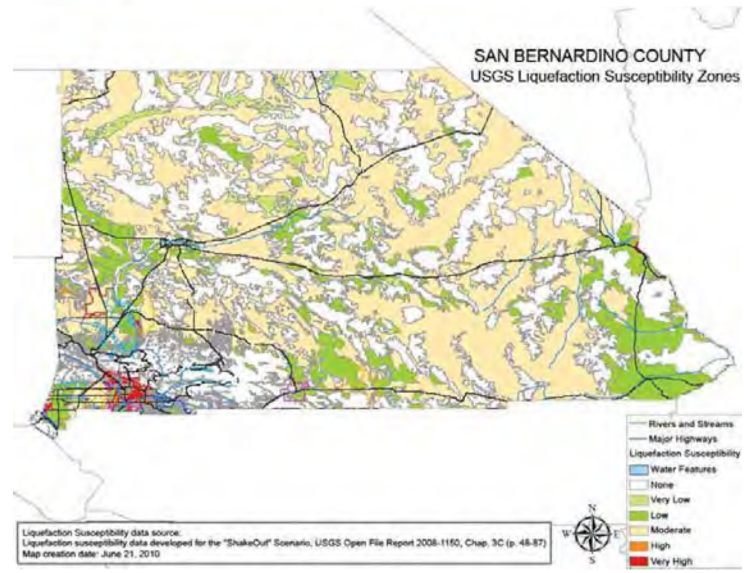

Figure 4-2: USGS Liquefaction Susceptibility Zone

4.3.4 Magnitude/Severity

The MMI Scale measures earthquake intensity as shown in Table 4-5. The MMI Scale has 12 intensity levels. Each level is defined by a group of observable earthquake effects, such as ground shaking and/or damage to infrastructure. Levels I through VI describe what people see and feel during a small to moderate earthquake. Levels VII through XII describe damage to infrastructure during a moderate to catastrophic earthquake.

See Section 4.3.5 to see how magnitude and severity are linked to the probability of earthquake occurrences.

Table 4-5: MMI Scale

Earthquake Magnitude and Intensity		
Magnitude (M_w)	**Intensity (Modified Mercalli Scale)**	**Description**
1.0 – 3.0	I	I. Not felt except by very few people under especially favorable conditions.
3.0 – 3.9	II – III	II. Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
		III. Felt quite noticeably indoors. Many do not recognize it as an earthquake. Standing motorcars may rock slightly.
4.0 – 4.9	IV – V	IV. Felt by many who are indoors; felt by a few outdoors. At night, some awakened. Dishes, windows and doors rattle.
		V. Felt by nearly everyone; many awakened. Some dishes and windows broken; some cracked plaster; unstable objects overturned.
5.0 – 5.9	VI – VII	VI. Felt by everyone; many frightened and run outdoors. Some heavy furniture moved; some fallen plaster or damaged chimneys.
		VII. Most people alarmed and run outside. Damage negligible in well-constructed buildings; considerable damage in poorly constructed buildings.
6.0 – 6.9	VII – IX	VIII. Damage slight in special designed structures; considerable in ordinary buildings; great in poorly built structures. Heavy furniture overturned. Chimneys, monuments, etc. may topple.
		IX. Damage considerable in specially designed structures. Buildings shift from foundations and collapse. Ground cracked. Underground pipes broken.
7.0 and Higher	VIII and Higher	X. Some well-built wooden structures destroyed. Most masonry structures destroyed. Ground badly cracked. Landslides on steep slopes.
		XI. Few, if any, masonry structures remain standing. Railroad rails bent; bridges destroyed. Broad fissure in ground.
		XII. Virtually total destruction. Waves seen on ground. Objects thrown into the air.

4.3.5 Frequency and Probability of Occurrence

Several of the major Southern California faults have a high probability of experiencing a Magnitude 6.7 or greater earthquake within the next 30 years (Figure 4-2); 59% probability of a M6.7 or greater on the Southern San Andreas Fault, 31% probability on the San Jacinto Fault, and 11% probability on the Elsinore Fault. These probabilities were determined by the USGS and CGS in a 2008 study (2007 Working Group on California Earthquake Probabilities, 2008, The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2): U.S. Geological Survey Open-File Report 2007-1437 and California Geological Survey Special Report 203 http://pubs.usgs.gov/of/2007/1437/).

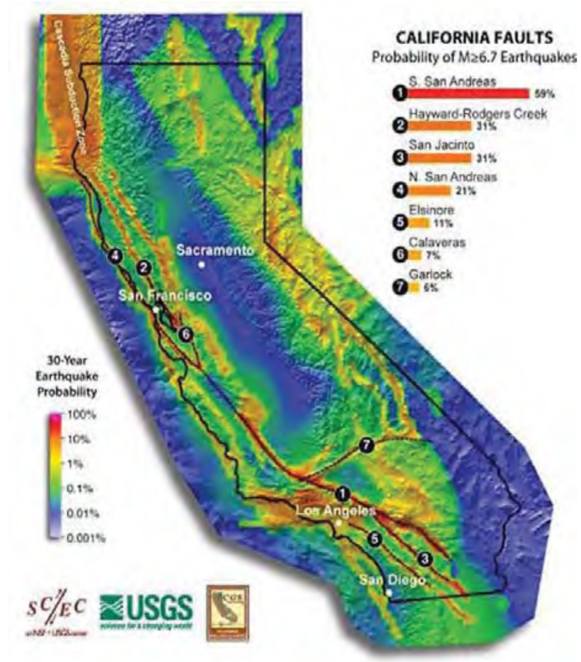

Figure 4-3: California Faults Probability of ≥ M 6.7 Earthquake

As shown in Figure 4-3 the probability of an earthquake with a Magnitude 6.7 or greater occurring somewhere in Southern California within the next 30 years is estimated to be 97% (2007 Working Group on California Earthquake Probabilities, 2008). As can be seen in the table, earthquake probabilities in Southern California are higher than those for Northern California.

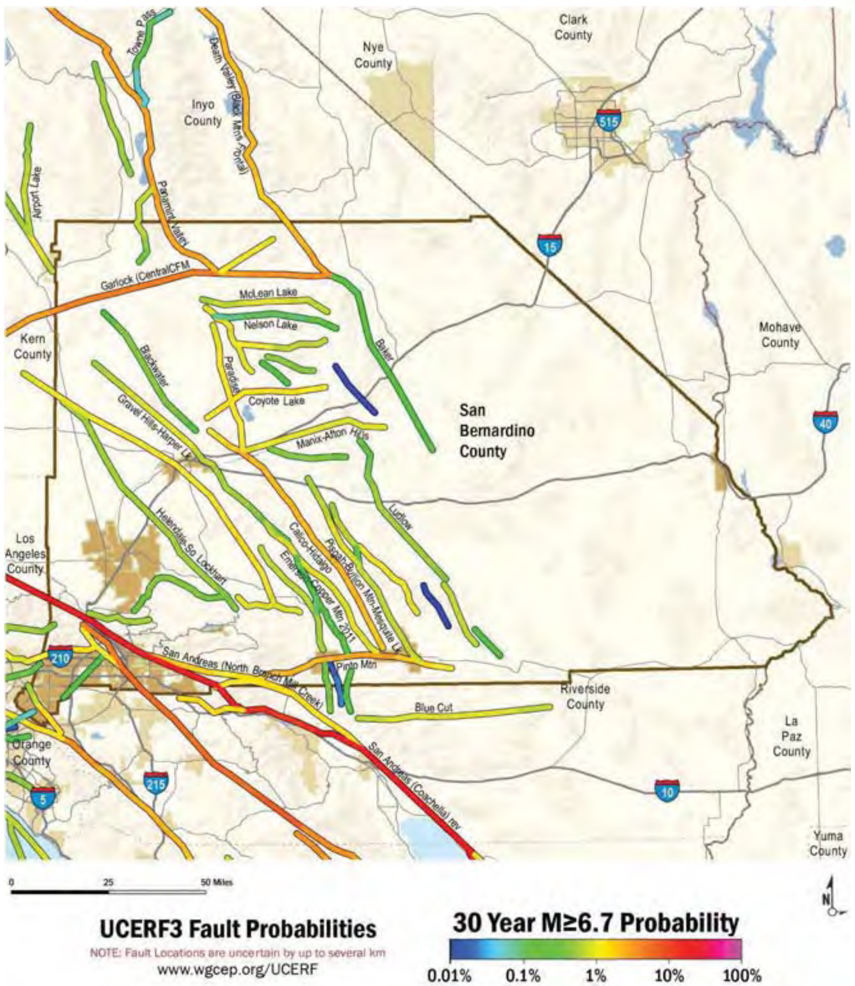

Figure 4-4: California Area Earthquake Probabilities by Magnitude

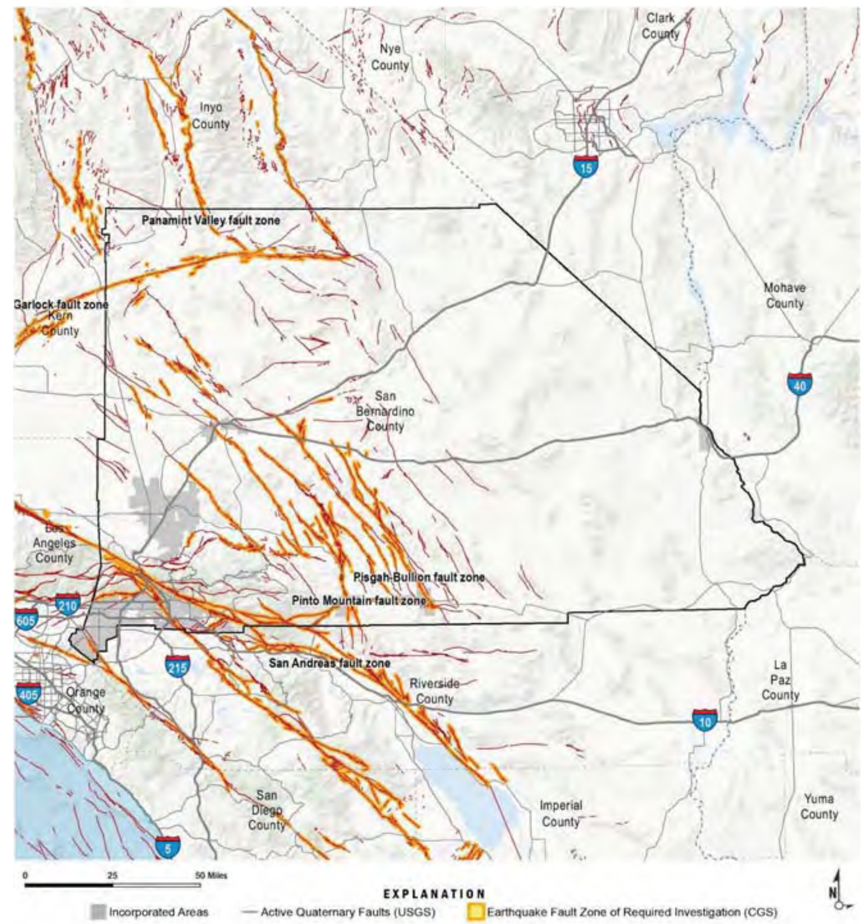

Figure 4-5: Earthquake Fault Zone

4.4 Wildfire

Wildfires present a significant potential for disaster in the County, a region of relatively high temperatures, low humidity, and low precipitation during the summer. This long summer season is followed by a fall season that is famous for high velocity, very dry winds that come out of the desert. The Santa Ana winds very consistently arrive from the middle of October to the end of November. In and of themselves, these weather patterns would be of little significance without the un-naturally dense forest and the dense undergrowth that has been allowed to grow unabated for the last several decades. Compounding the vegetative growth that has occurred is the unchecked development of substantial housing and businesses in mountain communities. This urbanized growth has required parallel growth and sophistication in the fire service that responds to wildfires in the wild land urban interface. With immediate responses to initial fire starts, the vast majority of fires are successfully extinguished in short order. In doing so, this eliminates nature's way of thinning the forest through smaller fires.

Another factor that is a potential for disaster is the number of dead trees in the mountain region. Due to the over densification of the forest combined with drought conditions during the past ten years, trees in the local mountains have become weakened, creating a perfect environment for Bark Beetles to proliferate from 2003 to 2008. Combine these severe burning conditions with people or lightning and the stage is set for the occurrence of large, destructive wildfires. In addition, the forested areas of the County are not only the most popular, with the most visitors in the Nation, but are also the most populated in residences and businesses in the Nation as well. The final element in this catastrophe waiting to happen is that because of the steep mountain terrain, there are only five routes in and out for almost 60,000 residents. On a holiday weekend though, this population can dramatically increase by 50,000 to 100,000 people as weekend vacationers.

4.4.1 Regulatory Environment

4.4.1.1 State

Wildfire State Responsibility Area (SRA) Fire Safe Regulations outline basic wildland fire protection standards for local jurisdictions. SRA Fire Safe Regulations (if policed) can decrease the risk of wildfire events in the wildland interface. SRA Fire Safe Regulations do not supersede local regulations, which equal or exceed minimum state regulations. The State statute for wildfire protection is Public Resources Code, Section 4290. Requirements in the code include information on the following (CA Fire Alliance):

- Road Standards for Fire Equipment Access
- Standards for Signs Identifying Streets, Roads and Buildings
- Minimum Private Water Supply Reserves for Emergency Fire Use
- Fuel Breaks and Greenbelts

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4.4.1.2 Local

4.4.1.2.1 Fire Hazard Abatement Program

In an effort to reduce the threat of wild fires, the San Bernardino County Fire Hazard Abatement (FHA) Program enforces the fire hazard requirements outlined in San Bernardino County Code Section 23.0301–23.0319. The primary function of the Fire Hazard Abatement Program is to reduce the risk of fires within communities by pro-actively establishing defensible space and reduction/removal of flammable materials on properties.

The Fire Hazard Abatement Program conducts surveys to identify fire hazards throughout the year. Fire hazards are identified and notices to abate the hazard(s) are mailed to property owners. Property owners are given 30 days to abate the violations. Failure to abate may result in citations, penalties, and/or fees for abatement by the County. The Fire Hazard Abatement Program responds to complaints year round in the unincorporated areas and contracting Cities and Fire Districts.

4.4.2 Past Occurrences

Wildfire locations from 1900 – 2016 are shown in Figure 4-6. In the past five years (since the 2010 MJHMP was approved) there have been 13 significant wildland fires within San Bernardino County. These fires are listed in Table 4-7, and several of the more damaging fires are discussed below.

Table 4-6: Wildfire Occurrences 2010-2016

Number	Date	Name	Acres
1.	9/5/2011	Hill Fire	1,158
2.	11/5/2012	Devore Fire	335
3.	6/28/2013	Mill Fire	534
4.	8/8/2013	Sharp Fire	243
5.	9/24/2013	Sierra Fire	200
6.	4/30/2014	Etiwanda Fire	2,143
7.	5/13/2014	Rancho Incident	1,548
8.	3/31/2015	River Bottom Fire	185
9.	6/17/2015	Lake Fire	31,359
10.	7/17/2015	North Fire/ Pines Fire	4,250
11.	8/23/2015	Summit Fire	555
12.	8/7/2016	Pilot Fire	8,110
13.	8/16/2016	Blue Cut Fire	36,274
			86,894

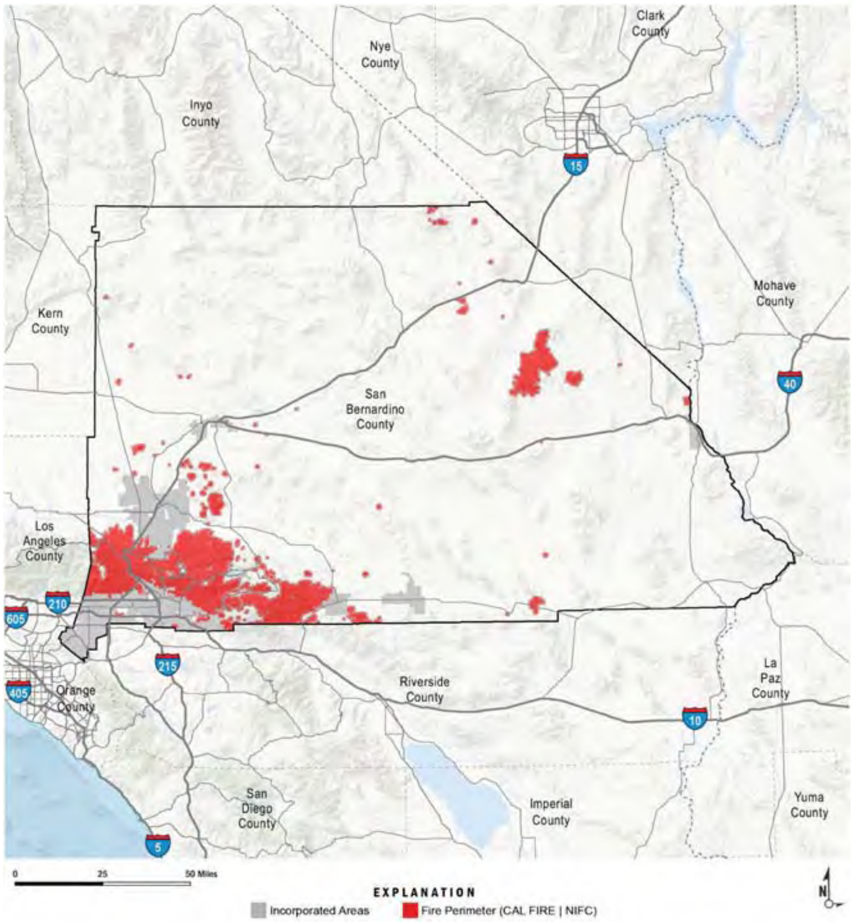

Figure 4-6: Wildfire History 1900 – 2016 (CalFire and USFS Data 2010)

The 2016 Blue Cut Fire was a reminder that wildfires are a significant threat to lives and property in the unincorporated San Bernardino County area. The Blue Cut Fire burned 36,274 acres, destroying an estimated 105 single family residences and 216 outbuildings. In addition, 3 single family residences and 5 other structures were damaged.

In 2015 The Lake Fire burned 31,359 acres and was the cause of 6 minor firefighter injuries and 1 residence and 3 outbuildings were destroyed.

North Fire/Pines Fire in 2015 burned a total of 4,250 acres, destroying 7 homes, 16 outbuildings and 44 vehicles in the community of Baldy Mesa. No injuries were reported.

The Blue Cut Fire, Lake Fire, and North Fire/ Pines Fire all occurred in the County's mapped Very High Fire Severity Zone. Mitigation efforts have reduced but not eliminated the threat from wildfire. The strong fall winds that are capable of creating firestorms cannot be controlled. Drought cannot be controlled. Fuels reduction programs reduce the potential spread of fire, upgraded Building Codes make structures more fire resistant, and public education prepares residents for wildfires. However, the threat of wildfire remains. The continuing goal is to reduce the threat from wildfire wherever possible.

4.4.3 Location/Geographic Extent

Using information from the California Department of Forestry (CAL FIRE) Figure 4-8, illustrates the areas at risk to a wildfire event. The areas with the highest risk of wildfire are the in the southwestern portions of County in the mountainous region.

Figure 4-7 illustrates vegetation mortality due to bark beetle infestation, drought, and other factors in San Bernardino County. These conditions create extreme fire hazards.

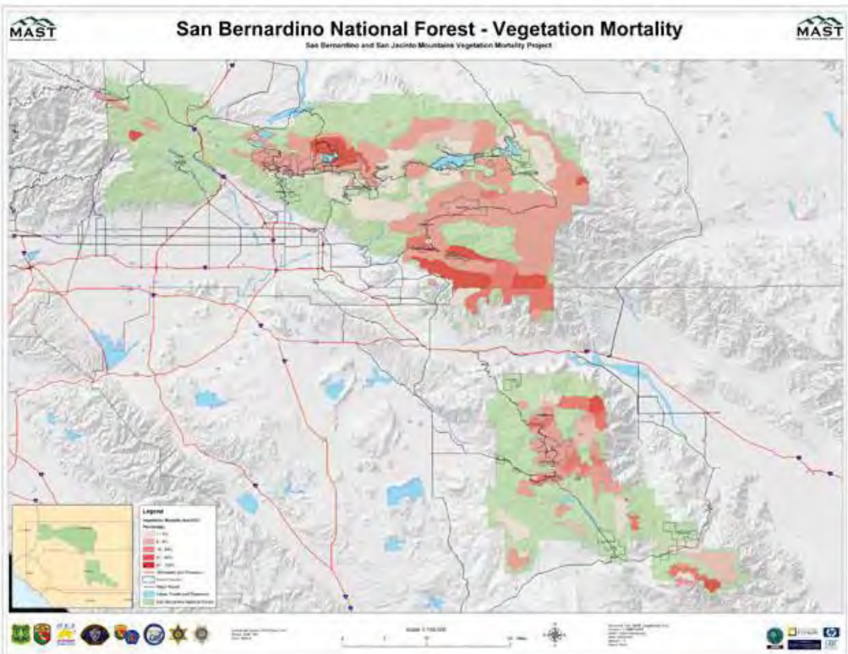

Figure 4-7: San Bernardino National Forest – Vegetation Mortality

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4.4.4 Magnitude/Severity

Fire Severity Zones are used in determining additional protective measures required when building new structures or remodeling older structures within the particular zone. Additional measures must be taken on the property around a structure in the higher ranked fire Severity Zones.

CAL FIRE adopted Fire Hazard Severity Zone maps for LRA in June 2008. The Fire Severity Zones for County identifies areas of Very High, High, and Moderate fire hazard severity throughout the County and are mapped in Figure 4-8.

Fire Severity Zones are used in determining additional protective measures required when building new structures or remodeling older structures within the particular zone. Additional measures must be taken on the property around a structure in the higher ranked fire Severity Zones.

Fire hazard mapping is a way to measure the physical fire behavior to predict the damage a fire is likely to cause. Fire hazard measurement includes vegetative fuels, probability of speed at which a wildfire moves the amount of heat the fire produces, and most importantly, the burning fire brands that the fire sends ahead of the flaming front.

The model used to develop the information in accounts for topography, especially the steepness of the slopes (fires burn faster as they burn up-slope.). Weather (temperature, humidity, and wind) also has a significant influence on fire behavior. The areas depicted as moderate and high in are of particular concern and potential fire risk in these are constantly increasing as human development, and the wildland urban interface areas expand.

4.4.5 Frequency/Probability of Future Occurrences

In San Bernardino County, wildfire season commences in the summer when temperatures are high, humidity is low, and conditions remain dry. The season continues into the fall, when the County experiences high velocity, very dry winds coming out of the desert. A statewide drought beginning in 2011 has caused the state to be the driest it's been since record keeping began back in 1895 (California 2016). This has caused extremely dry conditions in unincorporated areas of the County creating plentiful fuel sources for wildfires.

USGS LANDFIRE (Landscape Fire and Resource Management Planning Tools), is a shared program between the wildland fire management programs of the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior, providing landscape scale geo-spatial products to support cross-boundary planning, management, and operations. Historical fire regimes, intervals, and vegetation conditions are mapped using the Vegetation Dynamics Development Tool (VDDT). This USGS data supports fire and landscape management planning goals in the National Cohesive Wildland Fire Management Strategy, the Federal Wildland Fire Management Policy, and the Healthy Forests Restoration Act.

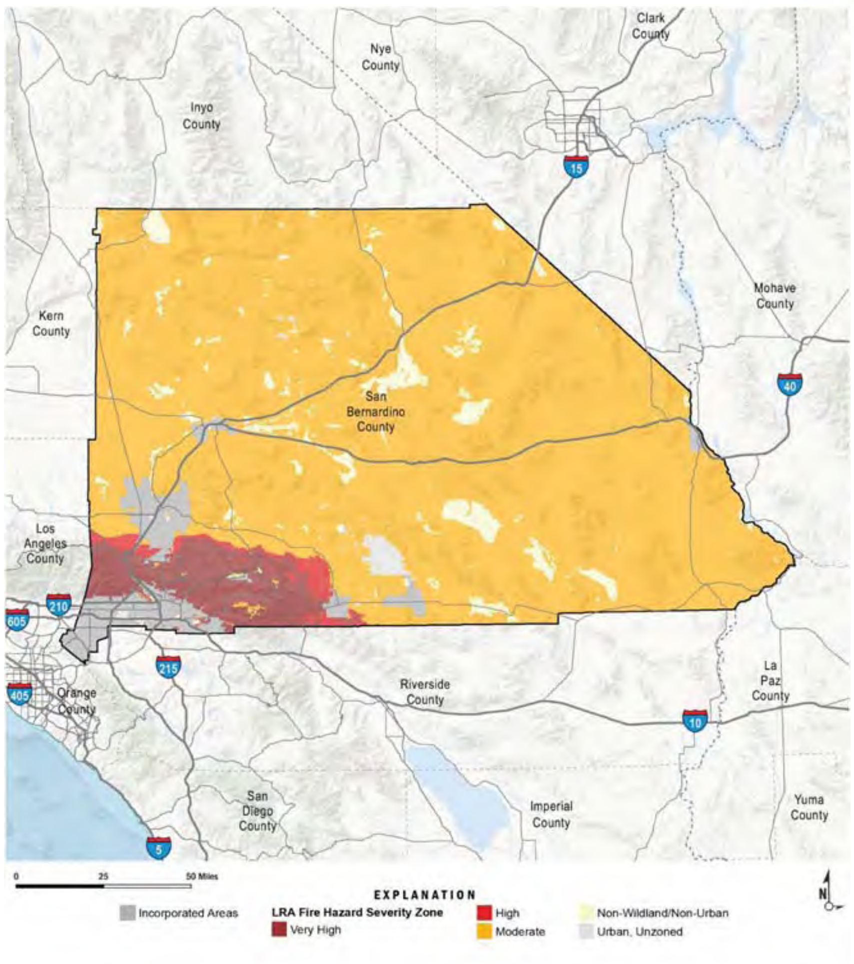

Figure 4-8: Fire Hazard Severity Zone

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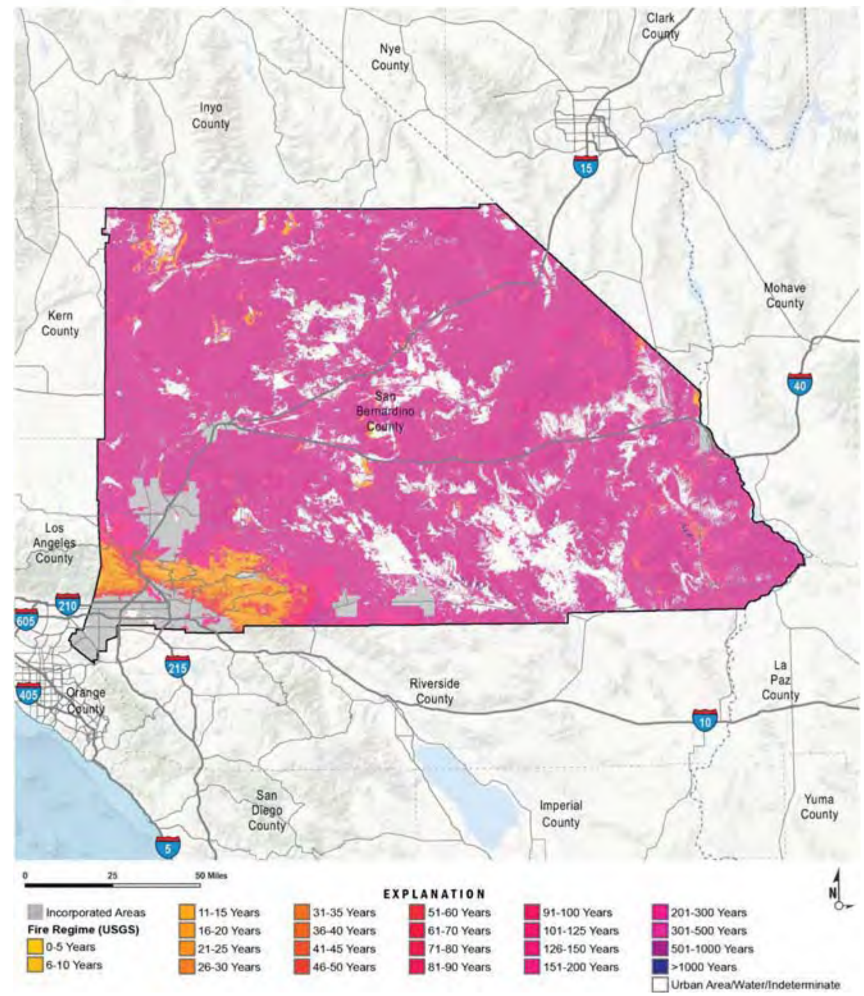

Figure 4-9: USGS Mean Fire Return Interval Map

As part of the USGS Landfire data sets, the Mean Fire Return Interval (MFRI) layer quantifies the average period between fires under the presumed historical fire regime. MFRI is intended to describe one component of historical fire regime characteristics in the context of the broader historical time period represented by the LANDFIRE Biophysical Settings (BPS) layer and BPS Model documentation.

MFRI is derived from the vegetation and disturbance dynamics model VDDT (Vegetation Dynamics Development Tool) (LF_1.0.0 CONUS only used the vegetation and disturbance dynamics model LANDSUM). This layer is created by linking the BpS Group attribute in the BpS layer with the Refresh Model Tracker (RMT) data and assigning the MFRI attribute. This geospatial product should display a reasonable approximation of MFRI, as documented in the RMT. See Figure 4-9 for predicted fire return interval for the jurisdictional area.

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4.5 Flood

Floods are the second most common and widespread of all natural disasters faced by the County and its Special Districts. Most communities in the United States have experienced some kind of flooding during or after spring rains, heavy thunderstorms, winter snow thaws, or summer thunderstorms.

A flood, as defined by the National Flood Insurance Program is: "A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is the policyholder's property) from:

- Overflow of inland or tidal waters, or
- Unusual and rapid accumulation or runoff of surface waters from any source, or
- Mudflow, or
- Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels."

Floods can be slow or fast rising but generally develop over a period of hours or days. Mitigation includes any activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies. Investing in mitigation measures now, such as: engaging in floodplain management activities, constructing barriers such as levees, and purchasing flood insurance will help reduce the amount of structural damage to structures and financial loss from building and crop damage should a flood or flash flood occur.

The standard for flooding is the 1% annual chance flood, commonly called the 100-year flood, the benchmark used by the Federal Emergency Management Agency (FEMA) to establish a standard of flood control in communities throughout the country. The 1% annual chance flood is also referred to as the base flood.

The 1% annual chance flood is the flood that has a 1% chance of being equaled or exceeded in any given year and it could occur more than once in a relatively short period of time. By comparison, the 10% flood (10-year flood) means that there is a 10% chance for a flood of its size to occur in any given year.

4.5.1 Regulatory Environmental

4.5.1.1 County of San Bernardino 2007 Development Code and Zoning Ordinances

One of the purposes of this Development Code is to create a comprehensive and stable pattern of land uses upon which to plan drainage/flood control and other public facilities and utilities. The follow chapters of the development code address floodways, flood control and development near such:

Chapter 82.14 Flood Plain Safety (FP) Overlay
Chapter 85.07 Flood Hazard Development Review
Chapter 86.04 Flood Plain Management Administrator

The County has also adopted Zoning Ordinances that are not part of the County Code but are part of the General Plan. These ordinances regulate land use; map the official land use and hazard overlay districts to include safety hazard and environmental protection areas.

4.5.1.2 National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. As a participating member of the NFIP, San Bernardino County is dedicated to protecting homes with more than 1,000 policies currently in force. Like most communities participating in NFIP, FEMA has prepared a detailed Flood Insurance Study (FIS) for areas of San Bernardino County. The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance of flood (the 100-year flood) and the 0.2-percent annual chance of flood (the 500-year flood). Base flood elevations and the boundaries of the 100 and 500 year floodplains are shown on the Flood Insurance Rate Maps (FIRM). More information on location and geographic extent of the FIRMs are provided in this section.
The County of San Bernardino entered the regular phase of the NFIP on September 09, 1978; in 2016 the County Floodplain Administrator is Marlene Mioyshi. As a participant in the NFIP, San Bernardino County is dedicated to regulating development in the FEMA regulated floodplain areas in accordance with NFIP criteria. Before a permit to build in a floodplain area is issued, San Bernardino County ensures that two basic criteria are met:

- All new buildings and developments undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain developments must not aggravate existing flood problems or increase damage to other properties.

Structures permitted or built in the County/City before the NFIP regulatory requirements were incorporated into the San Bernardino County ordinances (before the effective date of the San Bernardino County FIRM) are called “pre-FIRM” structures. For the San Bernardino County, pre-FIRM structures are those permitted or built before September 09, 1978

Extensive FEMA NFIP databases are used to track claims for every participating community including San Bernardino County. NFIP insurance data provided by FEMA indicates that as of September 02, 2016, there were 1,772 policies in San Bernardino County, resulting in $403,874,500 of insurance in force; this amounts to $1,758,534 in total premiums. Of the 1,772 policies, only 1,070 are for structures located within the 1% annual chance flood zones, while the remaining 701 policies are for structures located outside of the FEMA identified floodplain.

Based on this analysis of insurance coverage, San Bernardino County has significant assets at risk to the 100-year flood. Of the 3,426 improved parcels within the 100-year floodplain, only 1,070 of those parcels maintain flood insurance[1]. That means approximately 2,356 improved parcels are without flood insurance in high risk areas according to FEMA. This condition could exist for a number of different reasons. Ground floor elevations are one foot above the 100-year floodplain and home owners and business that wish not to purchase floodplain insurance (non-federally backed loans, home with no mortgage, homes that are "grandfathered" into the NFIP). The 2,356 uninsured structures located in mapped floodplain areas are especially vulnerable.

Currently, San Bernardino County contains 12 Repetitive Loss (RL) properties under their jurisdictional umbrella. The total dollar amount of claims paid to date by the NFIP is $2,606,098. San Bernardino County also contains zero (0) Severe Repetitive Loss (SRL) structure.

Most of the RL properties that have experienced flooding are in the High Desert and Mountain areas of San Bernardino County are due to debris flow in localized areas. Every loss claim is seasonal in nature as all loss claims have been in December, January or February. Some mitigation on these properties has been conducted and San Bernardino County is currently tracking mitigation actions through standardized forms as required by FEMA.

NOTE: A property does not have to be currently carrying a flood insurance policy to be considered a RL or SRL property. Often homes in communities are not carrying flood insurance but are still on the community's repetitive loss list. The "repetitive loss" designation follows a property from owner to owner; from insurance policy to no insurance policy, and even after the property has been mitigated. Having an insurance policy and making claims that fall into the repetitive loss criteria will put a property on the RL list. Even after the policy on a property has lapsed or been terminated, the property will remain on San Bernardino County RL list.

NOTE: The Privacy Act of 1974 (5 U.S.C. 522a) restricts the release of certain types of data to the public. Flood insurance policy and claims data are included in the list of restricted information. FEMA can only release such data to state and local governments, and only if the data are used for floodplain management, mitigation, or research purposes. Therefore, this plan does not identify the repetitive loss properties or include claims data for any individual property.
For more information on California Regulation and the NFIP, please see California's Department of Water Resources Quick Guide here: http://www.water.ca.gov/floodmgmt/lrafmo/fmb/docs/CAQG-screen.pdf

4.5.2 Past Occurrences

Severe weather events leading to flooding are listed in Table 4-7; several major events are discussed below.

[1] An improved property owner may not carry flood insurance for a number of reasons; not everyone is required to carry flood insurance. Structures carrying federally-backed mortgages that are in a SFHA are required to carry flood insurance in the County of San Bernardino. Owners who have completed the terms of the mortgage or who purchased their property outright may not choose to carry flood insurance and instead bear the costs of recovery on their own.

Table 4-7: Severe Weather Events 2010-Present

Date	Type
1/18/2010	January 2010 Winter Storms
12/17/2010	Highland Flooding Incident
8/25/2013	Flooding- Remnants of Tropical Storm Ivo
11/21/2013	Winter Storms
2/28/2014	Winter Storm
8/3/2014	Thunderstorms, heavy rain, flash flooding, mudslides
7/6/2015	Flash flooding resulting from Lake Fire
7/30/2015	Severe Thunderstorms
1/6/2016	Strong rain, flooding and mudslides
8/22/16	Flash flooding from storm system

4.5.3 Location/Geographic Extent

Table 4-8 shows the number of acres and square miles that lie in flood hazard areas within the County. Figure 4-10 provides flood hazard data for San Bernardino County as mapped in FEMA's National Flood Hazard Layer for California (April, 2010). Mapped areas include areas subject to inundation by the 1% Annual Chance Flood (also referred to as the 100-year flood), and areas subject to inundation in the 0.2% Annual Chance Flood (500-year flood).

Table 4-8: San Bernardino County Flood Hazard Area

Flood Hazard Type	Sum of Acres	Sum of Square Miles
100-Year Flood	65,209	101.89
100-Year, Floodway	13,968	21.83
500-Year Flood	13,838	21.62
500-Year, Protected by Levee	4,336	7
Total	**97,351**	**152.11**

Table 4-9 shows a land use compatibility chart for 100 year flood plains.

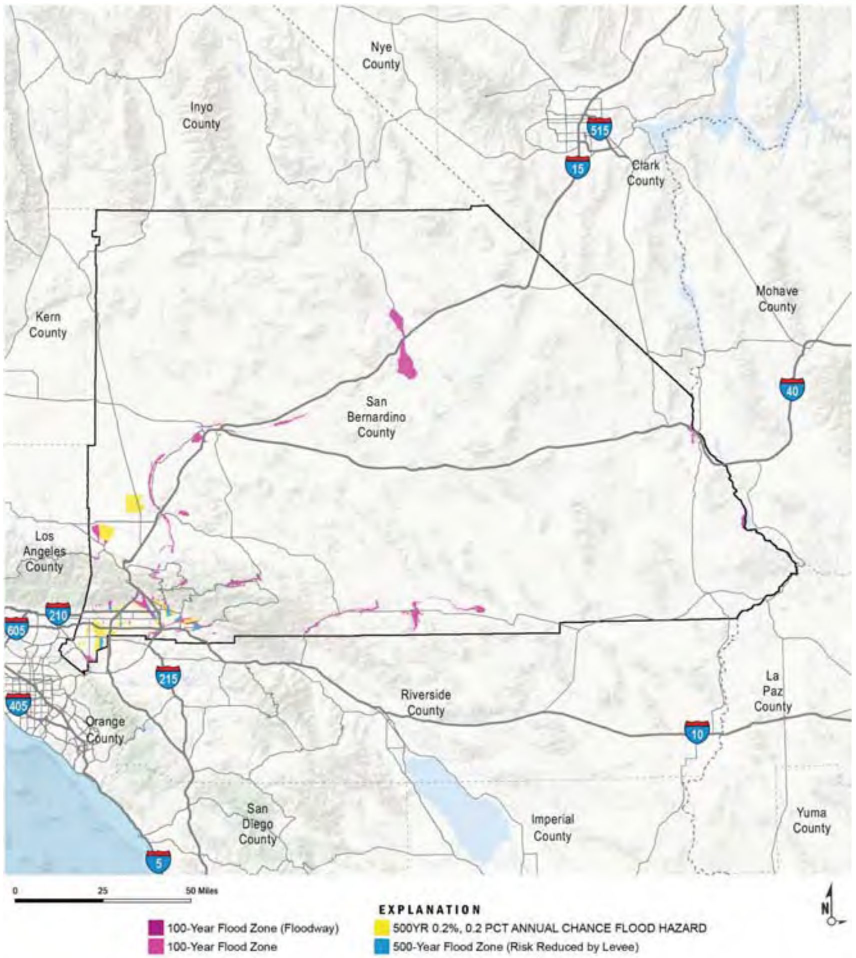

Figure 4-10: Flood Hazard Severity Zone Map

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Table 4-9: Land Use Compatibility Chart for 100 Year Flood Plains (General Plan Table S-1)

Land Uses	Compatibility in 100-Year Floodplains
Critical Nuclear related systems; explosives or hazardous materials/ manufacturing, handling or storage; hospitals and other emergency medical facilities.	Restricted
Essential Police, fire and communications systems; Emergency Operations Centers (EOC's); electric power inter-tie systems; power plants; utility substations; sewage treatment plants; water-works; local gas and electric distribution lines; aqueducts; major pipelines; major highways, bridges and tunnels; ambulance services; public assembly sites with 300 or more capacity; schools.	Restricted
High Occupancy Multi-family residential of 20 or more units; major commercial including large shopping centers; office buildings; large hotels; health care clinics and convalescent homes; heavy industry; gas stations.	Generally Incompatible
Normal-Low Risk Single-family and two-family residential; multi-family of less than 20 units; small scale commercial; small hotels, motels; light industry; warehousing.	Generally Incompatible

Restricted unless alternative sites are not available or feasible and it is demonstrated that, although mitigation may be difficult, hazards will be adequately mitigated. Generally Incompatible Restricted unless site investigation demonstrates that site is suitable or that hazards will be adequately mitigated.

4.5.4 Magnitude/Severity

4.5.4.1 Flash Flooding

Flash flooding tends to occur in the summer and early fall because of the monsoon rains and is typified by increased humidity and high summer temperatures.

The desert area contains many mountain ranges that are steep and experience summer thunder storms causing flash floods in many dry washes on the desert floor. The water collects in dry lake beds throughout the desert area.

Environmental permit processing has delayed or prohibited work in the washes to provide flow lines to many bridges on county highways. Many highways do not have bridges but convey water across the road with dip crossings. Flash flooding cause's road and bridge wash outs and erosion of earthen channels and basins when they occur near these facilities.

Cities and towns often experience street closures for several days due to sediment transport and road damage. Because of the sheet flow character of the desert, many private properties experience erosion and sediment deposits. The urban valley also can experience flash flooding in its narrow canyons and within the many unimproved creeks and interim channels feeding the Santa Ana River. The valley floor in many areas is very flat so even minor rain events can produce flooding of roads and private property. In coordination with local jurisdictions, the County of San Bernardino Flood Control District has prepared Master Drainage plans for many cities and towns to provide a plan for reducing flooding due to minor storms. Maps can be found on the County's Department of Public Works website here: http://cms.sbcounty.gov/dpw/FloodControl/Planning/MPD.aspx

However, local resources are not sufficient to cover the cost of the construction of the drainage systems. The densely populated (75% of the county population) urban valley region contains the headwaters of the Santa Ana River. The San Gabriel and San Bernardino Mountains border the North side of the valley are steep reaching 5,000 feet with alluvial fans which are developed and densely populated.

4.5.5 Frequency/Probability of Future Occurrences

The Flood Insurance Rate Map (FIRM) not only identifies the flood hazard zones for insurance and floodplain management purposes, but also provides a statement of probability of future occurrence.

A 500-year flood has a 0.2-percent chance of occurring in any given year; a 100-year flood has a 1-percent chance, a 50-year flood has a 2-percent chance, and a 10-year flood has a 10-percent chance of occurrence. Although the recurrence interval represents the long-term average period between floods of specific magnitude, significant floods could occur at shorter intervals or even within the same year. The FIRM maps typically identify components of the 500-year and 100-year floodplains

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4.6 Drought

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. Drought severity depends on numerous factors, including duration, intensity, and geographic extent, as well as regional water supply demands by humans and vegetation. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity.

Drought originates from a deficiency of precipitation over an extended period, usually one or more seasons. Drought can result in a water shortage for some activity, group, or environmental sector. Drought is a complex natural hazard, which is reflected in the following four definitions commonly used to describe it:

- Agricultural – drought is defined principally in terms of naturally occurring soil moisture deficiencies relative to water demands of plant life, usually arid crops.
- Hydrological – drought is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- Meteorological – drought is defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Socioeconomic – drought associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall. It may also be called a water management drought.

Although climate is a primary contributor to hydrological drought, other factors such as changes in land use (e.g., deforestation), land degradation, and the construction of dams all affect the hydrological characteristics of the basin. Since regions are interconnected by hydrologic systems, the impact of meteorological drought may extend well beyond the borders of the precipitation-deficient area. Similarly, changes in land use upstream may alter hydrologic characteristics such as infiltration and runoff rates, resulting in more variable streamflow and a higher incidence of hydrologic drought downstream. Land use change is one of the ways human actions alter the frequency of water shortage even when no change in the frequency of meteorological drought has been observed.

4.6.1 Regulatory Environment

The County and participating jurisdictions have a number of regulatory requirements and documents to address planning for drought in the County. This includes Watershed Water Quality Management Plans (WQMP) for San Bernardino County and the Mojave and Santa Ana Watersheds. On June 21st, 2013, the Executive Officer approved the revised Technical Guidance Document for Water Quality Management Plan (TGD-WQMP).

The 1972 Federal Water Pollution Control Act, also known as the Clean Water Act (CWA) provides the basis for the protection of all inland surface waters, estuaries, and coastal waters. California's Porter-Cologne Water Quality Control Act of 1970 established the Regional Water Quality Control Board as the agency responsible for implementing the CWA and Porter-Cologne requirements in the Santa Ana Watershed.

In 2006, California State lawmakers adopted AB 1881. This provided guidelines and timelines for the revision of the State's Model Water Efficient Landscape Ordinance (MWELO) and mandated that every city, county or other agency within the State adopt MWELO or be in compliance with it through their own ordinance by January 2010. On January 1, 2010 the San Bernardino County Water Efficient Landscape Ordinance was implemented. It can be obtained on the county website.

4.6.1.1 Watershed Water Quality Management Plan

San Bernardino County's WQMP draft was written in 2013 and final approval was given on June 21, 2013.

4.6.1.2 Technical Guidance Document for Water Quality Management Plan (TGD-WQMP)

Approved on June 21, 2013, this document provides direction to project proponents on the regulatory requirements applicable to a private or public development activity, including public works transportation projects, from project conception to completion.

4.6.2 Past Occurrences

- The 2013 California State MHMP states that from 1950 to 2012, there has been eight-drought State Emergency Proclamations in California. Specifically for San Bernardino County, there have been six drought events since 1896. Previous occurrences of drought are described as follows:

- **1975 to 1977:** California experienced the two driest years (1976 and 1977) in the State's history in 1976 and 1977. The drought was declared an Emergency (FEMA-EM-3023) on January 20, 1977. Total crop damages statewide totaled $2.67 billion dollars for both years ($888.5 million in 1976 and $1.8 billion in 1977).

- **2006 to 2009:** A California State-declared three-year drought of below-average rainfall, low snowmelt runoff, and the largest court-ordered water restricting in state's history. The dry conditions damaged crops, deteriorated water quality, and caused extreme wildfire danger. Approximately $300 million in agricultural revenue loss, and a potential $3 billion in economic losses over time.

- **2012 to 2016:** San Bernardino County first declared a local drought emergency in 2014. As of May 23rd, 2016, San Bernardino County and the City of Rancho Cucamonga had both submitted local Emergency Proclamations. This ongoing drought is the most severe drought in over 100 years. In order to abide by the State Water Resources Control Board's mandatory water reductions, the San Bernardino Municipal Water Department Board of Water Commissioners authorized implementation of Stage IIA of the department's Water Supply Contingency Plan on June 1, 2015. The State Water Board will adjust emergency water conservation regulations through the end of January 2017, in recognition of the differing water supply conditions across the state, and develop proposed emergency water restrictions for 2017 if the drought persists.

Additional information about previous occurrences of droughts in California (in general) can be obtained from the California DWR.

4.6.3 Location/Geographic Extent

Drought can affect the County, region, and the State of California as a whole. The County's primary source of water is imported by the San Bernardino Valley Municipal Water District (http://www.sbvmwd.com/about-us/what-we-do) through participation in the State Water Project (SWP). It is received at the Devil Canyon Power Plant Afterbay. This supply is supplemented by groundwater basins in the County. Drought has no defined geographical boundaries and cannot be depicted in map form. As such, the entire County is subject to drought.

4.6.4 Magnitude/Severity

The magnitude of drought is usually measured in time and the severity of the hydrologic deficit. There are several resources available to evaluate drought status and estimate future expected conditions. The National Integrated Drought Information System (NIDIS) Act of 2006 (Public Law 109-430) prescribes an interagency approach for drought monitoring, forecasting, and early warning. The NIDIS maintains the U.S. Drought Portal (www.drought.gov) which is a web-based

access point to several drought related resources. Resources include the U.S. Drought Monitor (USDM) and the U.S. Seasonal Drought Outlook (USSDO).

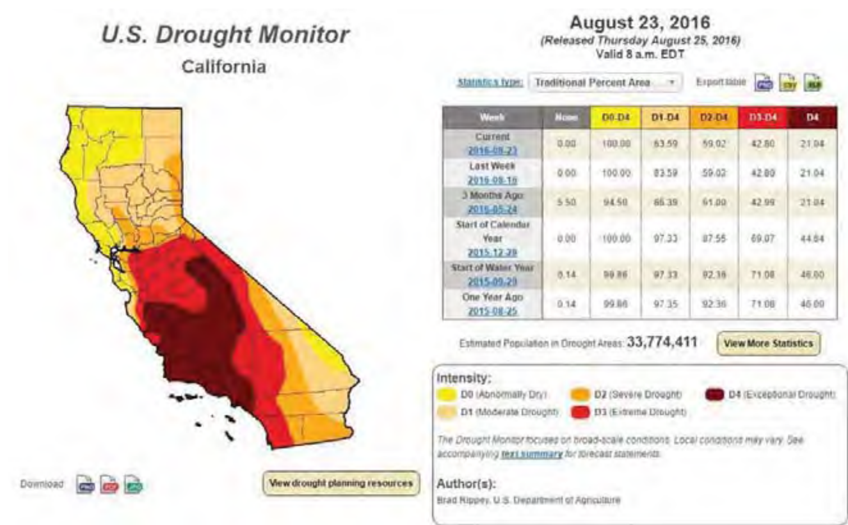

Figure 4-11: US Drought Monitor Map for the State of California on August 23, 2016

The USDM provides a summary of drought conditions across the United States and Puerto Rico and is developed and maintained by the National Drought Mitigation Center (www.drought.unl.edu). USDM includes the U.S. Drought Monitor Map. This map is updated weekly by combining a variety of drought database and indicators, and local expert input into a single composite drought indicator. The map denotes four levels of drought intensity (ranging from D1 - D4) and one level of "abnormal dryness" (D0). In addition, the map depicts areas experiencing agricultural (A) or hydrological (H) drought impacts. These impact indicators help communicate whether short or long-term precipitation deficits are occurring. An example Drought Monitor Map for the State of California for August 23, 2016 is illustrated in Figure 4-11.

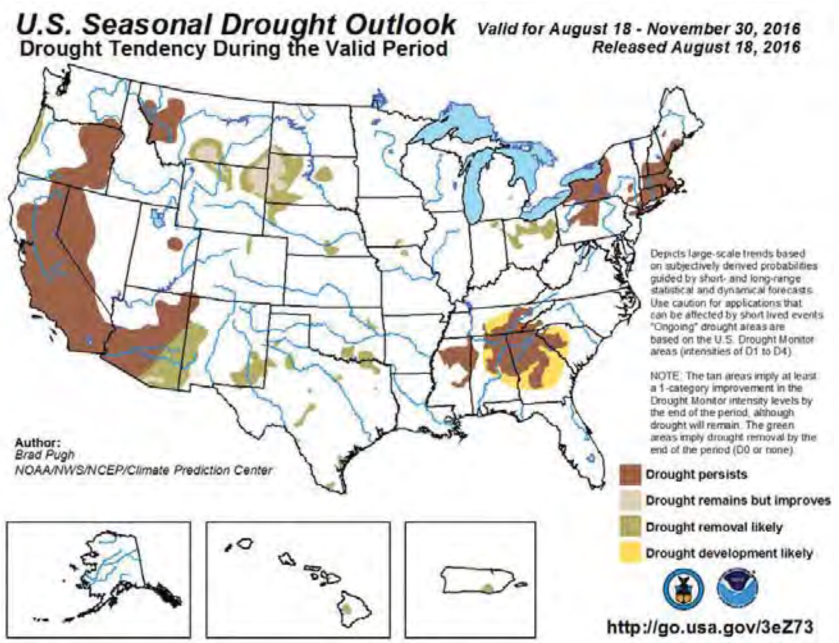

Figure 4-12: USSDO Drought Tendency Map (Valid August 18-November 30, 2016

For western States with mountainous terrain and complex regional microclimates, it is also useful to supplement the PDSI values with other indices such as Surface Water Supply Index and Standardized Precipitation Index (SPI). The Surface Water Supply Index takes snowpack and other unique conditions into account. The National Drought Mitigation Center (NDMC) uses the SPI to identify emerging drought months sooner than the PDSI. It is computed on various time scales to monitor moisture supply conditions. The SPI is the number of standard deviations that precipitation value would deviate from the long-term mean. As shown in Figure 4-13 the 72-month SPI through the end of August 2016 for San Bernardino County is low.

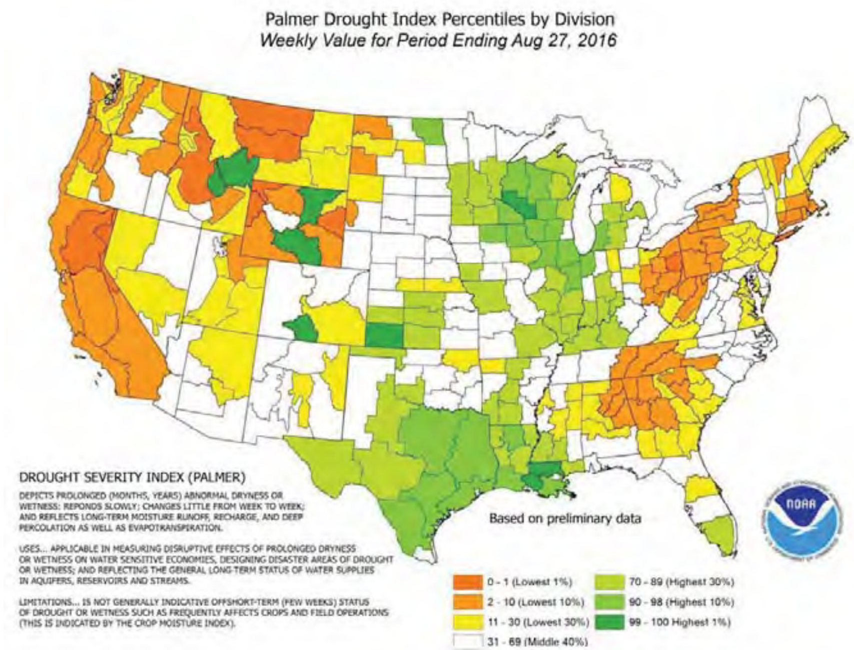

Figure 4-13: Month SPI through the end of August 2016 for San Bernardino County

A number of indices measure how much precipitation for a given period has deviated from historically established norms. The primary indicator for the USDM and USSDO for the western United States is the Palmer Drought Severity Index (PDSI). The PDSI is widely used by the USDA to determine when to grant emergency drought assistance to affected areas. PDSI is a commonly used index that measures the severity of drought for agriculture and water resource management. It is calculated from observed temperature and precipitation values and estimates soil moisture. However, the PDSI is not considered consistent enough to characterize the risk of drought on a nationwide basis (FEMA, 1997) and is not well suited to the dry, mountainous areas in the western U.S.

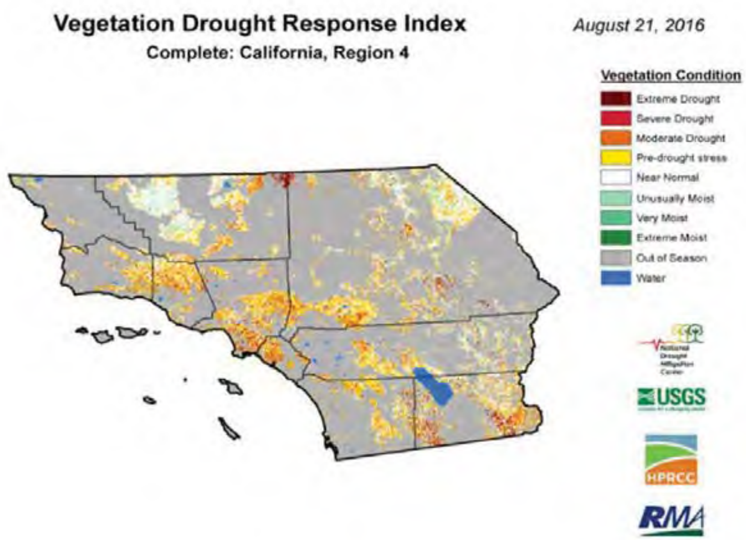

Figure 4-14: Vegetation Drought Response Index – California Region 4 for August 21, 2016

The Vegetation Drought Response Index, or VegDRI, is a bi-weekly depiction of vegetation stress across the contiguous United States. VegDRI is a fine resolution (1-km^2) index based on remote sensing data, and incorporates climate and biophysical data to determine the cause of vegetation stress. Development of the VegDRI map and associated products is a joint effort by the National Drought Mitigation Center (NDMC), the U.S. Geological Survey's (USGS) National Center for Earth Resources Observation and Science (EROS), and the High Plains Regional Climate Center (HPRCC). Figure 4-14 illustrates the VegDRI results for Southern California for August 21, 2016.

4.6.5 Frequency/Probability of Future Occurrences

Currently there is no data on the probability of drought that would be comparable to the USGS effort on earthquakes in the region, or how 100-year flood maps are created.

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4.7 Terrorism

This section was added due to the December 2, 2015 terror attack in San Bernardino County. There is no single, universally accepted definition of terrorism; however, FEMA defines "terrorism" as intentional, criminal, malicious acts. FEMA document 386-7 refers to terrorism specifically as the use of Weapons of Mass Destruction (WMD), including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; and "cyberterrorism."

FEMA developed the Integrated Emergency Management System (IEMS) using an all-hazards approach. While the IEMS was established as an "all-hazard" approach, responding to the threat of terrorism (referred to as counterterrorism) came to be viewed as the responsibility of law enforcement, defense, and intelligence agencies. Furthermore, defensive efforts to protect people and facilities from terrorism (referred to as antiterrorism) were generally limited to the government sector, the military, and some industrial interests.

While the term "mitigation" refers generally to activities that reduce loss of life and property by eliminating or reducing the effects of disasters, in the terrorism context it is often interpreted to include a wide variety of preparedness and response actions. For the purposes of this document, the traditional meaning will be assumed; that mitigation refers to specific actions that can be taken to reduce loss of life and property from manmade hazards by "modifying the built environment" or antiterrorism to reduce the risk and potential consequences of these hazards.

4.7.1 Antiterrorism Regulatory Environment

Adopted on February 9, 2012 and updated on October 1, 2013, United Facilities Criteria (UFC) 4-010-01 defines the United States Department of Defense's (DoD) minimum antiterrorism standards for both new and existing buildings. The document applies to DoD buildings, National Guard buildings, visitor centers and museums, visitor control facilities and expeditionary structures. Historic preservation compliance for implementation of anti-terrorism standards, philosophy, design strategies and assumptions are all taken into account. Site planning, structural design, architectural design, and electrical and mechanical design are discussed in detail in Appendix B.
https://www.fema.gov/news-release/2004/01/13/dhs-announces-new-building-science-guidelines-enhance-terrorism-resistance

4.7.2 Counterterrorism Regulatory Environment

After the 12/2/15 mass shooting, two full time positions with a regional FBI-led terrorist task force (FBI's Joint Terrorism Task Force) were created. These task force officers have the clearance to conduct terrorism investigations in the County. The Task Force includes partners from Homeland Security Investigations (HSI), the San Bernardino Police Department, the San Bernardino County Sheriff's Department, the Riverside County Sheriff's Department, the Ontario Police Department, the Riverside Police Department, the Corona Police Department and the Chino Police Department. For more information regarding the positions, contact the San Bernardino Police Department at (909) 384-5742. Read more here: http://www.pe.com/articles/task-789539-force-san.html

The State of California Department of Justice's Anti-terrorism program works with federal, state and local law enforcement agencies to detect, investigate, prosecute, dismantle, prevent and respond to domestic and international terrorist activities. Read more here: https://oag.ca.gov/bi/atp

The State of California Bureau of Security and Investigative Services' Power to Arrest Course includes a Weapons of Mass Destruction (WMD) & Terrorism Awareness section. Read More Here: http://www.bsis.ca.gov/about_us/laws/bsis_regulations.pdf

4.7.3 Past Occurrences

There have been two terrorist attacks recorded in San Bernardino County. Table 4-10 describes both attacks.
Source: https://www.start.umd.edu/gtd/search/Results.aspx?search=san+bernardino&sa.x=0&sa.y=0&sa=Search

Table 4-10: Terrorist Attacks in San Bernardino County

Date	Perpetrator Group	Fatalities	Injured	Target Type
3/16/1970	White Extremists	0	1	Government (General)
12/2/2015	Unaffiliated Individuals	16	17	Government (General)

The state of California has experienced 574 terrorist attacks from 1970-2011 (Integrated United States Security Database (IUSSD): Data on the Terrorist Attacks in the United States Homeland, 1970-2011 2012). Figure 4-17 shows the types of terrorist attacks in the state of California from 1970 to the present.

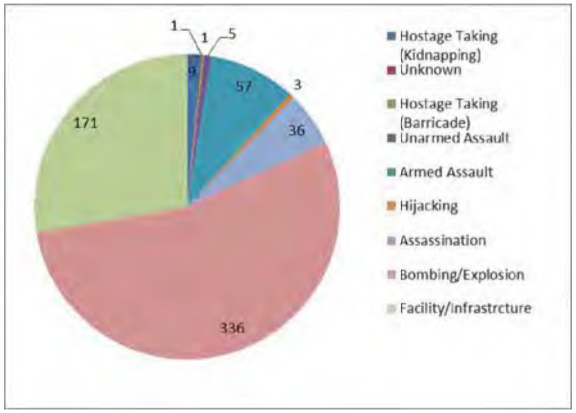

Figure 4-15: Types of Terrorist Attacks in California from 1970-Present

As seen in Figure 4-15 since 1970, the number of terrorist attacks in the United States has steadily decreased. According to http://www.heritage.org most terrorist attacks on America happen outside our nation's borders. The number of international terrorist attacks against the United States from 1970-2011 is shown in Figure 4-16 and Figure 4-17.

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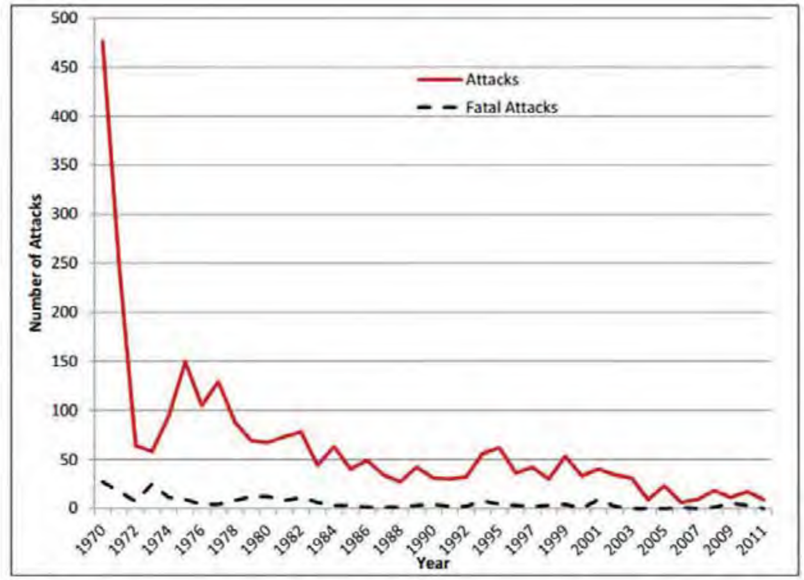

Note: There were 2,608 total attacks and 226 fatal attacks between 1970 and 2011.

Figure 4-16: Total and Fatal Terrorist Attacks in the United States by Year

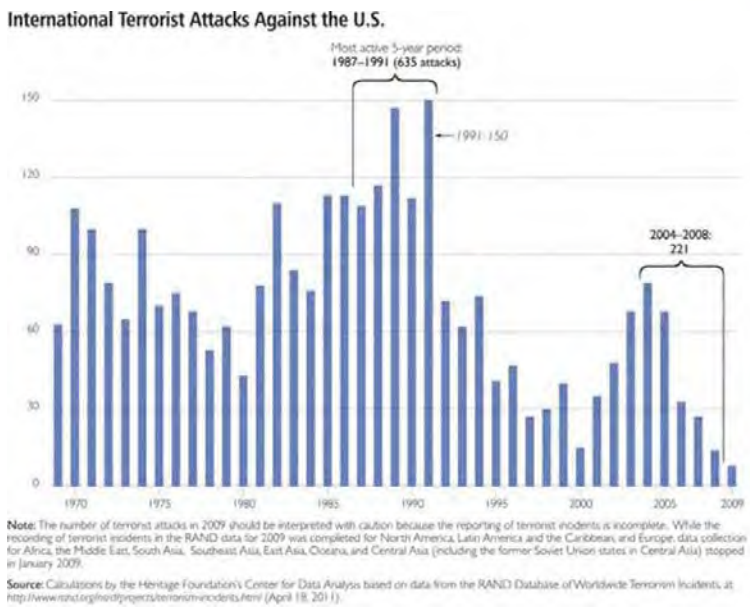

Figure 4-17: International Terrorist Attacks Against the United States

4.7.4 Location/Geographic Extent

Unlike natural hazards, which often follow patterns and can be forecasted, manmade hazards such as acts of terrorism are much more unpredictable. Terrorists have the ability to choose targets and tactics and can often adjust conditions to achieve their objective. Terrorist attacks are often in a more specific location rather than a widespread, more predictable area such as a flood plain. As demonstrated in the 12/2/15 mass shooting, “homegrown terrorists” (self-radicalizing and pulls off their attacks without any help or communication with people in other countries) are even harder to detect and predict.

Translating most manmade hazard profiles into meaningful geospatial information is difficult at best. Instead, the planning team will use an asset-specific approach, identifying potentially at-risk critical facilities and systems in the community. Once a comprehensive list of assets has been developed, it will be prioritized so that the community’s efforts can be directed to protect the most

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important assets first. Then, beginning with the highest priority assets, the vulnerabilities of each facility or system to each type of hazard will be assessed (FEMA 2003).

4.7.5 Magnitude/Severity

As previously discussed, predicting terrorist attacks cannot be done with the same level of accuracy as predicting a natural hazard and its potential impacts on the community. However, we can learn from past terrorist incidents. Table 4-11 profiles 10 different types of terrorist attacks and technological hazards.

Table 4-11: Event Profiles for Terrorism and Technological Hazards

Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
Conventional Bomb/ Improvised Explosive Device	Detonation of explosive device on or near target; delivery via person, vehicle, or projectile.	Instantaneous; additional "secondary devices" may be used, lengthening the time duration of the hazard until the attack site is determined to be clear	Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc.	Overpressure at a given standoff is inversely proportional to the cube of the distance from the blast; thus, each additional increment of standoff provides progressively more protection. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers/shielding; poor construction; and ease of concealment of device
Chemical Agent *	Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/ containers; or munitions.	Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists.	Contamination can be carried out of the initial target area by persons, vehicles, water and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated.	Air temperature can affect evaporation of aerosols. Ground temperature affects evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents but

Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
				can spread contamination. Wind can disperse vapors but also cause target area to be dynamic. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects.
Arson/ Incendiary Attack	Initiation of fire or explosion on or near target via direct contact or remotely via projectile.	Generally minutes to hours.	Extent of damage is determined by type and quantity of device/ accelerant and materials present at or near target. Effects generally static other than cascading consequences, incremental structural failure, etc.	Mitigation factors include built-in fire detection and protection systems and fire-resistive construction techniques. Inadequate security can allow easy access to target, easy concealment of an incendiary device and undetected initiation of a fire. Non-compliance with fire and building codes as well as failure to maintain existing fire protection systems can substantially increase the effectiveness of a fire weapon.
Armed Attack	Tactical assault or sniping from remote location.	Generally minutes to days.	Varies based upon the perpetrators' intent and capabilities	Inadequate security can allow easy access to target, easy concealment of weapons and undetected initiation of an attack.
Biological Agent *	Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line	Biological agents may pose viable threats for hours to years depending on the agent and the	Depending on the agent used and the effectiveness with which it is deployed, contamination can	Altitude of release above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to

Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
	sources such as munitions, covert deposits and moving sprayers.	conditions in which it exists	be spread via wind and water. Infection can be spread via human or animal vectors.	moderate wind will disperse agents but higher winds can break up aerosol clouds; the micro-meteorological effects of building and terrain can influence aerosolization and travel of agents.
Cyberterrorism	Electronic attack using one computer system against another.	Minutes to days	Generally no direct effects on built environment.	Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.
Agriterrorism	Direct, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock.	Days to months	Varies by type of incident. Food contamination events may be limited to discrete distribution sites, whereas pests and diseases may spread widely. Generally no effects on built environment.	Inadequate security can facilitate adulteration of food and introduction of pests and disease agents to crops and livestock.
Radiological Agent **	Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point or line sources such as munitions, covert deposits and moving sprayers.	Contaminants may remain hazardous for seconds to years depending on material used.	Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior of radioactive contaminants may be dynamic.	Duration of exposure, distance from source of radiation, and the amount of shielding between source and target determine exposure to radiation.
Nuclear Bomb **	Detonation of nuclear device underground, at the surface, in the air or at high altitude.	Light/heat flash and blast/shock wave last for seconds; nuclear radiation and fallout hazards can persist for years. Electromagnetic pulse from a high altitude detonation lasts for seconds and affects only	Initial light, heat and blast effects of a subsurface, ground or air burst are static and are determined by the device's characteristics and employment; fallout of radioactive contaminants may	Harmful effects of radiation can be reduced by minimizing the time of exposure. Light, heat and blast energy decrease logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by

Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
		unprotected electronic systems.	be dynamic, depending on meteorological conditions.	absorbing and/or deflecting radiation and radioactive contaminants.
Hazardous Material Release (fixed facility or transportation)	Solid, liquid and/or gaseous contaminants may be released from fixed or mobile containers.	Hours to days	Chemicals may be corrosive or otherwise damaging over time. Explosion and/or fire may be subsequent. Contamination may be carried out of the incident area by persons, vehicles, water and wind.	As with chemical weapons, weather conditions will directly affect how the hazard develops. The micro-meteorological effects of building and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. Non-compliance with fire and building codes as well as failure to maintain existing fire protection and containment features can substantially increase the damage from a hazardous materials release.

* Source: Jane's Chem-Bio Handbook
** Source: FEMA, Radiological Emergency Management Independent Study Course

4.7.6 Frequency/Probability of Future Occurrences

We can usually forecast the type, frequency and location of a natural hazard thanks to the laws of physics and nature. However, when dealing with manmade hazards such as terrorism, we are often dealing with functions of the human mind-malevolence, incompetence, carelessness and other behaviors. These actions cannot be predicted with any accuracy; therefore, there is the potential for an act of terrorism to occur anywhere, at any time.

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4.8 Climate Change

Climate change refers to any distinct change in measures of climate lasting for a long period of time, more specifically major changes in temperature, rainfall, snow, or wind patterns. Climate change may be limited to a specific region, or may occur across the whole Earth. Climate change may result from:

- Natural factors (e.g., changes in the Sun's energy or slow changes in the Earth's orbit around the Sun);
- Natural processes within the climate system (e.g., changes in ocean circulation); and
- Human activities that change the atmosphere's make-up (e.g., burning fossil fuels) and the land surface (e.g., cutting down forests, planting trees, building developments in cities and suburbs, etc.).

The effects of climate change are varied: warmer and more varied weather patterns, melting ice caps, and poor air quality, for example. As a result, climate change impacts a number of natural hazards.

The 2013 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

4.8.1 Regulatory Environment

California's response to climate change is directed by Legislation and Regulations and by other Mandates such as executive orders.

4.8.1.1 The Sustainable Communities and Climate Protection Act of 2008

The Sustainable Communities and Climate Protection Act of 2008 (Sustainable Communities Act, SB 375, Chapter 728, Statutes of 2008) looks to reduce GHG emissions through coordinated transportation and land use planning with the goal of more sustainable communities. Regional targets are established for GHG emissions reductions from passenger vehicle use by the sustainable communities strategy (SCS) established by each metropolitan planning organization (MPO). The SCS is an integral part of the regional transportation plan (RTP) and contains land use, housing, and transportation strategies to meet GHG reductions targets. In San Bernardino County, the South Coast Air Quality Management District facilitates compliance with the federal Clean Air Act and implements the state's air quality program.

The Office of Planning and Research's General Plan Guidelines and SB 375 builds upon Assembly Bill 162 (flood protection) and Senate Bill 1241 (fire protection) and supports Safeguarding California implementation.

SB 375 also supports Assembly Bill 2140 which requires that a City/County General Plan contains a safety element in addition to a Hazard Mitigation Plan. AB 2140 also requires a vulnerability assessment, adaptation goals, policies and objectives, and a set of feasible implementation measures.

4.8.1.2 California Adaptation Planning Guide (APG)

The State of California has been taking action to address climate change for over 20 years, focusing on both greenhouse gas emissions reduction and adaptation. The California Adaptation Planning Guide (APG) continues the state's effort by providing guidance and support for communities addressing the unavoidable consequences of climate change.

Based on upon specific factors, 11 Climate impact regions were identified. Some of the regions were based on specific factors particularly relevant to the region. As illustrated in Figure 4-18 San Bernardino County is located in the Desert Region.

The Desert is a heavily urbanized inland region (4.3+ million people) made up of sprawling suburban development in the west near the South Coast region and vast stretches of open, largely federally owned desert land to the east. Prominent cities within the desert portion include Palm Springs (44,500+) and El Centro (42,500+). The region's character is defined largely by the San Gabriel Mountains, San Gorgonio Mountains, San Jacinto Mountains, and smaller inland mountains reaching through the desert to the Colorado River, which borders the region on the east. Communities in the Desert region should consider evaluating the following climate change impacts:

- Reduced water supply
- Increased temperature
- Reduced precipitation
- Diminished snowpack
- Wildfire risk
- Public health and social vulnerability
- Stress on special-status species

Figure 4-18: Climate Impact Regions

4.8.2 Past Occurrences

Climate change has never been directly responsible for any declared disasters. Past flooding, wildfire, levee failure, and drought disasters may have been exacerbated by climate change, but it is impossible to make direct connections to individual disasters. In addition, unlike earthquake and floods that occur over a finite time period, climate change is an on-going hazard the effects of which some are already experiencing. Other effects may not be seriously experienced for decades, or may be avoided altogether by mitigation actions taken today.

4.8.3 Location/Geographic Extent

The effects of climate change are not limited by geographical borders. San Bernardino County, the State of California, the United States, and the rest of the world are all at risk to climate change. As such, the entire County is at risk to the effects of climate change.

Figure 4-19 and Figure 4-20 provide Cal Adapt[2] modeled decadal July high temperature averages for 2010 and 2090. These figures provide current decade-long July temperature averages and possible annual high heating trends for the remaining portion of the century. The data presented in the figures represent a “projection” of potential future climate scenarios, they are not predictions. These figures illustrate how the climate may change based on a variety of different potential social and economic factors. The visualizations are comprised of average values from Coupled Climate model 2.1 (GFDL), Community Climate System Model Version 3 (CCSM3), Coupled Global Climate Model Version 3 (CNRM) and Parallel Climate Model 1 (PCM1). During the next few decades, scenarios project average temperature to rise between 1° and 2.3°F; however, the projected temperature increases begin to diverge at mid-century so that, by the end of the century, the temperature increases projected in the higher emissions scenario (A2) are approximately twice as high as those projected in the lower emissions scenario (B1). Customizable maps can be viewed at http://cal-adapt.org/temperature/decadal/

[2] Cal-Adapt has been funded to provide access to data and information that has been produced by the State's scientific and research community. The data available in this site offer a view of how climate change might affect California at the local level.

Figure 4-19: July Decadal Average High Temperature Map; 2010

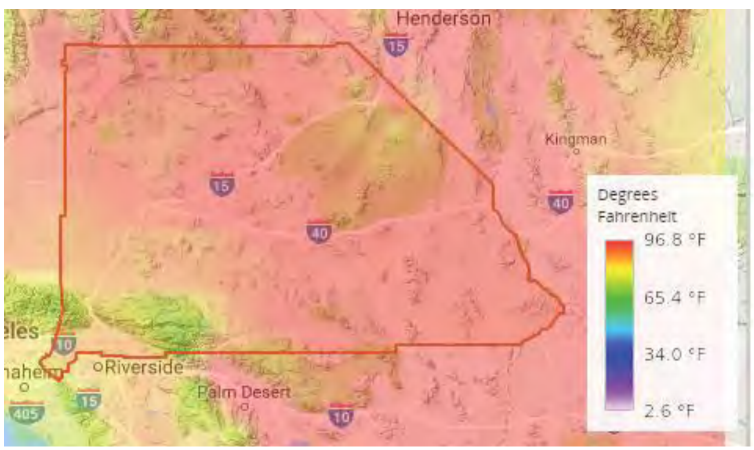


Figure 4-20: July Decadal Average High Temperature Map; 2090

4.8.4 Magnitude/Severity

The California Climate Adaptation Strategy (CAS), citing a California Energy Commission study, states that “over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined.” This study shows that California is getting warmer, leading to an increased frequency, magnitude, and duration of heat waves. These factors may lead to increased mortality from excessive heat, as shown in Figure 4-21: California Historical and Projected Temperature Increases 1961 to 2099

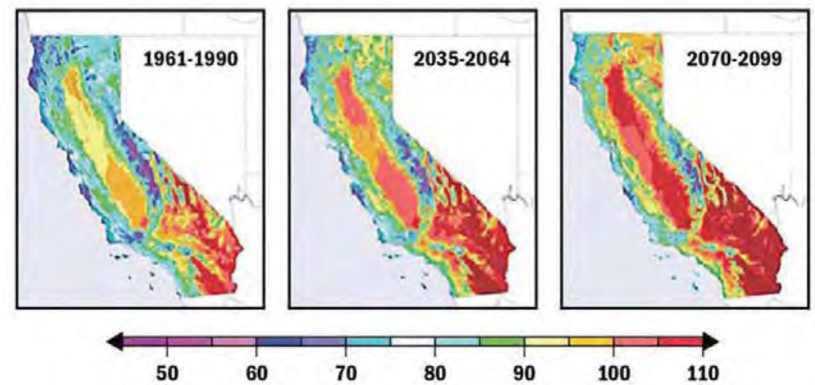


Figure 4-21: California Historical and Projected Temperature increases 1961-2099

Source: Dan Cayan; California Climate Adaptation Strategy

4.8.5 Frequency/Probability of Future Occurrences

According to the ABAG 2010 Local Hazard Mitigation Plan (LHMP), climate change is one of the few natural hazards where the probability of occurrence is influenced by human action. In addition, unlike earthquake and floods that occur over a finite time period, climate change is an on-going hazard.

The 2009 Climate Adaptation Strategy (CAS) delineated how climate change may impact and exacerbate natural hazards in the future, including wildfires, extreme heat, floods, drought, and levee failure:

Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in San Bernardino County and the rest of California, which are likely to increase the risk of mortality and morbidity due to heat-related illness and exacerbation of existing chronic health conditions. Those most at risk and vulnerable to climate-related illness are the elderly, individuals with chronic conditions such as heart and lung disease, diabetes, and mental illnesses, infants, the socially or economically disadvantaged, and those who work outdoors.

- Higher temperatures will melt the Sierra snowpack earlier and drive the snowline higher, resulting in less snowpack to supply water to California users.
- Droughts are likely to become more frequent and persistent in the 21st century.
- Intense rainfall events, periodically ones with larger than historical runoff, will continue to affect California with more frequent and/or more extensive flooding.
- Storms and snowmelt may coincide and produce higher winter runoff from the landward side, while accelerating sea-level rise will produce higher storm surges during coastal storms. Together, these changes will increase the probability of levee and dam failures in the Sacramento-San Joaquin Delta.
- Warmer weather, reduced snowpack, and earlier snowmelt can be expected to increase wildfire through fuel hazards and ignition risks. These changes can also increase plant moisture stress and insect populations, both of which affect forest health and reduce forest resilience to wildfires. An increase in wildfire intensity and extent will increase public safety risks, property damage, fire suppression and emergency response costs to government, watershed and water quality impacts, vegetation conversions and habitat fragmentation.

4.8.6 El Niño Effect

El Niño is defined as an abnormal weather pattern that is caused by the warming of the Pacific Ocean near the equator, off the coast of South America. This occurs when the normal trade winds weaken (or even reverse), which lets the warm water that is usually found in the western Pacific flow instead towards the east. This warm water displaces the cooler water that is normally found near the surface of the eastern Pacific, setting off atmospheric changes that affect weather patterns in many parts of the world.

As a result of the predicted El Niño in 2015 the following meetings were held during the months of January – December 2015:

El Niño Awareness Program

- **January - December 2015**

- **October 28, 2015** (Two meetings) two separate meetings one with the Public with 200 High Desert residents attending, the other meeting was at the same location of the Victor Ville City Council Chambers of 80 operators
- **November 9, 2015** South Desert Meeting at the Town of Yucca Valley Community Center, with 50 Operators and 235 general public ,residents
- **November 12, 2015** 2:30pm-4:30pm Valley Cooperators Meeting, City of Rancho Cucamonga, Victoria Gardens, 90 Operators and 2nd Meeting at the same location held at 530pm-730pm meeting with 205 public and residents
- **November 16, 2015** Public Meeting at Upland city Hal l for San Antonio heights, Mt. Baldy and local residents 110 Public and Residents in attendance .
- **November 23, 2015** Wrightwood Community Center, 80 Operators and 330 Public and Residents
- **November 24, 2015** City of Yucaipa 40 operators at Yucaipa City Hall
- **December, 2015** 5000 English pamphlets and 5000 Spanish pamphlets distributed Winter Weather Workshop meetings (discuss long term weather models and predictions as far as estimated rain fall anticipated. and Extreme Heat Program meetings (stakeholder and Red Cross and SCE and other responders/operators meetings on anticipated overly hot days and local assistance plans. program in place by OES.

4.8.7 Extreme Weather

The Extreme Weather – Excessive Heat Standard Operating Guidelines (SOG) were developed in response to the potential for Excessive Heat and heat related Power Outage events in San Bernardino County. The following objectives and activities have been established to prevent the harmful effects of excessive heat on at-risk populations and the potential for life-threatening repercussions of power outages during excessive heat events.

The Extreme Weather – Excessive Heat SOG describe the County operations during heat related emergencies and provide guidance for local jurisdictions in their preparation for heat emergencies and other related activities.

The information included in this document is “situation” and/or “incident” driven and subject to revision by the Extreme Weather Committee as conditions warrant. Notifications are information dependent and modification of the activities in these guidelines may be required in response to changing conditions, situations and/or inaccurate weather predictions.
The Extreme Weather – Excessive Heat Standard Operating Guidelines (SOG) were developed through the collaborative efforts of the “Extreme Weather Committee”. The committee consists of

representatives from key County Departments and private sector partners who have a shared interest, responsibility and/or expertise in the County's preparation for an Excessive Heat event. It is designed to protect all of the County's population especially the most vulnerable populations.

For the last ten years the annual Winter Weather Workshop and Meeting brings together San Bernardino County Fire Office of Emergency Services with The San Bernardino County Special Districts key stakeholders and first responders as well as weather experts. The annual meeting is an accumulation of meetings with NOAA and other Meteorological experts on the possible winter weather outlook and forecast including possible precipitation levels and wide ranging forecasts.

The meeting includes discussions on possible plans of actions and response to flooding emergencies and or snow or white out events and the other possibility of continuing long duration droughts.

4.9 Other Hazards

As mentioned earlier, lower priority hazards are addressed at a lesser level of detail due to their relatively fewer impacts, as identified in the preceding hazard assessment section. The lower priority hazards for the unincorporated area are:

- Severe Thunderstorm
- Infestation
- Drought
- High Winds/Straight Line Winds
- Lightning
- Extreme Heat
- Hail
- Tornado

Although not part of the MJHMP, the remaining hazards are a part of the San Bernardino County 2007 General Plan and are addressed in the County Building Codes and Ordinance.

The information in this section provides an explicit representation of what a community stands to lose in a disaster. This is useful for county officials and other decision makers who will need to balance the costs of mitigation against the potential harm to citizens and damage to property. It provides comparable measurements of community natural hazard exposure and assists in determining which hazards and/or what parts of San Bernardino County to focus on making resilient to disaster first. Based upon possible assets at risk, hazard mitigation resources can be directed where need be, in-part, by a vulnerability assessment and information found in hazard profiles presented in Section 4.8.

4.10 Vulnerability Assessment

The information in this section provides an explicit representation of what a community stands to lose in a disaster. This is useful for county officials and other decision makers who will need to balance the costs of mitigation against the potential harm to citizens and damage to property. It provides comparable measurements of community natural hazard exposure[3] and assists in determining which hazards and/or what parts of San Bernardino County to focus on making resilient to disaster first. Based upon possible assets at risk, hazard mitigation resources can be directed where need be, in-part, by a vulnerability assessment and information found in hazard profiles presented in Section 4.2.

The vulnerability assessment is developed by providing the hazard mitigation analysts with quantitative and qualitative information for each hazard identified by the HMP Planning Team Through an exposure analysis, quantitative data is developed for each hazard. An exposure analysis provides quantities of people and assets at risk to particular hazards. Qualitative data has been developed and presented in this section for hazards without measurable data. Qualitative data provides information beyond quantities of people and assets at risk, but rather a description of how the hazard could affect a region like San Bernardino County.

Note: The hazard exposure analysis has been developed with best available data and follows methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses.

Note: There are other intangible losses that could result from a natural hazard event, such as losses of historic or cultural integrity or damage to the environment that are difficult to quantify. Other costs, including response and recovery costs, are often unrecoverable and are not addressed in this document.

4.10.1 Methodology

A vulnerability assessment was conducted for each of the identified priority hazards. Geospatial data is essential in determining population and assets exposed to particular hazards. Geospatial analysis can be conducted if a natural hazard has a particular spatial footprint that can be overlaid against the locations of people and assets. In San Bernardino County, wildfire, flood, earthquake, and landslides have known geographic extents and corresponding spatial information about each hazard.

Several sources of data are necessary to conduct a vulnerability analysis. Figure 4-22provides an exhibit of the data inputs and outputs used to create the vulnerability analysis results presented in this section. U.S. Census data is the primary source in determining natural hazard exposure to residents. Census data has been used to determine the population at risk, which is generally referred to as population exposure. Population exposure is provided for wildfire, flooding, earthquakes and landslides as potential hazards later in this section.

[3] Elements at risk; Risk inventory; Exposure encompasses all elements, processes, and subjects that might be affected by a hazardous event. Consequently, exposure is the presence of social, economic, environmental or cultural assets in areas that may be impacted by a hazard.

Together with the U.S. Census data, asset data was used to provide a snapshot of how City assets are affected by natural hazards. For purposes of this vulnerability analysis, asset data includes parcels and critical infrastructure within the San Bernardino County boundaries. Critical infrastructure is described as assets that are essential for people and a community to function. Critical infrastructure includes such as utilities, San Bernardino County owned facilities, bridges, schools, and other community facilities that provide essential services to residents.

Critical facilities data was developed from a variety of sources including San Bernardino County owned and maintained data, state and federal government datasets, and private industry datasets. A critical infrastructure spatial database was developed to translate critical facilities information into georeferenced[4] points. Critical facility points are intersected with the spatial hazard layers to develop a list of "at risk" critical facilities. The San Bernardino County critical facilities that intersect with natural hazards are referred to as facilities with hazard "exposure". Exposure results are presented later in this section.

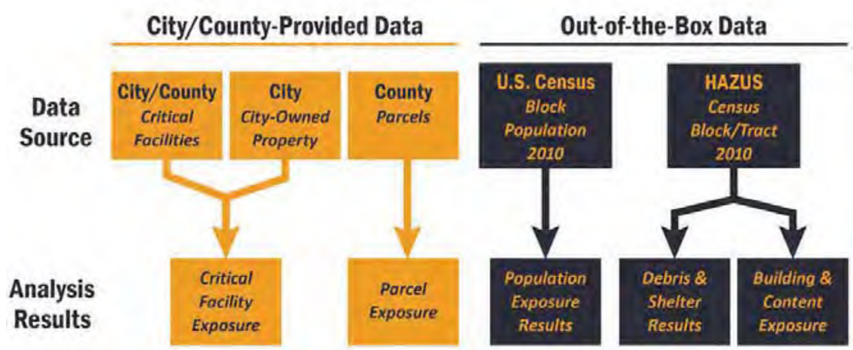


Figure 4-22: Data Source and Methodology

Lastly, FEMA's Hazus-MH MR5 (Hazus) software was implemented to conduct detailed loss estimation for flood and earthquake. Hazus is a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. HAZUS uses Geographic Information Systems (GIS) technology to estimate physical, economic, and social impacts of disasters. For purposes of this planning effort, Hazus was used to graphically illustrate the limits of identified high-risk locations due to possible earthquakes and floods.

[4] To georeference something means to define its existence in physical space. That is, establishing its location in terms of map projections or coordinate systems. The term is used both when establishing the relation between raster or vector images and coordinates, and when determining the spatial location of other geographical features.

The vulnerability and potential impacts from priority hazards that do not have specific mapped areas nor the data to support additional vulnerability analyses are discussed in more general terms in alphabetical order following the discussion on wildfire, flooding and earthquake hazards.

4.10.2 Hazus MH Inputs

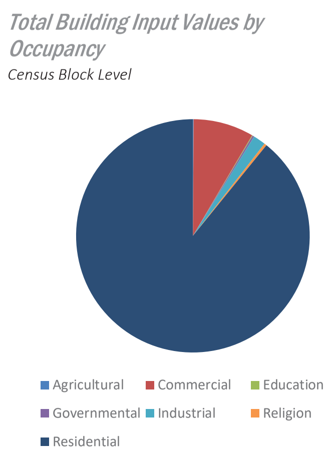
FEMA's loss estimation software, Hazus MH, was used to analyze the San Bernardino County building risk to flood and earthquake hazards. Hazus contains a database of economic, demographic, building stock, transportation facilities, local geology, and other information that can be used for several steps in the risk assessment process. Hazus software operates on structure square footage, structure replacement, and content replacement costs aggregated to the census block and tract levels depending on type of hazard analysis. The following table provides value data for building categories at the census block and census tract levels. Census block and census tracts are used to provide input information for the Hazus analysis presented in this report.

The project team used the San Bernardino County Essential Facilities Risk Assessment (SBEFRA) project and incorporated the newly updated DFIRM data into HAZUS to assess potential losses in the mapped 100-year (with and without levee protection) and 500-year flood zones.

Note: The Hazus software utilizes different census level information inputs to develop loss estimates depending on the hazard module. The flood module uses census block information while the earthquake module uses census track information. It is important to understand the total values of each as estimated damage to the community is presented on a percent of total value basis.

Table 4-12: Hazus Flood Census Block Input Values

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (%)	Content Replacement Cost ($000)	Content Replacement Cost (%)	Total Value ($000)	Total Value (%)
Agricultural	$ 70,841	0.3%	$ 70,841	0.3%	$ 141,682	1%
Commercial	$ 1,208,163	4.4%	$ 1,231,690	4.5%	$ 2,439,853	9%
Education	$ 120,017	0.4%	$ 127,161	0.5%	$ 247,178	1%
Governmental	$ 34,216	0.1%	$ 43,192	0.2%	$ 77,408	0%
Industrial	$ 452,710	1.6%	$ 610,063	2.2%	$ 1,062,773	4%
Religion	$ 176,012	0.6%	$ 176,012	0.6%	$ 352,024	1%
Residential	$ 15,483,634	56.2%	$ 7,744,650	28.1%	$ 23,228,284	84%
Total	**$ 17,545,593**	**64%**	**$ 10,003,609**	**36%**	**$ 27,549,202**	**100 %**



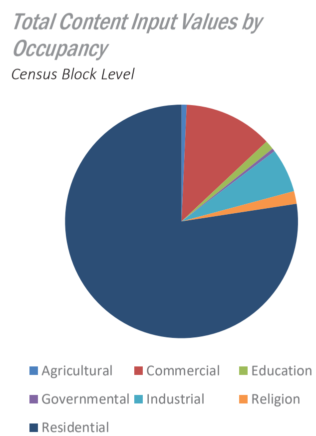
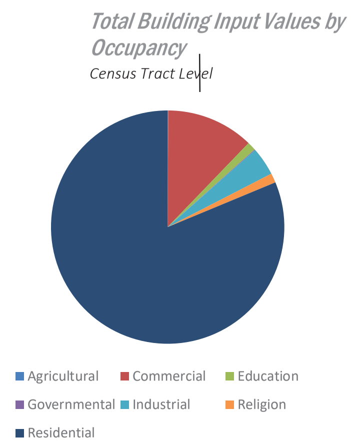


Figure 4-23: Census Block Building and Content Exposure Values

Table 4-13: Hazus Earthquake Census Tract Input Values

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (%)	Content Replacement Cost ($000)	Content Replacement Cost (%)	Total Value ($000)	Total Value (%)
Agricultural	$ 264,949	50.0%	$ 264,949	50.0%	$ 529,898	1%
Commercial	$ 11,056,871	48.5%	$ 11,756,479	51.5%	$ 22,813,350	9%
Education	$ 819,946	48.4%	$ 874,703	51.6%	$ 1,694,649	1%
Governmental	$ 265,933	45.6%	$ 316,930	54.4%	$ 582,863	0%
Industrial	$ 3,733,265	41.4%	$ 5,276,431	58.6%	$ 9,009,696	4%
Religion	$ 958,122	50.0%	$ 958,122	50.0%	$ 1,916,244	1%
Residential	$ 84,302,884	66.7%	$ 42,159,954	33.3%	$ 126,462,838	84%
Total	**$ 101,401,970**	**62%**	**$ 61,607,568**	**38%**	**$ 163,009,538**	**100 %**



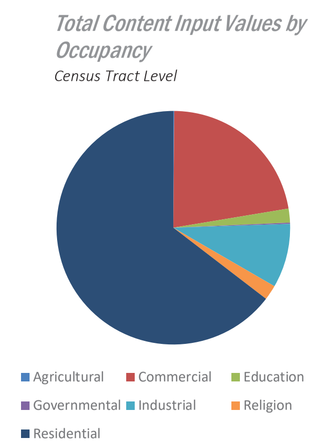


Figure 4-24: Census Tract Building and Content Exposure Values

4.11 Population and Assets

To describe vulnerability for each hazard, it is important to understand the “total” population and “total” assets at risk. The exposure for each hazard described in this section will refer to the percent of total population or percent of total assets. This provides the possible significance or vulnerability to people and assets for the natural hazard event and the estimated damage and losses expected during a “worst case scenario” event for each hazard. Sections below provide a description of the total population, critical facilities, and parcel exposure inputs.

Table 4-12 and Table 4-13 provide an estimate of the number and size of buildings in the County’s unincorporated areas and its Special Districts, as well as the replacement value of the buildings and their contents. The table provides information by occupancy class (e.g., residential, commercial, etc.), as well as by construction type (e.g., concrete, wood frame, etc.).

4.11.1 Population

To develop hazard-specific vulnerability assessments, population near natural hazard risks should be determined to understand the total “at risk” population. We can understand how geographically defined hazards may affect San Bernardino County by analyzing the extent of the hazard in relation to the location of population. For purposes of the vulnerability assessment approximately 292,152 (100 %) of the San Bernardino County’s population is exposed to one or more hazards within or near the County of San Bernardino boundaries. Each natural hazard scenario affects the San Bernardino County residents differently depending on the location of the hazard and the population density of where the hazard could occur. Vulnerability assessment sections presented later in this section summarize the population exposure for each natural hazard.

4.11.1.1 Vulnerable Populations

The severity of a disaster depends on both the physical nature of the extreme event and the socioeconomic nature of the populations affected by the event. Important socioeconomic factors tend to influence disaster severity. A core concept in a vulnerability analysis is that different people, even within the same region, have a different vulnerability to natural hazards.

4.11.1.2 Income and Housing Condition

Income or wealth is one of the most important factors in natural hazard vulnerability. This economic factor affects vulnerability of low income populations in several ways. Lower income populations are less able to afford housing and other infrastructure that can withstand extreme events. Low income populations are less able to purchase resources needed for disaster response and are less likely to have insurance policies that can contribute to recovery efforts. Lower income elderly populations are less likely to have access to medical care due to financial hardship. Because of these and other factors, when disaster strikes, low income residences are far more likely to be injured or left without food and shelter during and after natural disasters.

Figure 4-25 shows the median household income distribution for the County of San Bernardino in 2012. The “median” is the value that divides the distribution of household income into two equal parts (e.g., the middle). The average median household income in the County of San Bernardino between 2010 and 2014 was $54,100, in the United States during the same period the median house household income was $51,759.

4.11.1.3 Age

Children and the elderly tend to be more vulnerable during an extreme natural disaster. They have less physical strength to survive disasters and are often more susceptible to certain diseases. The elderly often also have declining vision and hearing and often miss reports of upcoming natural hazard events. Children, especially young children, have the inability to provide for themselves. In many cases, both children and the elderly depend on others to care for them during day to day life.

Finally, both children and the elderly have fewer financial resources and are frequently dependent on others for survival. In order for these populations to remain resilient before and after a natural hazard event, it may be necessary to augment city residents with resources provided by the City, state and federal emergency management agencies and organizations. See Figure 4-26 and Figure 4-27 for location of vulnerable population by age within the County of San Bernardino.

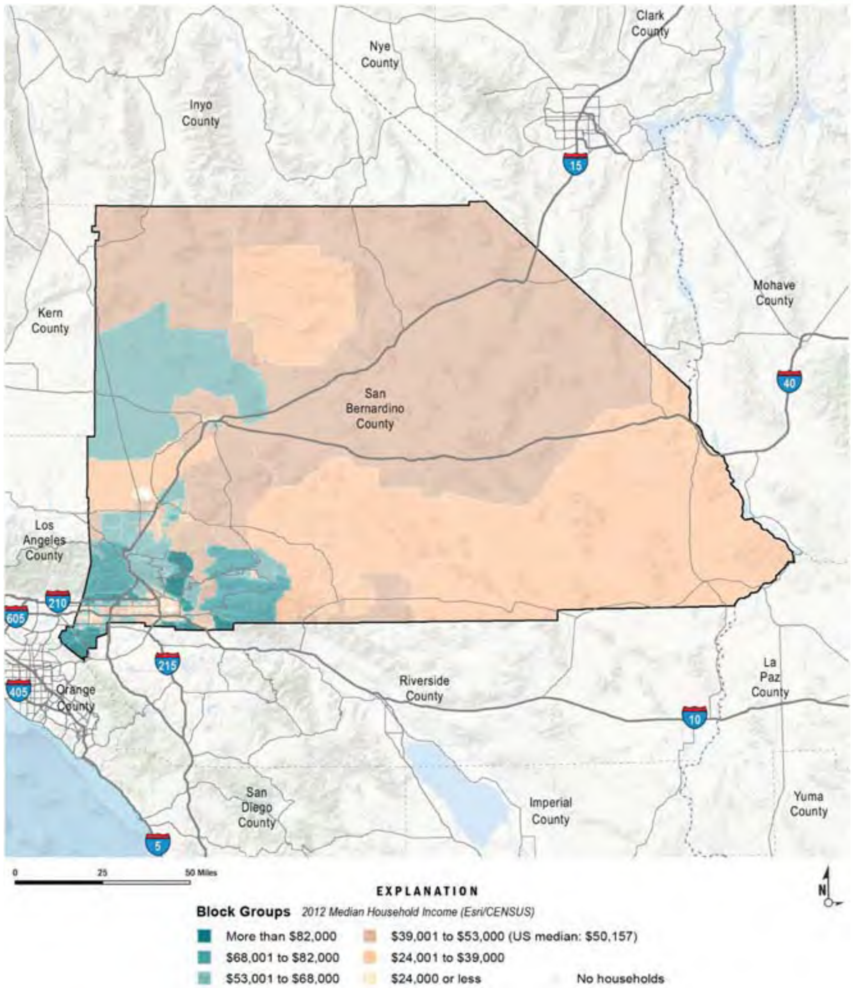


Figure 4-25: Median Household Income Distribution Maps

COUNTY OF SAN BERNARDINO - Hazard Mitigation Plan Update

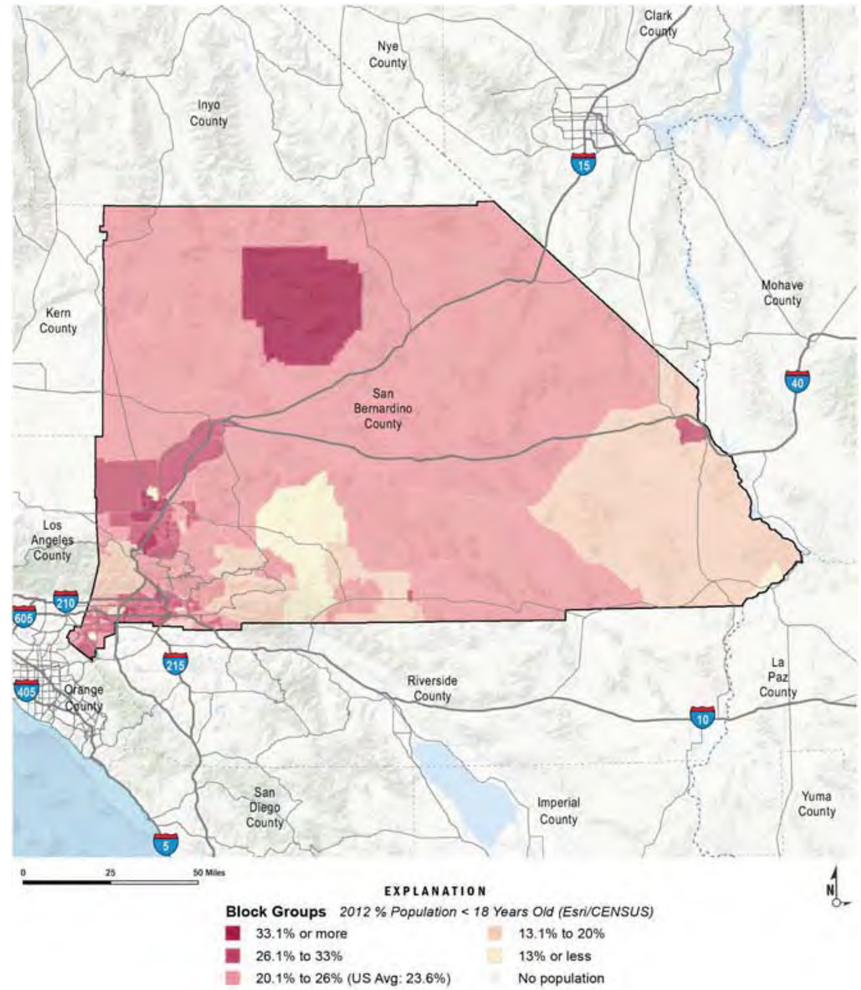


Figure 4-26: Population Under Age 18

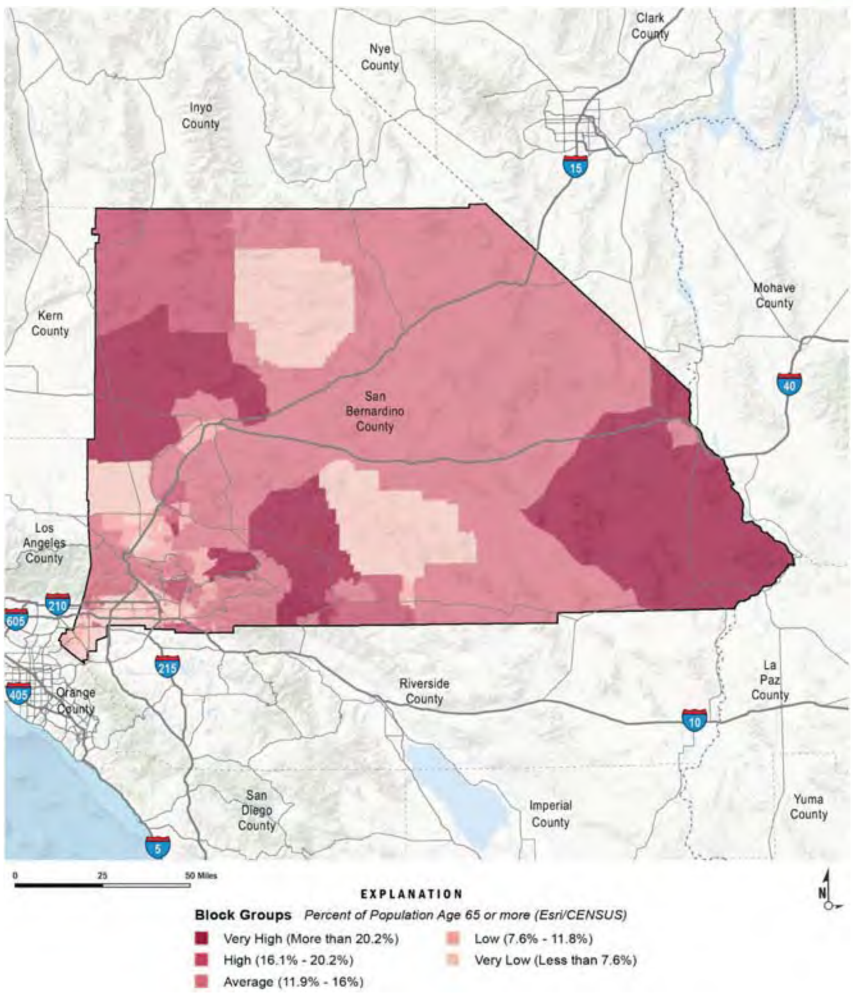


Figure 4-27: Population Over Age 65

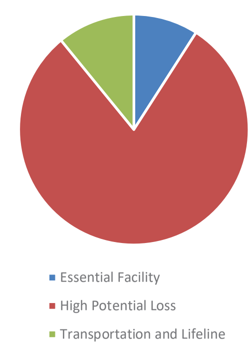
4.11.1.4 Critical Facility List

As stated in the San Bernardino County Emergency Operations Plan (EOP), the San Bernardino County Sheriff's Department (Sheriff) is the lead County agency in identifying critical infrastructure in the County and its Special Districts. A Sheriff's Department Working Group was established to identify Critical Facilities throughout San Bernardino County. Due to Homeland Security and issues related to terrorism, this list is not included in the MJHMP, but is available through the Sheriff's Department.

The Sheriff's Department maintains a Critical Infrastructure Database listing the site name, location, critical level, threat level, site type, and contact information. This database was created for the 2010 MJHMP and has been updated regularly by the Intelligence Division. The Sheriff's Intelligence Division has created Emergency Response Folders (Folders) on each of the locations. The Folders contain site-specific information needed by emergency personnel to respond to any type of emergency. The Folders contain floor plans, photographs, entry/exit points, utility locations, ingress and egress locations, known hazardous materials on site, and emergency contact information for the responsible persons of the site. The Sheriff's Department maintains control and transport of this information to an Incident Command Post/Department Operations Center/Emergency Operations Center when needed.

Table 4-14: Critical Facility Points

Infrastructure Type	Feature Count
Essential Facility	**268**
EOC	2
Fire Station	99
Hospital	9
Police Station	28
School	130
High Potential Loss	**1,155**
Child Care Center	91
Child Residential Care - 24 hour	2
Foster Family Agency	2
Adult Residential Care	52
Home Care Organization	2
Elder Residential Care	35
Communication Facility	40
Dam	24
Waste Water Facility	2



Infrastructure Type	Feature Count
HAZMAT	51
EPA FRS Facility	731
FCC ASR	107
Electric Power Facility	6
Natural Gas Facility	7
Potable Water Facility	3
Transportation and Lifeline	**636**
Airport	34
Runway	36
Bus Facility	2
Highway Bridge	553
Railway Bridge	11
Grand Total	**2,059**

Table 4-15: Linear Utilities

Infrastructure Type	Total Linear Mileage
Transportation and Lifeline	**16,992**
Railway	**719**
Roads	**16,273**
Interstate Highway	587
State / County Highway	1,259
Primary Highway	308
Local Road, Major	2,928
Local Road	6,530
Other Minor Road	4,031
Vehicular Trail	543
Cul-de-Sac / Traffic Circle	11
Ramp	68
Service Road	8
Grand Total	**16,992**

4.11.1.5 Utility Agencies

The utilities and transportation infrastructure is another significant concern for the County and its Special Districts. Various laws, ordinances, regulations, standards, and guidelines have been established to ensure proper and thorough mitigation measures to decrease the effects of hazards.

The following are two of the major utility agencies:

Southern California Edison (SCE) has undertaken an all-hazards approach to planning for an emergency event. SCE has developed an Emergency Response and Recovery Plan to provide a safe and reliable electric service. SCE also has a long-standing relationship with the County and is an active member of several local, state, and federal organizations. According to SCE they have acted to mitigate the impacts of hazards on their electrical system.

Southwest Gas Corporation (SWG) has also coordinated with the County, maintains a natural gas high-pressure system within the County, and consists of approximately 100 miles of underground pipelines. The system also includes some above ground facilities. The total replacement cost for the entire system is approximately $40,000,000. Southwest Gas conducts annual training for the first responders within their service territories to teach the proper methods of responding to and working with natural gas leaks. Staff from SWG serves on local emergency management committees within their service territory.

4.12 Hazard Specific Vulnerabilities

This section summarizes the possible impacts and quantifies, where data permits, the County's vulnerability to each of the priority hazards identified in the hazard profiles earlier in this section.

An estimate of the vulnerability of the County to each identified hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, geographic extent, and damage and casualty potential. It is categorized into the following classifications:

Low: Minimal potential impact the occurrence and potential cost of damage to life and property is minimal.

Medium: Moderate potential impact this ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.

High: Widespread potential impact this ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.

Extremely High: Very widespread with catastrophic impact.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be inventoried and their values tabulated. Other information can be collected in regard to the hazard area, such as the location of critical community facilities, historic structures, and valued natural resources. Together, this information conveys the vulnerability of that area to a hazard.

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4.13 Earthquake

Major Impacts from earthquakes are primarily the probable number of casualties and damage to infrastructure occurring from ground movement along a particular fault (USGS, 2016). The degree of infrastructure damage depends on the magnitude, focal depth, distance from fault, duration of shaking, type of surface deposits, presence of high groundwater, topography, and the design, type, and quality of infrastructure construction.

To analyze the risk to San Bernardino County residents, the Great Shakeout scenario was chosen modeled by the California Integrated Seismic Network (CISN). The 2016 Great Southern California ShakeOut was based on a potential magnitude 7.8 Earthquake on the southern San Andreas Fault approximately 5,000 times larger than the magnitude 5.4 earthquake that shook southern California on July 29, 2008. Such an earthquake will cause unprecedented damage to Southern California greatly dwarfing the massive damage that occurred in Northridge's 6.7-magnitude earthquake in 1994. The hazard foot print for this scenario was used to develop exposure results for population, critical facilities, and single family residential parcel values. FEMA Hazus analyses was used to conducted loss estimation for both scenarios and include building and content loss estimation results based on peak ground acceleration, peak ground velocity, and peak spectral acceleration modeled for the 7.8 earthquake on the San Andreas Fault.

4.13.1 Population at Risk

According to the 2010 US Census, the population of jurisdiction is 297,425. Though rural residential construction is not particularly vulnerable to earthquakes, the chosen earthquake scenarios will directly or indirectly expose the entire population of San Bernardino County to ground shaking. Depending on the time of day (the population differs based on employment opportunities) and exact location of the modeled epicenter, the earthquake scenarios could be experienced differently. Figure 4-28 exhibit the population totals in each modeled earthquake severity zone. Population location is based upon information taken during the 2010 U.S. Census.

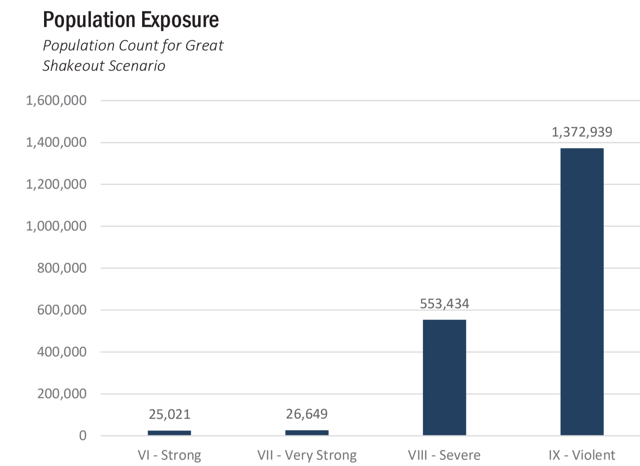

Figure 4-28: Population Exposure to the Great Shakeout EQ Shake Severity Zone

4.13.2 Improved Parcel Value at Risk

The County's parcel layer was used as the basis for the inventory of improved residential parcels. GIS was used to create centroids, or points, to represent the center of each parcel polygon this is assumed to be the location of the structure for analysis purposes. The centroids were then overlaid with the shake severity zones to determine the at-risk structures. Only improved parcels greater than $20,000 were analyzed. The analysis indicates residential parcels the chosen scenario will experience similar, but different shaking patterns. The type and year of construction will greatly influence damage for structures subject to similar shaking. Table 4-16 shows the count of at-risk structures and their associated improvement and land exposure values.

Table 4-16: Improved Parcel Value Exposure from Southern California Great ShakeOut

Shake Severity Zone	Improved Parcel Count	Improvement Value Exposure ($000)	Land Value Exposure ($000)	Total Exposure ($000)
IV - Light	1,099	$ 181,952	$ 64,548	$ 246,499
V - Moderate	4,382	$ 485,082	$ 215,875	$ 700,956

Shake Severity Zone	Improved Parcel Count	Improvement Value Exposure ($000)	Land Value Exposure ($000)	Total Exposure ($000)
VI - Strong	1,340	$ 142,763	$ 63,941	$ 206,704
VII - Very Strong	7,669	$ 824,794	$ 206,725	$ 1,031,519
VIII - Severe	46,889	$ 8,741,904	$ 3,039,484	$ 11,781,388
IX - Violent	46,974	$ 9,068,446	$ 3,591,379	$ 12,659,825
Grand Total	**108,353**	**$ 19,444,940**	**$ 7,181,951**	**$ 26,626,891**

4.13.3 Critical Facilities with Damage Potential

Earthquakes pose numerous risks to critical facilities and infrastructure. Seismic risks, or losses, that are likely to result from exposure to seismic hazards include:

- Casualties (fatalities and injuries).
- Utility outages.
- Economic losses for repair and replacement of critical facilities, roads, buildings, etc.
- Indirect economic losses such as income lost during downtime resulting from damage to private property or public infrastructure.

Roads or railroads that are blocked or damaged can prevent access throughout the area and can isolate residents and emergency service providers needing to reach vulnerable populations or to make repairs.

Linear utilities and transportation routes are vulnerable to rupture and damage during and after a significant earthquake event. The cascading impact of a single failure can have affects across multiple systems and utility sectors. Degrading infrastructure systems and future large earthquakes with epicenters near critical regional infrastructure could result in system outages that last weeks for the most reliable systems, and multiple months for others.
Table 4-17provides an inventory of critical facility locations (points only) with earthquake exposure to the Great Shakeout Scenario. The building codes have been amended to include provisions for seismic safety at various bench marks years. Depending on “year built”, each critical facility presented in the tables may have varying damage potential.

Table 4-17: Critical Facilities with Earthquake Risk Southern California Great ShakeOut

Infrastructure Type	Violent Shake Zone (IX)	Severe Shake Zone (VIII)	Very Strong (VII)	Strong Shake Zone (VI)	Feature Count
Essential Facility	3	12	80	122	217
EOC	-	-	2	-	2
Fire Station	3	7	31	34	75
Hospital	-	-	9	-	9
Police Station	-	-	3	24	27
School	-	5	35	64	104

Infrastructure Type	Violent Shake Zone (IX)	Severe Shake Zone (VIII)	Very Strong (VII)	Strong Shake Zone (VI)	Feature Count
High Potential Loss	31	56	213	484	784
Child Care Center	1	3	25	56	85
Child Residential Care – 24 hour	-	-	-	2	2
Foster Family Agency	-	-	-	2	2
Adult Residential Care	2	5	10	34	51
Home Care Organization	-	-	1	1	2
Elder Residential Care	-	1	9	25	35
Communication Facility	1	9	9	8	27
Dam	1	-	11	4	16
Electric Power Facility	1	-	-	-	1
Natural Gas Facility	2	-	-	-	2
Waste Water Facility	-	2	-	-	2
HAZMAT	-	-	6	16	22
EPA FRS Facility	21	27	115	307	470
FCC ASR	2	9	27	29	67
Transportation and Lifeline	16	20	41	131	208
Airport	5	5	8	-	18
Runway	5	6	7	1	19
Bus Facility	-	-	1	-	1
Highway Bridge	6	8	24	124	162
Railway Bridge	-	1	1	6	8
Grand Total	**50**	**88**	**334**	**737**	**1,209**

HazMat Fixed Facilities

Although earthquakes are low probability events, they produce hazardous materials (HazMat) threats at very high levels when they do occur. Depending on the year built and construction of each facility containing HazMat, earthquake initiated hazardous material releases (EIHR) potential will vary. HazMat contained within masonry or concrete structures built before certain benchmark years reflecting code improvements may be of particular vulnerability.

Transportation

Earthquake events can significantly impact bridges which often provide the only access to some neighborhoods. Since soft soil regions generally follow floodplain boundaries, bridges that cross water courses are considered vulnerable. Since most of the San Bernardino County bridges provide access across water courses, most are at least somewhat vulnerable to earthquakes. Key factors in the degree of vulnerability are the bridge’s age and type of construction which indicate the standards to which the bridge was built. Special attention will be paid to the multiple bridges that cross interstates. Interstates would serve as major emergency response and evacuation routes.

Utilities

Linear utilities and transportation infrastructure would likely suffer considerable damage in the event of an earthquake. Due to the amount of infrastructure and sensitivity of utility data, linear utilities are difficult to analyze without further investigation of individual system components. Table 4-18 provides the best available linear data and it should be assumed that these systems are exposed to breakage and failure.

Table 4-18: Lifeline with Earthquake Risk Southern California Great ShakeOut

Facility Type	Strong	Very Strong	Severe	Violent	Total Mileage
Transportation and Lifeline	1,324	1,951	2,796	2,624	8,697
Railway	47	22	22	99	191
Roads	1,277	1,929	2,774	2,525	8,506
Interstate Highway	22	7	-	48	77
State / County Highway	57	90	263	233	644
Primary Highway	34	15	19	27	95
Local Road, Major	102	207	625	792	1,726
Local Road	540	1,153	1,728	1,128	4,550
Other Minor Road	494	423	109	96	1,122
Vehicular Trail	25	32	26	178	261
Cul-de-Sac / Traffic Circle	-	1	2	2	5
Ramp	2	1	2	20	25
Service Road	-	-	-	1	1
Grand Total	**1,324**	**1,951**	**2,796**	**2,624**	**8,695**

4.13.4 Loss Estimation Results

The Hazus Level 2 analysis was used to assess the risk from and vulnerability to earthquake shaking within San Bernardino County. Hazus buildings data is aggregated to the census tract level for earthquake models, known as the general building stock (GBS), which has a level of accuracy acceptable for planning purposes. Where possible the GBS was enhanced using GIS data from the county as described previously. The following sections describe risk to and vulnerability of the GBS within the San Bernardino County Hazus calculates losses to structures from earthquake shaking by considering the amount of ground displacement and type of structure. The software estimates the percentage of damage to structures and their contents by applying established building fragility curves. Damage estimates are then translated to estimated dollar losses.

For each Great ShakeOut Scenario ground shaking data (shakemaps) were acquired from CISN and imported into Hazus. The shakemap data consist of peak ground velocity, peak

ground acceleration, peak spectral acceleration at 0.3 seconds, and peak spectral acceleration at 1.0 seconds. The earthquake module operates on census tracts that often include population and structures in the incorporated cities and the unincorporated area within a single tract. Due to this fact the results include census tracts that have a substantial portion of land within the incorporated area (loss estimates for some tracts will include structures in incorporated cities).

The results are summarized in Table 4-17 for the Great ShakeOut Scenario. It is important to understand that the Hazus earthquake module uses the census tract as its enumeration unit rather than the more detailed census block. The loss estimation values for earthquakes are much higher than those of the flooding and dam failure due to this fact. The portions of incorporated areas included within boundary census tracts elevate the values due to the inclusion of additional GBS. Though the difference between census tracts and census blocks are extremely disparate, the most important summary information is the percent of loss estimation against the total value.

Residential building and content loss estimation from the Great ShakeOut Scenario is *$9.3* billion dollars and 57 percent of the total value of the residential buildings. In Great ShakeOut Scenario, residential damage will be the greatest. While there are several limitations to the FEMA Hazus model, it does allow for potential loss estimation. It is important to remember that the replacement costs are well below actual market values, thus, the actual value of assets at risk may be significantly higher than those included herein.

Table 4-19: Estimated Building and Content Loss Great ShakeOut Scenario Earthquake

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (% of Total Value)	Content Replacement Cost ($000)	Content Replacement Cost (% of Total Value)	Total Estimated Loss ($000)	Total Loss Estimation (% of Total Value)
Agricultural	$ 51,431	9.7%	$ 17,215.68	3.2%	$ 68,646.80	13.0%
Commercial	$ 3,286,331	14.4%	$ 1,110,422.84	4.9%	$ 4,396,754.29	19.3%
Educational	$ 175,987	10.4%	$ 56,822.89	3.4%	$ 232,810.20	13.7%
Government	$ 53,348	9.2%	$ 20,298.84	3.5	$ 73,647.28	12.6%
Industrial	$ 1,179,339	13.1%	$ 590,913.81	6.6%	$ 1,770,253.41	19.6%
Religious	$ 243,891	12.7%	$ 80,862.72	4.2%	$ 324,754.33	16.9%
Residential	$ 7,841,645	6.2%	$ 1,525,181.65	1.2%	$ 9,366,826.84	7.4%
Grand Total	**$ 12,831,972**	**7.9%**	**$ 3,401,718.42**	**2.1%**	**$ 16,233,693.14**	**10.0%**

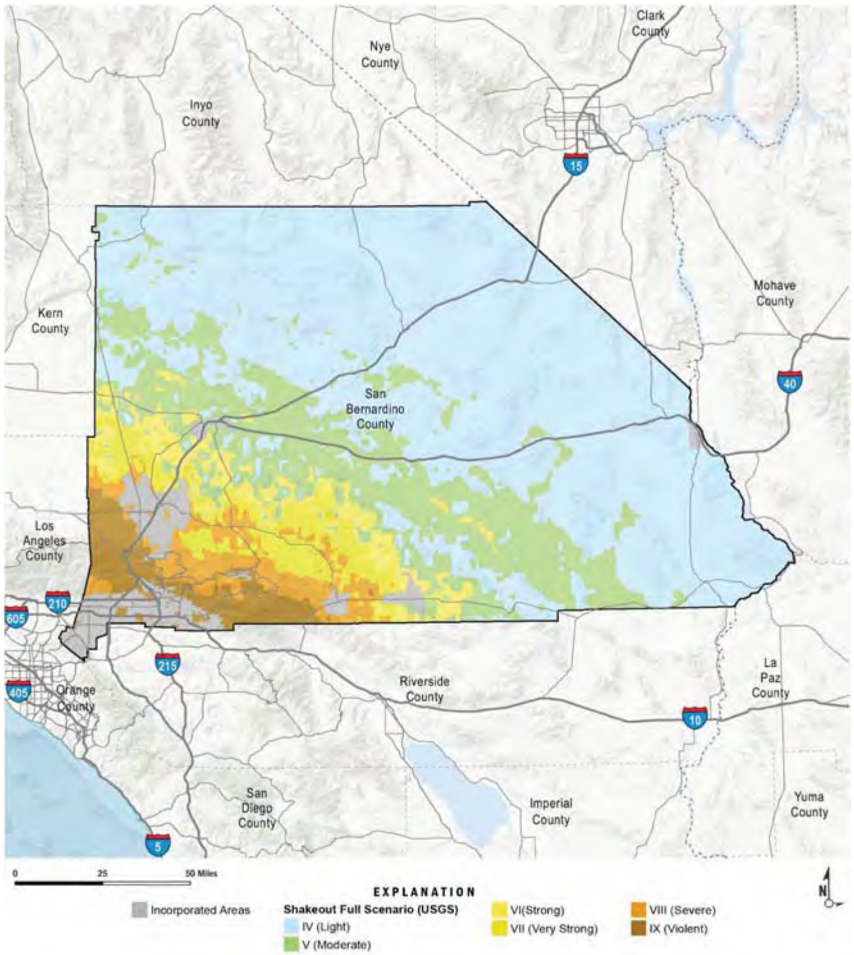

Figure 4-29: Great Shakeout Scenario MMI Classes

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4.14 Wildfire

Risk to the County of San Bernardino from wildfire is of significant concern. High fuel loads in the hills, along with geographical and topographical features, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and sometimes catastrophic fires. During the May to October fire season the dry vegetation and hot and sometimes windy weather, combined with continued growth in the WUI areas, results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become large and out-of-control.

Potential losses from wildfire include human life, structures and other improvements, natural and cultural resources, quality and quantity of water supplies, cropland, timber, and recreational opportunities. Short and long-term economic losses could also result due to loss of business and other economic drivers associated with San Bernardino County summer season activities. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

Generally, there are three major factors that sustain wildfires and predict a given area's potential vulnerability to burn. These factors are fuel, topography, and weather.

- Fuel – Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and volume. Fuel sources are diverse and include everything from dead tree leaves, twigs, and branches, to dead standing trees, live trees, brush, and cured grasses. Manmade structures are also considered a fuel source, such as homes and other associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Fuel is the only factor that is under human control. Development in the mountain region currently possesses the highest vulnerability to wildfire.

- The residents of this region are also considered to be the most vulnerable due to their age and income levels. This area is comprised of lower income (that is, lower than the US median income) homes as well as a higher than average amount of residents under age 18 and an average amount of residents 65 or older.
- Topography – An area's terrain and slope affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.

- Weather – Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out fuels that feed wildfires, creating a situation where fuel will ignite more readily and burn more intensely. Thus, during periods of drought the threat of wildfire increases. Wind is the most treacherous weather factor. The greater the wind, the faster a fire can spread and the more intense it can be. Wind shifts, in addition to wind speed, can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. As part of a weather system, lightning also ignites wildfires, often in difficult to reach terrain for firefighters.

Factors contributing to the high, widespread wildfire risk in San Bernardino County include:

- Narrow and often one-lane and/or dead-end roads complicating evacuation and emergency response.
- Nature and frequency of ignitions; and increasing population density leading to more ignitions.
- Slope of the foothills;
- Residential development along the foothills;

4.14.1 Population at Risk

Wildfire risk is of greatest concern to populations residing in the moderate, high, and very high wildfire hazard zones. The San Bernardino County census block data was used to estimate populations within the hazard zones. There are a significant number of people living within the WUI described in the wildfire profiles. More than 34,000 residents in the unincorporated county live within areas considered very high fire hazard and more than 63,000 residents live within a very high hazard

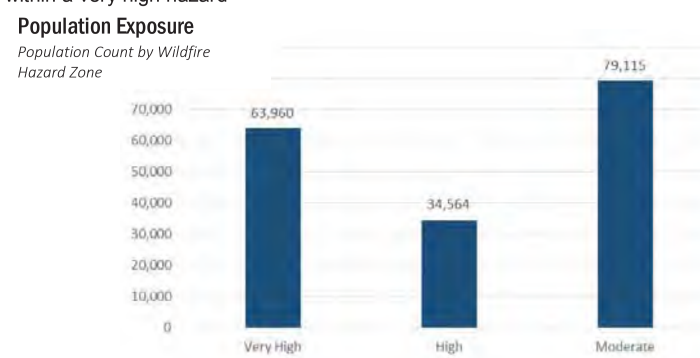

Figure 4-30: Population at Risk from Wildfire Hazards

4.14.2 Improved Parcel Value at Risk

The County's parcel layer was used as the basis for the inventory of improved residential parcels. In some cases, a parcel will be within in multiple fire threat zones. GIS was used to create centroids, or points, to represent the center of each parcel polygon – this is assumed to be the location of the structure for analysis purposes. The centroids were then overlaid with the fire threat layer to determine the risk for each structure. The fire threat zone in which the centroid was located was assigned to the entire parcel. This methodology assumed that every parcel with a square footage value greater than zero was developed in some way. Only improved parcels were analyzed. Table 4-20 exhibits portions of San Bernardino County that have significant assets at risk to wildfire in the Moderate, High and Very High fire severity zones.

Table 4-20: Residential Buildings and Content at Risk from Wildfire

Fire Hazard Severity Hazard Zone	Improved Parcel Count	Improvement Value Exposure ($000)	Land Value Exposure ($000)	Total Exposure ($000)
Very High	43,794	$ 8,602,590	$ 3,075,148	$ 11,677,739
High	11,512	$ 1,822,731	$ 551,160	$ 2,373,892
Moderate	25,477	$ 3,221,982	$ 950,044	$ 4,172,026
Non-Wildland/Non-Urban	621	$ 573,866	$ 294,283	$ 868,148
Urban Un-zoned	26,974	$ 5,223,286	$ 2,310,932	$ 7,534,219
Grand Total	**108,378**	**$ 19,444,456**	**$ 7,181,567**	**$ 26,626,023**

Note:
1-The table above does not display loss estimation results; the table exhibits total value at risk based upon the hazard overlay and San Bernardino County Assessor data.
2- Parcel information is for all county parcels with greater than $20,000 in assessed parcel improvement value only. The San Bernardino County Assessor's roles only provide spatial information on assessed improvement and land values.

4.14.3 Critical Facilities at Risk

Critical facilities data were overlain with fire hazard severity zone data to determine the type and number of facilities within each risk classification. Tables 4-21 and 4-22 list the critical facilities in the High and Very High wildfire hazard zones for San Bernardino County.

Table 4-21: Critical Facilities at Risk from Wildfire

Infrastructure Type	High	Very High	Feature Count
Essential Facility	11	105	116
EOC	2	0	2
Fire Station	4	45	49
Hospital	0	5	5
Police Station	0	24	24
School	5	31	36
High Potential Loss	72	177	249
Child Care Center	3	29	32
Child Residential Care - 24 hour	1	0	1
Foster Family Agency	0	0	0
Adult Residential Care	11	4	15
Home Care Organization	0	0	0
Elder Residential Care	8	5	13
Communication Facility	2	13	15
Dam	0	14	14
Electric Power Facility	0	0	0
Natural Gas Facility	0	0	0
Potable Water Facility	0	0	0
Waste Water Facility	0	0	0
HAZMAT	0	2	2
EPA FRS Facility	37	83	120
FCC ASR	10	27	37
Transportation and Lifeline	10	103	113
Airport	1	0	1
Runway	1	0	1
Bus Facility	1	0	1
Highway Bridge	7	101	108
Railway Bridge	0	2	2
Grand Total	**93**	**385**	**478**

Table 4-22: Lifelines with Wildfire Risk

Facility Type	High	Very High	Total Mileage
Transportation and Lifeline	819	1,906	2,725
Railway	19	47	66
Roads	800	1,859	2,659
Interstate Highway	4	37	41
State / County Highway	33	226	259
Primary Highway	17	13	30
Local Road, Major	311	521	832
Local Road	389	806	1,195
Other Minor Road	34	56	91
Vehicular Trail	10	184	195
Cul-de-Sac / Traffic Circle	1	2	3
Ramp	2	12	13
Service Road	0	1	1
Grand Total	**819**	**1,906**	**2,725**

4.14.4 Loss Estimation Results

Wildland fire cost impacts of damage done to land and structures and also to critical infrastructure

It is impossible to estimate the possible cost in dollars to replace and pay for actual firefighting as the damage costs that incur from wildland fires varies so greatly. One of the varied costs is the replacement and repair of structures and remediate of the damaged properties. Then the rebuilding costs and replacing of the structures with laws requiring new buildings to meet new criteria as a result of state laws that may require more stringent building and construction practices far greater than the original building of the said structure. Also the estimate of damages to critical infrastructures such as power lines and delivery systems as it is difficult the collateral loses to businesses and individuals losing power for and unknown time. Also damages to railroads and bridges also to road way, freeways as it is impossible to gauge the actual lose amounts from commerce being impeded.

Many of the County’s landfills, transfer stations, and closed disposal sites are situated in areas subject to wildfires. In 2003, the Old Fire burned through three separate sites and caused major damage at the Heaps Peak Transfer Station when the fire burned through the office building and Transfer Station site.

None of this takes into account the costs of labor and retardants, vehicle damages and fuel and wear and tear as well as equipment expended and used and or damaged. Along with replace any safety gear or injuries to any persons working to mitigate the wildland fire

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4.15 Flooding

The County has experienced severe and widespread flooding throughout its history. Several major drainage basins have the potential to subject residents and structures to a high risk of flooding. In addition, the cumulative increase in impervious surfaces has increased problems related to surface run- off. While complete avoidance or protection through control facilities is not practical, considerable improvement can be made through structural and non-structural methods.

The County currently utilizes land use zoning districts to prohibit habitable structures in floodways as defined by the federal requirements necessary to participate in the National Flood Insurance Program. The consistent adoption of overlays is needed to require special review, conditions, and the prohibition of some uses in floodplain areas (areas subject to 100-year floods), including dry lakes. In addition, there are land use policies and development standards that can be implemented, including reduction of impervious surfaces; increase of percolation, infiltration, and recharge; and the control of urban run-off. There is a need for the County to identify all areas of flood and drainage hazards, especially in the Desert Region where mapping is sparse, as well as areas with a heavy concentration of debris or the potential for dam inundation. Flood hazards are more comprehensively discussed in the Safety Background Report.

The vulnerable areas are addressed in the County's General Plan. See Sections 5 and 6 for additional information. San Bernardino County has seven (7) properties listed in the Repetitive Loss and Severe Repetitive Loss properties. All of the properties are single-family residences. The properties are located in:

- Barstow – 2 properties (1999 and 2005)
- Crestline (1980 and 1982)
- Forest Falls (1995 and 1999)
- Lake Arrowhead (1998 and 2005)
- Lytle Creek (1998 and 2005)
- Sugarloaf (1993 and 1995)

These properties were damaged during unusual storms and/or immediately after a wildfire in the area and are isolated properties in widely scattered areas of the County. The properties were not damaged during the 2009 or 2010 winter storm events. Property addresses are not listed to comply with privacy laws.

The areas are now covered by the County General Plan and County Ordinance. These are in compliance with the National Flood Insurance Program.

4.15.1 Population at Risk

Of greatest concern in the event of a flood is the potential for loss of life. Using 2012 population data aggregated by census blocks, an estimate was made of the population exposed to the 100 and 500-year floodplain. To account for census blocks that were partially within the floodplain, a weighted average was employed to calculate the proportion of the population within the floodplain. The results of the population overlay are shown in Figure 4-31. More than 9,500 residents live near or within the 100-year floodplain and approximately 13,346 county residents live within the 500-year floodplain. Approximately 18,816 county residents live within areas protected by levees.

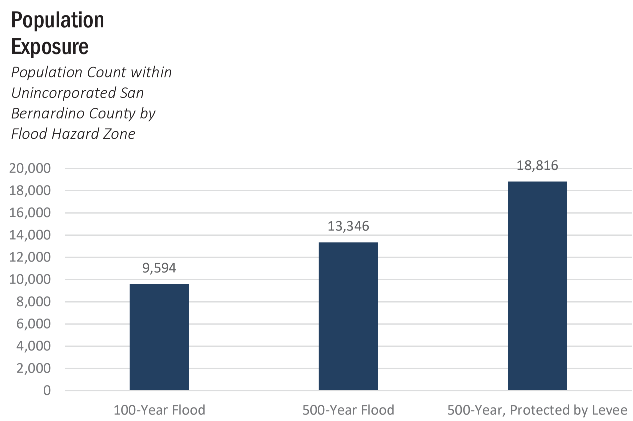

Figure 4-31: Population Exposed to NFIP Flood Zones

4.15.2 Residential Parcel Value with Flood Risk

The County's parcel layer was used as the basis for the inventory of improved residential parcels within the FEMA NFIP flood zones. In some cases, a parcel will be within in multiple flood zones. GIS was used to create centroids, or points, to represent the center of each parcel polygon – this is assumed to be the location of the structure for analysis purposes. The centroids were then overlaid with the floodplain layer to determine the flood risk for each structure. The flood zone in which the centroid was located was assigned to the entire parcel. This methodology assumed that every parcel with a square footage value greater than zero was developed in some way. Only improved parcels greater than $20,000 were analyzed.

Table 4-23 shows the count of at-risk parcels and their improvement and land exposure values.

Table 4-23: Parcels Exposed to NFIP Flood Zones

Flood Hazard Zone	Improved Parcel Count	Improvement Value Exposure ($000)	Land Value Exposure ($000)	Total Exposure ($000)
100-Year Flood	3,426	$ 518,483	$ 368,058	$ 886,541
500-Year Flood	3,397	$ 833,287	$ 338,728	$ 1,172,014
500-Year, Protected by Levee	4,608	$ 1,327,942	$ 527,317	$ 1,855,259
Grand Total	11,431	$ 2,679,711	$ 1,234,103	$ 3,913,814

While there are several limitations to this methodology, it does allow for potential loss estimation. It should be noted that the analysis may include structures in the floodplain that are elevated at or above the level of the base flood elevation, which will most likely decrease potential flood damage to these structures. Also, it is important to remember that the County Assessor's values are well below actual market values; thus, the actual value of assets at risk may be significantly higher than those included herein.

4.15.3 Critical Facilities Exposure

Critical facilities data were overlain with flood hazard data to determine the type and number of facilities within the 100- and 500-year floodplain. Flooding poses numerous risks to critical facilities and infrastructure:

- Roads or railroads that are blocked or damaged can prevent access throughout the area and can isolate residents and emergency service providers needing to reach vulnerable populations or to make repairs.
- Bridges washed out or blocked by floods or debris from floods also can cause isolation.
- Creek or river floodwaters can back up drainage systems causing localized flooding.
- Floodwaters can get into drinking water supplies causing contamination.
- Sewer systems can be backed up causing waste to spill into homes, neighborhoods, rivers, and streams.
- Underground utilities can also be damaged.

Tables 4-24 and 4-25 provide an inventory of critical facilities in the floodplain for San Bernardino County and it provides the location of lifelines relative to the floodplain in the areas of the San Bernardino County. With a total of 810 essential facilities, high potential losses, and transportation and lifeline structures located in either the 100 or 500-year flood zone, the impact to the community could be devastating if these critical facilities were damaged or destroyed during a flood event.

Table 4-24: Critical Facility Exposed to NFIP Flood Zones

Infrastructure Type	100 Year Flood Zone	500 Year Flood Zone	500 Year Flood Zone, Protected by Levee	Feature Count
Essential Facility	21	114	5	140
EOC	0	1	0	1
Fire Station	4	27	2	33
Hospital	0	4	0	4
Police Station	2	23	0	25
School	15	59	3	77
High Potential Loss	52	458	52	562
Child Care Center	13	57	3	73
Child Residential Care - 24 hour	0	2	0	2
Foster Family Agency	0	2	0	2
Adult Residential Care	0	37	3	40
Home Care Organization	0	2	0	2
Elder Residential Care	0	24	8	32
Communication Facility	0	7	0	7
Dam	2	3	0	5
Waste Water Facility	1	0	0	1
HAZMAT	0	16	1	17
EPA FRS Facility	33	286	35	354
FCC ASR	3	22	2	27
Transportation and Lifeline	26	77	5	108
Airport	2	5	0	7
Runway	2	5	0	7
Bus Facility	1	1	0	2
Highway Bridge	20	65	5	90
Railway Bridge	1	1	0	2
Grand Total	**99**	**649**	**62**	**810**

Table 4-25: Lifelines Exposure to NFIP Flood Zones

Facility Type	100 Year	500 Year Flood Zone	500 Year Flood Zone, Protected by Levee	Total Mileage
Transportation and Lifeline	204	1,952	69	2,225
Railway	9	44	6	59
Roads	195	1,908	63	2,166
Interstate Highway	1	34	1	36
State / County Highway	20	189	9	218
Primary Highway	7	20	-	28

Facility Type	100 Year	500 Year Flood Zone	500 Year Flood Zone, Protected by Levee	Total Mileage
Local Road, Major	32	377	38	447
Local Road	115	1,168	13	1,295
Other Minor Road	18	86	2	107
Vehicular Trail	2	15	-	17
Cul-de-Sac / Traffic Circle	0	1	-	1
Ramp	0	18	0	19
Grand Total	**204**	**1,952**	**69**	**2,225**

4.15.4 Loss Estimation Results

The Hazus analysis was used to assess the risk from and vulnerability to flooding within San Bernardino County. Hazus buildings data is aggregated to the census block level, known as the general building stock (GBS), which has a level of accuracy acceptable for hazard mitigation planning purposes. The following sections describe risk to and vulnerability of the GBS within the San Bernardino County mapped regulatory floodplain. The total value of exposed buildings and content within the San Bernardino planning area was generated using Hazus and is previously summarized.

Hazus calculates losses to structures from flooding by considering the depth of flooding and type of structure. Using historical flood insurance claim data, the software estimates the percentage of damage to structures and their contents by applying established depth-damage curves. Damage estimates are then translated to estimated dollar losses. The results are summarized in Tables 4-26 and 4-27 and Figure 4-32. While there are several limitations to the FEMA Hazus model, it does allow for potential loss estimation. It should be noted that the analysis may include structures in the floodplain that are elevated at or above the level of the base flood elevation, which will likely mitigate flood damage. Also, it is important to remember that the replacement costs are well below actual market values, thus, the actual value of assets at risk may be significantly higher than those included herein.

Table 4-26: Flood Loss Estimation (Based on Depth) in NFIP Flood Zones

Flood Hazard Zone	Building Loss ($000)	Building Loss (% of Total Value)	Content Loss ($000)	Content Loss (% of Total Value)	Total Estimated Loss ($000)	Total Estimated (% of Total Value)
100-Year	$ 34,749.00	0.1%	$ 24,858.00	0.1%	$ 59,849.00	0.2%
500-Year	$ 218,454.00	0.8%	$ 173,304.00	0.6%	$ 396,336.00	1.4%

Table 4-27: 100 Year Flood Los Estimation (Based on Depth) in NFIP Flood Zones by Occupancy Type

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (% of Total Value)	Content Replacement Cost ($000)	Content Replacement Cost (% of Total Value)	Total Estimated Loss ($000)	Total Loss Estimation (% of Total Value)
Agriculture	$ 147.00	0.10%	$ 246.00	0.17%	$ 427.00	0.30%
Commercial	$ 1,874.00	0.08%	$ 4,458.00	0.18%	$ 6,463.00	0.26%
Education	$ 46.00	0.02%	$ 271.00	0.11%	$ 319.00	0.13%
Government	$ 56.00	0.07%	$ 304.00	0.39%	$ 370.00	0.48%
Industrial	$ 201.00	0.02%	$ 389.00	0.04%	$ 624.00	0.06%
Religious/Non-Profit	$ 326.00	0.09%	$ 1,946.00	0.55%	$ 2,279.00	0.65%
Residential	$ 32,099.00	0.14%	$ 17,244.00	0.07%	$ 49,367.00	0.21%
Grand Total	**$ 34,749**	**0.13%**	**$ 24,858**	**0.09%**	**$ 59,849**	**0.22%**

100 YR Flood Hazard

Estimated Content Loss by Occupancy Type

100 YR Flood Hazard

Estimated Building Loss by Occupancy Type

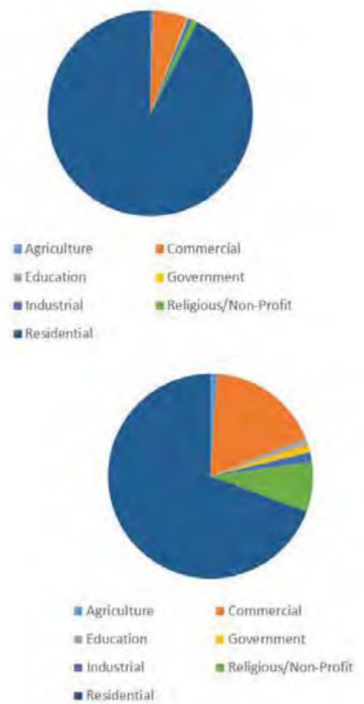

Figure 4-32: Total Building and Content Loss by Occupancy Type for 100 Year Flood

Table 4-28: 500 Year Flood Loss Estimation (Based on Depth) In NFIP Flood Zones by Occupancy Type

Building Type	Building Replacement Costs ($000)	Building Replacement Cost (% of Total Value)	Content Replacement Cost ($000)	Content Replacement Cost (% of Total Value)	Total Estimated Loss ($000)	Total Loss Estimation (% of Total Value)
Agriculture	$ 674.00	0.48%	$ 981.00	0.69%	$ 1,781.00	1.26%
Commercial	$ 10,080.00	0.41%	$ 27,640.00	1.13%	$ 39,179.00	1.61%
Education	$ 720.00	0.29%	$ 3,563.00	1.44%	$ 4,355.00	1.76%
Government	$ -	0.00%	$ 2.00	0.00%	$ 9.00	0.01%
Industrial	$ 6,036.00	0.57%	$ 13,975.00	1.31%	$ 22,438.00	2.11%
Religious/Non-Profit	$ 1,210.00	0.34%	$ 6,070.00	1.72%	$ 7,332.00	2.08%
Residential	$ 199,734.00	0.86%	$ 121,073.00	0.52%	$321,242.00	1.38%
Grand Total	**$ 218,454**	**0.79%**	**$ 173,304**	**0.63%**	**$ 396,336**	**1.44%**

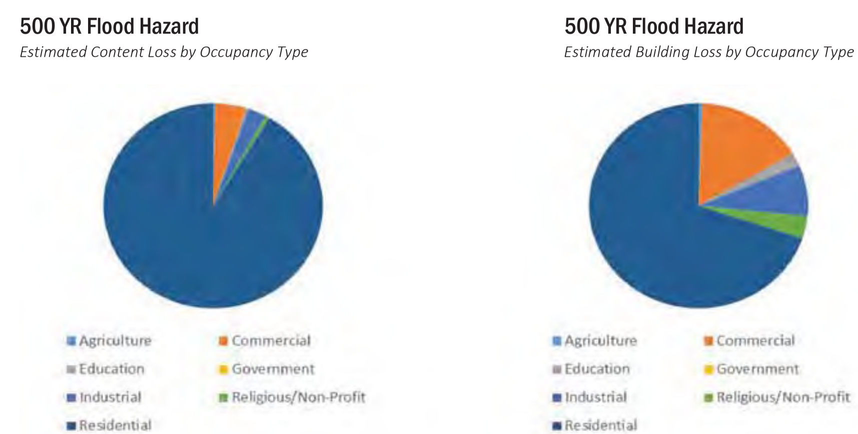

Figure 4-33: Total Building and Content Loss by Occupancy Type for 500 Year Flood

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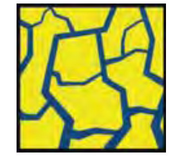
4.16 Drought



Drought should not be viewed as merely a physical phenomenon or natural event. Its impacts on society result from the interplay between a natural event (less precipitation than expected resulting from natural climatic variability) and the demand people place on water supply.

Due to the lack of defined geographical boundaries, the vulnerability assessment for drought differs from other natural hazards. The impacts of drought can be categorized as economic, environmental, or social. Many economic impacts occur in agriculture and related sectors, including forestry and fisheries, because of the reliance of these sectors on surface and subsurface water supplies. In addition to obvious losses in yields in crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. Droughts also bring increased problems with insects and diseases to forests and reduce growth. The incidence of forest and range fires increases substantially during extended droughts, which in turn places human and wildlife populations, buildings, infrastructure and critical facilities, at higher levels of risk.

Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Reduced income for farmers has a ripple effect. Retailers and others who provide goods and services to farmers face reduced business. This leads to unemployment, increased credit risk for financial institutions, capital shortfalls and loss of tax revenue for local, state and federal government. Less discretionary income affects the recreation and tourism industries. Prices for food, energy and other products increase as supplies are reduced. In some cases, local shortages of certain goods result in the need to import these goods from outside the stricken region.

4.16.1 Loss Estimation Results

No standardized methodology exists for estimating losses due to drought. Drought does not generally have a direct impact on critical and non-critical facilities and building stock. Instead, drought vulnerability is primarily measured by its potential impact to sectors of the County's economy and natural resources. In San Bernardino County some of the potential impacts to the economy include the following:

- Reduced agricultural and livestock production;
- Loss of timber from increased wildfires;
- Decreased municipal and industrial water supply;
- Loss of recreation/tourism; and
- Decreased wildlife and wildlife habitat.

4.16.2 Statewide Mandatory Water Reductions

Recognizing persistent, yet less severe, drought conditions throughout California, on May 18, 2016 the State Water Resources Control Board adopted an emergency water conservation regulation requiring locally developed conservation standards based upon each water supplier's specific circumstances. It replaces the prior percentage reduction-based water conservation standard. In San Bernardino County, each water wholesaler (Mojave Water Agency) was required to calculate the supply of water for the next three years, considering drought conditions persist. Each water supply retailer subsequently self-certified the expected demand on water resources, determining whether or not there is sufficient supply to meet demand. Our Department certified that there is sufficient water supply to meet the demand over the next three years; however due to ongoing drought conditions in the region, water conservation efforts should continue. The County has developed a watering schedule, watering hour restrictions and additional end user watering restrictions which can be viewed here: http://www.specialdistricts.org/index.aspx?page=548

4.17 Terrorism

Translating most manmade hazard profiles into meaningful geospatial information is difficult at best. Instead, the planning team will use an asset-specific approach. Population, facilities, systems and assets will be prioritized and assessed in this vulnerability assessment.

Special consideration should be given to areas with high density and those containing vulnerable populations (young, old, and those whose primary language is not English).

Facilities at high risk may include gathering places, critical facilities/ transportation and lifelines and utilities.

4.17.1 Population at Risk

Since terrorism can happen anytime, anywhere, 100% of the population is vulnerable to terrorism. In particular, people with access and functional needs, the elderly and the very young are especially vulnerable because they often rely heavily on others in their daily lives. Persons with English as a second language are also vulnerable as they may not receive warnings or notifications related to an incident in their primary language.

4.17.2 Critical Facilities Exposure

Critical facilities may include essential facilities (such as hospitals, police and fire stations, evacuation centers, etc.), transportation systems, lifeline utility systems, high potential loss facilities (such as nuclear power plants, dams and military installations, etc.), and hazardous material facilities.

Gathering facilities should also receive special attention. Places of mass gathering not only present terrorists with potential opportunities for mass casualties, symbolism and high impact media coverage, they pose a broad range of security challenges for their owners and operators. The National Counter Terrorism Committee has noted that places of mass gathering have been specifically identified by religious and political extremists as attractive targets.

Places of mass gathering incorporate a diverse range of facilities including, but not limited to, sporting venues, shopping and business precincts, tourism/entertainment venues/attractions, hotels and convention centers, major events and public transport hubs. This also includes significant one off events.

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4.18 Climate Change

The vulnerability assessment for climate change is different from other natural hazards discussed in this HMP due to the lack of defined geographical boundaries. This section provides a summary of San Bernardino County's vulnerability to climate change.

The most serious threats to the public health of Californians will stem primarily from the higher frequency of extreme conditions, principally more frequent, more intense, and longer heat waves. A heat wave is defined as 5 or more consecutive extreme heat days. An increase in heat waves may increase the risk of directly related conditions such as heat stroke and dehydration.

In the desert areas of the County, the Extreme Heat Day Threshold temperatures are around 110°F and in the mountainous regions it is in the mid 80's. According to the Cal-Adapt Extreme Heat Tool, the number of extreme heat days (a day in April through October where the maximum temperature (Tmax) exceeds the 98th historical percentile of maximum temperatures based on daily temperature data between 1961 and 1990) will continue to increase rapidly from the present day to 2090.

Projections by Scripps Institution of Oceanography show little change in total annual precipitation in San Bernardino County. However, even modest changes would have a significant impact because California ecosystems are conditioned to historical precipitation levels and water resources are nearly fully utilized. The Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. In the mountainous areas of the County, it is projected that the decadal average of snowpack will continue to decrease until 2090. As shown in Figure 4-34 the sharpest decreases in snowpack are projected to begin around 2030. The area projected to be burnt by wildfire toward the end of the century will not increase substantially in the County. The most change will be experienced in the mountainous regions.

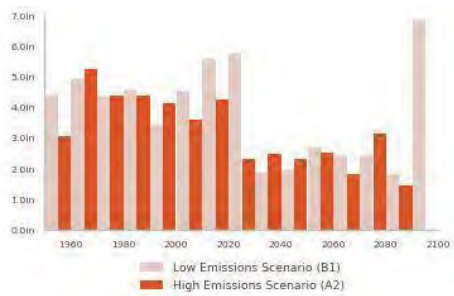

Figure 4-34: Decadal Snowpack Averages 1960-2090

Source: cal-adapt.org/snowpack/decadal

4.18.1 Population at Risk

Vulnerable populations should receive special attention when assessing the community's vulnerability to climate change. For example, care and sheltering during extreme heat conditions must be provided for vulnerable populations such as the elderly. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. According to the National Weather Service (NWS), among natural hazards, only the cold of winter—not lightning, hurricanes, tornados, floods, or earthquakes—takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died.

Section 5. Community Capability Assessment

5.1 Existing Plans, Policies and Programs

San Bernardino County is encouraging all departments, special districts, and agencies to share reports and common information. This sharing and exchanging of ideas has led to more coordinated efforts and better planning. The driving document in the County of San Bernardino is the County's General Plan. The County General Plan provides the foundation on which all development and future programs are built upon.

5.1.1 San Bernardino County General Plan

The State of California recommends that the General Plan is updated every 10-20 years; depending mostly on whether or not the plan is meeting the community's needs. The San Bernardino County General Plan was last updated and adopted in 2007. There are seven (7) mandatory elements in a General Plan:

- Circulation Element,
- Conservation Element,
- Housing Element,
- Land Use Element,
- Noise Element,
- Open Space Element, and
- Safety Element.

However, there are several optional elements. The County of San Bernardino General Plan includes an optional element, the Economic Development Element.

The Land Use Element of the General Plan establishes 18 land use zoning districts that apply only to lands governed by the County; not for lands controlled by other jurisdictions or lands controlled by federal and state government (see Section 1.3.5, page 8 for a listing of the 18 Land Use districts in the Land Use Element). The Land Use Element also describes land use compatibility for the primary three (3) hazards: Geologic; Flood; and, Wildfire. Because of these commonalities between the General Plan and the MJHMP, the county Board of Supervisors has adopted the MJHMP as part of the County's General Plan.

5.1.2 Regulations, Code, Policies and Ordinances

The following titles of the San Bernardino County Code include regulations and ordinances on the following issues and topics related to hazard mitigation:

Table 5-1: County Development Code Hazard Crosswalk

Hazard	Plan/Program/ Regulation	Description
Multi-Hazard	**Title 2**	Emergency Services Uniform Fire Code and related miscellaneous fire regulations Police Regulations and Public Protection
Multi-Hazard	**Title 3**	Emergency Medical Services Domestic Water Sources and Systems Hazardous Materials and Toxics Control Waste Management
Multi-Hazard	**Title 6**	California Building Code California Electrical Code California Plumbing Code California Mechanical Code
Multi-Hazard	**Title 7**	Airport Rules and Regulations
Multi-Hazard	**Title 8**	Development Code includes regulations relative to Land Use, Development Standards, Safety Standards, and Environmental Protection.
Multi-Hazard	**Zoning Ordinances**	The County has also adopted Zoning Ordinances that are not part of the County Code but are part of the General Plan. These ordinances regulate land use; map the official land use and hazard overlay districts to include safety hazard and environmental protection areas.

5.1.3 Local Programs for Mitigation Implementation

The information in Table 5-2 is used to construct mitigation actions aligned with existing planning and regulatory capabilities of the County. Planning and regulatory tools typically used by local jurisdictions to implement hazard mitigation activities are building codes, zoning regulations, floodplain management policies, and other County programs or planning documents.

Table 5-2: Planning and Regulatory Mitigation Capabilities Summary

Hazard	Plan/Program/ Regulation	Responsible Agency	Comments
Multi-Hazard	Mountain Mutual Aid	Fire District	Mountain Mutual Aid is an operational group of emergency responders. It is comprised of all of the agencies and volunteer relief groups that would be and have been involved in any and all disasters on the mountain. It is of note to that their main and most frequent call to service is in response to a wildfire. They meet monthly and maintain themselves in a constant state of readiness.
Wildfire	Forest Care	Cal Fire	Forest Care is a program dedicated to creating a healthier forest. This program provides foresters to assess individual properties for thinning the vegetation and then provides 75% of the funding to do so. Funding originates at the Federal level but is passed through Cal Fire and it employs Cal Fire Foresters as well as staff from the National Forest Association

5.1.3.1 Public Education and Alert Programs

Table 5-3: Public Education and Alert Programs

Hazard	Program	Responsible Agency	Comments
Multi-Hazard	MAST	Multiple	Mountain Area Safety Taskforce (MAST) has a substantial public education component. All agencies participate with the goal to have no one on the mountain uneducated about creating a thinner forest which is a more fire safe forest. For more information on MAST, see Annex A Section A.6 Fire Protection District Mitigation Project .
Multi-Hazard	CERT	Fire District	The Community Emergency Response Team (CERT) Program educates people about disaster preparedness and trains them in basic response

Hazard	Program	Responsible Agency	Comments
			skills. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Multi-Hazard	Listos	Fire District	Listos, which means “ready” in Spanish, is a twelve-hour disaster preparedness course created specifically for the Spanish-speaking community and is delivered entirely in Spanish. The program is intended to be adaptable, flexible and culturally relevant. This means participants are encouraged to involve the entire family and accommodations are made for young children. San Bernardino County Fire, Office of Emergency Services currently partners with the Cities of Fontana and Rialto to bring Listos to their communities
Multi-Hazard	California Disaster Corps	Fire District	The Disaster Corps is a first-in-the-nation effort to professionalize, standardize and coordinate highly trained disaster volunteers statewide. This program initiative was built collaboratively in partnership with California Volunteers from the ground up through public-private partnerships and with a wide range of subject matter experts. See Annex A Section A.6 Fire Protection District Mitigation Project .
Multi-Hazard	TENS	Fire District	Telephone Emergency Notification Systems (TENS) During an emergency, public safety can be a direct function of the speed and accuracy of the dissemination of information. This is particularly important during emergencies that require evacuations. To that end the Board of Supervisors dedicated General Fund money in 2003 to the implementation of an automated phone dialing system that calls telephones in specific geographic areas of concern. All areas of San Bernardino County have all been preprogrammed so that during an emergency, the specific target group can be notified as quickly as possible.

Hazard	Program	Responsible Agency	Comments
Multi-Hazard	ECS	Fire District	The Emergency Communications Service (ECS) is a volunteer group providing front-line communications, technical and logistical support to the San Bernardino County Fire Department and Office of Emergency Services. Their primary mission is to support County Fire, County Government and other local agencies in time of disaster. In addition, ECS has provided telecommunications and event support to other County departments including Public Health, Behavioral Health, Public Works, Pre-School Services, Sheriff's Search and Rescue and other County Departments.
Multi-Hazard	AM Radio	Fire District	Community Based AM Radio Transmitters The Fire Safe Councils discovered the existence of very inexpensive but very effective community based AM radio transmitters. The transmitters are very effective for providing information and updates to a community that is either preparing for a community emergency or just had one. As a delivery modality they are extremely reliable because in most all emergencies the AM radio in your car is likely to be operational particularly when the electricity is out in your house.
Multi-Hazard	IPAWS	Fire District	During an emergency, alert and warning officials need to provide the public with life-saving information quickly. The Integrated Public Alert and Warning System (IPAWS) is a modernization and integration of the nation’s alert and warning infrastructure and will save time when time matters most, protecting life and property. Federal, State, Territorial, Tribal, and local alerting authorities can use IPAWS and integrate local systems that use Common Alerting Protocol (CAP) standards with the IPAWS infrastructure. IPAWS provides public safety officials with an effective way to alert and warn the public about serious emergencies using the Emergency Alert System (EAS), Wireless Emergency Alerts (WEA), the

Hazard	Program	Responsible Agency	Comments
			National Oceanic and Atmospheric Administration (NOAA) Weather Radio, and other public alerting systems from a single interface.

5.1.3.2 Wildfire Mitigation Programs

San Bernardino County has one of the most comprehensive set of programs to mitigate the potential for catastrophic wildfires in the Nation. There is no other jurisdiction that has the comprehensive, multi-agency cooperation and coordination as is found in San Bernardino County. See Annex A Section A.6 Fire Protection District Mitigation Project to see how the Fire Protection District will implement the following programs:

Table 5-4: Wildfire Mitigation Programs

Hazard	Program	Responsible Agency	Comments
Wildfire	MAST	Multiple	The mission of the MAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for protection from wildfire. For more information on MAST, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Community Based Fuels Reduction program	Fire District	This program is designed to create community based fuel modification programs across the mountain communities. For more information see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Cal Fire	Cal Fire	Cal Fire provides programs to increase fire safety in high fire hazard severity zones. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	County Fire Hazard Abatement	Fire District	Fire Hazard Abatement works to reduce the potential for an individual's property to be the source of fire and structural ignitability. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .

Hazard	Program	Responsible Agency	Comments
Wildfire	Contractor Certification	City of Big Bear Lake Fire Department	This program trains and certifies landscape contractors to provide a qualified workforce to conduct fuels reduction activities on individual properties. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Southern California Edison (SCE)	Southern California Edison (SCE)	SCE removes dead trees near power lines to reduce fire hazards. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Wood Shake Roof Replacement	County	This code requires that all Wood Shake Roofs in the Fire Safety Overlay, as defined in the Development Code, ongoing effort.
Wildfire	Inland Empire Fire Safe Alliance	Inland Empire Fire Safe Alliance	The Alliance was created to act as a forum for all Fire Safe Councils in San Bernardino County. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Community Wildfire Protection Plans (CWPP)	Fire District	CWPPs are designed to provide a means for a community to have input into and actively participate in the planning, strategy, goals, and objectives of creating a fire safe community. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	Organized Group Volunteer Activities	Fire District	There are several volunteer citizen groups throughout the County that are capable of providing significant resources that are not provided by traditional governmental agency services. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .

5.1.3.3 Earthquake/Geologic Mitigation Programs

San Bernardino County's seismic mitigation programs focus on two areas that have historically resulted in the greatest amount of damage and life loss from major earthquakes in California.

5.1.3.3.1 Bridge Retrofit Program

Caltrans inspects County and City bridges yearly every 2 years for structural sufficiency (which applies to earthquake) and functional obsolescence (which applies to floods). Caltrans provides reports that include recommended repairs or replacement. The County and Cities make the repairs and/or apply for bridge replacement funds thru the Federal Highway Bridge Program (HBR). Currently the County has 5 funded HBR replacements due to structural deficiencies:

- Dola Ditch, (out for bid to construct)
- Lanzit Ditch, (out for bid to construct)
- Garnett at Mill Creek (under construction)
- Yermo Rd at Manix Wash.(waiting for SCAG approval for additional funds to move forward with the Design & Environmental)
- Baker Blvd west of SR127. (waiting for HBP fund for Design & Environmental)
- National Trails Hwy at Kalmia Bridge (waiting for HBP funds)
- National Trails HWY @ Adena Ditch (Received HBP funds for design phase)
- Bridge Management (consultant on board that has prioritized all timber bridges on National Trails Highway and DPW is submitting groups of bridges for funding over a ten year period)

The design and environmental work has been started for Rock Springs Road (functionally obsolete bridge) using DPW funds, waiting for HBP funds for R/W phase.

The County has completed the construction of the Alabama Street at Plunge Creek bridge replacement using Federal Emergency Relief funds.

5.1.3.3.2 Unreinforced Masonry Building Program

In the 1990's, the County of San Bernardino compiled a master list of suspected Unreinforced Masonry Buildings within the unincorporated areas. Since that time, several sites have been incorporated and therefore, are now removed from County jurisdiction. In addition, several appear to have been demolished or retrofitted since the 1990's. The Land Use Services Department's Building and Safety Division is currently in the process of re-evaluating the URM list. Re-evaluation will include a field visit to each site photographing structures and verifying the occurrence of unreinforced masonry. This process is scheduled to be completed by the end of the 2010.The program would be an inspection program and maintenance and inspections as warranted.

There are no large publically utilized URM structures currently on the list. These types of structures are typically restricted to the incorporated areas of the County. There are only twenty-two (22) structures remaining on the list.

5.1.3.3.3 Geologic Hazard Mapping

The Seismic Hazards Mapping Act (Public Resources Code, Chapter 7.8 Section 2690-2699.6) directs the Department of Conservation, California Geological Survey (CGS) to identify and map areas prone to liquefaction, earthquake-induced landslides and amplified ground shaking. Although the San Bernardino area has a full spectrum of geologic hazards, CGS does not have adequate funding to complete the hazard mapping within the County.

5.1.3.4 Flood Mitigation Programs

The flood mitigation projects are programs that were established by San Bernardino County Flood Control District to protect life and property. These projects are typically designed to convey 1% annual chance or greater storm flows in order to mitigate danger to life and property, and critical infrastructure consisting of existing, new and future structures. Also, these projects include revisions to local land use and building codes where analysis or experience shows the need for code revisions or amendments to meet previously unidentified circumstances.

Hazard	Program	Responsible Agency	Comments
Flood	Flood Area Safety Taskforce(FAST)	Flood Control District	The FAST Organization stresses liaison with the communities, provides for community education and information, and places emphases on Community and city partnerships. For more information on FAST, see Annex B Section B.6 Flood Project Prioritization and Implementation.
Flood	Alluvial Fan Task Force	Alluvial Fan Task Force	The Task Force reviews the state of knowledge regarding alluvial fan floodplains, determine future research needs, and, if appropriate, develop recommendations relating to alluvial fan floodplain management, with an emphasis on alluvial fan floodplains that are being considered for development. For more information, see Annex B Section B.6 Flood Project Prioritization and Implementation.
Flood	StormReady	Flood Control District	San Bernardino County is a StormReady County. For more information, see Annex B Section B.6 Flood Project Prioritization and Implementation.

5.1.3.5 Climate Change Programs

5.1.3.5.1 Extreme Heat, Extreme Cold Programs

This document is a contingency plan supporting the San Bernardino County Emergency Operations Plan (EOP).

Excessive Cold events are commonplace in San Bernardino County and most often warrant monitoring activities only. These Standard Operating Guidelines provide GUIDANCE based on the most likely scenario, and can be expanded to meet the parameters of a “disaster” scenario if necessary.

The Extreme Weather – Excessive Cold Standard Operating Guidelines (SOG) were developed in response to the potential for Excessive Cold and cold related Power Outage events in San Bernardino County. The following objectives and activities are to prevent the harmful effects of excessive cold on at-risk populations and the potential for life-threatening repercussions of power outages during excessive cold events.

The information included in this plan is “situation” and/or “incident” driven and subject to revision by the Extreme Weather Committee as conditions warrant. Notifications are information dependent and modification of the activities in these guidelines may be required in response to changing conditions, situations and/or inaccurate weather predictions

5.1.3.5.2 San Bernardino County Fire Office of Emergency Services Heat Plan

This document is a contingency plan supporting the San Bernardino County Emergency Operations Plan (EOP). The Extreme Weather – Excessive Heat Standard Operating Guidelines (SOG) were developed in response to the potential for Excessive Heat and heat related Power Outage events in San Bernardino County. The following objectives and activities have been established to prevent the harmful effects of excessive heat on at-risk populations and the potential for life-threatening repercussions of power outages during excessive heat events. The Extreme Weather – Excessive Heat SOG describe the County operations during heat related emergencies and provide guidance for local jurisdictions in their preparation for heat emergencies and other related activities. The information included in this plan is “situation” and/or “incident” driven and subject to revision by the Extreme Weather Committee as conditions warrant. Notifications are information dependent and modification of the activities in these guidelines may be required in response to changing conditions, situations and/or inaccurate weather predictions.

5.2 Fiscal Resources

The 2016-17 recommended budgets of $5.4 Billion are balanced and consistent with policy and direction received from the Board of Supervisors. The 2016-17 Recommended Budgets address the following key issues:

- Ongoing funding for neglected raises for County employees
- Ongoing funding for maintenance of County roads
- Continues investment in facilities, infrastructure and operating systems.
- Ongoing funding of mental health and medical services for County residents.
- Maintains fiscal responsibility through contributions to the reserves of $62.8 million.

The budget represents the County General Fund and County restricted general funds .It also presents capitol project funds, special revenue funds, enterprise funds, internal service funds and permanent funds for all entities in the 2016-17 Recommended Budget including the County Board Governed County Service Areas, San Bernardino County Fire Protection District, San Bernardino County Flood Control District. Other agencies presented in the budget include County Industrial Development Authority, Inland Counties Emergency Medical Agency and the recently added Housing Authority of the County of San Bernardino. The total requirements for these funds in the 2016-17 are $5.4 billion, which includes amounts budgeted as contingencies or contributions to reserves. Excluding these amounts, total projected expenditures for the 2016-17 are $5.3 billion. The General fund Requirements total $2.9 billion and are funded by countywide discretionary revenues (primary property taxes), departmental revenues and other funding sources of the General Fund, of this $2.9 billion, only $558.3 million is truly discretionary.

5.2.1 The Budget in Brief

This budget book collectively presents the general fund, special revenue funds, capital project funds, internal service funds, and enterprise funds for the county and its Special Districts. The total spending authority for these funds in 2016– 2017 is $5.4 billion. The general fund spending authority totals $5.3 billion and is funded by countywide discretionary, and the beginning fund balance of the General Fund. Of this $2.9 billion, only $558.5 million is truly discretionary.

Table 5-5: Spending Authority for San Bernardino County

	Spending Authority (in Millions)		
	2015-16	2016–2017	Change
General Fund	$ 2,984.3	$ 2,911.1	$ (73.2)
Restricted Funds	49.3	49.7	(.4)
Capital Project Funds	1169.	911.3	(258.4)
Special Revenue Funds	257.6	298.4	40.7
Enterprise Funds	984.9	1001.	16.5
Internal Service Funds	1.6	0.0	(1.6)
	$ 5,692.0	$ 5,420.0	272.0

There is a $73.2 million net decrease in General Fund requirements due to a $106.1 million reduction in contributions to General Fund reserves, as the Board of Supervisors approved an increase to multiple County General Fund operational groups' requirements are increasing by $32.9 million. There are Law and Justice ($12.5 million). The Human Services Operational Group is anticipating increased State and Federal funding that will support Department of Behavioral Health services, including inpatient hospitalization, indigent hospital care, general mental health services, and services for children, youth, and families .The County is also continuing to allocate additional resources to meet the growing need for augmented health and mental health correctional services associated with Public Safety Realignment.

The net reduction of $258.4 Million is Special Revenue Funds is associated with the County's shift in 2015-16 from budgeting contingencies to instead placing unallocated resources in reserves. This technical change resulted in a large one-time contribution to reserves in 2015-16 that is not required in 2016-17. This reduction in contributions to reserves totaling $289.6 million is offset by increased operational costs of $31.2 million. This is due to increases within the Department of Behavioral Health's Mental Health Services Act (MHSA) budget unit and the County Fire Protection budget is increasing as a result of the pending annexation of fire prevention and suppression services from the City of San Bernardino (429.6 million) and Twentynine Palms ($1.7 million).

The $40.7 million increase in Capital Project Funds is primarily due to the planned construction of two Department of Behavioral funded Crisis Stabilization Centers and four Crisis Residential Treatment Centers totaling $36.5 million. This will enable Community Crisis Response Team (CCRT) clinics throughout the County to be expanded to provide 24 hour services and to respond to request by law enforcement for support during the night hours.

Enterprise Funds requirements are increasing a net $16.5 million. Notably, the Housing Authority of the County of San Bernardino has been added to the budget book and is contributing to the overall increase in Enterprise Fund requirements, including additional assumed payments for Housing Assistance and increased Capital Expenditures.

Table 5-6: 2015-2017 Staffing Budget

	Budgeted Staffing		
	2015–2016	2016–2017	Change
General Fund	14,332	14,425	93
Other Funds	6,375	6,508	133
Special Districts and Other Agencies	1402	15601	159
Total:	**22,109**	**36,534**	**385**

5.2.2 Budget Highlights (2016 – 2017)

Create and Maintain and Grow Jobs and Economic Value in the County

- The Real Estate Services Department of Project Management Division (formerly Architecture and Engineering) Capital improvement budget includes 355 active projects with total requirements of $295.2 million, including $128.2 million in new projects funded with $57.7 million of Discretionary General Funding includes an ongoing base budget of $12.0 million for maintenance and non-major Capital Improvement Plan (CIP) projects ,and $45.7 million for construction and major CIP projects .These major projects include $26.4 million for the 800 Megahertz Upgrade Project ,$12.2 million for various Sheriff's facility improvements ,$8.0 million for the County Buildings Acquisition and Retrofit Project including the upgrade of the County Government Center parking lots and grounds ,and $7.6 million for a variety of other projects.

Improve County Government Operations

- Enterprise Financial Management System: Implementation of the new system began in May 2016 with the first phase (out of two phases) continuing into 2016-17 at an estimated cost of $7.1 million. The total cost for the financial system is estimated to be $25.0 million and will streamline business processes and provide better management information.

- Public Health will continue its efforts to achieve and maintain National Accreditation, through the Public Health Accreditation Board (PHAB). Accreditation ensures the Department's continued focus on quality and performance improvement, transparency and accountability to all stakeholders, and the capacity to deliver core Public Health functions. The department will be submitting the required application to PHAB in December 2016.

- The County Library continues its plans to enhance service by replacing outdated computer hardware and software. Funding has been included in the Library's material's budget, which adds high demand items to the collection, including an expanded digital book collection.
- Land Use Services, in conjunction with Public Works, Information Services, and other County departments, continues to upgrade to a new enterprise permit solution, Accela. The new system will include a shared database, precise digital maps, and satellite images of land data that are linked to the County's GIS database. It will also provide field staff remote real-time access to the database. This solution will streamline the permitting process, offering the public access to a web portal to manage and monitor applications and permits online.

Operate in a Fiscally-Responsible and Business-like Manner

- The County Museum's budget of $3.8 million demonstrates the County's commitment to support the Museum through a time of transition. The budget includes $1.1 million in one-time Discretionary General Funding which includes bridge funds to support current operations and funding for activities related to re-accreditation. The County Museum continues to implement the consultant study recommendations as approved by the Board of Supervisors, to address organizational and financial challenges.

- The Transitional Assistance Department is in the second of a four year reduction to the State's CalFresh Match Waiver pursuant to the phase-out agreement adopted in the prior year State budget. This wavier allowed the County to draw additional Federal and half of the State funding without increasing the County's Maintenance of Effort. The budget includes the use of $2.5 million of the original $5.0 million general fund reserve that the Board approved in 2014-15 for this phase-out period.

Ensure Development of a Well-Planned, Balanced, and Sustainable County

- The County continues work on a complete overhaul of the County's General Plan, referred to as the Countywide Plan. This Countywide Plan will be a comprehensive web-based system to document land use planning and organizational governance policies. It will be comprised of three basic components: The Policy Plan (a comprehensive general plan); the County Business Plan (a system that will define and guide how the County government operates and manages itself); and the Regional Issues Forum (a web-based resource center containing information regarding shared Countywide issues). Additionally, the County is updating and expanding the community plans. When completed, there will be 27 web-based community plans involving 49 communities.

- A team of County departments will continue to monitor the drought and develop ways to reduce water usage at County facilities to show good stewardship of this valuable resource. The Special Districts Department, in collaboration with other County

departments, will continue to implement water conservation programs/strategies at various County Service Areas and Districts throughout the County.

- The Registrar of Voters budget fluctuates based on the 4-year election cycle, with the Presidential Election being the largest and most costly of the major elections. The Department is transitioning from a one minor and two major election cycles in 2015-16 to a one minor and one major election cycle for 2016-17. The budget includes provisions for the following: November 8, 2016 Presidential General Election (major); December 6, 2016 San Bernardino County Employees' Retirement Association Election (minor); and three anticipated, but unscheduled special elections (minor). The minor elections are 100% reimbursable; however, the November Presidential General Election is only 30% reimbursable and thus requires one-time Discretionary General Funding (Net County Cost) of $3.7 million for the year.

- The Public Works – Transportation budget includes over $35.0 million in major infrastructure projects, funded in part with Discretionary General Funding. Budgeted activities include design, right of way and/or construction for major projects including:
  - Bridge replacements on: Glen Helen Parkway, Baker Boulevard, Garnet Street, Rock Springs Road, Dola Ditch Bridge, Lanzit Ditch Bridge, Yermo Road and Arrowbear Drive;
  - New bridge on Shadow Mountain Road;
  - Widening of Slover Avenue in the Bloomington Area;
  - Installation of raised pavement markers on National Trails Highway in the Amboy area;
  - Reconstruction of Institution Road to improve access to the Sheriff facility in San Bernardino;
  - National Trails Highway Bridges: Bridge management plan for the repair, rehabilitation or replacement of 127 bridges on National Trails Highway and starting the design phase for replacement of 10 bridges:
  - Rehabilitation and re-profiling at various locations on Needles Highway in the Needles area;
  - Improvements to alleviate congestion and improve circulation of the interchange on Interstate 10 at Cedar Avenue

- The Public Works – Transportation budget includes $31.5 million worth of pavement improvement projects, funded in part with ongoing Discretionary General Funding, to preserve the County's roadways by investing enough to keep the system from deteriorating further.

- The Public Works – Solid Waste Management Division plans to complete $8.9 million of capital improvement projects, which includes the following:
  - $2.0 million for resurfacing the entrance and haul roads at the San Timoteo Landfill;
  - $957,000 for construction of Groundwater Treatment Systems at the closed Lenwood-Hinkley Landfill and Yucaipa Disposal Site;

  - $1.5 million for the East Slope Stabilization and Mitigation project at the closed Heaps Peak Disposal Site;
  - $1.5 million for construction of Landfill Gas Extraction Systems at the Barstow and Big Bear Landfills which includes $300,000 to bring electrical power to the Barstow Landfill

- The Public Works – Flood Control District (District) budget includes $37.6 million in capital improvement projects. The District anticipates completion of the following projects: Cactus Basin # 3, Wilson Creek Channel, Santa Ana River Flood Wall Repair, and the waterline relocations for Bandicoot Basin and Amethyst Basin. The District also plans to start construction on the following projects: Levee Certification Restoration for Patton Basin, Mojave River Levee, and Sand Creek/Warm Creek Confluence.

- Land Use Services Planning budget includes $150,000 of Discretionary General Funding for the preparation of a Morongo Basin Cultural Plan.

- The Special Districts department's budget includes $45.3 million capital improvement projects including the design and construction of the Big Bear Alpine Zoo relocation, rehabilitation of the Lake Gregory Dam, and construction of Snow Drop Road. Water and sanitation infrastructure projects of $19.2 million include pipeline replacements; water system improvements, and design and construction of a pipeline, a 75,000-gallon water reservoir, and a pump station in CSA 70 W-4 – Pioneertown.

- Community Development & Housing is constructing Phase 2 of the Bloomington Community and Neighborhood Revitalization. A total of 190 multi-generational affordable housing units include 120 family units and 70 senior units and the Bloomington Branch Library. The Bloomington Branch Library and the first phase of housing are completed. The second phase is currently under construction and will be completed by spring 2017.

<u>Provide for the Safety, Health and Social Service Needs of County Residents</u>

- The County is expanding efforts to provide homeless support to County residents through the flowing allocations included in the 2016-17 budget:
  - The Department of Behavioral Health is investing $4.0 million by providing basic needs, case management, outreach services, and additional built and supportive housing opportunities.
  - The Sheriff/Coroner/Public Administrator is continuing to fund the HOPE Program (Homeless Outreach Proactive Enforcement) Team ($620,000), which provides services to the homeless population by connecting them to the appropriate agencies for much needed services that help in the transition from homelessness.
  - The Probation Department has included $3.2 million towards transitional housing for adult offenders requiring Probation Department supervision.

- The Department of Behavioral Health is expanding Mental Health Treatment Services, notable in the following areas:
  - $1.0 million towards staffing Community Crisis Response Team clinics, which will now provide 24 hour services to departmental consumers and respond to requests by law enforcement for support during night hours. The department has also allocated $36.5 million towards the construction of new CCRT clinics throughout the County to expand these services.
  - $8.5 million for the Mental Health Act (MHSA) Comprehensive Children and Family Support Services program to support expanded mental health services for children.
  - $4.3 million for the MHSA Regional Adult Full Service Partnership (FSP) program support expanded mental health services to adults.
  - $1.0 million for the MHSA Forensic Integrated Mental Health Partnership program to expand services to develop peer support and mentoring strategies for individuals who have been released early from County jail or State prison.

- The Sheriff/Coroner/Public Administrator budget included $1.1 million of existing departmental resources for a program authorized by the Board as a pilot on December 15, 2015 (Item No. 72) related to the delivery of law enforcement services to unincorporated areas of the West End including the North Rancho/Etiwanda Preserve and the Mission Corridor, respectively. The program was successful and is now being incorporated as an ongoing service beginning in 2016-17 ,

- The Sheriff/Coroner/Public Administrator budget includes $9.0 million of one-time Discretionary General Funding (Net County Cost) to replace 2 aging and obsolete patrol helicopters: including equipment, travel and training for pilots and mechanics, installation of equipment, and delivery charges. The helicopter replacements will provide newer more reliable aircraft.
- The Public Defender Proposition 47 program will use media resources to reach all potential citizens who have convictions eligible for reclassification to further enhance their ability to rehabilitate within the community.

- County Fire is assuming fire, rescue, Emergency Medical Services (EMS), and prevention responsibilities within the Cities of San Bernardino ($29.6 million) and Twentynine Palms ($1.7 million) as a result of the pending annexations. This continued expansion of a regional approach will provide a more effective and efficient delivery of fire services for County residents.

- Land Use Services Code Enforcement is continuing to pilot various strategic initiatives to address issues with short-term rentals, particularly in the mountain areas. For 2016-17, a pilot program for a short-term rental hotline will be established where the public can report illegal or disruptive activities at short-term rental properties.

- The Information Services Department Telecommunication Services division is in the process of upgrading the County's Regional Public Safety Radio System (800 Mhz Upgrade Project). The project is currently on schedule, with an estimated completion date of 2020-21. The estimated cost of the project is $158.2 million primarily funded with Discretionary General Funding.

- The Department of Aging and Adult Services (DAAS) budget of $8.3 million will supplement programs such as the Elderly Nutrition, Supportive Services, Medicare Improvements for Patients and Providers Act, and Family Caregiver.

- The Arrowhead Regional Medical Center (ARMC) budget includes the addition of 14 positions to strengthen the Sterile Processing division to meet operational needs and ensure compliance with regulatory standards.

- The Department of Children and Family Services is implementing an After Hours Response Center (ARC) in June 2016 to provide optimal customer services to our community partners, children and families. The Center will enhance the departments critical after hour function of responding to child abuse, neglect and exploitation referrals called into the Child and Adult Abuse Hotline (CAAHL).

Pursue County Goals and Objectives by Working with Other Agencies

- ARMC is participating in California's 1115 waiver Renewal (Medi-Cal 2020), working alongside the California Association of Public Hospitals, the State of California, The Centers for Medicare & Medicaid Services, and multiple County departments focusing on improved patient outcomes, efficiencies and access in patient care integrated care models and procuring maximum reimbursement for performance of prescriptive clinical measures. The budget includes $52.5 million in revenues related to the Medicaid Waiver programs.

Focus on Recovery and Resiliency Following the December 2, 2015 Terrorist Attack (SB Strong)

- The County Administrative Office has commenced a countywide effort to document the impact and ongoing response to the December 2, 2015 terrorist attack while pursuing multiple sources of potential cost-reimbursement and to create a historic and best-practices document.

- The County has allocated approximately $10.2 million in funds towards improving security at County facilities. This includes $8.2 million in immediate improvements to facilities, such as expanded security guard services, upgraded security camera and key card access installations, and $2.0 million to conduct a security assessment of all County facilities.

Challenges in Fiscal Year 2016-17 and Beyond

Although the balancing of future costs with projected revenue has improved compared to prior County five year forecasts, broad economic challenges remain. The current economic expansion will be 7 years at the end of June 2016, which is the fourth longest in the history of the United States and cannot be assumed to last indefinitely. In addition, the fiscal uncertainly inherent in the State budget process continues to present a major challenge to the County's fiscal planning efforts.

Economic Challenges

The County's Five Year Financial Forecast covers July 2016 through June 2021 and includes moderate growth of major revenue streams throughout the period. Not included in the forecast are the impacts of a potential recession or the unknown economic impacts of the coming statewide $15 minimum wage.

By the end of the third year of the County's forecast the current economic expansion would match the longest expansion in history. Although the weakness of the current recovery and quantitative easing may have pushed off the next recession temporarily, it would be without precedent for the economy to expand throughout the County's entire five year forecast. In response to these unknown variables, the County has taken the approach of budgeting revenue growth in a conservative fashion over the entire five year forecast rather than assuming greater potential revenue increase in the immediate future with reductions in the later part of the forecast.

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Section 6. Mitigation Strategy

6.1 Mitigation Goals and Objectives

Goals and objectives discussed in this section help describe what actions should occur, using increasingly narrow descriptors. Long-term goals are developed which can be accomplished by objectives. To achieve the stated objectives "mitigation actions" provide specific measurable descriptors on how to accomplish the objective. The goals, objectives, and actions form the basis for the development of a Mitigation Action Strategy and specific mitigation projects to be considered for implementation.

The process consists of 1) setting goals and objectives, 2) considering mitigation alternatives, 3) identifying strategies or "actions", and 4) developing a prioritized action plan resulting in a mitigation strategy.

The following section provides an overview of the Mitigation Goals and Objectives for profiled hazards, Wildfire, Earthquake, Flood, Drought, Terrorism, and Climate Change for the County Unincorporated Area and the County's Special Districts. These goals were compiled from various sources including the County of San Bernardino 2007 General Plan. (See Section 3.5 for a detailed description of the process used by the County Planning Team)

6.1.1 All Hazard (AH)

AH GOAL: Increase readiness for all hazards in the unincorporated areas of San Bernardino County.

OBJECTIVE 1: Construct All-Hazard Response Facilities: Construct facilities to increase operational readiness to reduce impacts of natural hazards.

AH Action 1.1: Construct Valley Dispatch and Operations Center. Construct facility and ensure cohesive working and response to any scale emergency and operations in a secure complex

AH Action 1.2: Construct Shelter Operations Compound (SHOC). This shelter concept provides a new one-stop shelter concept. The SHOC combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location.

OBJECTIVE 2: Special District Funding: Continue Special Districts Projects relating to all hazards.

AH Action 2.1: Continue funding and support for Special Districts Projects relating to water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big

Bear Valley Recreation Park District and Bloomington Recreation and Park District for all hazards.

AH Action 2.2: Install Generators at Critical Facilities Retrofit existing buildings and facilities with connectors/ ATS for emergency generators and/or install permanent emergency generators at critical facilities, including wells and booster station locations.

AH Action 2.3: Water Systems Repair Plan Develop a plan for speeding the repair of and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.

AH Action 2.4: Smart Water Meters and SCADA Utilization of SCADA and Smart Water Meters to get real time data on problems with the system and reduce drive time emissions as a result of traditional meter reading.

AH Action 2.5: Provide Employees with Emergency Supplies Provide emergency supplies of food, water, and portable generators for employees at office and field locations.

AH Action 2.6: Annual Tower and Guide Wire Inspections Conduct annual tower and guide wire inspections to mitigate storm/wind/earthquake hazards from knocking out communications.

AH Action 2.7: **Maintain Tower Lighting** Maintain lights on all tower locations.

AH Action 2.8: Designate Emergency Operations Sites Conduct an inventory or list of County Park Facilities and Community Centers to establish a list of pre-designated emergency operations or disaster relief sites. Not all Community Centers are an appropriate size to accommodate large numbers of evacuees and may only serve as command and control centers or distribution centers.

AH Action 2.9: Establish Power Sources for Emergency Operations Sites Establish small solar energy fields or other forms of renewable power at County Community Centers to
facilitate stand-alone emergency operations for the community.

AH Action 2.10: Connect Water Systems to Generators Connect water systems to generators to ensure delivery even in disaster situations.

AH Action 2.11: Establish a Centralized Communications Network Establish a centralized communications network to monitor channel output for TV Districts and provide emergency information by way of character generator tied to channel transmissions.

AH Action 2.12: Incorporate as appropriate requirements from the State of California's most recent land use regulations regarding the hazard mitigation planning process (Government Code 65302 and 8685.9).

6.1.2 Wildfire (WF)

WF GOAL: Continue to reduce fire hazards in the unincorporated areas of San Bernardino County.

WILDFIRE OBJECTIVE 1: **Mountain Area Safety Taskforce.** Continue the cooperation and coordination of Fire Hazard Mitigation efforts with all stakeholders in the mountain areas of San Bernardino County through participation in MAST.

WF Action 1.1: Continue Mountain Area Safety Taskforce (MAST) funding to support mitigation activity.

WILDFIRE OBJECTIVE 2: Support Mountain Mutual Aid Objectives. Continue development of and continue the mission of mutual aid between the first responders in the County mountain areas through County Mitigation Planning.

WF Action 2.1: Update Mountain Mutual Aid Mapbook to document.

WF Action 2.2: Update Community Structure Protection Plans as necessary.

WILDFIRE OBJECTIVE 3: Community Based Fuels Reduction Program. Continue the community based Fuels Reduction Program through community based programs, both volunteer and government funded.

WF Action 3.1: Implement identified community based fuels reduction projects.

WF Action 3.2: Develop fuels reduction "maintenance program" by obtaining participation from citizens and/or homeowners associations.

WF Action 3.3: Vegetation Removal Clear vegetation from Road District facilities/yards.

WILDFIRE OBJECTIVE 4: Forest Care. Continue providing assistance to homeowners by expanding services to all communities in the Mountain areas of the County.

WF Action 4.1: Increase homeowner assistance services to mountain residents for fuel reduction.

WF Action 4.2: Continue working with Southern California Edison to remove dead trees near power lines.

WILDFIRE OBJECTIVE 5: County Fire Hazard Abatement. Overcome funding shortfalls while improving service delivery.

WF Action 5.1: Inspect every residence in the mountain communities within the next two years to enforce the new Fire Hazard Abatement code that addresses green fuels.

WF Action 5.2: Continue to collaborate with Forest Care, Red, Cross and Cal Fire to overcome increased costs of enforcement.

WILDFIRE OBJECTIVE 6: Decrease Wildfire Hazards at Private Property through the Fire Hazard Abatement Programs

WF Action 6.1: Train and Certify landscape contractors to comply with the new Fire Hazard Abatement Code.

WF Action 6.2: Continue wildfire mitigation efforts under the Wood Shake Roof Replacement Program.

WF Action 6.3: Protect Property in Wilderness Areas Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.

WILDFIRE OBJECTIVE 7: Support Mitigation Strategies in Community Wildfire Protection Plans. Continue to improve CWPP's in cooperation with Cal Fire, the IEFSA and individual Fire Safe Councils.

WF Action 7.1: Modify independent and unique CWPPs into a more common framework making them similar but leaving room to provide specific hazard characteristics and mitigation actions for each community.

WILDFIRE OBJECTIVE 8: Improve Emergency Access. Improve and maintain emergency access for wildfire protection.

WF Action 8.1: Construct Arrowbear Drive Realignment and Widening

WF Action 8.2: Construct Cedar Glen Fire Access Road

WF Action 8.3: Structural Fire Breaks Widening Double the width of external fire breaks on grounds which have structures located in wilderness and or areas prone to wildfires.

WILDFIRE OBJECTIVE 9: Special District Funding: Continue Special Districts Projects relating to wildfire.

WF Action 9.1: Continue funding and support for Special Districts Projects relating to wildfire in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

WF Action 9.2: Emergency Water Supplies Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal. (completed with continuous fresh of supplies and rotation)

6.1.3 Earthquake/Geologic Hazards (EQ)

GOAL: Minimize exposure to structural and contents damage from geologic and seismic conditions. (Complements General Plan, Section VIII, Safety Element (Goal S 7)

EARTHQUAKE OBJECTIVE 1: Educate the public on reducing earthquake risk.

EQ Action 1.1: Improve public education programs and practices to residents for earthquake risk.

EARTHQUAKE OBJECTIVE 2: Protect occupants and structures in proposed developments from high levels of risk caused by rupture of the ground surface during an earthquake (Complements General Plan, Section VIII Safety Element Policy S 7.4).

EQ Action 2.1: Evaluate single family homes for Earthquake hazard when conducting permit applications and plan reviews.

EQ Action 2.2: Seismic Strapping for existing water tanks and future construction.

EQ Action 2.3: Employee Emergency Sheltering Develop a plan for short-term and intermediate-term sheltering of employees.

EARTHQUAKE OBJECTIVE 3: Continue geologic hazard mapping projects to minimize and prevent damage caused by earthquakes and other geologic hazards.

EQ Action 3.1: Identify liquefaction hazard areas outside the currently designated Geologic Hazard Overlay Districts.

EARTHQUAKE OBJECTIVE 4: Protect life and property from risks resulting from gravity-derived and/or earthquake-triggered landslides, expansive soils and/or other poor soil conditions. (Complements General Plan, Section VIII, Safety Element Policy § 7.6)

EQ Action 4.1: Require development on hillsides to minimizes the extent of topographic alteration and erosion, to maintain slope stability, and to reduce the potential for offsite sediment transport (Complements General Plan, Section VIII, Safety Element Policy § 6.1).

EQ Action 4.2: Generator Installation Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.

EARTHQUAKE OBJECTIVE 5: Reduce runoff over the cliffs in the Rimforest neighborhood. (Complements Rimforest Drainage Feasibility Study)

EQ Action 5.1: Divert runoff to Little Bear Creek.

EARTHQUAKE OBJECTIVE 6: Special District Funding: Continue Special Districts Projects relating to earthquake hazards.

EQ Action 6.1: Continue funding and support for Special Districts Projects relating to earthquake hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

6.1.4 Flood (FL)

GOAL: Provide adequate flood protection to minimize hazards and structural damage. (General Plan, Safety Element, Goal S 5)

FLOOD OBJECTIVE 1: National Flood Insurance Program. Participate in the National Flood Insurance Program (NFIP), which provides flood insurance within designated floodplains. (General Plan, Safety Element, Policy S 5)

FL Action 1.1: Update NFIP data and maps with newly identified flood hazard areas in the County, as new information becomes available.

FLOOD OBJECTIVE 2: Alluvial Task Force. Review and analyze the findings and recommendations from the recently released Alluvial Fan Task Force reports, as funding permits.

FL Action 2.1: Determine whether or not additional amendments to development standards or policies are merited, based on the completed analysis.

FLOOD OBJECTIVE 3: Flood Hazard Reduction. Reduce flood hazards through development standards and policies stated in the County of San Bernardino General Plan and County of San Bernardino 2010 Development Code.

FL Action 3.1: Amend the Flood Plain Safety Overlay District through automatic map updates as new data is released and published by FEMA.

FL Action 3.2: Review development plans to ensure compliance with ordinances.

FL Action 3.3: Inspect construction to ensure compliance with approved development plans.

FL Action 3.4: Soil Stabilization on Roadways and Along Roadway Shoulders Soil stabilization on roadway shoulders and dirt roads. This will prevent erosion caused by flood conditions.

FL Action 3.5: Encasing Pipelines Encase water pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.

FLOOD OBJECTIVE 4: Future Flood Mitigation Projects. Improve existing facilities and construct new facilities to mitigate flooding with the County.

FL Action 4.1: In each flood control zone, construct facilities identified in those zones by the Flood Control Advisory Committee. See Flood Control District Annex for a listing of projects.

FLOOD OBJECTIVE 5: Special District Funding: Continue Special Districts Projects relating to flood hazards.

FL Action 6.1: Continue funding and support for Special Districts Projects relating to flood hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

FL Action 6.2: On Call Contractors Employ on call contractors to assist in emergency situations.

6.1.5 Drought (DR)

GOAL: Minimize the effects of drought on the County in all aspects including economically and socially.

DROUGHT OBJECTIVE 1: Educate the public on water conservation methods.

DR Action 1.1: Create a public awareness campaign advising citizens, business owners and farmers on water conservation.

DR Action 1.2: Provide incentives for farmers to grow crops that are less water intensive.

DR Action 1.3: Continue to coordinate with the San Bernardino Valley Water Conservation District to provide Qualified Water Efficient Landscaper (QWEL) training.

DR Action 1.4: Continue to enforce the watering schedule and watering restrictions throughout the County.

DROUGHT OBJECTIVE 2: Protect the quality of the County's watersheds.

DR Action 2.1: Approve the County's Watershed Water Quality Management Plan written in 2013.

DROUGHT OBJECTIVE 3: Special District Funding: Continue Special Districts Projects relating to drought hazards.

DR Action 3.1: Continue funding and support for Special Districts Projects relating to drought hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

6.1.6 Anti-Terrorism (AT)

GOAL: Use antiterrorism strategies to discourage terrorism and protect the people, infrastructure and assets in San Bernardino County from the effects of terrorism.

ANTI-TERRORISM OBJECTIVE 1: Use anti-terrorism design strategies to discourage / prevent acts of terrorism.

AT Action 1.1: Identify and prioritize mitigation activities (anti-terrorism force protection) at critical facilities and gathering places that are vulnerable to terrorist attacks.

ANTI-TERRORISM OBJECTIVE 2: Special District Funding: Continue Special Districts Projects relating to terrorism hazards.

AT Action 2.1: Continue funding and support for Special Districts Projects relating to terrorism hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

6.1.7 Climate Change (CC)

GOAL: Reduce the impacts of climate change on the County and limit human activities that change the atmosphere's makeup.

CLIMATE CHANGE OBJECTIVE 1: Meet greenhouse gas (GHG) reductions targets set forth by the Clean Air Act.

CC Action 1.1: Continue working with the South Coast Air Quality Management District and the Mojave Desert AQMD to meet GHG reductions targets.

CC Action 1.2: Continue implementing the energy conservation and efficiency measures identified in the County of San Bernardino Greenhouse Gas Emissions Reduction Plan. (San Bernardino County Renewable Energy and conservation Element)

CLIMATE CHANGE OBJECTIVE 2: Educate the public on the effects of climate change and reducing our impact.

CC Action 2.1: Encourage carpooling and the use of public/ alternative transportation methods.

CC Action 2.2: Optimize energy efficiency in the built environment and promote the local economic benefits of energy efficiency retrofits. (San Bernardino County Renewable Energy and conservation Element)

CC Action 2.3: Encourage residents and businesses to conserve energy. (San Bernardino County Renewable Energy and conservation Element)

CLIMATE CHANGE OBJECTIVE 3: Special District Funding: Continue Special Districts Projects relating to climate change hazards.

CC Action 3.1: Continue funding and support for Special Districts Projects relating to climate change hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District.

6.2 Mitigation Strategy

To narrow mitigation alternatives for inclusion, FEMA's six broad categories of mitigation alternatives were used. Each FEMA category is listed below. The HMP Planning Committee developed several mitigation alternatives for implementation under each mitigation category.

- Prevention (PRV)

- Property Protection (PPRO)
- Public Education and Awareness (PE&A)
- Natural Resource Protection (NRP)
- Emergency Services (ES)
- Structural Projects (SP)

Table 6-1 summarizes the mitigation alternatives for categories of projects addressing the hazards in the San Bernardino County Unincorporated Area Multi-Jurisdictional Hazard Mitigation Plan. The Table includes implementation strategies for the wildfire, earthquake/geologic hazards, flood, drought, climate change and terrorism.

Table 6-1: Mitigation Alternative Summary

Action	Lead Agency	Hazard	Funding Source
Prevention (PRV): **Preventative activities are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. This includes the development of additional code requirements to further reduce or eliminate damages from the identified hazards.**	County Land Use Services	All Hazards	General Fund
Natural Resource Protection (NRP): **To locate and protect natural and cultural resources at risk from the identified hazards.**	Fire Protection District / Flood Control District	Wildfire and Flood	General Fund, Grants
Property Protection (PPRO): **Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations.**	Fire Protection District.	Wildfire	General Fund, Grants
Public Education and Awareness (PE&A): **To continue and develop new public education programs targeting the top identified hazards.**	Fire Protection District.	All Hazards	General Fund, Grants

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Action	Lead Agency	Hazard	Funding Source
Emergency Services (ES): **Although not typically considered a "mitigation" technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:**	Fire Protections District	All Hazards	General Fund, Special District Funds, Grants
Structure Protection (SP) – Flooding **To continue to identify, fund, and build projects that reduce or eliminate flood hazards in the County.**	Flood Control District	Flooding Hazards	General Fund, Special District Funds, Grants
Structure Protection (SP)– Geological Hazards **To identify unknown hazards and develop additional new and retrofit requirements or programs to reduce or eliminate damage from geological hazards.**	Land Use Services	Geological Hazards	General Fund Grants
Structure Protection (SP) – Wildfire **To further protect structures at risk from wildfire through education, building, and enforcement codes and actions.**	Fire Protections District	Wildfire	General Fund, Special District Funds, Grants

6.2.1 Mitigation Action Plan

This section serves to identify *on-going* actions and projects in the County Unincorporated Area. With the results of the hazard risk assessment finalized, mitigation goal established, and capabilities assessed, the County and participating districts then set out to identify new mitigation actions that would reduce the outlined in the vulnerability assessment.

Not all identified mitigation actions are implementable in the 5-year plan cycle, due to technical feasibility, political acceptance, lack of funding, or other constraints. Once the mitigation actions for each participating jurisdiction were identified, they were evaluated and prioritized (by providing a time frame) to identify the most suitable mitigation actions for each participating jurisdiction to implement.

Cost effectiveness of each measure was a primary consideration when developing mitigation actions. Because mitigation is an investment to reduce future damages, it is important to select measures for which the reduced damages over the life of the measure are likely to be greater than the project cost. For structural projects, the level of cost effectiveness is primarily based on the likelihood of damages occurring in the future, the severity of the damages when they occur, and the level of effectiveness of the selected measure. While detailed analysis was not conducted during the mitigation action development process, these factors were of primary concern when selecting measures. For measures that do not result in a quantifiable reduction of damages, such as public education and outreach, the relationship of the probable future benefits and the cost of each measure was considered when developing the mitigation actions.

Based upon the participating jurisdiction capabilities, Table 6-2 shows primary actions selected for further implementation and development during the next planning cycle. Table 6-2 provides details for each mitigation action with mitigation action descriptions, FEMA mitigation category, responsible party, and timeframe.

Important to Note: See Jurisdictional Annexes for more information on implementation mechanisms and mitigation projects for each participating jurisdiction. If a participating jurisdiction is identified as a primary lead for implementation, the mitigation actions are also contained the corresponding jurisdictional annex.

Table 6-2: Mitigation Action Descriptions

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
ALL Hazard	**AH Action 1.1:** Valley Dispatch and Operations Center.	Update and maintain the operations of the facility and ensure cohesive working and response to any scale emergency and operations in a secure complex	ES	Budgetary Items from County and Federal Grant Funding, EMPG, HMPG, UASI.	Fire Protection District.	1-3 Years	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
ALL Hazard	**AH Action 1.2:** Maintain Shelter Operations Compound (SHOC). This shelter concept provides a new one-stop shelter concept. The SHOC combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location.	After the 2003 Wildland Fires, the County and American Red Cross recognized the need to provide services beyond basic care and short-term sheltering, especially during large fires, floods, and earthquakes The Mass Care & Shelter Plan and Concept of Operations, outlines the framework of a new one-stop shelter concept, Shelter Operations Compound (SHOC). It combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location. Residents can access public information and referral services through the LAC, and then take a short walk to the Non-LAC Unit for communication, postal services, and other private organizations/business at little to no cost. The completion of the Plan in 2012 will help to sync local resources, encourage local self-sufficiency, foster partnership between public and private agencies, and serve as a reference document for the region. By June 2017, the program will have 32 trailers/caches equipped with mass care and shelter supplies, strategically placed throughout the County and ready for rapid deployment. It is expected to serve over 12,000 residents. In addition to enhancing the comfort levels of shelter residents, the program will produce standardized documents and protocols for procuring and maintaining Mass Care and Shelter trailers/caches. These plans and programs will help the County prepare for and mitigate damages from hazards. This is an update and expansion of the plan and done without more grant funds.	ES	To increase Mass Care and Shelter capability of the county, grants from 2008-2009 Homeland Security Grant Program (HSGP) and 2009 Riverside Regional Urban Area Security Initiative (UASI) funded the Mass Care and Shelter Trailer/Cache Program.	Fire Protection District/	1-5 Years	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
All-Hazard	**AH Action 2.1:** Continue funding and support for Special Districts Projects relating to all hazards.	Continue funding and support for Special Districts Projects relating to water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District for all hazards. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
All-Hazard	**AH Action 2.2:** Install Generators at Critical Facilities	Retrofit existing buildings and facilities with connectors/ ATS for emergency generators and/or install permanent emergency generators at critical facilities, including wells and booster station locations.	ES, SP	TBD	Water Systems	TBD	Critical sites are already set up for connection or has a permanently installed generator

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
All-Hazard	**AH Action 2.3:** Water Systems Repair Plan	Develop a plan for speeding the repair of and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.	PRV	SDD WAS	Water Systems	TBD	We have a warehouse and inventory. Add'l inventory would need to be purchased from local wholesaler
All-Hazard	**AH Action 2.4:** Smart Water Meters and SCADA	Utilization of SCADA and Smart Water Meters to get real time data on problems with the system and reduce drive time emissions as a result of traditional meter reading.	PRV	Individual CSAs	Water Systems	Ongoing	Both SCADA and Smart Meters have been installed and continue to be installed
All-Hazard	**AH Action 2.5:** Provide Employees with Emergency Supplies	Provide emergency supplies of food, water, and portable generators for employees at office and field locations.	ES	SDD/WAS	Water Systems	Ongoing	WAS has a stock of emergency food supplies, water, and generators.
All-Hazard	**AH Action 2.6:** Annual Tower and Guide Wire Inspections	Conduct annual tower and guide wire inspections to mitigate storm/wind/earthquake hazards from knocking out communications.	PRV	TBD	TV Districts	7/1/2016-7/1/2017	All Districts
All-Hazard	**AH Action 2.7**: Maintain Tower Lighting	Maintain lights on all tower locations.	SP	TBD	TV Districts	June-17	
All-Hazard	**AH Action 2.8:** Designate Emergency Operations Sites	Conduct an inventory or list of County Park Facilities and Community Centers to establish a list of pre-designated emergency operations or disaster relief sites. Not all Community Centers are an appropriate size to accommodate large numbers of evacuees and may only serve as command and control centers or distribution centers.	PRV	TBD	Park Districts	April-17	All Districts
All-Hazard	**AH Action 2.9:** Establish Power Sources for Emergency Operations Sites	Establish small solar energy fields or other forms of renewable power at County Community Centers to facilitate stand-alone emergency operations for the community.	PRV, SP	TBD	Park Districts	12/1/2016-7/1/2018	Lucerne Valley Joshua Tree
All-Hazard	**AH Action 2.10:** Connect Water Systems to Generators	Connect water systems to generators to ensure delivery even in disaster situations.	PRV, SP	TBD	Park Districts	TBD	
All-Hazard	**AH Action 2.11:** Establish a Centralized Communications Network	Establish a centralized communications network to monitor channel output for TV Districts and provide emergency information by way of character generator tied to channel transmissions.	PRV	TBD	TV Districts	7/1/2017-12/1/2017	All districts
All-Hazard	**AH Action 2.12** Incorporate as appropriate requirements from the State of California's	Government Code 65302.6 requires the following elements to be included in the hazard mitigation plan: (1) An initial earthquake performance evaluation of public facilities that provide essential services, shelter, and critical governmental functions.	PRV, NRP	TBD	Primary: Land Use Services	1-3 years	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
	most recent land use regulations regarding the hazard mitigation planning process (Government Code 65302 and 8685.9).	(2) An inventory of private facilities that are potentially hazardous, including, but not limited to, multiunit, soft story, concrete tilt-up, and concrete frame buildings. (3) A plan to reduce the potential risk from private and governmental facilities in the event of a disaster. Government Code 8685.9 requires that the state share shall not exceed 75 percent of total state eligible costs unless the local agency is located within a city, county, or city and county that has adopted a local hazard mitigation plan as part of the safety element of its general plan. In that situation, the Legislature may provide for a state share of local costs that exceeds 75 percent of total state eligible costs.			Secondary: Fire Protection District/		
All-Hazard	**AH Action 3.1:** Continue funding and support for Special Districts Projects relating to all hazards.	Continue funding and support for Special Districts Projects relating to water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District for all hazards. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Wildfire	**WF Action 1.1** Continue Mountain Area Safety Taskforce (MAST) funding to support mitigation activity.	MAST was formed to mitigate the region wide risk of a catastrophic wildfire due to dead and dying trees in the mountain communities. The mission of the MAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for the protection of property owners, residents, and property subject to the risk of catastrophic wildfire that could occur in San Bernardino County with an initial emphasis on the threat resulting from the Old and Grand Prix fires in 2003. MAST priorities are to continue reducing fire hazards through fuel reduction programs and hazard abatement though enforcement of county ordinances. The Mountain Area Safety Taskforce (MAST) Operations Section meets monthly. MAST Operations Section determines project priorities based on the benefit cost analysis of the projects and the effect of the project on the overall goals of the MAST organization. Goals can change as detailed Benefit Cost Analysis is conducted and CEQA/NEPA reviews are completed.	NRP, PPRO	Seeking additional funding through HMPG.	San Bernardino County Fire Protection District	On-Going	See Implementation plan on more information on MAST. See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
Wildfire	**WF Action 2.1:** Update Mountain Mutual Aid Map Book to document updated information contained in 2016 HMP.	The Map Book portion of the Community Safety and Structure Protection Plan provides not only a street network of the area but more importantly it provides the locations of strategic and critical resources for fire fighters. These include but are not limited to safe zones, open areas, locations for refuge. They also identify areas within communities that have narrow and steep winding streets and or with limited ingress and egress. The document is handed out to all responding strike teams from out of the area and has proved invaluable in directing and coordinating an effective firefighting response and reduces the potential for life loss and property damage.	ES	Seeking additional funding through HMPG.	San Bernardino County Fire Protection District	On-Going	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 2.2** Update Community Structure Protection Plans as necessary.	This is an on-going action (from the 2011 MJHMP) with the goal to continue development of and continue the mission of mutual aid between first responders in the County mountain areas.	PPRO		Fire Protection District	On-Going	
Wildfire	**WF Action 3.1:** Implement identified community based fuels reduction projects.	The Fuels Reduction Program is designed to create community based fuel modification programs across the mountain communities. These projects are selected specifically to reduce the potential for catastrophic wildfires and the damage that they can do to the communities. Project design, contracting, and operations are managed by the County's Public Works Department with priorities set by local fire chiefs in monthly MAST Operations Meetings. This program is the oldest and most significant for reducing wildfire threat on a mountain wide basis.	PPRO	Current Funding: Seeking additional funding through HMPG.	Primary: San Bernardino Public Works Department Secondary: County Fire Protection District	On-Going	
Wildfire	**WF Action 3.2:** Develop fuels reduction "maintenance program" by obtaining participation from citizens and/or homeowners associations.	To survive a wildfire, property owners need to manage the land surrounding their homes and communities effectively. Removing fuels in the wildland fuel reduction zone beyond the defensible space can reduce the speed and intensity of an oncoming wildfire. But if these areas aren't regularly **maintained**, they lose their effectiveness. Plants grow back, and flammable vegetation needs to be routinely removed and disposed of properly. This guide provides tips on how to create and maintain defensible space and wildland fuels treatments around your property.	PPRO, PE&A	Seeking additional funding through HMPG	Primary: Public Works Secondary: Fire Protection District	On-Going	
Wildfire	**WF Action 4.1** Increase homeowner assistance services to mountain residents for fuel reduction.	This is an ongoing wildfire mitigation action (from the 2011 MJHMP) for the group Forest Care to achieve the goal of providing assistance to homeowners by expanding services to all communities in the Mountain areas of the County. Forest Care is a program dedicated to creating a healthier forest. This program provides foresters to assess individual properties for thinning the vegetation and then provides 75% of the funding to do so.	PPRO, PE&A	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 4.2** Continue working with Southern California Edison (SCE) to remove dead trees near power lines.	A significant number of fires across the State are caused by trees falling into power lines. When the forests in the mountain communities became infested with bark beetles the pine tree die off was unprecedented. Thousands of these dead trees were standing precariously close to power lines. Early in the Bark Beetle Emergency in 2004, Southern California Edison swiftly initiated a program to remove all trees that were dead, dying, and/or diseased that had the potential to fall into any SCE power lines.	PRV, PPRO	As of July of 2010 Southern California Edison (SCE) has spent $179,758,978 to remove dead dying and diseased trees.	San Bernardino County Fire Protection District	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
		The role of Southern California Edison was critical to the success of MAST both operationally and financially. Edison still removes the most difficult trees, the most costly trees; and the ones that are most likely to be the source of ignition for a wild land fire. They are also removing the trees that are immediately threatening homes. They have removed 118,305 trees since the inception of the program in 2004. They also provided reimbursements to people that removed their own trees.					
Wildfire	**WF Action 5.1:** Inspect every residence in the mountain communities throughout the year to enforce the Fire Hazard Abatement code that addresses green fuels.	The Fire Hazard Abatement Program conducts surveys to identify fire hazards throughout the year. Fire hazards are identified and notices to abate the hazard(s) are mailed to property owners. Property owners are given 30 days to abate the violations. Failure to abate may result in citations, penalties, and/or fees for abatement by the County. The Fire Hazard Abatement Program responds to complaints year round in the unincorporated areas and contracting Cities and Fire Districts. The Division completes more than 430,000 inspections, issues more than 45,000 Notices to Abate Fire Hazards, issues over 4,000 citations for non-compliance, and abates the fire hazards on more than 2,000 parcels annually. Within the last 5 years, the Fire Hazard Abatement Division has received even more financial resources that enable them to abate all properties declared a fire hazard.	PRV, PPRO, PE&A	Seeking additional funding through HMPG	Primary: Land Use Services Secondary: Fire Protection District	On-Going	For more information on Contractor Certification, see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	**WF Action 5.2:** Continue to collaborate with Forest Care, Red, Cross and Cal Fire to overcome increased costs of enforcement.	This is an on-going action from the 2011 MJHMP with the goal of overcoming funding shortfalls for the County Fire Hazard Abatement Program.	PRV		San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 6.1** Train and Certify landscape contractors to comply with the Fire Hazard Abatement Code.	The City of Big Bear Lake created a program to train and certify landscape contractors to provide a qualified workforce to conduct fuels reduction activities on individual properties. The contractors are trained to comply with the new Fire Hazard Abatement Code that exists both in the City of Big Bear and the County unincorporated area. The City of Big Bear Lake Fire Department conducts the classes for landscapers and handy persons. This provides an incentive for the contractors and provides a level of certification that the homeowner can rely on when they are deciding to hire a landscape contractor to conduct fuels abatement around their home.	PRV, PPRO	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	On-Going

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 6.2:** Continue wildfire mitigation efforts under the Wood Shake Roof Replacement Program.	The County successfully passed an ordinance that requires the replacement of wood shake roofs by 2014. MAST has successfully mapped all of the wood shake roofs in the fire safety overlay and has created a strategy as to which roofs will be selected to participate in the FEMA funded project. This is an on-going project in cooperation with Big Bear Lake Fire Protection District in order to provide more funding for wood shake roof replacements by property owners.	PRV, PPRO, SP		Primary: MAST Secondary: San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 6.3:** Protect Property in Wilderness Areas	Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.	PPRO, PRV, SP	TBD	Sewer Systems	January-17	All sewer pump stations have paving
Wildfire	**WF Action 7.1:** Modify independent and unique CWPPs into a more common framework making them similar but leaving room to provide specific hazard characteristics and mitigation actions for each community.	Community Wildfire Protection Plans are designed to provide a means for a community, usually through the Fire Safe Council, to have input into and actively participate in the planning, strategy, goals, and objectives of creating a fire safe community.	PRV	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	On-Going For more information on CWPP see Annex A Section A.6 Fire Protection District Mitigation Project .
Wildfire	**WF Action 8.1:** Construct Arrowbear Drive Realignment and Widening.	The Arrowbear community off State Highway 18 has limited access to State Highway 138. The existing bridge/spillway and road needs to be realigned and widened to facilitate access by emergency personnel during wildfires and flooding. Mitigation strategy for this is to remove and replace existing bridge/spillway, realign and widen the road.	SP	Seeking grant funding Total Cost: $3,000,000 Approx.	Primary: Public Works Secondary: San Bernardino County Fire Protection District	1-3 Years	
Wildfire	**WF Action 8.2:** Construct Cedar Glen Fire Access Road.	Lack of paved roads inhibits traffic circulation and the ability to enter and exit the area without backtracking during wildfire emergencies. Strategy is to Construct road and drainage improvements to Little Bear Creek Road and Elder Drive.	SP	Seeking grant funding **Total Cost:** $2,500,000	Public Works	1-3 Years	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 8.3:** Structural Fire Breaks Widening	Double the width of external fire breaks on grounds which have structures located in wilderness and or areas prone to wildfires.	SP, PRV	Individual CSAs	Water Systems	7/1/2017-7/19/2019	
Wildfire	**WF Action 9.1:** Continue funding and support for Special Districts Projects relating to wildfire.	Continue funding and support for Special Districts Projects relating to wildfire in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Wildfire	**WF Action 9.2:** Emergency Water Supplies	Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.(completed with continuous fresh of supplies and rotation)	ES	TBD	Roads	TBD	
Earthquake	**EQ Action 1.1:** Improve public education programs and practices to residents for earthquake risk.	Public education and outreach programs are an efficient and cost-effective way to promote meaningful changes within a community. A Program for Public Information (PPI) for earthquake awareness and mitigation could significantly reduce injury and property damage to earthquake. Use a suite of partnerships, activities, and products to educate the public about earthquake science and motivating homeowners to become prepared for earthquakes.	PE&A		Human Resources	5-10 Years	
Earthquake	**EQ Action 2.1:** Evaluate single family homes for Earthquake hazard when conducting permit applications and plan reviews.	82.15.040 Development Standards states that a structure used for human occupancy shall be located 50 feet or farther from any active earthquake fault traces. Lesser setbacks may be applicable in certain situations as determined by an appropriate geologic investigation and approved by the County Geologist or other engineering geologist designated by the Building Official. Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code Section 2621 et seq.) requires the delineation of potential damage areas along known active faults throughout California. It requires local governments to withhold approval of construction permits in those zones until geologic investigation has determined that the site is not threatened by surface displacement from future faulting.	PRV		Land Use Services	TBD	On-Going
Earthquake	**EQ Action 2.2:** Seismic Strapping	Seismic strapping for existing water tanks and future construction.	SP, PRV	CSA 64	Water Systems	7/17/2017-7/1/2019	Ongoing currently
Earthquake	**EQ Action 2.3:** Employee Emergency Sheltering	Develop a plan for short-term and intermediate-term sheltering of employees.	PRV	WAS	Sewer Systems	7/17/2017-7/19/2019	To purchase cots, small portable generators, tents, etc.

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Earthquake	**EQ Action 3.1:** Identify liquefaction hazard areas outside the currently designated Geologic Hazard Overlay Districts.	Supported by General Plan mechanism (General Plan, Section VIII, Safety Element Policy § 7.5; California Building Code §1803.5.11); Seismically- induced lateral spreading, and/or seismically-induced lateral flow, can cause devastating structural damage and a high potential for saturation exists when the groundwater level is within the upper 50 feet of alluvial material.	PRV		Land Use Services	5-10 Years	
Earthquake	**EQ Action 4.1:** Require development on hillsides to minimizes the extent of topographic alteration and erosion, to maintain slope stability, and to reduce the potential for offsite sediment transport (Complements General Plan, Section VIII, Safety Element Policy § 6.1).	This mitigation action is especially important in the San Bernardino and San Gabriel Mountains which have high slope failure / erosion potential. Typical slope mitigation techniques that are used include: Drainage Improvements - Since water is the biggest culprit in failing slopes, drainage improvements should be the first priority. Some drainage improvements may include: ▪ Collect or divert surface water from the problem slope. This may include catch basins, swales, or sealing tension cracks to prevent infiltration. ▪ Collect and remove subsurface water. This may include drains constructed within the subsurface to remove excess seepage, or lower ground water. Some earthwork mitigation techniques are as follows: ▪ Remove the upper soils of the slope to create a flatter slope. ▪ Buttress the slope toe by filling with rock, gravel, or soil. ▪ Benching the slope if each bench is on competent subgrade. ▪ Structural Improvements - Structural improvements include: ▪ Friction Piles ▪ Retaining walls ▪ Geo Grid ▪ Sheet Piles ▪ Rock Bolts ▪ Vegetative Cover Complements General Plan, Section VIII, Safety Element Policy § 7.6 Complements General Plan, Section VIII, Safety Element Policy § 6.1)	PRV	N/A	Land Use Services	On-Going	Provide enhanced information during the development review process to address slope failure concerns.
Earthquake	**EQ Action 4.2:** Generator Installation	Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.	SP, PPRO	TBD	Roads	TBD	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Earthquake	**EQ Action 5.1:** Divert runoff to Little Bear Creek.	To reduce the runoff over the cliff(s) in the Rimforest neighborhood, the runoff must be diverted to another path. This will be accomplished over three phases: • Phase 1: Reduce Runoff Tributary Area by 64%- 50.35 AC • Phase 2: Reduce Runoff Tributary Area by 30%- 23.79 AC • Phase 3: Reduce Runoff Tributary Area by 5%- 3.99 AC	SP, NRP, PRV		Primary: Public Works Secondary: Flood Control District		
Earthquake	**EQ Action 6.1:** Continue funding and support for Special Districts Projects relating to earthquake hazards.	Continue funding and support for Special Districts Projects relating to earthquake hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Flood	**FL Action 1.1:** Update NFIP data and maps with newly identified flood hazard areas in the County, as new information becomes available.	As required by the State of California, National Flood Insurance Program (NFIP) maps published by FEMA must be included in the HMP or General Plan Safety Element. Keeping this information current is an important mitigation action.	PRV, PPRO		San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 2.1:** Determine whether or not additional amendments to development standards or policies are merited, based on the Alluvial Fan Task Force Recommendation.	This is an on-going mitigation action from the 2011 MJHMP.	PRV		Primary: San Bernardino County Flood Control District Secondary: Land Use Services	On-Going	
Flood	**FL Action 3.1:** Amend the Flood Plain Safety Overlay District through automatic map updates as new data is released and published by FEMA.	Current San Bernardino County Hazard Maps can be found at: http://cms.sbcounty.gov/lus/Planning/ZoningOverlayMaps/HazardMaps.aspx.	PRV, NRP		Primary: San Bernardino County Flood Control District Secondary: Land Use Services	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Flood	**FL Action 3.2:** Review development plans to ensure compliance with ordinances.	This is an on-going mitigation action from the 2011 MJHMP in order to reduce the flood hazards through development standards and policies stated in the General Plan and San Bernardino 2077 Development Code.	PRV		Primary: Land Use Services Secondary: San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 3.3:** Inspect construction to ensure compliance with approved development plans.	This is an on-going mitigation action from the 2011 MJHMP in order to reduce the flood hazards through development standards and policies stated in the General Plan and San Bernardino 2077 Development Code.	PRV, PPRO, SP		Primary: Public Works Secondary: Flood Control District	On-Going	
Flood	**FL Action 3.4:** Soil Stabilization on Roadways and Along Roadway Shoulders	Soil stabilization on roadway shoulders and dirt roads. This will prevent erosion caused by flood conditions.	SP, PRV	TBD	Roads	TBD	
Flood	**FL Action 3.5:** Encasing Pipelines	Encase water pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.	SP, PRV	CSA 70 J	Water Systems	7/17/2017-7/1/2027	
Flood	**FL Action 4.1:** In each flood control zone, construct facilities identified in those zones by the Flood Control Advisory Committee. See Flood Control District Annex for a listing of projects.	This is an ongoing mitigation action from the 2011 MJHMP to achieve the goal of improving existing facilities and construct new facilities to mitigate flooding within the County.	SP		Primary: Public Works Secondary: San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 6.1:** Continue funding and support for Special Districts Projects relating to flood hazards.	Continue funding and support for Special Districts Projects relating to flood hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Flood	**FL Action 6.2:** On Call Contractors	Employ on call contractors to assist in emergency situations.	PRV, ES	TBD	Roads	TBD	
Drought	**DR Action 1.1:** Create a public awareness campaign advising citizens, business owners and farmers on water conservation.	Public education and outreach programs are an efficient and cost-effective way to promote meaningful changes within a community. A program to raise awareness on the importance of water conservation could significantly reduce the amount of water used by the public.	PE&A, NRP		Human Resources	TBD	
Drought	**DR Action 1.2:** Provide incentives for farmers to grow crops that are less water intensive.	Farmers use 80% of the State's water. By offering incentives to produce less water intensive foods (such as beets, carrots and potatoes) as opposed to more water intensive foods such as almonds, beef and pork) would make a substantial difference in water consumption.	NRP, PRV,		DAO Community Services?	On-Going	
Drought	**DR Action 1.3:** Continue to coordinate with the San Bernardino Valley Water Conservation District to provide Qualified Water Efficient Landscaper (QWEL) training.	The Qualified Water Efficient Landscaper training presents an affordable proactive local approach to reducing landscape water demand. QWEL provides graduates with knowledge in water efficient and sustainable landscape practices including water management and preservation of other valuable resources.	PE&A		Economic Development Agency?	On-Going	
Drought	**DR Action 1.2:** Approve the County's Watershed Water Quality Management Plan.	The County's Watershed Water Quality Management Plan written in 2013.	PRV, NRP			On-Going	
Drought	**DR Action 1.4:** Continue to enforce the watering schedule and watering restrictions throughout the County.	In response to the State Water Resources Control Board's 2016 emergency water conservation regulation, the County enforces a watering schedule for residential and commercial addresses.	PRV, NRP		Land Use Services	On-Going	
Drought	**DR Action 3.1:** Continue funding and support for Special Districts Projects relating to drought hazards.	Continue funding and support for Special Districts Projects relating to drought hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7	VARIES	VARIES	VARIES	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Anti-Terrorism	**AT Action 1.1:** Identify and prioritize mitigation activities (anti-terrorism force protection) at critical facilities and gathering places that are vulnerable to terrorist attacks.	Critical facilities may include essential facilities (such as hospitals, police and fire stations, evacuation centers, etc.), transportation systems, lifeline utility systems, high potential loss facilities (such as nuclear power plants, dams and military installations, etc.), and hazardous material facilities. Gathering facilities should also receive special attention. Places of mass gathering not only present terrorists with potential opportunities for mass casualties, symbolism and high impact media coverage, they pose a broad range of security challenges for their owners and operators.	PRV, PPRO		Land Use Services	On-Going	
Anti-Terrorism	**AT Action 2.1:** Continue funding and support for Special Districts Projects relating to terrorism hazards.	Continue funding and support for Special Districts Projects relating to terrorism hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Climate Change	**CC Action 1.1:** Continue working with the South Coast Air Quality Management District to meet GHG reductions targets.	The San Bernardino County General Plan Amendment and Greenhouse Gas Reduction Plan addresses the environmental effects specific to the proposed General Plan Amendment, Greenhouse Gas Reduction Plan, and associated Development Code Amendment and can be found here: http://www.sbcounty.gov/Uploads/lus/Countywide/GreenhouseGas/Full-Vol-1.pdf	PRV, NRP		Land Use Services	On-Going	
Climate Change	**CC Action 1.2:** Continue implementing the energy conservation and efficiency measures identified in the County of San Bernardino Greenhouse Gas Emissions Reduction Plan.	According to the San Bernardino County Renewable Energy and conservation Element, San Bernardino County's commercial, institutional and residential communities will continue to grow in the foreseeable future. Access to dependable and affordable energy sources is critical to maintaining and enhancing the quality of life enjoyed by San Bernardino residents and businesses. As energy needs grow, so do the needs to develop new energy sources.	PRV, NRP		Land Use Services	On-Going	
Climate Change	**CC Action 2.1:** Encourage carpooling and the use of public/ alternative transportation methods.	Reduction Measure R2T1 of the County of San Bernardino Greenhouse Gas Emissions Reduction Plan establishes an Employment Based Trip and VMT Reduction Policy. Some features include a compressed work week, car/vanpools, employee bicycle/pedestrian programs, and shuttle/ transit programs.	PE&A, PRV, NRP		Human Resources	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Climate Change	**CC Action 2.2:** Optimize energy efficiency in the built environment and promote the local economic benefits of energy efficiency retrofits. (San Bernardino County Renewable Energy and Conservation Element)	This is an on-going mitigation policy from the San Bernardino County Renewable Energy and Conservation Element.	SP, PE&A, PRV		Public Works	On-Going	
Climate Change	**CC Action 2.3:** Encourage residents and businesses to conserve energy. (San Bernardino County Renewable Energy and conservation Element)	This is an on-going mitigation policy from the San Bernardino County Renewable Energy and Conservation Element.	PE&A, NRP, PRV		Human Resources	On-Going	
Climate Change	**CC Action 3.1:** Continue funding and support for Special Districts Projects relating to climate change hazards.	Continue funding and support for Special Districts Projects relating to climate change hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	

Section 7. Plan Maintenance

7.1 Monitoring Evaluating and Updating the HMP

The San Bernardino County Fire Protection District Office of Emergency Services (OES) is the custodian of the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). In the 2010 MJHMP, County of San Bernardino indicated that the MJHMP would be reviewed annually. Although no formal meetings were held, OES reviewed the plan annually and collected new hazard mitigation information and mitigation efforts throughout the county. Additionally, OES referenced/reviewed the MJHMP before submitting grant applications to ensure the project was captured in the plan when applying for all grants to assist their mitigation efforts.

There are three (3) main components to the MJHMP: hazards, projects, and stakeholder involvement (public, as well as, county staff). The County and its Special Districts have focused on these components and over the last 5 years have made steady improvements in all areas. The County and its Special Districts participated and facilitated several meetings and established several tasks forces to help advance the understanding of hazards in the community. This information was shared with other county personnel and the general public. OES believes that this sharing of information leads to a more informed community, thus a more robust MJHMP.

Departments and Special Districts with projects track the status of the projects through the entire life cycle from concept to completion. Projects in progress are tracked to ensure all milestones are met and payments are made in a timely manner. Each year proposed projects are reviewed during budget development every spring and selected projects are submitted for funding to the appropriate funding source. These funding sources include but are not limited to grant funding, General Fund funding, and Special District funding.

Because the MJHMP is a living document that reflects ongoing hazard mitigation activities, the process of monitoring, evaluating, and updating will be critical to the effectiveness of hazard mitigation within the County Unincorporated Area. The County and its Special Districts will hold internal planning meetings to discuss current projects and evaluate newly proposed projects resulting from internal staff meetings and input from the public. The results of these Departmental/Special District meetings will be presented to the Multi-Jurisdictional Planning Team meetings at their annual meetings. To facilitate the Multi-Jurisdictional Hazard Mitigation Planning process, OES is proposing to conduct these annual meeting with the Multi-Jurisdictional County Planning Team where the Team Members will discuss the projects, priorities, and goals in the current plan and from individual Special District meetings and suggest any necessary changes. Results of the annual meeting will be retained and compiled for the 2016 update. The County Planning Team will continue to support focused outreach for county Departments and Districts as well as support Countywide activities.

7.1.1 Plan Adoption

To comply with DMA 2000, the San Bernardino County Board of Supervisors has officially adopted the 2016 San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan. The adoption of the 2016 MJHMP recognizes the County's commitment to reducing the impacts of natural hazards within the County limits. A copy of the 2016 MJHMP adoption resolution is included after the table of contents in this document.

7.1.2 Implementation

The knowledge gained from the MJHMP has helped the county enhance other planning efforts. One of the biggest results from the 2010 MJHMP efforts was the incorporation of the MJHMP into the 2007 General Plan's Safety Element. This merging of plans has help ensure development decisions are considering the most recent hazard information. It is the County's intent to incorporate by reference the updated MJHMP into the County General Plan upon approval from FEMA.

The MJHMP has also led to the strengthening and improvement of several County Ordinances, which are designed to ensure proper fuels reduction was completed in the Severe Fire Hazard Zones. Two new ordinances were passed requiring replacement of wood shake roofs in the Severe Fire Hazard Severity Zones by 2014 and the reduction of live fuel loads around structures in the Very High Fire Hazard zone.

The MJHMP goals and actions will be incorporated into various general operations of government. For example, much of the information from the MJHMP will be included in the County Operational Area Emergency Operation Plan (EOP). As any future County plans are developed, the Multi-Jurisdictional Hazard Mitigation Plan will be a great asset in any plan development efforts. As noted earlier, much of the information contained in this MJHMP is from the County General Plan and is already part of the planning process.

Additional benefit is gained from the County and its Special Districts reviewing existing mitigation projects and development of additional mitigation projects at their internal annual Planning Team meetings. This input includes comments and suggestions from the public as well as from the internal planning process of each County department and District.

7.1.2.1 Implementation through Existing County Mechanisms

7.1.2.1.1 All Hazards

7.1.2.1.2 Amendment to Title 6 County Code

An amendment to Title 6 of the County of San Bernardino Code to adopt by reference the 2010 Editions of the California Building Standards Codes went before the Board of Supervisors on

November 2, 2010 and was continued for a second reading on November 16, 2010 and approved unanimously. The amendment became effective on January 1, 2011.

The County of San Bernardino amendment to Title 6 of the County Code to adopt by reference the 2010 Editions of the California Building Standards Codes repealed the current chapters of Division 3 of Title 6 that reflect the 1994/1995 editions of the California Building Standards Codes and adopt the 2010 editions of these codes by reference.

The California Building Standards Commission approved the California Building Standards Code (Code) for a statewide effective date of January 1, 2011 and requires this Code apply in all parts of the state. This Code consists of the California Building, Residential, Plumbing, Mechanical, Electrical, Energy, Historical Buildings, Existing Building (Unreinforced Masonry) and the Green Building Standards Codes. Since this 2010 Edition was adopted by local ordinance, the prior editions of this code will be repealed and the most recent editions of the codes with applicable amendments requiring express findings and certain appendices necessary for the health and safety of the citizens of this County will be in effect within the unincorporated areas of San Bernardino County. The benefit of adopting this Code is that it provides consistency and clarification for the building community as well as building inspectors and plans examiners. State law (Health & Safety Code 18941.5 and 17958.7) requires the local government make express findings in order to amend building standards and the amendments must be necessary due to local climatic, geological, or topographical conditions.

Those amendments and findings are included in the County’s ordinance and were filed with the California Building Standards Commission.

The recommended modifications not requiring express findings are administrative or procedural in nature and concern the local implementation issues that are not covered by building standards.

An example of this type of modification is to the California Residential Code, Section R105.3.1.1 which requires the Board of Appeals to confirm substantial valuations in the flood plain. The traditional purpose of the Board of Appeals has been reserved for a contested decision of the Building Official, and it is felt that it should remain as such.

With respect to grading and excavation regulations found in Appendix J of the 2010 State published code, the 2001 California Building Code dealt with grading with more clarity in regards to what activities require a permit and set forth rules to ensure large grading projects are scrutinized in greater detail than smaller projects by requiring more reporting and inspection of such work. The grading chapter in the 2001 Code has been trusted and in use in its primary form for years. The 2010 Appendix J grading chapter needs substantial amendment and modification to address all grading issues and is not recommended for adoption in its present form. The Board adopted the 2001 Appendix Chapter 33 regulations as part of this proposed ordinance. Relocation permit requirements have been moved to a new section of the Code, and it retains specific standards for relocation procedures in details not found in the 2010 State-published code. Clarification of the types of buildings affected by the new regulations has also been made.

Administrative changes to the 2010 California Existing Building Code (Part 10 of Title 24) were approved to outline the procedures required to set allowable time limits for the retrofit and repair of unreinforced masonry buildings. Staff is also recommending that authorization be given to the Building and Safety Division of the Land Use Services Department to issue Administrative Citations as an alternative means of enforcement of the County Code provisions.

Express findings are made for changes to the California Plumbing Code, Appendix K regarding the soil conditions that exist in this county. These changes are supported by the Environmental Health Division. These express findings are iterated in the ordinance and will be filed with the Building Standards Commission as required by law in order to become effective.

7.1.2.2 Wildfire

7.1.2.2.1 Inland Empire Fire Safe Alliance (IEFSA)

The Inland Empire Fire Safe Alliance (IEFSA) was created to act as a forum for all Fire Safe Councils in San Bernardino County. Some of the benefits are developing a consistent and comprehensive message to citizens about fire safety; coordinating efforts for grant administration, writing, and reporting; a one-stop shop for information, resources and research; and a centralized source for sharing of updates from cooperating governmental agencies. There are approximately 20 Fire Safe Councils active in San Bernardino County.

IEFSA has held bimonthly meetings for over 5 years and have been the focal point for all regional Fire Safe Councils including some from Riverside County. They have also held numerous workshops and seminars regarding fire resistive construction, and materials, BAER reports, CWPPs and grant writing. The IEFSA was the focal point for Fire Safe Councils (FSCs) that were working on completing their CWPPs and created a focus group and a steering committee to accomplish these critical plans. To support public education and involvement,

IEFSA created the web site www.fireinformation.com as well as participated in countless safety fairs and fire wise awareness activities. They also conducted a Public Education Media Exchange where all FSC and Agencies got together to share educational modalities and create common thought and educational threads. They have reached out to thousands of mountain residents in preparing them for wildfires.

7.1.2.2.2 Mountain Area Safety Taskforce (MAST)

MAST was formed to mitigate the region wide risk of a catastrophic wildfire due to dead and dying trees in the mountain communities. The mission of the MAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for the protection of property owners, residents, and property subject to the risk of catastrophic wildfire that could occur in San Bernardino County with an initial emphasis on the threat resulting from the Old and Grand Prix fires in 2003. MAST priorities are to continue reducing fire hazards through fuel reduction programs and hazard abatement though enforcement of county ordinances.

The Mountain Area Safety Taskforce (MAST) Operations Section meets monthly. MAST Operations Section determines project priorities based on the benefit cost analysis of the projects and the effect of the project on the overall goals of the MAST organization.

The MAST Unified Command identified the following objectives as their focus and direction:

- Provide for Community Safety.
- Develop Coordinated Public Information Dissemination Between Cities, County, Special Districts, State, Federal, and Non-Profit Agencies.
- Develop Immediate, Mid-range and Long-range Coordinated Agency Plans.
- Identify and Secure Potential Funding Resources to Provide Protective Measures.
- Document Task Force Activities Including Mission, Goals and Objectives, Policies, Procedures, and Outcomes. Prior to any type of flood threat, the following precautionary measures may be taken by MAST members to reduce the impact of impending fires:
- Review mutual aid agreements
- Define evacuation areas and trigger points
- Review the use of alert and warning systems
- Provide information to the public of fire prone areas and protective measures in progress or planned for those areas
- Educate public on emergency self-help and preparedness
- Develop and maintain emergency notification procedures and checklists

MAST is the central point of coordination for all projects related to the reduction of the potential for catastrophic wildfires. There are numerous participants and all levels of government. MAST partners collaborate to provide multi-agency technical support to ensure project success. Economic impacts are considered and the result has been significant increase in economic activity through thoughtful application of grant funding. MAST has been so successful in the environmental management of projects that all of the local environmental groups including national affiliates are now supporters of MAST fuels projects.

The MAST group includes:

- San Bernardino County Board of Supervisors
- County Administrative Office
- County Public Works-Flood Control/Transportation/Solid Waste

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- County Fire Protection District
- County Fire Protection District/Office of Emergency Services (OES)
- County Sheriff's Department
- Southern California Edison
- Bear Valley Electric
- Arrowbear Lake Fire Department
- Big Bear City Fire Protection District
- City of Big Bear Lake Fire Department
- Crest Forest Fire Protection District
- Running Springs Fire Department
- USFS
- San Bernardino National Forest Association
- Forest Care
- Cal Fire
- Caltrans
- California Highway Patrol
- Inland Empire Fire Safe Alliance
- Angelus Oaks Fire Safe Council
- Arrowhead Communities Fire Safe Council
- Bear Valley Fire Safe Council
- Lytle Creek Fire Safe Council
- Mill Creek Fire Safe Council
- Mountain Rim Fire Safe Council
- Wrightwood Fire Safe Council

Since its beginnings, MAST has been the Unified Command that has successfully implemented and completed numerous programs leading to safer communities, a more educated public and an improved environment.

MAST provides an extensive Fuels Reduction Program. The Fuels Reduction Program began with removal of dead hazardous trees from areas threatening electrical transmission lines, evacuation routes, and structures within the San Bernardino Mountains. Dead and dying trees pose an extreme fire danger, and MAST members began removing these trees under state and federal grants, including a $70 million grant from the USDA Natural Resources Conservation Service. At the height of the program, Southern California Edison contractors were taking out 650 trees a day. As the program developed, additional hazards were identified, such as green fuel load density and wood shake roofs on structures within the San Bernardino Mountains

The MAST mission has expanded to include reducing green fuel by thinning live trees in densely wooded areas. Property owners also are being urged to thin the live trees and vegetation on their property to gain an upper hand on the bark beetle infestation and reduce the risk of catastrophic wildfires like the Grand Prix and Old fires in 2003.

Other MAST Achievements include:

- Increasing awareness of the drought-related bark beetle emergency and the threat of catastrophic wildfires
- Distributing fire safety and prevention information to the public
- Developing evacuation plans and distributing emergency planning information to the public
- Developing commercial use or disposal options for waste wood products.

The Mountain Area Safety Taskforce (MAST) Operations Section meets monthly. MAST Operations Section determines project priorities based on the benefit cost analysis of the projects and the effect of the project on the overall goals of the MAST organization.

Goals can change as detailed Benefit Cost Analysis is conducted and CEQA/NEPA reviews are completed.

7.1.2.2.3 Fire Safety Overlay District Mitigation

A General Plan Amendment to the Safety Element of the County of San Bernardino 2007 General Plan updated the Fire Safety Overlay District effective March 11, 2010. The Safety Element includes several hazard overlays that are included in the General Plan mapping system to inform the public of potential hazards to development of property within certain areas of the County and to enable the County to mitigate the risks presented to property owners by these hazards, by requiring fire resistant building construction methods. The overlays include potential fire hazards within the mountain regions as well as the valley and desert "interface". Over the past twenty years, certain federal and state agencies have been in the process of digitizing much of this hazard data. The digitization of this data has allowed for greater accuracy as well as more timely updates. In recognition of the new data from various federal and state agencies, the County updated the Fire Safety Overlay District contained within the Safety Element of the General Plan. The Fire Safety Overlay District is amended by modifying four General Plan Quad Maps to incorporate updated fire safety mapping published by Cal Fire for the Valley area.

As new information is received, the overlay maps are updated to reflect changes. These updates are made by the Land Use Services Department in collaboration with County Fire Protection District. More areas have been added through annexation and contract for services and so there has been large growth and the overlay will be updated. The future 2018 CountyWide Plan will replace the General Plan, and will contain more update maps and regulations that will allow development to occur but ensure safety and sustainability within the Fire Safety Overlay District.

7.1.2.2.4 Public Education Programs

The County through MAST conducted a comprehensive mountain-wide multi-modality Public Outreach Program from 2006 to 2008. It can be found at www.CalMAST.org. The program in both English and Spanish created and presented multiple public educational meetings, newsletters,

brochures, calendars, and posters. Because of the large number of visitors to the forest, MAST also created Emergency Information Visitors brochure and glove box sized Emergency Response Evacuation maps for the mountain communities. The program won national awards for advertising and public relations. Other jurisdictions initiated their own public education activities but brought them back through MAST so that the entire group could receive the benefit. The City of Big Bear Lake Fire Department was the most prolific in developing innovative and creative educational programs. They developed the Thin-Is-In website at (www.thinisin.org) that is an excellent site for citizens and agencies as well. Since the Big Bear Valley is served by an excellent radio station KBHR (k-bear) they have posted numerous public safety messages. Also during the Butler, Butler II and Slide Fires, KBHR provided constant updates to the community regarding the fire.

7.1.2.2.5 County Fire Hazard Abatement

Land Use Services Department, Environmental Health Division is responsible for Fire Hazard Abatement (FHA). Fire Hazard Abatement works to reduce the potential for an individual's property to be the source of fire and structural ignitability. Failing to maintain private property in a fire safe condition is seen as a fire threat and is considered a threat to neighbor's property rights. To obtain compliance, FHA issues notices of violation to properties that have dry vegetation and flammable green vegetation. If the property owner doesn't comply with the notice, FHA then obtains a warrant to go onto the property and abate the fire hazard.

The Fire Hazard Abatement portion of the County Code was completely rewritten and redesigned around real flammable fuels. The most significant change was to include certain types of green fuels as flammable vegetation.

Following in the City of Big Bear Lake's path, the County adopted the new code in the fall of 2008. In January of 2010 the County amended the Hazard Overlay maps.

The Fire Hazard Abatement Division of the Land Use Services Department conducts annual inspections of all parcels of land in mountain regions for the purpose of identifying exterior fire hazards. Biannual inspections are completed in valley and desert serviced areas. The targeted hazards include high energy release shrubs, dead and hazardous trees, flammable vegetation, weeds, grasses and combustible rubbish. The Division completes more than 430,000 inspections, issues more than 45,000 Notices to Abate Fire Hazards, issues over 4,000 citations for non-compliance, and abates the fire hazards on more than 2,000 parcels annually. Within the last 5 years, the Fire Hazard Abatement Division has received even more financial resources that enable them to abate all properties declared a fire hazard.

7.1.2.2.6 Countywide Fuels Management Program

In May of 2005 the San Bernardino County Fire Protection District and the San Bernardino County Flood Control District formed a partnership to implement the Hazardous Tree Removal Program, later the Fuels Management Program. In this endeavor the Flood Control District formed the Hazardous Tree Removal Operations Division which was tasked with developing, bidding and administering Tree Removal and Fuel Reduction Contracts funded by various grants. Contracts originally focused on removing dead, dying, and diseased trees caused by the drought conditions and the bark beetle infestation. The program has evolved to include fuel modification projects which remove hazardous vegetative fuels through the thinning of live vegetation. In addition the location of the fuel reduction projects are moving beyond the limits of the San Bernardino Mountains and into the interface between the Mountain foothills and the high desert.

The following are the types of programs/projects included in the Fuels Management Program:

- Emergency Tree Removal Projects consist of the removal of a tree (or trees) that poses an immediate threat to safety, a structure, or the public right-of-way.
- Block Projects are dead dying diseased tree removal projects on multiple parcels which are located in close proximity to one another.
- Large Urban Parcel Projects are dead dying diseased tree removal projects on a single or multiple large parcels.
- Fuel Modification Projects focus on the removal of hazardous fire fuels in the wildland/urban interface. The fuels removed in these projects are both live and dead vegetation. The goal of these projects is to reduce a future forest fire's intensity as well as the removal of ladder fuels which carry the fire from the forest floor to the forest canopy and result in a crownfire.

In addition to the Hazardous Tree Removal Operations Division, the San Bernardino County Fire Fuels Management Crews are also funded by the same grant sources. The primary focus of the crews is to create and maintain fuel modification projects in the vicinity of communities at risk and construct fuel breaks. In addition the crews assist the public with curb side chipping programs throughout local partner jurisdictions.

7.1.2.2.7 Fireworks Interdiction

The unlawful transport of dangerous fireworks continues to be enforced by several local and state fire and law enforcement agencies, The program continues ensures that thousands of pounds of fireworks per year are seized and properly disposed of, preventing fires, fire injuries and fire deaths.

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7.1.2.2.8 Programs Listed in Fire District Annex

Table 7-1: Wildfire Mitigation Implementation Methods

Mitigation type	Description
PPRO	SCE removes dead trees near power lines to reduce fire hazards. For more information, see Annex A Section A.6 Mitigation Project Prioritization and Implementation.
ES	Mountain Mutual Aid is an operational group of emergency responders.
PRV	The Alliance was created to act as a forum for all Fire Safe Councils in San Bernardino County. For more information, see Annex A Section A.6 Mitigation Project Prioritization and Implementation.
PRV	Fire Hazard Abatement works to reduce the potential for an individual's property to be the source of fire and structural ignitability. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
PE&A	Cal Fire provides programs to increase fire safety in high fire hazard severity zones. For more information, see Annex A Section A.6 Mitigation Project Prioritization and Implementation.
PRV, PPRO	The Contractor Certification program trains and certifies landscape contractors to provide a qualified workforce to conduct fuels reduction activities on individual properties. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .
PRV, PPRO	CWPPs are designed to provide a means for a community to have input into and actively participate in the planning, strategy, goals, and objectives of creating a fire safe community. For more information, see Annex A Section A.6 Fire Protection District Mitigation Project .

7.1.2.3 Earthquake / Geologic

A General Plan Amendment to the Safety Element of the County of San Bernardino 2007 General Plan updated the Geologic Hazard Overlay Maps which became effective on March 11, 2010. The Safety Element includes several layers of hazard overlays that are included in the General Plan mapping system to inform the public of potential hazards to development of property within certain areas of the County and to enable the County to mitigate the risks presented to property owners by these hazards. These overlays include potential geologic hazards. Over the past twenty years, certain federal and state agencies have been in the process of digitizing much of this hazard data. The digitization of this data has allowed for greater accuracy as well as more timely updates. In recognition of the new data from various federal and state agencies, the County updated the geologic hazard overlay maps, specifically the Generalized Liquefaction

Susceptibility layer and the Generalized Landslide Susceptibility layer, contained within the Safety Element of the General Plan.

The Generalized Liquefaction Susceptibility layer was amended to modify four General Plan Quad Maps to incorporate new liquefaction data in the Big Bear Lake area designated by the County Geologist for the Big Bear Lake Valley. This information was then incorporated into the County-designated Geologic Hazard Overlay District.

The Generalized Landslide Susceptibility layer was amended by modifying 17 General Plan Quad Maps and one regional Quad Map, to incorporate updated existing landslide data published by the U. S. Geological Survey for the Mountain area. The County Geologist updated the landslide inventory within the Geologic Hazard Overlay District by incorporating new geologic mapping by the U.S. Geological Survey.

The following is a list of the updated General Plan Geologic Hazard Overlay Maps effective on March 11, 2010:

Table 7-2: General Plan Geologic Hazard Overlay Maps

Map #	Quad Name
FH08C	Fifteen Mile Valley
FH11C	Mt. San Antonio
FH12C	Telegraph Peak
FH13C	Cajon
FH14C	Silverwood Lake
FH15C	Lake Arrowhead
FH16C	Butler Peak
FH19C	Mt. Baldy
FH20C	Cucamonga Peak
FH21C	Devore
FH22C	San Bernardino North.
FH24C	Keller Peak
FH27C	Ontario
FH30C	San Bernardino South
FH31C	Redlands
FH32C	Yucaipa
FI09C	Fawnskin
FI10C	Big Bear City
FI17C	Big Bear Lake
FI18C	Moonridge
EH/FH C	SW Portion of County
FH23C	**Harrison Mtn.**

7.1.2.4 Flood

7.1.2.4.1 Existing Drainage Studies

Drainage studies including review of upstream properties, site drainage area, potential upstream development, and site-specific development will help to mitigate damage from future storm events. San Bernardino County owns landfill sites, transfer stations and closed disposal sites where combined site property totals several hundred acres. Landfills and disposal site properties include acreage that has been constructed to design grades and may include improved drainage systems. Also, within most landfill and disposal site properties there are many acres of property that remain in its natural state including native vegetation and natural grades. During severe weather events, both engineered areas and undisturbed areas are subject to erosion from storm run-off. The erosion can range from minor to severe depending on the storm event and amount of precipitation. Most sites where engineered drainage systems are in place hold up well experiencing only minor erosion and debris flow. However, during major storm events, runoff from native and unimproved areas carrying solids and debris flow may compromise downstream drainage systems and overwhelm system facilities. Much of the damage to landfill and disposal sites during the December 2010 Winter Storm event was caused by erosion with sediment carried from undeveloped/undisturbed areas or where no improved drainage system is in place.

Other events that may cause damage to property and structures include earthquakes, wildfires, high winds, extreme freezes, and lightning storms.

- Earthquakes have the potential of causing damage to site roadways, structures, and systems including concrete drainage systems, Landfill Gas systems (LFG) and Leachate Collection Recovery Systems (LCRS). With earthquakes, there is always the potential of slope failure and slides on the landfill surface. Damage to any of these facilities has the potential to result in an inability to temporarily service the community.
- High Winds can cause damage to temporary drainage structures, fencing, and metal structures. During past high wind events, Transfer Stations have experienced roof panels being torn from the beams. Landfill sites with exposed geo-synthetic liners may experience damage if the winds lift and tear the liners.
- In January 2007, the County experienced a loss of over $21,000 in damage when water pipes at three separate Transfer Stations froze, then burst, causing damage to offices and electrical equipment.

- Lightning storms have the potential to damage electrical components in scale houses, in-ground scales, LFG, and LCRS.

7.1.2.4.2 NFIP Program and County General Plan Policies

Because the County has entered into an agreement to participate in the National Flood Insurance Program (NFIP) which provides flood insurance within designated floodplains, the following goals, policies and programs shall apply:

As stated in the San Bernardino County General Plan Safety Element:

GOAL S 5
The County will provide adequate flood protection to minimize hazards and structural damage.

Policy S 5.1: Participate in the National Flood Insurance Program (NFIP), which provides flood insurance within designated floodplains.

Programs

1) Designate Floodway and Floodplain areas, as identified by the Federal Emergency Management Agency (FEMA) on flood insurance rate maps and flood boundary maps, as Floodway (FW) on the Land Use Maps and Floodplain Overlays on the Hazards Overlay Maps.

2) Designated floodway areas will be preserved for non-structural uses through restrictions of the FW Land Use Zoning District

3) All new development, including filling, grading, and construction, proposed within designated floodplains, will require submission of a written assessment prepared by a qualified hydrologist or engineer, in accordance with the latest "San Bernardino County Hydrology Manual" and the various detention basin policies (see Existing Policy FL-11), to determine whether the development will significantly increase flood hazard and to show that all new structures will be adequately protected. Development will be conditioned on receiving approval of this assessment by the San Bernardino County Surveyor Division of the Public Works Department. All new construction in a Floodplain Overlay area will be required to be flood-proofed, located, and designed to allow unrestricted flow of floodwaters.

4) The Land Use Compatibility Chart for 100-Year Flood Plains Table 5-1 will apply to County reviews of all discretionary and ministerial actions in County designated floodplains.

5) Lands within floodplain areas may be developed with non-critical and non-essential uses if mitigation measures are incorporated to ensure that the proposed development will not be hazardous, increase flood depths or velocities downstream, or degrade water quality, especially uses such as parks, trails, and open space.

6) Provide known flood hazard information with every discretionary or ministerial application.

7) When no mapped data exist, existing topographical, watershed, and drainage course data will be evaluated for a determination of potential flood hazard for every discretionary and ministerial action.

Policy S 5.2: Update data and maps with newly identified flood hazard areas in the County, as new information becomes available.

Programs

1) As new overflow studies and mapping are completed and approved by either the County's Land Development Engineer or the San Bernardino County Flood Control District, they will supplement the FEMA mapping and will be incorporated into Flood Hazard Overlay mapping.

2) Initiate and finance programs for the continuous evaluation and designation of floodway, floodplain, and drainage areas.

3) Timely application for FEMA mapping changes will be initiated to reflect any additions to or alterations in identified Floodways or Floodplains by the County Floodplain Management Administrator.

7.1.2.5 Drought

7.1.2.5.1 Water Efficient Landscape Ordinance

Over the years, the State of California has been promoting water conservation for all new development within the State. In a drought-prone California, where approximately 60 percent of all residential water is used in landscape applications, California lawmakers have adopted such legislation as Assembly Bill (AB) 325 (1990), AB 2717 (2004), and AB 1881 (2006) that outline, and in some instances mandate, the practice of water conservation in landscape applications. As part of AB 325, the Department of Water Resources (DWR) was charged to assemble a task force of stakeholders representing the landscape, water, and building industries as well as cities, counties, and other agencies that would help DWR prepare and promote the State's first Model Water Efficient Landscape Ordinance (MWELO).

While AB 325 did not require cities, counties, and other agencies within the State to comply with the first adopted MWELO, it did encourage local agencies to implement water conservation techniques into their local ordinances and codes. The County adopted Administrative Guidelines that were amended several times and ultimately given the status of "regulation" when they were incorporated into the Development Code (Chapter 83.10) during the 2007 General Plan Update process.

In 2006, State lawmakers adopted AB 1881, which gave guidelines and timelines for revision of the State's MWELO and mandated that every city, county, or other agency within the State of California adopt the State's revised MWELO, or be in compliance with it through their own ordinance, by January 2010. Local agencies are required to report their final action, along with findings of ordinance effectiveness, to DWR by January 2011. While this process was underway, Senate Bill X7-7 was enacted (2009). This bill requires the State of California to achieve a 20 percent reduction in urban per capita water use by December 31, 2020; additionally, it requires the State to make incremental progress towards this goal by reducing per capita water use by at least 10 percent by December 31, 2015. These requirements were incorporated into the MWELO and, in February 2008, DWR made a draft of the State's revised MWELO available to all cities, counties, and other agencies within the State. The final version of the revised MWELO was released in September 2009.

Upon review of the final version of the State's MWELO and the provisions of AB 1881, staff determined the County would need to revise Development Code Chapter 83.10 which sets forth landscaping and irrigation standards within the unincorporated areas of the County. This would in part, become a mitigation measure to assist with any drought hazard the County may encounter. In the meanwhile, the County began enforcing the State's revised MWELO in January 2010, as required by law.
Once the proposed changes to the Development Code have been adopted by the Board of Supervisors, staff will notify and forward all required information regarding the adoption and effectiveness of the County's Water Efficient Landscaping Ordinance to the State DWR as required by January 2011.

The proposed Development Code Amendment will revise the landscaping standards to reflect the changes governed by and to be as effective as, the State of California's revised Model Water Efficient Landscape Ordinance, while continuing to recognize the unique character of the regions that make up the County of San Bernardino.
The ***proposed revisions*** will require the applicant/developer to:

- Design and install systems that meet more effective and efficient water conservation standards in all landscaped areas on a project site, including residential;
- Comply with the revised standards for all new and rehabilitated landscape areas regardless of square footage for projects that are not homeowner installed and for all new and rehabilitated landscape areas, that are homeowner installed, that are 5,000 square feet or greater. This includes the following:
  - Submit a comprehensive Landscape Documentation Package, which has been prepared by a landscape architect licensed to work in the State of California or other licensed professional authorized to design and prepare Landscape Plans within the State of California;

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  - Submit estimated annual water budget calculations for compliance with water conservation practices and the efficient use of water for each new or rehabilitated landscape. Calculations for the annual water budget for a project/site specific landscape shall use the formulas for the Maximum Applied Water Allowance (MAWA) and the Estimated Annual Water Use (EAWU) outlined in the ordinance;
  - Submit a Landscape Certificate of Compliance prepared by the landscape professional who prepared the Landscape Documentation Package conveying the project's compliance with the requirements of Development Code prior to final inspection;
  - Planting material within landscaped areas shall be chosen based on the information found in the Water Use Classification of Landscape Species, third edition (WUCOLS III) and the climate zone for the region based on information found in Sunset Western Garden Book;
  - Irrigation systems shall be equipped with a "smart" irrigation controller, which automatically adjusts the frequency and/or duration of irrigation events in response to changing environmental conditions.
  - Submit a rough and/or precise grading plan on all projects proposing more than 50 cubic yards of grading;
  - Submit a soil management report, that includes recommendations for soil modification and/or amendment;
  - Submit a project-specific regular maintenance schedule and two project-specific irrigation schedules for those projects subject to the ordinance.

Other provisions of the new regulations include standards for non-potable/recycled water use where it is available and new enforcement standards for compliance with water conservation practices.

Since the State law became effective on January 1, 2010, the Landscape Plan Review Fee was adjusted (Ordinance #4412, June 22, 2010) to reflect the increase in staff time necessary to meet these additional requirements.

The Planning Commission considered this ordinance on October 21, 2010. There was no one at the hearing who wished to address the Commission on this issue. The Commission recommended that the Board adopt the ordinance as presented on a vote of four commissioners in favor and one absent.

The proposed amendment is exempt from the California Environmental Quality Act (CEQA) in accordance with Section 15061(b) (3) of the CEQA Guidelines as the proposed change does not have the potential to cause a significant effect on the environment.

The proposed Ordinance is to be presented to the County of San Bernardino Board of Supervisors for adoption in the first quarter of 2011. Utilizing either the State Water Efficient Landscape Ordinance, which is in effect currently, or the County's specific Water Efficient Landscape Ordinance; the drought mitigation for this hazard is positive.

7.1.2.5.2 San Bernardino County Desert Area Groundwater Inventory and Atlas

As of January 2011, the California Department of Water Resources anticipates releasing the Final Local Groundwater Assistance (LGA) Guidelines later this calendar year. In December 2009, the draft LGA Guidelines and Proposal Solicitation Package (PSP) was available for public comment. The comment period ended on January 12, 2010.

Local public agencies with authority to manage groundwater resources are encouraged to apply Examples of projects that may be considered are: Groundwater data collection, modeling, monitoring and management studies; monitoring programs and installation of equipment; basin management; development of information systems; and other groundwater related work.

The County of San Bernardino Board of Supervisors may consider an action directing staff to apply for the grant when it becomes available for a Desert Area Groundwater Inventory (DGI) and Atlas. The DGI falls within the scope of the Local Groundwater Assistance (LGA) Program, which is funded with Prop 84 IRWM funds anticipated to be available for fiscal year 2010-2011. Grants are limited to $250,000 per recipient, and total funding is $4.7 million.

California Department of Water Resources will give priority to local agencies with adopted groundwater management plans (SB1938 compliant), and which demonstrate collaboration with other local agencies in managing groundwater basins. County's groundwater management ordinance satisfies this requirement.

By having a Desert Area Groundwater Inventory and Atlas, this would enable the County to have a database providing locational and water depth information for specific regions of the County that currently do not have a groundwater inventory. This Inventory and Atlas would provide information applicable for flood mitigation or ground water availability for usage during severe drought. The location and water depth in the inventory are important for an earthquake hazard analysis, if liquefaction potential exists.

Since there is not a Desert Area Groundwater Inventory currently, and if liquefaction is a concern in a specific region of the County, then the water depth data would estimate the vertical distance from the land surface to the top of the groundwater aquifer (i.e., the groundwater-saturated layer.)

Table 7-3: Tentative Schedule for the LGA Grant

Date	Event	
TBD	Release Final LGA Guidelines and PSP	Dependent upon Grant approval
TBD	Proposal Applications Due	Dependent upon Grant approval
TBD	Public Release of Draft Award Recommendations	Dependent upon Grant approval

Fund Source: Proposition 84

7.1.3 Continued Public Involvement

As indicated earlier, the County will continue to engage the general public and seek input on the mitigation and preparedness planning process. In addition to the San Bernardino County Board of Supervisor meetings, the actions include:

- Municipal Advisory Communities throughout the unincorporated County area,
- Flood Zone Advisor Committees,
- Special District Advisory Committees,
- Public hearings for County General Plan updates held four times a year,
- MAST and FAST meetings,
- Fire Safe Council meetings,
- Community Emergency Response Team meetings, and
- Public events where educational efforts are undertaken in the unincorporated areas.

Additionally, the public is kept involved through annual programs such as the Great Shakeout held annually in October, SKY Warn events sponsored by the National Weather Service, and other monthly safety programs. The County will continue to use several different methods to reach out to the public: mailers, cable TV, website, social networks, e-mail, posting in public libraries, and fairs.

Section 8. Works Cited

USGS. (2009).

USGS. (2016, April 7). *USGS Earthquake Hazards Program*. Retrieved from https://earthquake.usgs.gov/learn/glossary/?term=earthquake

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Appendix A. Outreach Documentation

A.1 Ready SB County Preparedness App Message

An App message was sent out to over 15,000 persons with the App and it is attached to the San Bernardino County Fire Website. .Ready SB County Preparedness Mobile App can be used on either an Android or iPhone. This app provides multiple resources for our residents that will assist them in preparing for a disaster and enhancing the recovery process. Protect yourself and your loved ones before, during and after a disaster.

Get the Latest News from SBCounty.gov, CalTrans, National Weather Service, and San Bernardino County Fire Office of Emergency Services. This app will provide you with an emergency supply kit list, grocery list and checklists tailored to your needs. You can access and update your plan as needed. Learn all you need to plan for and respond to natural disasters, terrorism and pandemic flu in San Bernardino County

A.2. San Bernardino County Fire Public Input Requested

San Bernardino County Fire Department/Office of Emergency Services (OES) is coordinating the update of the San Bernardino County Unincorporated Area Multi Hazard Mitigation Plan. Hazard Mitigation Plans are updated every five years and must be approved by Cal OES and FEMA. The purpose of the public input and comment is to show progress being made and elimination of hazards since the last plan. Your input is appreciated by reviewing and commenting on the current plan (link below) by calling OES at 909-356-3998 – ask for David Davis. Comment period **closed at 5:00 p.m., Wednesday, November 3, 2016.**
http://www.sbcfire.org/oes/Documents.aspx

A.3. MJHMP PowerPoint Presentation

Annex A. Fire Protection District

A.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Fire Protection District, a previously participating jurisdiction to the 2011 San Bernardino County Hazard Mitigation Plan Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the base plan document. As such, all sections of the base plan, including the planning process and other procedural requirements apply to and were met by the Fire Protection District. This Annex provides additional information specific to the Fire Protection District, with a focus on providing additional details on mitigation actions and projects.

The Board of Supervisors acts as the Board of Directors for the County Flood Control District, and as part of their responsibilities as an elected member of the County of San Bernardino Board of Supervisors.

A.2 Fire District Profile

The San Bernardino County Fire Department is an all-risk/full-service fire department committed to providing the highest level of service in the most efficient and cost effective manner to the citizens and communities that we serve. At 20,160 square miles, San Bernardino County is the largest county in the continental United States. Our jurisdiction encompasses 19,278 square miles of extremely diverse environments that stretch from the Los Angeles County line on the west, to the Colorado River on the east, to the Nevada State line and Kern and Inyo counties on the north. We provide services to more than 60 communities/cities and all unincorporated areas of the county.

Mission Statement
Community-based all-risk emergency services organization dedicated to the health and well-being of the citizens of San Bernardino County through a balance of regionalized services delivery and accountability to the local community supported by centralized management and services.

Service Motto
Duty, Honor, Community.

Standard of Commitment
"Where Courage, Integrity, and Service Meet."

Vision Statement
Committed to Providing Premier Fire Services.

Hazard Mitigation Planning Group:
Michael Antonucci – Emergency Services Manager

A.3 Planning Process

As described above, the County Fire District followed the planning process detailed in Section 3 of the base plan. In addition to providing representation on the San Bernardino County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table A-1. Additional details on plan participation and District representatives are included in Appendix A.

Table A-1: Fire District Planning Team

Name	Title / Role
Michael Antonucci	Emergency Services Manager
Cindy Serrano	Assistant Emergency Services Manager
David Davis	Emergency Services Officer
Miles Wagner	Emergency Services Officer
Cheryl Nagy	Emergency Services Officer
Carrie Cruz	Emergency Services Officer
Elli Maldonado	Office Assistant
Mary Barnett	Technical Writer / Plan Update and Edits
Michael Horton	Fire Marshal

Weekly meetings held every Tuesday since July 2016 with conference calls to the consultant group and other stakeholders plus all meetings listed in this document.

A.4 Hazard Identification and Prioritization

The County Fire Protection District Planning Team participated in the County hazard identification and prioritization process described in the base plan. The Fire District Planning Team assisted to summarize the extent, probability of future occurrences, potential magnitude/severity, and significance specific to the Fire District in the base plan.

The Planning Team (all participating jurisdictions) determined that the County and its Special Districts should focus over the next five (5) years on hazards that fell within the HIGH and MEDIUM “Probability” and “Impact” categories. While all the hazards present a potential problem in the County, the Planning Team felt that if they were able to reduce or eliminate the risk from “fire related” hazards, it would provide a greater service to the people within the jurisdiction. Table 4-3 illustrates how the final prioritization of the hazard; the “Green” colored box represents the highest priority hazards; and the “White” colored boxes represent lower (second and third tier) priority hazards.

Table A-2: Fire District Hazard Priority Matrix

		Impact		
		High	Medium	Low
Probability	High	**Wildfire** Flood Earthquake/ Geologic Hazards	Drought	
	Medium	Terrorism	Climate Change (Extreme Heat and other)	Hail Infestation
	Low		Dam Inundation	Tornado High Winds Winter Storm Lightning Extreme Cold

A.5 Coordination with existing Fire District Mechanisms

Coordination with other District planning efforts is paramount to the successful implementation of this plan. This Section provides information on how the Fire Protection District integrated the previously-approved 2011 Plan into existing planning mechanisms and programs.

While not designed or proposed specifically as mitigation projects, the County Fire Protection District undertakes many activities that incorporate mitigation elements and integrate risk reduction as an additional benefit. The following describes a number of these projects which exemplify how the County integrates hazard mitigation into county-wide programs.

A.5.1 Critical Route Planning Committee

San Bernardino County Fire Protection District Office of Emergency Services has a “Critical Route Planning Committee” that is developing countywide routes and alternate routes for use in evacuating residents from a disaster area while simultaneously allowing first responders’ access into a disaster area without congestion and gridlock. The Committee members are from County departments, City and Town representatives, and key state and federal agencies. The Critical Route Planning effort is being coordinated with surrounding counties to prevent congestion and gridlock at the County boundaries.

A.5.2 Public Alert and Education Programs

A.5.2.1 Wireless Emergency Alerts (WEA)

During threatening emergencies in your area, authorized government agencies can send Wireless emergency Alerts to your mobile device. Messages regarding extreme weather, life threatening emergencies, AMBER alerts, and Presidential Alerts during a national emergency are all sent through the WEA system

A.5.2.2 Emergency Alert System (EAS)

The Emergency Alert Systems: national public warning system that requires TV and radio broadcasters, cable television systems, wireless cable systems, satellite digital audio radio service providers, direct broadcast satellite service providers and wireline video service providers to offer to the President the communications capability to address the American public during a national emergency. The FCC works with the Federal Emergency Management Agency and the National Oceanic and Atmospheric
Administration's National Weather Service to implement the EAS at the national level. Only the President determines when the EAS will be activated at the national level, and has delegated the administration of this function to FEMA.
Accordingly, FEMA activates the national EAS, and directs national EAS tests and exercises. The NWS uses the EAS on a local and statewide basis to provide the public with alerts and warnings regarding dangerous weather and other emergency conditions.

The EAS allows participating providers to send and receive emergency information quickly and automatically, even if their facilities are unattended. If one link in the system for spreading emergency alert information is broken, members of the public have multiple alternate sources of warning. EAS equipment also provides a method for automatic interruption of regular programming, and in certain instances is able to relay emergency messages in languages other than English.

A.5.2.3 Integrated Public Alert & Warning System (IPAWS)

During an emergency, alert and warning officials need to provide the public with lite-saving Information quickly. The Integrated Public Alert and Warning System (IPAWS) is a modernization and integration of the nation's alert and warning infrastructure and will save time when time matters most, protecting life and property. Federal, State, territorial, tribal and local alerting authorities can use IPAWS and integrate local systems that use Common Alerting Protocol (CAP) standards with the IPAWS infrastructure. IPAWS provides public safety officials with an effective way to alert and warn the public about serious emergencies using the Emergency Alert System {EAS}, Wireless Emergency Alerts (WEA), the National Oceanic and Atmospheric Administration (NOAA) Weather Radio and other public alerting systems from a single interface.

A.5.2.4 Telephone Emergency Notification System (TENS) Implementation

Emergency service agencies like the Sheriff's Office have implemented TENS on numerous occasions to notify residents in specified areas to evacuate. Most recently it was used to evacuate hundreds of homes in the eastern portion of Yucaipa during the Pendleton Fire and in Wrightwood during the Sheep Fire when the entire community was ordered evacuated.

A.5.2.5 Emergency Communications Services (ECS)

In the last 10 year the ECS program has continually provided support to all major and minor incidents. The more recent events were the Pilot Fire and the Blue Cut Fire in 2016. ECS provides communications and logistical support to public safety and disaster preparedness events. They have also set up a training program for other County Departments that are not typical emergency responders but provided support in an emergency. ECS delivered and set up amateur radio equipment for Department of Public Works, Department of Public Health, Preschool Services Department, and Department of Behavioral Health and provided training for the employees.

A.5.2.6 Fire Safe Council/CERT Community Based AM Radio Transmitters

The Wrightwood Fire Safe Council and the Big Bear City CSD set up and operates a local AM radio transmitter. It has been brought into use during local incidents including a power outage where it is very useful. In power outages, the AM radio in a person's car still works. It was also used to provide preparatory information to the citizens of Wrightwood as the Station Fire was approaching the community from the west. It is also used extensively during the Wrightwood Fire Wise Awareness Days to keep citizens apprised of community events.

A.5.3 OES Volunteer Programs

The San Bernardino County Fire, Office of Emergency Services (County OES) is proud to provide residents of San Bernardino County with meaningful disaster-related volunteer opportunities. Recognizing that during disasters and other emergencies professional responders may be overwhelmed or need assistance County OES trains residents to integrate with and support professional responders during incidents. County OES currently does these through three volunteer programs; the Community Emergency Response Team (CERT), Emergency Communications Service (ECS) and California Disaster Corps programs. Please visit the links below to learn about the programs offered.

A.5.3.1 Community Emergency Response Team (CERT)

The Community Emergency Response Team (CERT) Program educates people about disaster preparedness and trains them in basic response skills. Following a catastrophic event CERT

Members can assist themselves, their families, and others in their neighborhood or workplace until professional responders arrive. Fourteen (14) CERT programs are in the communities of:

- Angelus Oaks
- Big Bear Valley
- Helendale
- Lucerne Valley
- Lytle Creek
- Mill Creek Canyon
- Morongo Basin
- Mountain
- Oak Hills
- Phelan/Pinon Hills
- Rosena Ranch
- San Antonio Heights
- Silver Valley
- Wrightwood CERT

San Bernardino County Fire Protection District Office of Emergency Services has sworn in over 1000 CERT participants as California Disaster Service Workers. These participants have gone on to receive a Sheriff's Department background check to become members of their community's CERT.

The program receives guidance and resources from Department of Homeland Security, FEMA, Citizen Corps, and California Volunteers. The program is administered locally by the San Bernardino County Fire Protection District Office of Emergency Services.

A.5.3.2 LISTOS

Listos, which means "ready" in Spanish, is a twelve-hour disaster preparedness course created specifically for the Spanish-speaking community and is delivered entirely in Spanish. The program is intended to be adaptable, flexible and culturally relevant. This means participants are encouraged to involve the entire family and accommodations are made for young children. San Bernardino County Fire, Office of Emergency Services currently partners with the Cities of Fontana and Rialto to bring Listos to their communities

A.5.3.3 California Disaster Corps

The Disaster Corps is a first-in-the-nation effort to professionalize, standardize and coordinate highly trained disaster volunteers statewide. This program initiative was built collaboratively in partnership with California Volunteers from the ground up through public-private partnerships and with a wide range of subject matter experts including representatives from all levels of government, local emergency managers, state agency volunteer coordinators, and leaders in non-governmental volunteer programs.

Disaster Corps programs reside only in San Bernardino, San Francisco and Riverside Counties. San Bernardino County Disaster Corps volunteers are those volunteers participating in the volunteer programs residing within the unincorporated communities of San Bernardino County and have demonstrated commitment to their volunteer program and strive to continue developing their skills and training to better support their program and their community.

Within San Bernardino County Disaster Corps volunteers are set aside from regular CERT (Community Emergency Response Team) and ECS (Emergency Communication Services) volunteers by having the ability to be deployed throughout other areas of San Bernardino County and the state. They have received specialized training in SEMS and NIMS, plus have completed many other ICS courses and First Aid and CPR training. In addition there are additional training opportunities not offered to the regular CERT and ECS volunteers.

A.5.3.4 **ECS Emergency Communications Service**

The Emergency Communications Service (ECS) is a volunteer group providing front-line communications, technical and logistical support to the San Bernardino County Fire Department and Office of Emergency Services. Their primary mission is to support County Fire, County Government and other local agencies in time of disaster. In addition, ECS has provided telecommunications and event support to other County departments including Public Health, Behavioral Health, Public Works, Pre-School Services, Sheriff's Search and Rescue and other County Departments.

ECS coordinates disaster communications between city and county agencies, provides a communication link to Cal OES and ensures backup communication channels are kept open in times of a major disaster.

In an average calendar year, ECS supports approximately two-dozen events and incidents throughout the County. These events range from parades and community events, to major public safety incidents including fires and floods. The 200 ECS volunteers donate an average of 9,100 hours per year to the County of San Bernardino.

ECS currently provides multiple HAM licensing classes to County Departments and the residents of San Bernardino County each year.

A.5.4 ROPE Plan (Responders Organized For Pass Emergencies)

ROPE Field Operations Guide (FOG) and Standard Operating Guide (SOG) for use by participating Federal, State, County, and Municipal agencies and industries for day-to-day incidents in the Cajon Pass, as well as for larger regional incidents requiring coordinated and unified multi agency response. The ROPE FOG contains; communications information, emergency contact information, critical infrastructure mapping and ICS planning tools.

A.5.5 Great ShakeOut County Drill in all Disciplines (held annually)

The San Bernardino County Operational Area will be participating in the annual The Great ShakeOut drill which will focus on the Southern California Regional Catastrophic Plan (SCRCP). This plan is based on a large scale magnitude earthquake scenario along the southern section of the San Andres Fault. The purpose for participation in the Great ShakeOut Exercise is to address the County's potential to respond to a catastrophic earthquake event based on the plan, and to better prepare for such an occurrence. The goal of the exercise will be to conduct an effective multiagency/multi-jurisdictional evaluation of the Regional Catastrophic Plan with our Operational Area response partners.

A.5.6 "Ready SB" Smart Phone App for Disaster Preparedness Program

The new mobile app, Ready SB, provides residents with multiple resources that will assist them in preparing for a disaster. Ready SB is now available as a free download from the Apple App Store and the Google Play Store it can immediately help residents prepare themselves for emergencies.

Ready SB features include: "My Plan", an individual emergency plan and/or a family or group plan. The person that downloads the application will receive county wide alerts and notifications of emergency situations in that person's area. There is a feature called "Share My Status" it is a place to update your status via text or email.

The app also includes information about areas that need to be evacuated, where to go, what routes are open and also what resources are available during that emergency.
The app features include: Evacuation Routes and Shelters, Need to Know, and has a Resources List.

A.5.7 Cal Fire

Cal Fire provides programs to increase fire safety in high fire hazard severity zones. It funds and staffs programs from public education activities to performing fuel modifications with inmate crews. One example is the active Re-Leaf program where mountain residents are educated about drought tolerant and fire resistive landscaping that is available and sustainable. Cal Fire is also the lead agency on reforestation after a wildfire to ensure the stability of the environment. Cal Fire Foresters are active participants in the MAST process helping educate citizens and leading forestry activities on private lands within the USFS boundary.

Numerous fuels projects have been completed by State inmate crews that do significant hand work in dense fuels adjacent to communities. Cal Fire has also led the way in countless re-forestation projects that ensure that new stands of the same trees will repopulate an area and that the original forest won't be overtaken by a different type of replacement forest.

A.5.8 Organized Group Volunteer Activities

Mountain communities are populated by several volunteer citizen groups that are capable of providing significant resources that are not provided by traditional governmental agency services.

Volunteer groups particularly “Mountain Hearts and Lives” (MHL) responded to numerous emergencies particularly of note the Grass Valley and Slide Fires. These groups have also spent significant time working to prepare citizens for disasters. MHL has coordinated CERT training as well as HAM radio operator training. Other activities can be found at www.heartsandlives.org. Other partners that assist in coordinated endeavors for disaster preparedness and disaster relief are Rim Family Services and the Rim Resource Community Network. Members of these and other groups work very closely with MAST, Mountain Mutual Aid and the American Red Cross.

A.6 Fire Protection District Mitigation Project Prioritizing

Cost effectiveness of each measure was a primary consideration when developing mitigation actions. Because mitigation is an investment to reduce future damages, it is important to select measures for which the reduced damages over the life of the measure are likely to be greater than the project cost. For structural projects, the level of cost effectiveness is primarily based on the likelihood of damages occurring in the future, the severity of the damages when they occur, and the level of effectiveness of the selected measure. While detailed analysis was not conducted during the mitigation action development process, these factors were of primary concern when selecting measures. For measures that do not result in a quantifiable reduction of damages, such as public education and outreach, the relationship of the probable future benefits and the cost of each measure was considered when developing the mitigation actions.

Based upon the Fire Districts capabilities, Table A-3: Mitigation Project Prioritization and Implementation shows primary actions selected for further implementation and development during the next planning cycle. Table A-3 provides details for each mitigation action with mitigation action descriptions, FEMA mitigation category, responsible party, and timeframe.

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A.7 Fire Protection District Mitigation Project Actions

Table A-3: Mitigation Project Prioritization and Implementation

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
ALL Hazard	**AH Action 1.1:** Valley Dispatch and Operations Center.	Update and maintain the operations of the facility and ensure cohesive working and response to any scale emergency and operations in a secure complex	ES	General Fund and HMP Grant	Fire Protection District/	1-3 Years	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
ALL Hazard	**AH Action 1.2:** Maintain Shelter Operations Compound (SHOC). This shelter concept provides a new one-stop shelter concept. The SHOC combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location.	After the 2003 Wildland Fires, the County and American Red Cross recognized the need to provide services beyond basic care and short-term sheltering, especially during large fires, floods, and earthquakes The Mass Care & Shelter Plan and Concept of Operations, outlines the framework of a new one-stop shelter concept, Shelter Operations Compound (SHOC). It combines a shelter, a Local Assistance Center (LAC) and a Non-LAC Unit in one easy location. Residents can access public information and referral services through the LAC, and then take a short walk to the Non-LAC Unit for communication, postal services, and other private organizations/business at little to no cost. The completion of the Plan in 2012 will help to sync local resources, encourage local self-sufficiency, foster partnership between public and private agencies, and serve as a reference document for the region. By June 2017, the program will have 32 trailers/caches equipped with mass care and shelter supplies, strategically placed throughout the County and ready for rapid deployment. It is expected to serve over 12,000 residents. In addition to enhancing the comfort levels of shelter residents, the program will produce standardized documents and protocols for procuring and maintaining Mass Care and Shelter trailers/caches. These plans and programs will help the County prepare for and mitigate damages from hazards. This is an update and expansion of the plan and done without more grant funds.	ES	To increase Mass Care and Shelter capability of the county, grants from 2008-2009 Homeland Security Grant Program (HSGP) and 2009 Riverside Regional Urban Area Security Initiative (UASI) funded the Mass Care and Shelter Trailer/Cache Program.	Fire Protection District/	1-5 Year	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
All-Hazard	**AH Action 2.1** Incorporate as appropriate requirements from the State of California's most recent land use regulations regarding the hazard mitigation planning process (Government Code 65302 and 8685.9).	Government Code 65302.6 requires the following elements to be included in the hazard mitigation plan: (1) An initial earthquake performance evaluation of public facilities that provide essential services, shelter, and critical governmental functions.	PRV, NRP	General Fund	Primary: Land Use Services Secondary: Fire Protection District/	1-3 years	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
		(2) An inventory of private facilities that are potentially hazardous, including, but not limited to, multiunit, soft story, concrete tilt-up, and concrete frame buildings. (3) A plan to reduce the potential risk from private and governmental facilities in the event of a disaster. Government Code 8685.9 requires that the state share shall not exceed 75 percent of total state eligible costs unless the local agency is located within a city, county, or city and county that has adopted a local hazard mitigation plan as part of the safety element of its general plan. In that situation, the Legislature may provide for a state share of local costs that exceeds 75 percent of total state eligible costs.					
Wildfire	**WF Action 1.1** Continue Mountain Area Safety Taskforce (MAST) funding to support mitigation activity.	MAST was formed to mitigate the region wide risk of a catastrophic wildfire due to dead and dying trees in the mountain communities. The mission of the MAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for the protection of property owners, residents, and property subject to the risk of catastrophic wildfire that could occur in San Bernardino County with an initial emphasis on the threat resulting from the Old and Grand Prix fires in 2003. MAST priorities are to continue reducing fire hazards through fuel reduction programs and hazard abatement though enforcement of county ordinances. The Mountain Area Safety Taskforce (MAST) Operations Section meets monthly. MAST Operations Section determines project priorities based on the benefit cost analysis of the projects and the effect of the project on the overall goals of the MAST organization. Goals can change as detailed Benefit Cost Analysis is conducted and CEQA/NEPA reviews are completed.	NRP, PPRO	Seeking additional funding through HMPG.	San Bernardino County Fire Protection District	On-Going	See Implementation plan on more information on MAST. See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .
Wildfire	**WF Action 2.1:** Update Mountain Mutual Aid Map Book to document updated information contained in 2016 HMP.	The Map Book portion of the Community Safety and Structure Protection Plan provides not only a street network of the area but more importantly it provides the locations of strategic and critical resources for fire fighters. These include but are not limited to safe zones, open areas, locations for refuge. They also identify areas within communities that have narrow and steep winding streets and or with limited ingress and egress. The document is handed out to all responding strike teams from out of the	ES	Seeking additional funding through HMPG.	San Bernardino County Fire Protection District	On-Going	See Fire Protection District Annex A. Section A.6 Fire Protection District Mitigation Project .

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
		area and has proved invaluable in directing and coordinating an effective fire-fighting response and reduces the potential for life loss and property damage.					
Wildfire	**WF Action 2.2** Update Community Structure Protection Plans as necessary.	This is an on-going action (from the 2011 MJHMP) with the goal to continue development of and continue the mission of mutual aid between first responders in the County mountain areas.	PPRO	HMP Grant Funding	Primary: San Bernardino County Fire Protection District Secondary: Land Use Services	On-Going	
Wildfire	**WF Action 3.1:** Implement identified community based fuels reduction projects.	The Fuels Reduction Program is designed to create community based fuel modification programs across the mountain communities. These projects are selected specifically to reduce the potential for catastrophic wildfires and the damage that they can do to the communities. Project design, contracting, and operations are managed by the County's Public Works Department with priorities set by local fire chiefs in monthly MAST Operations Meetings. This program is the oldest and most significant for reducing wildfire threat on a mountain wide basis.	PPRO	Current Funding: Seeking additional funding through HMPG.	Primary: San Bernardino Public Works Department Secondary: County Fire Protection District	On-Going	
Wildfire	**WF Action 3.2:** Develop fuels reduction "maintenance program" by obtaining participation from citizens and/or homeowners associations.	To survive a wildfire, property owners need to manage the land surrounding their homes and communities effectively. Removing fuels in the wildland fuel reduction zone beyond the defensible space can reduce the speed and intensity of an oncoming wildfire. But if these areas aren't regularly **maintained**, they lose their effectiveness. Plants grow back, and flammable vegetation needs to be routinely removed and disposed of properly. This guide provides tips on how to create and maintain defensible space and wildland fuels treatments around your property.	PPRO, PE&A	Seeking additional funding through HMPG	Primary: Public Works Secondary: Fire Protection District	On-Going	
Wildfire	**WF Action 4.1** Increase homeowner assistance services to mountain residents for fuel reduction.	This is an ongoing wildfire mitigation action (from the 2011 MJHMP) for the group Forest Care to achieve the goal of providing assistance to homeowners by expanding services to all communities in the Mountain areas of the County. Forest Care is a program dedicated to creating a healthier forest. This program provides foresters to assess individual properties for thinning the vegetation and then provides 75% of the funding to do so.	PPRO, PE&A	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 4.2** Continue working with Southern California Edison (SCE) to remove dead trees near power lines.	A significant number of fires across the State are caused by trees falling into power lines. When the forests in the mountain communities became infested with bark beetles the pine tree die off was unprecedented. Thousands of these dead trees were standing precariously close to power lines. Early in the Bark Beetle Emergency in 2004, Southern California Edison swiftly initiated a program to remove all trees that were dead, dying, and/or diseased that had the potential to fall into any SCE power lines. The role of Southern California Edison was critical to the success of MAST both operationally and financially. Edison still removes the most difficult trees, the most costly trees; and the ones that are most likely to be the source of ignition for a wild land fire. They are also removing the trees that are immediately threatening homes. They have removed 118,305 trees since the inception of the program in 2004. They also provided reimbursements to people that removed their own trees.	PRV, PPRO	As of July of 2010 Southern California Edison (SCE) has spent $179,758,978 to remove dead dying and diseased trees.	San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 5.1:** Inspect every residence in the mountain communities throughout the year to enforce the Fire Hazard Abatement code that addresses green fuels.	The Fire Hazard Abatement Program conducts surveys to identify fire hazards throughout the year. Fire hazards are identified and notices to abate the hazard(s) are mailed to property owners. Property owners are given 30 days to abate the violations. Failure to abate may result in citations, penalties, and/or fees for abatement by the County. The Fire Hazard Abatement Program responds to complaints year round in the unincorporated areas and contracting Cities and Fire Districts. The Division completes more than 430,000 inspections, issues more than 45,000 Notices to Abate Fire Hazards, issues over 4,000 citations for non-compliance, and abates the fire hazards on more than 2,000 parcels annually. Within the last 5 years, the Fire Hazard Abatement Division has received even more financial	PRV, PPRO, PE&A	Seeking additional funding through HMPG	Primary: Land Use Services Secondary: San Bernardino County Fire Protection District	On-Going	For more information on Contractor Certification, see Annex A Section A.6 Fire Protection District Mitigation Project .

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
		resources that enable them to abate all properties declared a fire hazard.					
Wildfire	**WF Action 5.2:** Continue to collaborate with Forest Care, Red, Cross and Cal Fire to overcome increased costs of enforcement.	This is an on-going action from the 2011 MJHMP with the goal of overcoming funding shortfalls for the County Fire Hazard Abatement Program.	PRV	HMP Grant Funding	San Bernardino County Fire Protection District	On-Going	
Wildfire	**WF Action 6.1** Train and Certify landscape contractors to comply with the Fire Hazard Abatement Code.	The City of Big Bear Lake created a program to train and certify landscape contractors to provide a qualified workforce to conduct fuels reduction activities on individual properties. The contractors are trained to comply with the new Fire Hazard Abatement Code that exists both in the City of Big Bear and the County unincorporated area. The City of Big Bear Lake Fire Department conducts the classes for landscapers and handy persons. This provides an incentive for the contractors and provides a level of certification that the homeowner can rely on when they are deciding to hire a landscape contractor to conduct fuels abatement around their home.	PRV, PPRO	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	On-Going
Wildfire	**WF Action 6.2:** Continue wildfire mitigation efforts under the Wood Shake Roof Replacement Program.	The County successfully passed an ordinance that requires the replacement of wood shake roofs by 2014. MAST has successfully mapped all of the wood shake roofs in the fire safety overlay and has created a strategy as to which roofs will be selected to participate in the FEMA funded project. This is an on-going project in cooperation with Big Bear Lake Fire Protection District in order to provide more funding for wood shake roof replacements by property owners.	PRV, PPRO, SP	Various Grant Funding from Edison, FEMA, Cal Fire	Primary: MAST Secondary: San Bernardino County fire Protection District	On-Going	
Wildfire	**WF Action 7.1:** Modify independent and unique CWPPs into a more common framework making them similar but leaving room to provide specific hazard characteristics and mitigation actions for each community.	Community Wildfire Protection Plans are designed to provide a means for a community, usually through the Fire Safe Council, to have input into and actively participate in the planning, strategy, goals, and objectives of creating a fire safe community.	PRV	Seeking additional funding through HMPG	San Bernardino County Fire Protection District	On-Going	On-Going For more information on CWPP see Annex A Section A.6 Fire Protection District Mitigation Project .

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Wildfire	**WF Action 8.1:** Construct Arrowbear Drive Realignment and Widening.	The Arrowbear community off State Highway 18 has limited access to State Highway 138. The existing bridge/spillway and road needs to be realigned and widened to facilitate access by emergency personnel during wildfires and flooding. Mitigation strategy for this is to remove and replace existing bridge/spillway, realign and widen the road.	SP	Seeking grant funding Total Cost: $2,000,000	Primary: Public Works Secondary: San Bernardino County Fire Protection District	1-3 Years	
Wildfire	**WF Action 8.2:** Construct Cedar Glen Fire Access Road.	Lack of paved roads inhibits traffic circulation and the ability to enter and exit the area without backtracking during wildfire emergencies. Strategy is to Construct road and drainage improvements to Little Bear Creek Road and Elder Drive.	SP	Seeking grant funding **Total Cost:** $2,500,000	Primary: Public Works Secondary: San Bernardino County Fire Protection District	1-3 Years	
Wildfire	**WF Action 9.1:** Continue funding and support for Special Districts Projects relating to wildfire.	Continue funding and support for Special Districts Projects relating to wildfire in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	On-Going	
Wildfire	**WF Action 9.2:** Emergency Water Supplies	Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.(completed with continuous fresh of supplies and rotation)	ES	TBD	Roads	TBD	

Annex B. Flood Control District

B.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Flood Control District, a previously participating jurisdiction to the 2010 San Bernardino County Hazard Mitigation Plan Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the base plan document. As such, all sections of the base plan, including the planning process and other procedural requirements apply to and were met by the Flood Control District. This Annex provides additional information specific to the Flood Control District, with a focus on providing additional details on mitigation actions and projects.

The Board of Supervisors acts as the Board of Directors for the County Flood Control District, and as part of their responsibilities as an elected member of the County of San Bernardino Board of Supervisors.

B.2 Flood District Profile

Flood Control District Functions:
The Flood Control functions are handled through the San Bernardino County Flood Control District under State legislation enacted in 1939. The District has developed a very extensive system of facilities, including dams, conservation basins, channels, and storm drains. The purpose of these facilities is to intercept and convey flood flows through and away from the major developed areas of the County. The principle functions are:

- Flood protection on major streams.
- Water conservation.
- Storm Drain construction.

Mission:
To enhance the quality of life for our communities by developing and maintaining public infrastructure, and providing a variety of municipal services that complements our natural resources and environment.

Vision:
Lead the way to a thriving community through innovation in public works, fiscal responsibility, and environmental stewardship.

B.3 Planning Process

As described above, the County Flood Control District followed the planning process detailed in Section 3 of the base plan. In addition to providing representation on the San Bernardino County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table B-4. Additional details on plan participation and District representatives are included in Appendix A.

Table B-4: Flood Control District Hazard Mitigation Planning Team

Name	Title	Role
Kevin Blakeslee	Deputy Director – Flood Control	Public Works Deputy Director
Kenneth Eke	Chief Flood Control Planning/ Water Resources Division	Public Works Engineer
Michael Fam	Flood Control Planning	Public Works Engineer
Mona Sadek	Flood Control Planning	Flood Control Planner
Marjorie Schrage	Flood Control Planning	Public Works Engineer Technician

B.4 Hazard Identification and Prioritization

The Flood Control District Planning Team participated in the County hazard identification and prioritization process described in the base plan. The Flood Control District Planning Team assisted to summarize the extent, probability of future occurrences, potential magnitude/severity, and significance specific to the Flood Control District (See Section 4).

The Planning Team determined that the County and its Special Districts should focus over the next five (5) years on hazards that fell within the HIGH and MEDIUM “Probability” and “Impact” categories. While all the hazards present a potential problem in the County, the Planning Team felt that if they were able to reduce or eliminate the risk from “food and drought related” hazards, it would provide a greater service to the people within the jurisdiction. Table 4-3 illustrates how the final prioritization of the hazard; the “Green” colored box represents the highest priority hazards; and the “White” colored boxes represent lower (second and third tier) priority hazards.

Table B-5: Prioritized Hazard Assessment Matrix

		Impact		
		High	Medium	Low
Probability	High	Wildfire **Flood**[x] Earthquake/ Geologic Hazards	Drought	
	Medium	Terrorism	Climate Change (Extreme Heat and other)	Hail Infestation
	Low		Dam Inundation	Tornado High Winds Winter Storm Lightning Extreme Cold

[x] = Flood District Area of Concentration

B.5 Coordination with Existing Flood District Mechanisms

Coordination with other County planning efforts is paramount to the successful implementation of this plan. This Section provides information on how the Flood Control District integrated the previously-approved 2011 Plan into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2011 MJHMP through other plans and programs shown below.

B.5.1 Flood Area Safety Taskforce (FAST)

During the devastating fires in the fall of 2003, there was great concern of what the ramifications might be for flooding in the burned areas, as well as in the valleys. In response to these concerns, an organization was established that mirrored the Mountain Area Safety Taskforce (MAST), mentioned above, which played a key role in minimizing damage.

While the fires were ravishing the countryside, representatives from multiple agencies met often to address potential issues associated with flood, mud and debris flows develop a strategy and to protect communities from flooding incidents. These agencies united together to become the Flood Area Safety Taskforce (FAST). FAST is structured as an ICS/SEMS Organization for managing incident activities both readiness and response. The FAST Organization stresses liaison with the communities, provides for community education and information, and places emphases on Community and city partnerships.

The FAST group includes:

- Elected State officials
- Representatives from all five (5) County Supervisorial Districts
- State Office of Emergency Services
- County Administrative Office
- County Public Works-Flood Control/ Transportation/Solid Waste
- County Fire Protection District
- County Fire Protection District/Office of Emergency Services (OES)
- County Sheriff's Department
- Representatives from the cities of Fontana, Highland Rancho Cucamonga, Rialto, and San Bernardino.
- USFS
- Caltrans
- CHP

The mission of the FAST is to facilitate a coordinated effort by cities, county, state, federal, and non-profit agencies to provide for the protection of property owners, residents, and property subject to the risk of erosion, mudflows, and flooding that could occur in San Bernardino County with an initial emphasis on the threat resulting from the Old and Grand Prix fires in 2003.

The FAST Unified Command identified the following objectives as the focus and direction of the FAST:

- Provide for Community Safety.
- Develop Coordinated Public Information Dissemination between Cities, County, State, Federal and Non-Profit Agencies.
- Develop Immediate, Mid-range and Long-range Coordinated Agency Plans.
- Identify and Secure Potential Funding Resources to Provide Document Task Force Activities Including Mission, Goals and Objectives, Policies, Procedures, and Outcomes.

Prior to any type of flood threat, the following precautionary measures may be taken by FAST members to reduce the impact of impending flooding:

- Review mutual aid agreements
- Define evacuation areas and trigger points
- Review the use of alert and warning systems
- Provide information to the public of potentially susceptible flooding areas and protective measures in progress or planned for those areas
- Educate public on emergency self-help and preparedness
- Develop and maintain emergency notification procedures and checklists.

A FAST Concept of Operations (CONOPS) was developed to provide activity guidelines for pre-flood activities related to National Weather Service (NWS) watches and warnings. Due to the unstable condition of the burned areas, activities and coordination needed to be established and implemented between departments.

The CONOPS is "situation" and "incident" driven and subject to revision by the Unified Command which includes County Flood Control District & Co Roads, County Fire Protection District, United States Forest Service (USFS), California Department of Transportation (Caltrans), California Highway Patrol (CHP), County Sheriff, City of Fontana, City of Highland, City of Rancho Cucamonga, City of Rialto, and City of San Bernardino. The Unified Command has the ability to modify activities in these guidelines in response to current situations and predicted changes. Currently, the CONOPS includes both summer and Winter Storm Event Readiness.

In addition, the CONOPS includes the San Bernardino County Flood Area Safety Taskforce Paging Network and a draft of the Alert Communication Matrix by Rain Amount/NWS Warning.

Over the past 10 years, the County has used the FAST CONOPS many times, greatly enhancing the County's ability to respond to flash flood in the desert and foothill areas. The CONOPS activity coordination between the agencies has been very successful. Because of the great success of the CONOPS, State Emergency Management Agency (Cal EMA) is using the CONOPS as a model for other agencies throughout the State.

In addition, San Bernardino County the CONOPS and FAST Plan is updated every two years and has done so since been put in to action the latest update being May of 2015.

B.5.2 Alluvial Fan Task Force

In December of 2002, the California Floodplain Management Task Force Report recommended that "The State should convene a task force specifically for alluvial fans, with stakeholder participation, to review the state of knowledge regarding alluvial fan floodplains, determine future research needs, and, if appropriate, develop recommendations relating to alluvial fan floodplain management, with an emphasis on alluvial fan floodplains that are being considered for development."

In September of 2004, Governor Arnold Schwarzenegger signed Assembly Bill 2141, which recommended the creation of the Alluvial Fan Task Force (Task Force). The Director of the Department of Water Resources (DWR) convened the Task Force in December of 2007 after funding to support Task Force activities was secured from a Pre-Disaster Mitigation Planning Grant from the Federal Emergency Management Agency (FEMA) and a state match was authorized by Assembly Bill 466. Funding supported the tasks charged to the Task Force including:

- Review the state of knowledge regarding alluvial fan floodplains;
- Determine future research needs;
- Develop a voluntary locally-adopted model ordinance for communities subject to alluvial fan flooding that supports land use decisions on alluvial fans;
- Develop local planning tools to assist local communities evaluate development on alluvial fans;
- Prepare recommendations relating to alluvial fan floodplain management.

Appointments to the Task Force by DWR Director Lester Snow represented a broad range of interests. Members included elected officials, represented by five Supervisors from Kern, Los Angeles, Riverside, San Diego and San Bernardino County where future alluvial fan development is projected. Appointments also included representatives of the development and environmental community, local floodplain managers and associated state and federal agencies, including the Federal Emergency Management Agency (FEMA), plus at-large members representing other issues related to future development on alluvial fans. The entire process was coordinated by the Water Resources Institute at California State University San Bernardino.

Primarily, the purpose of the Alluvial Fan Taskforce *Findings and Recommendations Report* (July 2010) and *The Integrated Approach for Sustainable Development on Alluvial Fans* (July 2010) documents are to provide a non-prescriptive and flexible model that local governments can use at their own discretion adapting to local conditions and needs that supports wise future land use decisions associated with development on alluvial fans.

As one of the ten Southern California counties studied by the Task Force, the County may review the development of the suite of local planning tools for pre-project screening for future development proposals on alluvial fans. If funding allows for the review, these planning tools may be useful as an optional database reference for project management. Additionally, the flood management tools designed to analyze alluvial fan flood hazards and formulate flood hazard protection, which were developed to be consistent with FEMA guidelines, may provide an optional data source for project development. Long term funding for updating and maintaining the pre-project screening tools database is a concern regarding the reliability for current data.

If funding exists, for the implementation of the *Integrated Approach for Sustainable Development on Alluvial Fans*, the methods contained therein may be used as some of the approaches for planning and evaluating the suitability of development on alluvial fans. During the analysis and review, if budgets allow, the long term ecological and financial sustainability issues would also be evaluated.

Based on the Findings from the Alluvial Fan Task Force process, recommendations were made for specific future actions that the State and other public agencies should consider regarding alluvial fans. The San Bernardino County Departments of Land Use, Special Districts and the Flood Control District are all coordinating on the below recommendations:

Recommendation 1: *on-going*

In February 2010, a General Plan Amendment (GPA) to the Safety Element of the 2007 General Plan was adopted to amend the Flood Plain Safety Overlay District to incorporate revised FEMA (Federal Emergency Management Agency) Flood Plain data, modifying 47 detail and seven regional General Plan Quad Maps. The GPA also adopted the FEMA Digital Flood Insurance Rate Map database as released by FEMA as it currently exists and as updated in the future for the County allowing for automatic map updates as new data are published by FEMA. This action by the County of San Bernardino Board of Supervisors implements the portion of the first recommendation from the Alluvial Fan Task Force by working with FEMA to continue updating flood insurance rate maps.

In addition, the GPA for the Safety Element in 2010 (a) amended the Generalized Landslide Susceptibility layer, modifying 17 General Plan Quad Maps and one regional Quad Map, to incorporate updated existing landslide data published by the U. S. Geological Survey for the Mountain area; (b) amended the Fire Safety Overlay District, modifying four General Plan Quad Maps to incorporate updated fire safety mapping published by Cal Fire for the Valley area; and (c) amended the Generalized Liquefaction Susceptibility layer, modifying four General Plan Quad Maps to incorporate new liquefaction data in the Big Bear Lake area designated by the County Geologist for the Big Bear Lake area.

Recommendation 2: *on-going*

The County will coordinate with the California Geological Survey (CGS) and the United States Geological Survey (USGS) to review any newly developed Quaternary geologic maps in alluvial fan areas in order to identify potential hazards in areas projected for future development.

Recommendation 4: *on-going*

Historical, documentation of flooding occurrences are preserved by the County's Flood Control District that would review the recommendation to identify flooding events that were associated with alluvial fans.

Recommendation 6: *on-going*

The increased severity and intensity of wildfires in Southern California increase flood risk because the same structures subject to fire risk are also prone to post-fire debris flows. Many of the debris basins that were constructed some time ago did not anticipate the increased severity and intensity of wildfires or the additional developments that would follow. The CalOES projects that climate change will further increase the severity of storms, wildland fires, flooding, mudslides and landslides in areas of Southern California where existing debris basins are located.

All of San Bernardino County Flood Control District's Debris Basins in the valley area; from the Los Angeles County Line to Yucaipa, were analyzed after the Grand Prix and Old Fires. Flood Control District Safety Assessment Teams utilized the Corps of Engineers' Los Angeles District methodology to determine debris production, the same methodology the Corps uses when designing debris basins. In many cases basins were physically expanded and additional measures such as K-rails and debris racks were installed. The understanding of post-fire debris flows continues to evolve; we work closely with the USGS as they develop Post Wildfire Debris Flow Hazard Assessments. The rainfall "Trigger Points" in our FAST CONOPS is a result of the USGS assessments. All Flood Control Basins are also studied on an annual basis to determine existing capacity.

Any additional funding to support our efforts will meet the intent of recommendation #6 which states that the State and local agencies should conduct assessments of the adequacy of strategically located debris basins under a range of scenarios in urbanized areas in light of increased fire and post-fire debris-flow events.

Recommendation 8: *on-going*

When funding sources become available for the maintenance and further development of the database for the web-based portal; which would be utilized as a pre-project screening and flood management tool for special alluvial fan areas, the County may evaluate the benefits of its use in the planning process.

Recommendation 9: future proposal

As financial resources are allocated, the County will consider the analysis of the Integrated Approach tools to be studied for use in land use planning for development on alluvial fans.

Recommendation 10: f*uture proposal*

If funding is provided, the County will review and propose for adoption a model ordinance tailored for the specific needs of the County.

Recommendation 12: *future proposal*

The County's Office of Legislative Affairs, after consulting with the appropriate departments and staff, may explore supporting the economic strategies recommended in the Integrated Approach regarding future maintenance of flood management infrastructure.

B.5.3 StormReady

On July 29, 2009, the National Weather Service recognized San Bernardino County as a "StormReady County". This recognition is valid until July 29, 2012 and has been renewed in use (2016) when the National Weather Service will review the County's weather related planning and notification procedures prior to renewing the "StormReady County" status.

San Bernardino County is the only StormReady jurisdiction in the United States covered by three Weather Forecast Offices. The NWS Offices are:

- San Diego, CA;
- Las Vegas, NV; and
- Phoenix, AZ.

This NWS Recognition may provide the County residents with a discount on their Flood Insurance premiums.

Flood Project Prioritization and Implementation

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Earthquake	**EQ Action 5.1:** Divert runoff to Little Bear Creek.	To reduce the runoff over the cliff(s) in the Rimforest neighborhood, the runoff must be diverted to another path. This will be accomplished over three phases: • Phase 1: Reduce Runoff Tributary Area by 64%- 50.35 AC • Phase 2: Reduce Runoff Tributary Area by 30%- 23.79 AC • Phase 3: Reduce Runoff Tributary Area by 5%- 3.99 AC	SP, NRP, PRV	TBD	Primary: Public Works Secondary: San Bernardino County Flood Control District		
Flood	**FL Action 1.1:** Update NFIP data and maps with newly identified flood hazard areas in the County, as new information becomes available.	As required by the State of California, National Flood Insurance Program (NFIP) maps published by FEMA must be included in the HMP or General Plan Safety Element. Keeping this information current is an important mitigation action.	PRV, PPRO	TBD	San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 2.1:** Determine whether or not additional amendments to development standards or policies are merited, based on the Alluvial Fan Task Force Recommendations.	This is an on-going mitigation action from the 2011 MJHMP.	PRV	TBD	Primary: San Bernardino County Flood Control District Secondary: Land Use Services	On-Going	
Flood	**FL Action 3.1:** Amend the Flood Plain Safety Overlay District through automatic map updates as new data is released and published by FEMA.	Current San Bernardino County Hazard Maps can be found at: http://cms.sbcounty.gov/lus/Planning/ZoningOverlayMaps/HazardMaps.aspx.	PRV, NRP	TBD	Primary: San Bernardino County Flood Control District Secondary: Land Use Services	On-Going	
Flood	**FL Action 3.2:** Review development plans to ensure compliance with ordinances.	This is an on-going mitigation action from the 2011 MJHMP in order to reduce the flood hazards through development standards and policies stated in the General Plan and San Bernardino 2077 Development Code.	PRV	TBD	Primary: Land Use Services Secondary: San Bernardino	On-Going	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
					County Flood Control District		
Flood	**FL Action 3.3:** Inspect construction to ensure compliance with approved development plans.	This is an on-going mitigation action from the 2011 MJHMP in order to reduce the flood hazards through development standards and policies stated in the General Plan and San Bernardino 2077 Development Code.	PRV, PPRO, SP	TBD	Primary: Public Works Secondary: San Bernardino County Flood Control District	On-Going	
Flood	**FL Action 4.1:** In each flood control zone, construct facilities identified in those zones by the Flood Control Advisory Committee. See the following pages for a listing of projects.	This is an ongoing mitigation action from the 2011 MJHMP to achieve the goal of improving existing facilities and construct new facilities to mitigate flooding within the County.	SP	TBD	Primary: Public Works Secondary: San Bernardino County Flood Control District	On-Going	

B.7 Flood Project Prioritization and Implementation

The Flood District project rankings utilize the same format as the 2011 Multi-Jurisdictional Hazard Mitigation Plan, and rankings are based on the current project funding status as shown on the County Flood Control District's 10 year Plan. A 'High' Local Priority, or (3), indicates that project funding is expected to be complete within about the next three years, depending on the Flood Zone and its' available revenue. A 'Medium' Local Priority (2) indicates that project funding is expected to be complete within about four to seven years. A 'Low' Local Priority (1) indicates that the project is on the 10-Year Plan but complete funding is likely eight to ten years or more in the future.

The task of determining local project priority is the responsibility of the County Flood Control District's staff and City Engineers. Each of the six zones of the District is represented by a Citizens Advisory Committee, composed of eleven members and serving by appointment of the Board of Supervisors without compensation. Each committee is formed of spirited citizens and public officials with unselfish and devoted interests, organized to meet annually or on call to afford recommendations to the Board of Supervisors on matters of tax levies, budgets, work programs, priority of projects, ventures and other counsel. The Mayor of each incorporated city in the District is a committee member with full standing for the appropriate zone.

County Flood Control District staff and the City Engineers for each zone meet twice per year to discuss future project needs and current project status. Projects are proposed based on the public safety needs within the particular zone. In addition to public safety, other issues are considered in the prioritization process such as grant funding, environmental reviews and approvals, and other impediments that may cause construction of the project to be delayed. (See Annex 1 for examples of how these prioritization factors are applied to proposed projects.)

Almost without reservation, the recommendations of these organized committees have been accepted by the Board of Supervisors in its administration of County Flood Control District functions.

Each flood control zone constructs facilities identified in those zones by the Flood Control Advisory Committee. The City Engineers for each zone along with the Flood Control District I Advisory Committee establishes Project Priorities based on Benefit Cost Analysis, Community input, and fiscal resources available for the project in addition to any other noted factors. The following three tables illustrate priority rankings based on three key factors: Total Cost, Hazard Assessment, and Potential Fatalities.

Table B-6: Priority Flood Control Projects

Project No	Completion Date	Total Cost	Total Funding	Status
1-112	5 Year Plan	$10,000,000	$10,000,000	Priority
1-114	10 Year Plan	$15,000,000	$1,000,000	Priority

Project No	Completion Date	Total Cost	Total Funding	Status
1-701	5 Year Plan	$1,100,000	$1,100,000	Priority
1-806	10 Year Plan	$5,000,000	$1,000,000	Priority
1-809	5 Year Plan	$8,500,000	$1,000,000	Priority
1-910	10 Year Plan	$10,000,000	$2,000,000	Priority
2-113	10 Year Plan	$3,100,000	$500,000	Priority
2-308	10 Year Plan	$27,000,000	$500,000	Priority
F01272	10 Year Plan	$31,600,000	$600,000	Priority
F01336	2017-2018	$12,800,000	$13,740,000	Priority
F01389-2	10 Year Plan	$2,700,000	$1,430,000	Priority
F01417	10 Year Plan	$39,500,000	$21,150,000	Priority
F01452-2	2017-2018	$38,400,000	$1,170,000	Priority
F01473	10 Year Plan	$8,100,000	$5,001,000	Priority
F01650	2017-2018	$5,200,000	$3,440,000	Priority
F01667	10 Year Plan	$26,900,000	$16,000,000	Priority
F01911	2018-2019	$8,700,000	$3,140,000	Priority
F02129	10 Year Plan	$16,700,000	$1,024,000	Priority
F02228	10 Year Plan	$8,700,000	$7,600,000	Priority
F02243	10 Year Plan	$2,400,000	$400,000	Priority
	Totals:	$281,400,000	$91,795,000	

B.7.1 Priority Project Descriptions

B.7.1.1 1-112 West State Storm Drain – Priority

Channel Invert Repair
Status: Proposed
Completion Date: 5-year plan
Total Cost: 11.4 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure
Hazard Mitigated: Downstream flooding

B.7.1.2 1-114 Carbon Canyon Channel – Priority

Channel improvement
Status: Proposed
Completion Date: 10-year plan
Total Cost: 15 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure
Hazard Mitigated: Downstream flooding

B.7.1.3 1-701 Etiwanda Channel Invert Repair – Priority

Channel Invert Repair
Status: Proposed
Completion Date: 5-year plan
Total Cost: 1.1 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure
Hazard Mitigated: Downstream flooding

B.7.1.4 1-806 Hawker Crawford Channel and Rich Basin – Priority

Channel / Basin improvement
Status: Proposed
Completion Date: 10-year plan
Total Cost: 5 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure by reducing peak Q
Hazard Mitigated: Downstream flooding

B.7.1.5 1-809 West Fontana Channel (From Banana Basin to Hickory Basin) – Priority

Channel Repair
Status: Proposed
Completion Date: 5-year plan
Total Cost: 8.5 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure
Hazard Mitigated: Downstream flooding

B.7.1.6 1-910 Grove Basin-Priority

Basin out improvement
Status: Proposed
Completion Date: 10-year plan
Total Cost: 10 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Public Safety; protection of local and downstream infrastructure by reducing peak Q
Hazard Mitigated: Downstream flooding

B.7.1.7 2-113 Randal Basin outlet improvement – Priority

Outlet improvements D/S of the Basin
Status: Proposed
Completion Date: On 10-year plan

Local Priority: Medium
Total Cost: $3.1 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public Safety
Hazard Mitigated: Potential failure & flooding downstream
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.1.8 2-308 Cable Creek Channel – Priority

Channel improvements
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $27 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Compliance with FEMA Levee Certification program
Hazard Mitigated: Reduction of floodplain; reduction of potential for major flooding
Resources to Implement: High
Cost to Implement: High
Time to Implement: High

B.7.1.9 F01272 Rialto Channel, Etiwanda Avenue to Willow Avenue – Priority

Construct Rialto channel to ultimate condition
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $31.6 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Rialto
Project Selected for: Public Safety & convenience Hazard Mitigated: Residential area flooding and road closures due to wash-outs
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.10 F01336 Amethyst Detention Basin – Priority

Construct a detention basin at Amethyst and Sycamore
Status: Design completed, Permits In process
Completion Date: Estimated 2017/2018
Local Priority: High
Total Cost: $12.8 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Victorville
Project Selected for: Public Safety; protection of local and downstream infrastructure by reducing peak Q
Hazard Mitigated: downstream flooding

Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.11 F01389-2 Mojave River Phase II – Priority

Construct earthen levee lined with 1/2 ton rock slope protection between Oro Grande Wash and Mojave River Phase I
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $2.7million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: To finalize levee improvement construction; protection of Amtrak station
Hazard Mitigated: Local flooding, railroad flooding
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.12 F01417 Bandicoot Detention Basin (Phase I&II) – Priority

Construction of detention basin, inlet/outlet facilities, fencing to attenuate 10-year storm flows adjacent to California Aqueduct and downstream residential and commercial properties developments.
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $39.5 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: To protect the State water aqueduct
Hazard Mitigated: Flood damage to aqueduct & local area
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.13 F01452-2 West Fontana Channel, Phase I – Priority

Construction of concrete channel from Juniper to Banana Basin
Status: In process
Completion Date: Estimated 2017/2018
Local Priority: Medium
Total Cost: $38.4 million
Funding Description: San Bernardino County Flood Control Taxes, City of Fontana
Project Selected for: Public safety & convenience
Hazard Mitigated: Flooding of railroad & Metrolink tracks; road damage & closure
Resources to Implement: Medium
Cost to Implement: High

Time to Implement: High

B.7.1.14 F01473 Rialto Channel – Priority

Construct channel improvements south of Interstate 10
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Medium
Total Cost: $8.1 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Rialto
Project Selected for: Public Safety
Hazard Mitigated: Existing channel is interim and undersized
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.1.15 F01650 Sand Creek/ Warm Creek Channels – Priority

Improve existing confluence of Sand Creek and Warm Creek Channels
Status: In process
Completion Date: Estimated 2017/2018
Local Priority: Medium
Total Cost: $5.2 million
Funding Description: San Bernardino County Flood Control
Project Selected for: channel improvements to interim storm drain system
Hazard Mitigated: Potential damage to infrastructure
Resources to Implement: High
Cost to Implement: High
Time to Implement: High

B.7.1.16 F01667 Cactus Basins #4 & 5 – Priority

Construction of detention basins to mitigate downstream flooding of Rialto Channel Work includes inlet/outlet structures
Status: Proposed
Completion Date: 10-year plan
Local Priority: Low
Total Cost: $26.9 million
Funding Description: San Bernardino County Flood Control, City of Rialto
Project Selected for: Ability to reduce downstream peak Q
Hazard Mitigated: flooding of nearby area

B.7.1.17 F01911 Elder Gulch – Priority

Construct trapezoidal rock-lined channel
Status: Proposed
Completion Date: Estimated FY 18/19
Local Priority: High

Total Cost: $8.7 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public safety
Hazard Mitigated: Flooding of local area
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Medium

B.7.1.18 F02129 Wildwood Channel – Priority

Channel improvement
Status: In preliminary design process
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $16.7 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Yucaipa
Project Selected for: History of flooding due to high debris flows
Hazard Mitigated: reduction in size of floodplain; minimized flooding
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Low

B.7.1.19 F02228 Plunge Creek Spillway – Priority

Repair of severe damage caused by storms in 2005
Status: Proposed
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $3 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Necessary repairs due to previous flood damage
Hazard Mitigated: Potential failure & flooding downstream
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.1.20 F02243 Rialto Channel Priority Crossings – Priority

Status: In preliminary design process
Completion Date: On 10-year plan
Local Priority: Low
Total Cost: $2.4 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Rialto

COUNTY OF SAN BERNARDINO - Hazard Mitigation Plan Update

Project Selected for: Public Safety & convenience
Hazard Mitigated: Elimination of flooding at intersections
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.2 Projects with Mitigation Benefits

Table B-7 is a list of the proposed projects to mitigate the Flood hazard within the County Unincorporated Area.

Table B-7: In Progress Flood Control Mitigation Projects

Project No	Completion Date	Total Cost	Total Funding	Status
F01312	2017/2018	4,400,000	2,200,000	Under Construction
F01666	2017/2018	17,800,000	17,800,000	Under Construction
F02094	2017	4,000,000	4,000,000	Under Construction
F02126	2017/2018	8,300,000	6,180,000	Under Construction
	Totals:	34,500,000	30,180,000	

B.7.2.1 F01312 English Channel/ Peyton Drive (Under Construction)

Construct triple RCB and channel upstream and downstream of Peyton Drive.
Status: In preliminary design process
Completion Date: Estimated 2017/2018
Local Priority: High
Total Cost: $4.4 million
Funding Description: San Bernardino County Flood Control Property Taxes, 50% and City of Chino Hills 50%
Project Selected for: Public safety & convenience
Hazard Mitigated: Flooding of roads in residential area
Resources to Implement: High
Cost to Implement: High
Time to Implement: Medium

B.7.2.2 F01666 Cactus Basin #3/ Expansion of Basin #3 – (Under Construction)

Status: In process
Completion Date: Estimated 2017/2018
Local Priority: High
Total Cost: $17.8 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Rialto

Project Selected for: Public safety & improved future development; protection of water filtration plant across the street; reduction of peak Q downstream.
Hazard Mitigated: Flooding of immediate area and downstream along Rialto Channel
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Medium

B.7.2.3 F02094 Cucamonga Basin #6, Phase II – (Under Construction)

Landscaping improvements
Status: Partial Completed
Completion Date: Mid-2011 – (Landscaping Phase Completion date end of 2017)
Local Priority: High
Total Cost: $4.0 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Environmental compliance & aesthetics
Hazard Mitigated:
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Low

B.7.2.4 F02126 Francis Street Storm Drain (Under Construction)

Construct ultimate storm drain improvements from Sultana Avenue east to beyond Grove Avenue
Status: In preliminary design process
Completion Date: Estimated 2017/2018
Local Priority: Low
Total Cost: $8.3 million
Funding Description: San Bernardino County Flood Control Property Taxes 75% and City of Ontario 25%
Project Selected for: Public safety & convenience
Hazard Mitigated: Existing storm drain is undersized/interim; local flooding
Resources to Implement: Medium

B.7.3 Future Year Projects

Table B-8: Future Year Projects

Project Number/Name	Completion Date	Total Cost	Status
2-509 Little Sand Creek	10 Year Plan	$10,500,000	Future
3-501 Mission Channel	10 Year Plan	$28,800,000	Future
3-601 Wilson Creek (10th St-I-10)	10 Year Plan	$38,800,000	Future
CSDP Drain Project	10 Year Plan	$18,500,000	Future
Extension of VV Line E-01	10 Year Plan	$2,000,000	Future
F01284	10 Year Plan	$7,200,000	Future
F01582	10 Year Plan	$19,000,000	Future
F01584	2018/2019	$11,700,000	Future
F01609	10 Year Plan	$32,500,000	Future
F02225	10 Year Plan	$33,100,000	Future
F02475	10 Year Plan	$9,000,000	Future
F02476	10 Year Plan	$32,300,000	Future
H1458	2021	$3,000,000	Future
Institution Road	2021	$30,000,000	Future
Line C-01 Hesperia	10 Year Plan	$5,300,000	Future
Line D-01 Hesperia	10 Year Plan	$32,500,000	Future
Line E-01 Apple Valley	10 Year Plan	$36,300,000	Future
Lone Pine Canyon Road Culvert	TBD	$25,000,000	Future
National Trails Hwy Bridge	TBD	$40,000,000	Future
Old Waterman Canyon Rd Culvert	TBD	$2,500,000	Future
Pine View Dr. Storm Drain	TBD	$6,000,000	Future
Piute Wash	2021	$34,500,000	Future
Rimforest Drainage Project	10 Year Plan	$6,900,000	Future
Rock Springs Rd Bridge Replacement	TBD	$32,876,000	Future
Tussing Ranch-Juniper Basin	10 Year Plan	$6,500,000	Future
Yermo Rd/National Trails Hwy Bridge	TBD	$40,000,000	Future
	Totals:	$544,776,000	

B.7.3.1 2-509 Little Sand Creek

Creek improvements between Date Street and Del Lemon basin
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $10.5 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety; residential area with school nearby
Hazard Mitigated: Flooding and pedestrian hazards
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.3.2 3-501 Mission Channel

Channel Repair, Construct concrete channel improvements
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $28.8 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety; residential area with school nearby
Hazard Mitigated: Flooding and pedestrian hazards
Resources to Implement: Medium

Cost to Implement: High
Time to Implement: High

B.7.3.3 3-601 Wilson Creek (from 10st Street to I-10)

Channel Repair, between 10st Street to I-10
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $38.8 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety; residential area with school nearby
Hazard Mitigated: Flooding and pedestrian hazards
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.3.4 CSDP -- Storm Drain Project – Colton

Construction of storm drains from Randall Basin to the Santa Ana River according to Comprehensive Storm Drain Plan (CSDP) 3-5 and 3-8
Status: Proposed
Completion Date: On 10-year plan
Local Priority: Medium
Total Cost: $18.5 million
Funding Description: San Bernardino County Flood Control Property Taxes
Hazard Mitigated: Existing channel is interim and undersized
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.3.5 Extension of Victorville Line E-01

Construct Storm Drain line E-01
Status: In preliminary design process
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $2.0 million
Funding Description: San Bernardino County Flood Control Property Taxes, City of Victorville
Project Selected for: Public safety of commercial area
Hazard Mitigated: local flooding; road closure/road damage (State Hwy)
Resources to Implement: High
Cost to Implement: High
Time to Implement: Low

B.7.3.6 F01284 Donnell Basin (Phase I&II)

Construct detention basin.
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $7.2 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public Safety; roadway protection; Safe Routes to School Program (SR2S)
Hazard Mitigated: Flood protection for homes, infrastructure, and pedestrians
Resources to Implement: Low

B.7.3.7 F01582 Desert Knolls II

Construct flood control channel from Apple Valley Road to Tuscola Road
Status: Proposed
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $19 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety/future development
Hazard Mitigated: Potential localized flooding due to increased development
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.3.8 F01584 Desert Knolls

Construct channel improvements from the Mojave River to Phase I
Strategy: Construct concrete lined channel to provide for 100 year storm flows and debris flows.
Status: Proposed
Completion Date: Estimated FY 18/19
Local Priority: High
Total Cost: $11.7 million
Funding Description: San Bernardino County Flood Control Tax Revenues
Project Selected for: Environmental requirements
Hazard Mitigated: This project is the mitigation aspect of Phase II
Resources to Implement: Low
Cost to Implement: High
Time to Implement: Medium

B.7.3.9 F01609 Ranchero Basin

Construct detention basin
Status: Proposed

Completion Date: 10-year plan
Local Priority: High
Total Cost: $32.5 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and reduction of peak Q
Hazard Mitigated: Potential damage to bridges and roads downstream due to high flows
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.3.10 F02225 Del Rosa

Channel Repair, Construct concrete channel improvements between Pacific Street and Del Rosa Avenue
Status: Proposed
Completion Date: 10-year plan
Local Priority: Medium
Total Cost: $33.1 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety; residential area with school nearby
Hazard Mitigated: Flooding and pedestrian hazards
Resources to Implement: Medium
Cost to Implement: High
Time to Implement: High

B.7.3.11 F02475 Seneca Basin

Construct detention basin
Status: Proposed
Completion Date: 10-year plan
Local Priority: High
Total Cost: $9 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and reduction of peak Q
Hazard Mitigated: Potential damage to bridges and roads downstream due to high flows
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.3.12 F02476 Oak Hills Basin

Construct detention basin
Status: Proposed
Completion Date: 10-year plan
Local Priority: High
Total Cost: $32.3 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and reduction of peak Q
Hazard Mitigated: Potential damage to bridges and roads downstream due to high flows
Resources to Implement: Low

Cost to Implement: High
Time to Implement: High

B.7.3.13 H1458 Arrowbear Dr. Bridge Replacement

Replacement of bridge crossing on Arrowbear Drive and increase spillway flow capacity to prevent flooding
Status: Proposed
Completion Date: 2021
Total Cost: $3,000,000.00
Funding Description: Major Local Highway Project Funds
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.14 Institution Road

Construction of bridge crossing along Institution Road on Cajon Wash
Status: Proposed
Completion Date: 2021
Total Cost: $30,000,000.00
Funding Description: seeking grant funding
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.15 Line C-01 Hesperia

Construction of concrete trapezoidal channel improvements, short reach of levee along the channel, 96 inch RCP and reconstruction of the existing deficient reach as a concrete trapezoidal channel with a portion of riprap channel
Status: Proposed
Completion Date: 10-year plan
Total Cost: $5.3 million
Funding Description: San Bernardino County flood Control
Project selected for: Public safety and roadway protection
Hazard Mitigated: Flooded roads and residential area
Resources to implement: High
Cost to implement: High
Time to implement: High

B.7.3.16 Line D-01 Hesperia

Improve the storm drain facility.
Status: Proposed
Completion Date: 10-year plan
Total Cost: $32.5 million
Funding Description: San Bernardino County flood Control
Project selected for: Public safety and roadway protection
Hazard Mitigated: Flooded roads and residential area
Resources to implement: High
Cost to implement: High

Time to implement: High

B.7.3.17 Line E-01 Apple Valley

Improve the storm drain facility.
Status: Proposed
Completion Date: 10-year plan
Total Cost: $36.3 million
Funding Description: San Bernardino County flood Control
Project selected for: Public safety and roadway protection
Hazard Mitigated: Flooded roads and residential area
Resources to implement: High
Cost to implement: High
Time to implement: High

B.7.3.18 Lone Pine Canyon Road Culvert

Construction of Culvert on Long Pine Canyon Road
Status: Proposed
Completion Date: No date until funding is available
Total Cost: $2,500,000.00
Funding Description: TBD
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.19 National Trails Highway Bridge Replacement

Removal of approximately 31 old timber bridges and construction of replacement bridges spanning Under 20' on National Trails Highway
Status: Preliminary engineering and environmental study only
Completion Date: No date until funding is available
Total Cost: $40,000,000.00
Funding Description: TBD
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.20 Old Waterman Canyon Road Culvert

Removal of approximately 31 old timber bridges and construction of replacement bridges spanning less than 20' on National Trails Highway
Status: Preliminary engineering and environmental study only
Completion Date: No date until funding is available
Total Cost: $2,500,000.00
Funding Description:
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.21 Pine View Dr. Storm Drain

Construction of storm drain on Pine View Drive
Status: Proposed
Completion Date: Shelf ready but no date until funding is available
Total Cost: $6,000,000.00
Funding Description: TBD
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.22 Piute Wash

Construction of bridge crossing along Needles highway road on Piute washes to prevent flooding and washing the road out.
Status: Proposed
Completion Date: 2021
Total Cost: $34,500,000
Funding Description: seeking grant funding
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.23 Rimforest Drainage Project – Rimforest Area

Capture the surface water within Rimforest and convey it to Little Bear Creek, away from the escarpment.
Status: In preliminary design process
Completion Date: On 10-year plan
Local Priority: High
Total Cost: $6.9 million
Funding Description: San Bernardino County Flood Control Property Taxes
Project Selected for: Public safety of commercial area
Hazard Mitigated: Public safety and reduction of peak Q
Resources to Implement: High
Cost to Implement: High
Time to Implement: Low

B.7.3.24 Rock Springs Road Bridge Replacement

Construct Replacement Bridge on Glen Helen Parkway over Cajon Wash It will increase flow capacity with a longer span and reduce flooding of the roadway.
Status: Proposed
Completion Date: No date until full funding is available
Total Cost: $32,876,000
Funding Description: Partially funded with General Fund Money
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

B.7.3.25 Tussing Ranch – Juniper Basin

Construct detention basin
Status: Proposed
Completion Date: 10-year plan
Local Priority: High
Total Cost: $6.5 million
Funding Description: San Bernardino County Flood Control
Project Selected for: Public safety and reduction of peak Q
Hazard Mitigated: Potential damage to bridges and roads downstream due to high flows
Resources to Implement: Low
Cost to Implement: High
Time to Implement: High

B.7.3.26 Yermo Road and National Trails Highway Bridge Replacement

Removal of approximately 11 old timber bridges and construction of replacement bridges spanning under 20' on National Trails Highway and Yermo Road. The military is using high load tractors and trailers warranting the need to increase the load capacity of the bridges.
Status: Preliminary engineering and environmental study only
Completion Date: No date until funding is available
Total Cost: $40,000,000.00
Funding Description: TBD
Project Selected for: Public Safety and convenience
Hazard Mitigated: flood damage, road closures and road damage

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Annex C. Special Districts Department

C.1 Introduction

Special Districts Department, under the direction of the San Bernardino County Board of Supervisors, provides administrative oversight and manages the operation of over 100 special districts throughout San Bernardino County. Through the formation of County Service Areas (CSAs) and Improvement Zones, these special districts provide a variety of municipal-type services to unincorporated areas of the county.

C.2 Special Districts Profile

Special District Functions:
The County Service Areas (CSAs) and Improvement Zones can provide one or all of the following services to meet the individual needs of communities, neighborhoods and new developments depending on needs and financial feasibility:

- Cemetery
- Dam Operation
- Detention Basin
- Engineering and Construction
- Landscaping
- Open Spaces
- Park and Recreation
- Public Financing
- Refuse
- Roads
- Streetlights
- Television Translator
- Water and Sanitation

Mission:
The Special Districts Department works to ensure safe, healthy, and enjoyable communities by providing customizable programs and municipal services for those who work, play and stay in San Bernardino County.

Vision:
To be recognized as the preeminent provider of customized municipal services focusing on improved quality of life for the residents and visitors of San Bernardino County.

COUNTY OF SAN BERNARDINO - Hazard Mitigation Plan Update

C.3 Planning Process

As described above, the County Flood Control District followed the planning process detailed in Section 3 of the base plan. In addition to providing representation on the San Bernardino County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table C-9. Additional details on plan participation and District representatives are included in Appendix A.

Table C-9: Special District Hazard Mitigation Planning Team

Name	Title
Jeffrey Rigney	Director of Special Districts
Steve Samaras	Water and Sanitation Division Manager
Tim Millington	Engineering Division Manager,
Reese Troublefield	Operations Division Manager
Erin Opliger	Districts Services Coordinator

The Special Districts Department has attending the following planning meetings:

Meeting Date	Meeting Type	Attendees	Additional Details
6/23/16	LHMP Update - Kickoff Meeting	Steve Samaras, Erin Opliger	
8/30/16	LHMP Group Meeting	Erin Opliger	
10/26/16	LHMP Blue Jeans Meeting	Erin Opliger	

The County of San Bernardino Special Districts Department (Department) has historically identified goals, objectives, and projects to mitigate the negative effects of hazards. The Department continues to work with various Advisory Commissions and the public to identify and mitigate the impacts of hazards to the various services that the Department provides, including: cemetery operations, dam operations, detention basin operations, landscaping services, open space, parks and recreation, refuse services, roads, streetlights, television translator, water distribution and treatment system operations, sewer collection system operations, and wastewater treatment plant operations.

The Department diligently identifies the hazards that each service district or County Service Area (CSA) and its zones face, and has assessed the vulnerability according to the potential event. Hazards, whether they are technological or natural, affect CSAs with varying frequency and can cause injury, impose monetary losses, and the disruption of services, affecting the Department's mission as a public agency service provider. Losses can be substantially reduced or eliminated through comprehensive pre- disaster planning and mitigation actions.

Many groups and individuals have contributed to the Department's planning for Disasters and the necessary hazard mitigation efforts. Advisory Committees, located in the Department's various CSAs, provide on-going input and support for the various aspects of hazard mitigation, including identifying persistent hazards that develop after storm events and options for mitigation.

Department staff participates in the hazard mitigation process by completing semi-annual audits of various CSAs, recommending temporary fixes and/or permanent solutions. CSA customers and the public have also participated in hazard mitigation planning by approaching staff in the field, contacting the office, and/or attending public meetings to identify temporary and ongoing hazards that need to be addressed. These resources have proved valuable to the Department in identifying and mitigating potential hazards. The Department also uses the following process to prepare hazard mitigation plans:

- Identify and prioritize disaster events that are most probable and destructive;
- Identify critical facilities;
- Identify areas within communities that are most vulnerable;
- Develop goals and objectives for reducing the effects of a disaster event;
- Develop specific projects to be implemented for each goal;
- Identify funding sources;
- Develop procedures for monitoring progress;
- Mitigate identified potential hazards.

The Department has identified areas for mitigation projects within the Special Districts of San Bernardino County as a result of their internal planning processes. These projects, shown below, are organized by type of special district these proposed projects are in the conceptual stage and detailed planning will be done in the future as funding becomes available. Prioritization of projects will be done in the planning stages, based on the risk prioritizations developed for the current Multi-Jurisdictional Hazard Mitigation Plan.

C.4 Hazard Identification and Prioritization

The Special Districts Planning Team participated in the County hazard identification and prioritization process described in the base plan. The Special Districts Planning Team assisted to summarize the extent, probability of future occurrences, potential magnitude/severity, and significance specific to the Special Districts (See Section 4).

C.5 Coordination with County Planning Efforts

Coordination with other County planning efforts is paramount to the successful implementation of this plan. This Section provides information on how the Special Districts integrated the previously-approved 2011 Plan into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2011 MJHMP through other plans and programs shown below.

C.5.1 3.2 Water Systems (Distribution Systems):

Fire:

- Rockscape or paved property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.
- Re-roof buildings and structures with tile, metal or fire resistant material.

Flood:

- Add drainage, elevate facilities and adjust sloping for facilities in low-lying areas and in natural waterways or floodplains. (Recent Completion)
- Conduct hydrologic and hydraulic studies for all facilities located near flood plains/natural waterways.
- Encase water pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.

Earthquake:

- Retrofit structures to higher seismic standards.
- Purchase portable containers (Conex containers) to stage emergency supplies and equipment for the first responders (i.e. water, food, small off road vehicles, fuel, cots, toiletries, communication devices, blankets, wet weather gear, etc.) at strategic water system locations throughout County of San Bernardino. Conex containers can be relocated if necessary to assist field staff during a disaster to maintain the operations of water systems. (Recent Completion and in implementation phase)

General Hazard (Fire/Flood/Earthquake):

- Retrofit existing buildings and facilities with connectors/ATS for emergency generators and/or install permanent emergency generators at critical facilities, including wells and booster station locations.
- Develop a plan for speeding the repair of and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.
- Develop a plan for areas subject to high ground shaking, earthquake-induced ground failure, and surface fault rupture to determine a replacement schedule for pipelines (along with importance, age, type of construction material, size, condition, and maintenance or repair history).(Project now in effect)
- Develop a plan for short-term and intermediate-term sheltering of employees.
- Develop a plan to work with local agencies that handle hazardous materials to coordinate mitigation efforts for the possible release of these materials due to a natural disaster such as an earthquake, flood, fire, or landslide.

- Utilization of SCADA and Smart Water Meters to get real time data on problems with the system and reduce drive time emissions as a result of traditional meter reading.
- Provide emergency supplies of food, water, and portable generators for employees at office and field locations.
- Install emergency generators at district facilities

C.5.2 3.3 Sewer Systems (Collection Systems):

Fire:

- Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.(Completion and program implementation by January 2017 estimated)
- Re-roof buildings and structures with tile or fire resistant material.

Flood:

- Add drainage, elevate facilities and adjust sloping for facilities in low-lying areas and in natural waterways or floodplains.
- Encase sewer pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.

Earthquake:

- Develop a plan for short-term and intermediate-term sheltering of employees.
- Retrofit structures to higher seismic standards.

General Hazard (Fire/Flood/Earthquake):

- Retrofit existing buildings and facilities with connectors/ATS for emergency generators and/or install permanent emergency generators.

- Develop a plan for speeding the repair and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.
- Develop a plan for areas subject to high ground shaking, earthquake-induced ground failure, and surface fault rupture to determine a replacement schedule for pipelines (along with importance, age, type of construction material, size, condition, and maintenance or repair history).
- Install emergency power generators at district facilities.

C.5.3 3.4 Wastewater Treatment Plant

Fire:

- Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.
- Purchase and store water pumps capable of suppressing fire.

Flood

- Add drainage, elevate facilities and adjust sloping for facilities in low-lying areas and in natural waterways or floodplains.

Earthquake:

- Develop a plan for short-term and intermediate-term sheltering of employees.

C.5.4 3.5 Roads

Fire:

- Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.
- Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.(completed with continuous fresh of supplies and rotation)
- Clear vegetation from Road District facilities/yards

Flood:

- Upgrade culverts in all flood prone areas. Most existing culvert sizes were never designed for high water volume. Upgrading will prevent roadway washouts caused by water bypassing existing culverts.(Complete and continuous maintenance)
- Upgrade culvert sizes in Main Channels and replace old culverts in Main Channels as required.(complete and continuous maintenance)
- Slope stabilization at water crossing areas along roadways. This will prevent the loss of the roadways at these areas by preventing undermining by the water.
- Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.
- Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.
- Soil stabilization on roadway shoulders. This will prevent erosion caused by flood conditions.

- Soil stabilization of dirt roadways. This will help mitigate the loss of material from the roadway during flooding conditions.
- Employ on call contractors to assist in emergency situations.

Earthquake:
Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.
Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal. (Completed and refresh of supplies as needed)

C.5.5 3.6 Television Translator Districts

General Hazard (Fire, Flooding, Earthquake):

- Install and maintain emergency generators at all TV Translator sites. Newberry Springs, Lucerne Valley, and Morongo Valley TV Transmitter sites are in need emergency generators. Pinto and Elephant Mountain sites have existing generators. Installing emergency generators at these sites will enable emergency information to be disseminated to the residents living in these remote locations.(Complete and maintenance of upgrades)
- Establish a centralized communications network to monitor channel output for TV Districts and provide emergency information by way of character generator tied to channel transmissions.
- Conduct annual tower and guide wire inspections to mitigate storm/wind/earthquake hazards from knocking out communications.
- Install poly insulators on power poles with high voltage power lines for Pinto Mountain. Establish an open purchase order for a High Voltage Electrician to provide annual inspections of power poles and service lines.(Completed and continuous maintenance)
- Maintain roadways on mountaintops and within washes leading to remote tower sites. Earthquakes and flash floods can block roadways, making them impassable to restore emergency communications.
- Maintain lights on all tower locations.

C.5.6 3.7 Parks Districts

- Trim large trees in parks to avert limb breakage and toppling during storm events.
- Establish emergency centers to ration drinking water at various County Park Community Centers.
- Establish community garden plots in designated County Park areas as an ongoing and emergency food source, including planting fruit bearing trees.
- Conduct an inventory or list of County Park Facilities and Community Centers to establish a list of pre-designated emergency operations or disaster relief sites. Not all Community

Centers are an appropriate size to accommodate large numbers of evacuees and may only serve as command and control centers or distribution centers.

- Establish small solar energy fields or other forms of renewable power at County Community Centers to facilitate stand-alone emergency operations for the community.
- Conduct repair and replacement of old roofs, and clearing of gutters and roof drains to minimize potential damage from major storm events.(Completed and continuous maintenance)
- Conduct an evaluation or study of County Park and Community Center facilities to install curbs, retaining walls, and drains to carry or divert water away from buildings.
- Connect water systems to generators to ensure delivery even in disaster situations.
- Provide emergency supply of food and water for employees in disaster situations.

C.6 Special Districts Mitigation Project Prioritizing

Cost effectiveness of each measure was a primary consideration when developing mitigation actions. Because mitigation is an investment to reduce future damages, it is important to select measures for which the reduced damages over the life of the measure are likely to be greater than the project cost. For structural projects, the level of cost effectiveness is primarily based on the likelihood of damages occurring in the future, the severity of the damages when they occur, and the level of effectiveness of the selected measure. While detailed analysis was not conducted during the mitigation action development process, these factors were of primary concern when selecting measures. For measures that do not result in a quantifiable reduction of damages, such as public education and outreach, the relationship of the probable future benefits and the cost of each measure was considered when developing the mitigation actions.

Based upon the Special Districts capabilities, Table C-10 shows primary actions selected for further implementation and development during the next planning cycle. Table C-10 provides details for each mitigation action with mitigation action descriptions, FEMA mitigation category, responsible party, and timeframe.

Table C-10: Mitigation Project Prioritization and Implementation

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
All-Hazard	**AH Action 2.1:** Continue funding and support for Special Districts Projects relating to all hazards.	Continue funding and support for Special Districts Projects relating to water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District for all hazards. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
All-Hazard	**AH Action 2.2:** Install Generators at Critical Facilities	Retrofit existing buildings and facilities with connectors/ ATS for emergency generators and/or install permanent emergency generators at critical facilities, including wells and booster station locations.	ES, SP	TBD	Water Systems	TBD	Critical sites are already set up for connection or has a permanently installed generator
All-Hazard	**AH Action 2.3:** Water Systems Repair Plan	Develop a plan for speeding the repair of and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies.	PRV	SDD WAS	Water Systems	TBD	We have a warehouse and inventory. Add'l inventory would need to be purchased from local wholesaler
All-Hazard	**AH Action 2.4:** Smart Water Meters and SCADA	Utilization of SCADA and Smart Water Meters to get real time data on problems with the system and reduce drive time emissions as a result of traditional meter reading.	PRV	Individual CSAs	Water Systems	Ongoing	Both SCADA and Smart Meters have been installed and continue to be installed
All-Hazard	**AH Action 2.5:** Provide Employees with Emergency Supplies	Provide emergency supplies of food, water, and portable generators for employees at office and field locations.	ES	SDD/WAS	Water Systems	Ongoing	WAS has a stock of emergency food supplies, water, and generators.
All-Hazard	**AH Action 2.6:** Annual Tower and Guide Wire Inspections	Conduct annual tower and guide wire inspections to mitigate storm/wind/earthquake hazards from knocking out communications.	PRV	TBD	TV Districts	7/1/2016-7/1/2017	All Districts
All-Hazard	**AH Action 2.7**: Maintain Tower Lighting	Maintain lights on all tower locations.	SP	TBD	TV Districts	June-17	
All-Hazard	**AH Action 2.8:** Designate Emergency Operations Sites	Conduct an inventory or list of County Park Facilities and Community Centers to establish a list of pre-designated emergency operations or disaster relief sites. Not all Community Centers are an appropriate size to accommodate large numbers of evacuees and may only serve as command and control centers or distribution centers.	PRV	TBD	Park Districts	April-17	All Districts
All-Hazard	**AH Action 2.9:** Establish Power Sources for Emergency Operations Sites	Establish small solar energy fields or other forms of renewable power at County Community Centers to facilitate stand-alone emergency operations for the community.	PRV, SP	TBD	Park Districts	12/1/2016-7/1/2018	Lucerne Valley Joshua Tree
All-Hazard	**AH Action 2.10:** Connect Water Systems to Generators	Connect water systems to generators to ensure delivery even in disaster situations.	PRV, SP	TBD	Park Districts	TBD	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
All-Hazard	**AH Action 2.11:** Establish a Centralized Communications Network	Establish a centralized communications network to monitor channel output for TV Districts and provide emergency information by way of character generator tied to channel transmissions.	PRV	TBD	TV Districts	7/1/2017-12/1/2017	All districts
Wildfire	**WF Action 3.3:** Vegetation Removal	Clear vegetation from Road District facilities/yards	PRV	TBD	Roads	TBD	
Wildfire	**WF Action 6.3:** Protect Property in Wilderness Areas	Rockscape or pave property grounds which have structures located in wilderness and or areas prone to wildfires. Double the width of external fire breaks.	PPRO, PRV, SP	TBD	Sewer Systems	January-17	All sewer pump stations have paving
Wildfire	**WF Action 8.3:** Structural Fire Breaks Widening	Double the width of external fire breaks on grounds which have structures located in wilderness and or areas prone to wildfires.	SP, PRV	Individual CSAs	Water Systems	7/1/2017-7/19/2019	
Wildfire	**WF Action 9.1:** Continue funding and support for Special Districts Projects relating to wildfire.	Continue funding and support for Special Districts Projects relating to wildfire in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Wildfire	**WF Action 9.2:** Emergency Water Supplies	Purchase emergency water supply or water purification devices to ensure uninterrupted supply of water to emergency response personal.(completed with continuous fresh of supplies and rotation)	ES	TBD	Roads	TBD	
Earthquake	**EQ Action 2.2:** Seismic Strapping	Seismic strapping for existing water tanks and future construction.	SP, PRV	CSA 64	Water Systems	7/17/2017- 7/1/2019	Ongoing currently
Earthquake	**EQ Action 2.3:** Employee Emergency Sheltering	Develop a plan for short-term and intermediate-term sheltering of employees.	PRV	WAS	Sewer Systems	7/17/2017-7/19/2019	To purchase cots, small portable generators, tents, etc.
Earthquake	**EQ Action 4.2:** Generator Installation	Install generators at all road facilities. This will allow uninterrupted communications and provide power to refuel critical emergency response equipment.	SP, PPRO	TBD	Roads	TBD	
Earthquake	**EQ Action 6.1:** Continue funding and support for Special Districts Projects relating to earthquake hazards.	Continue funding and support for Special Districts Projects relating to earthquake hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Flood	**FL Action 3.4:** Soil Stabilization on Roadways and Along Roadway Shoulders	Soil stabilization on roadway shoulders and dirt roads. This will prevent erosion caused by flood conditions.	SP, PRV	TBD	Roads	TBD	

Hazard	Mitigation Action	Description / Background	Mitigation Strategy Type	Funding	Responsible Agency	Time Frame	Status / Comments / Implementation Mechanisms
Flood	**FL Action 3.5:** Encasing Pipelines	Encase water pipelines with specific sized rock, gravel, and road base in natural waterways to prevent continual washout or exposure during heavy storm events/floods.	SP, PRV	CSA 70 J	Water Systems	7/17/2017-7/1/2027	
Flood	**FL Action 6.1:** Continue funding and support for Special Districts Projects relating to flood hazards.	Continue funding and support for Special Districts Projects relating to flood hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Flood	**FL Action 6.2:** On Call Contractors	Employ on call contractors to assist in emergency situations.	PRV, ES	TBD	Roads	TBD	
Drought	**DR Action 3.1:** Continue funding and support for Special Districts Projects relating to drought hazards.	Continue funding and support for Special Districts Projects relating to drought hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Anti-Terrorism	**AT Action 2.1:** Continue funding and support for Special Districts Projects relating to terrorism hazards.	Continue funding and support for Special Districts Projects relating to terrorism hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	
Climate Change	**CC Action 3.1:** Continue funding and support for Special Districts Projects relating to climate change hazards.	Continue funding and support for Special Districts Projects relating to climate change hazards in the categories of water systems, sewer systems, wastewater treatment, roads, TV districts, park districts, Big Bear Valley Recreation Park District and Bloomington Recreation and Park District. For more information regarding these projects, see Annex C Section C.7.	VARIES	VARIES	VARIES	Ongoing	

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APPENDIX F

RIVERSIDE COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

COUNTY OF RIVERSIDE

Multi-Jurisdictional

Local Hazard Mitigation Plan

July 2018

  

Bruce Barton, Director

County of Riverside Emergency Management Department

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Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

Executive Summary

The purpose of the Riverside County Operational Area Multi-Jurisdictional Local Hazard Mitigation Plan is to identify the County's hazards, review and assess past disaster occurrences, estimate the probability of future occurrences and set goals to mitigate potential risks to reduce or eliminate long-term risk to people and property from natural and man-made hazards.

The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to achieve eligibility and potentially secure mitigation funding through Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance, Pre-Disaster Mitigation, and Hazard Mitigation Grant Programs.

Riverside County's continual efforts to maintain a disaster-mitigation strategy is on-going. Our goal is to develop and maintain an all-inclusive plan to include all jurisdictions, special districts, businesses and community organizations and to promote consistency, continuity and unification.

The County's planning process followed a methodology presented by FEMA and Cal-OES which included conducting meetings with the Operational Area Planning Committee (OAPC) coordinated by Riverside County Emergency Management Department comprised of participating Federal, State and local jurisdictions agencies, special districts, school districts, non-profit communities, universities, businesses, Tribal Leaders, Healthcare Facilities and general public.

The plan identifies vulnerabilities, provides recommendations for prioritized mitigation actions, evaluates resources and identifies mitigation shortcomings, provides future mitigation planning and maintenance of existing plan.

The plan will be implemented upon FEMA approval.

Plan Adoption/Resolution

The County and its participating jurisdictions will submit plans to Cal OES for review prior to being submitted to FEMA and will adhere to the recommended process. In addition, the County and its participants will wait to receive an "Approval Pending Adoption" before taking the plan to the local governing bodies for adoption. Upon approval, County and participating jurisdictions will insert signed resolution.

(See Appendix A for Draft Resolution)

Acknowledgments

County Board of Supervisors:
District 1 – Kevin Jeffries
District 2 – John F. Tavaglione
District 3 – Chuck Washington
District 4 – Manuel Perez
District 5 – Marion Ashley

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Sandy Olinga, Administrative Services Analyst I

Local Hazard Mitigation Plan External Steering Committee (OAPC)
Federal, State and Local Government, Special Districts, Tribal Leaders, Healthcare Facilities, Non-Governmental Organizations, Faith- based organizations, businesses, Emergency Services Coordinators and other key Stakeholders.

Local Hazard Mitigation Internal Planning Steering Committee
Cal OES
Agricultural Commissioner's Office
Environmental Health
Riverside County Animal Services
Riverside County Fire- CAL FIRE
Riverside County Flood Control
Riverside County Human Resources
Riverside County Office of Education
Riverside County University Health System
Riverside County Sheriff's Office
Riverside County Information Technology
Riverside County Transportation and Land Management Agency
SoCal Edison
SoCal Gas
NOAA

Jurisdictional Participation
Special thanks to the participating local jurisdictions and special districts for collecting and compiling historical disaster information, providing area hazard identification summaries and completing their stand-alone local hazard mitigation plans. The local hazard assessments and insight are very instrumental to incorporate mitigation actions in the Riverside County Multi-Jurisdictional Hazard Mitigation Plan

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Participant Annexes for 2017 Plan

Table 1: Annexes for 2017 Plan

Local City Jurisdictions		Tribes	
A-1	City of Banning		Agua Caliente Band of Cahuilla Indians - DROPPED OUT
A-2	City of Beaumont		
A-3	City of Blythe	A-27	Morongo Band of Mission Indians
A-4	City of Calimesa		Ramona Band of Indians - DROPPED OUT
A-5	City of Canyon Lake		
A-6	City of Cathedral	**Special Districts**	
A-7	City of Coachella	A-28	Beaumont Unified
A-8	City of Corona	A-29	Desert Sands USD
A-9	City of Desert Hot Springs	A-30	Eastern Municipal Water
A-10	City of Eastvale	A-31	Hemet Unified School District
A-11	City of Hemet	A-32	High Valley Water
A-12	City of Indian Wells	A-33	Idyllwild Fire Protection
A-13	City of Indio	A-34	Imperial Irrigation District
A-14	City of Jurupa Valley	A-35	Kaiser Hospital - Riverside
A-15	City of La Quinta	A-36	Lake Elsinore USD
A-16	City of Lake Elsinore		March Air Force Base – DROPPED OUT
A-17	City of Murrieta	A-37	Moreno Valley USD
A-18	City of Norco	A-38	Perris Union HSD
A-19	City of Palm Desert	A-39	Rancho California Water
A-20	City of Palm Spring	A-40	Riverside Community Colleges
A-21	City of Perris	A-41	Riverside County Office of Education
A-22	City of Rancho Mirage	A-42	Riverside Unified School District
A-23	City of Riverside	A-43	San Jacinto USD
A-24	City of Temecula	A-44	Santa Ana Watershed
A-25	City of San Jacinto	A-45	Western Municipal Water
A-26	City of Wildomar		

Appendices

APPENDIX A – Resolution Draft

APPENDIX B – Participating Jurisdictions and Letters of Commitment

APPENDIX C - Mitigation Action Table

APPENDIX D – Public Outreach Meetings

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Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

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Section 1.0 – Local Hazard Mitigation Plan

1.1 Plan Description

The 2017 Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP) was written with the assistance and cooperation of multiple departments within the County of Riverside and multiple cities, tribes and special districts. This plan is an update to the 2012 LHMP and reaffirms the commitment of the Riverside County Operational Area to reduce risks from natural and other hazards.

Since 1965, Riverside County has had 44 Federal Disaster Declarations. The most recent Federally Declared Disaster was in March, 2017 and was the result of winter storms and flooding. In addition, the county has experienced 22 Governor-Proclaimed State Disasters, with the most recent in February 2017. In 2016, Riverside County was impacted by earthquakes, floods, high winds, high heat and fires. These natural disasters will occur again, many on a yearly basis.

Riverside County cities, tribes, communities and special districts share the common goal of becoming a disaster resistant county.

1.2 Purpose of Plan and Authority

Disaster Mitigation Act of 2000 (DMA 2000) (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for State, local and Indian Tribal governments as a condition of mitigation grant assistance. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for State, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts. The requirement for a State Hazard Mitigation Plan (SHMP) is continued as a condition of disaster assistance, adding incentives for increased coordination and integration of mitigation activities at the State level. DMA 2000 also established a new requirement for local mitigation plans and authorized up to seven (7) percent of Hazard Mitigation Grant Program (HMPG) funds available to a State for development of State, local, and Indian Tribal mitigation plans.

The FEMA Mitigation and Insurance Strategic Plan for 2014-2018 identifies critical goals, objectives, and strategies to enhance the way FEMA carries out its mitigation and insurance mission. The plan is designed to help build and sustain collaboration with Federal, State, Tribal, Territorial, and community partners through a strategic framework that guides day-to-day work leading to more resilient communities nationwide.

The County of Riverside Emergency Management Department shares many of FEMA's goals and objectives including the following:

FEMA Objective 1.2: Provide support to local leaders and tribal officials to strengthen recovery and mitigation core capabilities

"Pursue a proactive approach in building stakeholder relationships FEMA Strategic Plan 2014–2018 with local leaders to help them better identify and address their disaster recovery challenges."

FEMA Objective 1.3: Increase disaster awareness and action by improving communication

"Pre-disaster preparedness communication aims to make the public aware of potential hazard risks and the steps they should take to stay safe when a disaster strikes."

FEMA Objective 4.3: Enhance the effectiveness, financial stability, and affordability of the National Flood Insurance Program

"The National Flood Insurance Program (NFIP) serves as a keystone for national efforts to reduce the loss of life and property from flood disasters…NFIP will explore ways to develop and implement more accurate methods of calculating risk, and place a greater emphasis on cost-effective mitigation as a way of lowering long-term expenses"

1.3 Grant Programs with Mitigation Plan Requirements

The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, United States Code (U.S.C.) 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor. The amount of HMGP funding available to the Applicant is based upon the total Federal assistance to be provided by FEMA for disaster recovery under the Presidential major disaster declaration.

The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA requires that the state, tribal, or local government applying for this form of assistance have adopted a hazard mitigation plan as a condition of receiving funding.

The Pre-Disaster Mitigation (PDM) program is authorized by Section 203 of the Stafford Act, 42 U.S.C. 5133. The PDM program is designed to assist States, Territories, Indian

Tribal governments, and local communities in implementing a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and mitigate structures during future hazard events, reducing reliance on Federal assistance during future disasters.

See section 7.4 for Fiscal Mitigation Capabilities

Section 322 of DMA 2000 specifically addresses mitigation planning at the state and local levels. It identifies new requirements that allow HMGP funds to be used for planning activities, and increases the amount of HMGP funds available to states that have developed a comprehensive, enhanced mitigation plan prior to a disaster. States and communities must have an approved mitigation plan on file prior to receiving post-disaster HMGP funds. Local and tribal mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to and the capabilities of the individual communities.

State governments have certain responsibilities for implementing Section 322, including:

- Preparing and submitting a standard or enhanced state mitigation plan
- Reviewing and updating the state mitigation plan every five years

Providing technical assistance and training to local governments to assist them in applying for HMGP grants and in developing local mitigation plans; and reviewing and approving local plans if the state is designated a managing state and has an approved enhanced plan.

DMA 2000 is intended to facilitate cooperation between state and local authorities. It encourages and rewards local and state pre-disaster planning and promotes sustainability as a strategy for disaster resistance. This enhanced planning network is intended to enable local and state governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects.

FEMA prepared an Interim Final Rule, published in the Federal Register on February 26, 2002 (44 CFR Parts 201 and 206), which establishes planning and funding criteria for states and local communities.

The Riverside County Operational Area Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP) supports the values and goals of the Federal Emergency Management Agency, and the California Office of Emergency Services. The 2013 State Hazard Mitigation Plan was used as a reference and source for relevant information and changes in the State of California Hazard Mitigation Planning process. The County of Riverside Emergency Management Department is also participating in the 2018 State Hazard Mitigation update planning process.

The 2013 State Hazard Mitigation Plan – An Enhanced State Mitigation Plan

The document is a comprehensive update of the 2010 SHMP. It performs the following functions:

1. Documents statewide hazard mitigation systems implemented in California
2. Describes strategies and priorities for future mitigation activities
3. Highlights new hazard mitigation initiatives since the 2010 SHMP
4. Describes and illustrates mitigation progress and success stories
5. Facilitates integration of local, state, tribal, and private sector hazard mitigation activities into a comprehensive statewide effort
6. Meets state and federal statutory and regulatory requirements for an enhanced State Mitigation Plan

Goals Shared with State Multi-Hazard Mitigation Plan

The Riverside Operational Area's LHMP goals are shared with the State of California 2018 Multi- Hazard Mitigation Plan.

Goal 1: Significantly reduce life loss and injuries

Goal 2: Minimize damage to structures and property, as well as interruption of essential services and activities

Goal 3: Protect the Environment

Goal 4: Promote hazard mitigation and community resilience as both integrated public policy and standard business practice

While the Disaster Mitigation Act of 2000 ("DMA 2000") requires that local communities address only natural hazards, the Federal Emergency Management Agency (FEMA) recommends that local comprehensive mitigation plans address man-made and technological hazards to the extent possible. In the 2012 Plan, Riverside OA addressed an expansive set of hazards. Upon review of the hazards since 2012, and the numbers of man-made incidents, the OA will continue to address the large set of man-made, technological and natural hazards. Communication Failure and Cyber Attacks have been added to the 2017 list of hazards.

In developing the original 2005 hazard list, the goal was to create a list by identifying as many hazards as could be found in the county. This list was used as part of the planning process. Some of the disasters identified on the list were found to have a limited amount of supporting information about the potential impact, specific locations in the county where the hazard might arise, and the magnitude of that hazard on the economy, infrastructure, and residents of the County.

The 2012 update used the 2005 hazard list as a reference. The hazards were reassessed to ensure that the threat of the hazard was still viable. The same process was used for the 2017 plan update. The 2017 LHMP Steering Committee met to address each hazard individually. Probability, severity, health systems impact, and mitigation capabilities were all taken into consideration while reorganizing the hazard ranking.

Support of Broader County Vision

The Riverside County Operational Area Multi-Jurisdictional LHMP supports the broader vision and values of the County of Riverside, along with the cities, special districts, and Tribal Leaders within the County. As stated in Riverside County General Plan of December 2015, Riverside County's vision is summarized by saying:

"Riverside County is a family of special communities in a remarkable environmental setting."

The values embodies in the General Plan vision are:

"Our vision is based on values that provide the foundation for common ground that, in turn; underpin the General Plan's goals, policies, and actions. The people of Riverside County declare that they join together in holding the following values and seeking a community future based on them. It can be argued that our values are optimistic and very ambitious: that they require our best instincts to prevail. Of course-why would we seek less in shaping our communities? So, with that theme in mind, let us express the values that have motivated our community building and that will continue to do so in the future."

- Community
- Health
- Inter-relatedness
- Rights
- Responsibilities
- Risks
- Diversity
- Equity
- Valued Contributions
- Varied Communities
- Balance
- Participation
- Volunteerism
- Decision Making
- Creativity and Innovation
- Distinctiveness
- Livable Centers
- Housing
- Natural Environment
- Man-made Environment
- Multi-Modal Transportation
- Employment

- Safety
- Planning Integration
- Communication and Information
- Quality Management
- Sustainability
- Recreation
- Healthy Food
- Costs
- Governmental Cooperation
- Youth in the Community

Riverside County Emergency Management Department Mission

The Riverside County Operational Area Multi-Jurisdictional LHMP supports the mission of the Emergency Management Department, through focusing efforts on mitigation actions intended to lessen the impact of natural, man-made, and technological disasters.

EMD Mission:

The mission of the Riverside County Emergency Management Department is to be a leader in emergency management to ensure the safety and security of the residents and visitors of Riverside County and to facilitate and support County Government and stakeholder efforts to mitigate, prepare for, respond to, and recover from natural and human caused emergencies and disasters.

The EMD Director expands on this Mission by stating:

"The Riverside County Emergency Management Department is comprised of dedicated personnel who strive to ensure the safety and security of the residents, businesses and visitors of Riverside County"

1.4 Multi-Jurisdictional Participants

Table 2: Multi-Jurisdictional Participants

Local City Jurisdictions	*City of San Jacinto
*City of Banning	*City of Temecula
*City of Beaumont	*City of Wildomar
*City of Blythe	**Tribes**
*City of Calimesa	Morongo Band of Mission Indians
*City of Canyon Lake	**Special Districts**
*City of Cathedral	*Beaumont Unified School District
*City of Coachella	Desert Sands Unified School District
*City of Corona	Eastern Municipal Water District
*City of Desert Hot Springs	*Hemet Unified School District
*City of Eastvale	*High Valley Water District
*City of Hemet	*Idyllwild Fire Protection District
*City of Indian Wells	*Imperial Irrigation District
*City of Indio	Kaiser Hospital - Riverside
*City of Jurupa Valley	*Lake Elsinore Unified School District
*City of La Quinta	Moreno Valley Unified School District
*City of Lake Elsinore	*Perris Union High School District
*City of Murrieta	*Rancho California Water District
*City of Norco	*Riverside Community College
*City of Palm Desert	*Riverside County Office of Education
*City of Palm Spring	*Riverside Unified School District
*City of Perris	*San Jacinto Unified School District
*City of Rancho Mirage	Santa Ana Watershed
*City of Riverside	*Western Municipal Water District

*Participated in 2012 Plan

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
July 2018

2017 Cities, Tribes and Special Districts

In the 2005 plan we had a total of 53 cities and special districts that participated: 24 Cities, 1 Tribe, 10 Hospitals, 8 School Districts and 10 special districts.

In the 2012 plan we had a total 53 cities and special districts that participated: 27 Cities, 1 Community Service District, 14 School District/Education, 1 Fire Protection District, 1 Hospital, 1 Sanitary District and 8 Water Districts.

In the 2017 plan, we have a total of 45 cities, special districts and tribes that participated: 26 Cities, 1 Tribe, 10 School District/Education, 1 Hospital, 1 Fire Protection District and 7 Special Districts.

The decrease in participation for the 2017 plan is primarily economic. Several previous participants had expressed that budget cuts have affected their staff and level of dedication participating mitigation efforts with in their jurisdictions.

Section 2.0 – Community Profile

2.1 History

Taking its name from the City of Riverside, the county was formed in 1893 from a small portion of San Bernardino County and a larger part of San Diego County.

Although the county marks its political beginnings in 1893, the land was occupied long before Europeans and their descendants entered the areas, by several Native American groups including the Serranos, the Luisenos, the Cupenos, the Chemehuevi, and the Cahuillas.

When Spain claimed California from the Native Americans the Spaniards began putting a series of missions in what was then called Alta California. The San Gabriel mission claimed lands in what are now Jurupa, Riverside, San Jacinto, and the San Gorgonio Pass, while the San Luis Rey mission claimed land in what are now Lake Elsinore, Temecula, and Murrieta. These lands were used for grazing of the large herds of cattle and sheep that belonged to the missions. In 1776, and again in 1778, Juan Bautista de Anza, an army captain charged with discovering an overland route from the Mexican state of Sonora to San Gabriel and Los Angeles, passed through much of Riverside County and described fertile valleys, lakes, and sub-desert areas.

In 1822, Mexico successfully revolted against Spain, and California came under Mexican jurisdiction. The missions and their lands were secularized beginning in 1834 and the land was transferred as "grants" to Californians who were citizens of Mexico. The "grants" were called ranchos, and many of the ranchos in Riverside County have lent their names to modern-day locales - Jurupa, San Jacinto, San Gorgonio, Temecula, and La Laguna (Lake Elsinore). The first land grant in what is now Riverside County, Rancho Jurupa, was given to Juan Bandini in 1838.

With the advent of the transcontinental railroad in 1869, land speculators, developers, and colonists came to Southern California. The first colony in what would become Riverside County was Riverside itself. Judge John Wesley North brought a group of associates and co-investors out to Southern California, and founded Riverside on part of the Jurupa Rancho.

By the late 1880's and early 1890's, there was growing discontent between Riverside and San Bernardino, its neighbor 10 miles to the north. There were many differences between the two towns. San Bernardino was predominantly Democratic in nature, allowed saloons, and had been a hot-bed of secessionist sympathy during the Civil War. Riverside was temperance minded (few saloons if any were allowed in Riverside proper) and Republican. After a series of charges about unfair use of tax monies to the benefit

of the City of San Bernardino only, several people from Riverside decided to investigate the possibility of a new county. Joined by San Diego County residents in the Temecula and San Jacinto Valleys and the desert region who were tired of living so far from their county seat, they petitioned the State legislature, held an election, and on May 9, 1893 the County of Riverside officially formed.

The County's early years were linked to the agriculture industry. The navel orange tree was planted and found to be such a success that full-scale planting started. By the time of Riverside County's formation, Riverside had grown to become the wealthiest city per capita in the country, due to the riches of the navel orange.

Further residential developments in Riverside County included Banning and Beaumont in the San Gorgonio Pass; Hemet south of San Jacinto; Moreno Valley east of Riverside; Perris, Lake Elsinore, Murrieta and Temecula along the California Southern Railroad; Palm Springs, Palm Desert, Indio and Coachella along the Southern Pacific route to Yuma; and Blythe on the Colorado River.

The last 35 years have brought dramatic population growth to Riverside County. Between 1980 and 1990, the number of residents grew by over 76% making Riverside the fastest-growing County in California. By 1992, the County was "home" to over 1.3 million residents. The County experienced a growth rate of 7.8 percent from 2010-2015.

The U.S. Census Bureau 2016 estimates show that the County has nearly doubled its population in the last 25 years with the current population at 2.4 million residence. The County population is now larger than that of 16 states, among them, Alaska, Hawaii, Maine, New Mexico, and West Virginia.

2.2 Geography and Climate

Riverside County is the fourth largest county in the State of California, stretching nearly 200 miles west to east and comprising over 7,200 square miles of fertile river valleys, low deserts, mountains, foothills, and rolling plains. Riverside County shares borders with densely populated Orange, San Diego, San Bernardino and Imperial Counties. The County extends from within 14 miles of the Pacific Ocean, as the crow flies, to the Colorado River and La Paz County, Arizona.

Geographically

Riverside County is mostly desert in the central and eastern portions of the county, and has a Mediterranean climate in the western portion of the County. The County lies inland of Los Angeles County and is bordered by Orange County to the west, San Bernardino County to the north, and San Diego County and Imperial County to the south.

Riverside County extends from the Santa Ana River at the eastern end of the Los Angeles basin, eastward to the Colorado River. It includes the desert regions of the Coachella Valley and Palm Springs, as well as the San Jacinto, Little San Bernardino and Santa Rosa mountains. It contains portions of Anza-Borrego Desert State Park and Salton Sea State Recreation Area, as well as most of Joshua Tree National Park. Riverside County has five nationally protected areas: the Cleveland National Forest, Coachella Valley National Wildlife Refuge, and Joshua Tree National Park, a portion of the San Bernardino National Forest and the Santa Rosa and San Jacinto Mountains National Monument. The county has visitors all year round because of the varied climates and ability to visit mountains and deserts all in one day.

The county has a total area of 7,303.13 square miles (18,915.0 km2), of which 7,207.37 square miles (18,667.0 km2) (or 98.69%) is land and 95.76 square miles (248.0 km2) (or 1.31%) is water. At roughly 180 miles (290 km) wide in the east-west dimension, the area of the county is massive. Riverside County is roughly the size of the State of New Jersey in total area. The Colorado River town of Blythe is a three-hour drive from the county seat, Riverside.

There are at least three geomorphic provinces: the Inland Empire western portion, the Santa Rosa Mountains communities and the desert region. Other possible subdivisions include tribal lands, the Colorado River communities, and the Salton Sea. The Inland Empire area of southern California is made up of the western portion of Riverside County.

Geographically from east to west, Riverside County is mostly desert, with high heat in the summer and comfortable weather in the winter. Most of Joshua Tree National Park is located in the eastern part of the county. Elevations range from 11,499 feet (3,505 m) at the top of the San Gorgonio Mountain to 220 ft. (-67.1 m) below sea level at the Salton Sea. As you move towards the west, the San Jacinto Mountains separate the desert from the valleys. The summit of Mount San Jacinto stands 10,834 feet above sea level, and the San Jacinto Mountains are the second highest mountain range in Southern California. The Santa Ana River travels from Mt. San Gorgonio for nearly 100 miles (160 km) through San Bernardino, Riverside, and Orange counties before it eventually spills into the Pacific Ocean at Newport Beach and Huntington Beach. The western portion of the county has a Mediterranean climate and is the most densely populated area. The Santa Rosa Mountains, as well as the Southern California portion of the Sonoran Desert, physically divide Riverside County from San Diego County.

Riverside County is home to a variety of endangered and protected species. Skillful planning and negotiation have resulted in the creation of several large habitat preserves, and the development of a multi-species habitat protection plan (MSHCP) for the western County area. The Plan protects 146 native species of plants, birds and animals and

covers 1.26 million acres. The County is also participating in a MSHCP with the Coachella Valley Association of Governments in the Coachella Valley and surrounding mountains.

Famous resort cities of the Coachella Valley such as Indian Wells, La Quinta, Rancho Mirage, Palm Springs and Palm Desert are located in Riverside County. Riverside County is also home to many famous concerts and tournaments. The Coachella Valley Music and Arts Festival is a two weekend event that attracts 198 thousand attendees and affects the local economy by over 84 million dollars a year. Stagecoach is a country music festival that attracts about 190 thousand over a three day period. The BNP Paribas Open is the largest professional combined ATP and WTA tennis tournament in the world. It houses 96 single players and 32 teams within the two stadiums.

Another factor that brings people into Riverside County is the agriculture. There is an influx of farm workers according to the crop. Indio is the center of an important date growing region.

In the Desert areas, there is an increase in population during the winter by “Snow Birds”. Many of the desert visitors are elderly or retired, and may have Access and Functional Needs requirements. The term snowbird is used to describe people from the U.S. Northeast, U.S. Midwest, or Canada who spend a large portion of winter in warmer locales such as California, Arizona, Florida, Texas, the Carolinas, or elsewhere along the Sun Belt region of the southern and southwest United States, Mexico, and areas of the Caribbean.

Snowbirds are typically retirees, and business owners who have a second home in a warmer location or whose business can be easily moved from place to place, such as flea market and swap meet vendors. Some snowbirds carry their homes with them, as campers (mounted on bus or truck frames) or as boats following the east coast Intracoastal water-way.

Climate

On average, there are 272 sunny days per year in Riverside County. The County average July high is around 95 degrees and the January low is 43. Riverside County has on average 10 inches of rain per year. The US average is 37. Riverside County average snowfall is one (1) inch. The average US city gets 25 inches of snow per year. The number of days with any measurable precipitation is 30.

Figure 1: Riverside County Climate

Climate	Riverside, CA	United States
Rainfall (in.)	10.3	36.5
Snowfall (in.)	0.003	25
Precipitation Days	20	100
Sunny Days	277	205
Avg. High	92.8	86.5
Avg. Low	41.6	20.5
UV Index	5.7	4.3
Elevation ft.	1,231	1,060

*Chart is current as of December 2016

The information regarding the averages of the county does not accurately reflect the drastic differences in climate between the East and West portions of the county. The East County climate is a hot desert atmosphere. It faces average highs in the summer months that reach into the 100's. The West County however, stays closer to the low 90's. The following charts represent the two sides of the county:

Figure 2: East County Average Annual Temperature

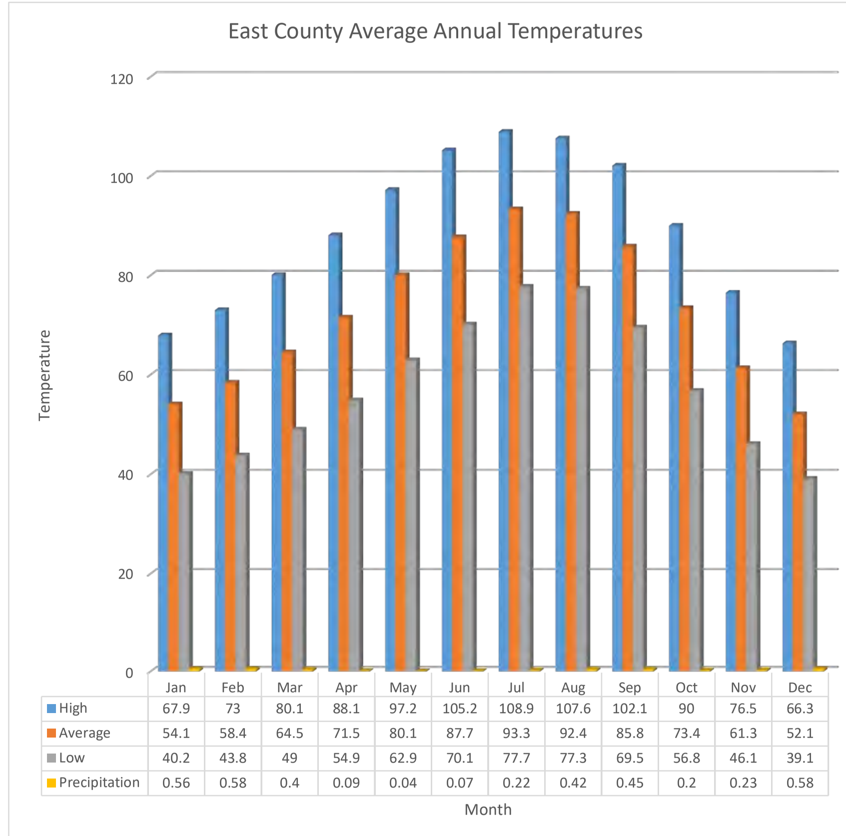
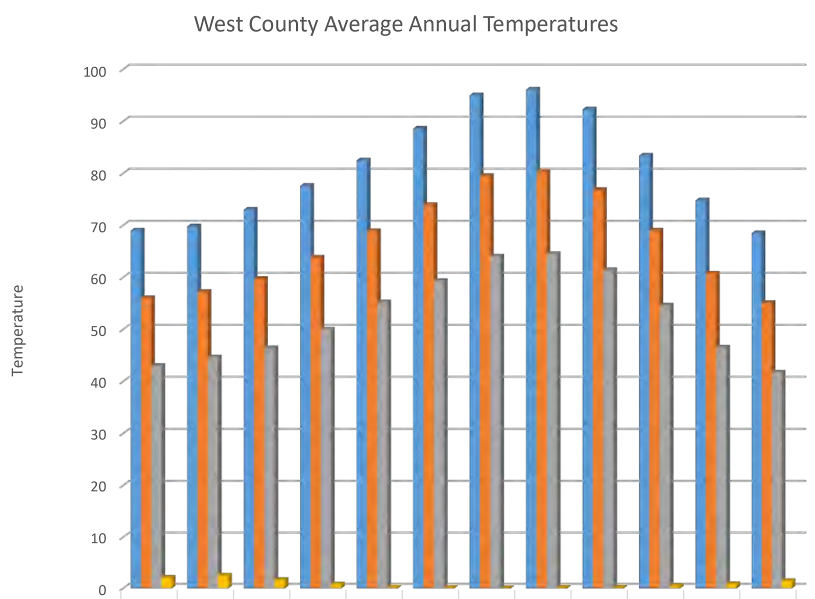


Figure 3: West County Average Annual Temperature



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	69	69.8	73	77.6	82.5	88.6	95	96.1	92.3	83.4	74.8	68.5
Average	56	57.2	59.7	63.8	68.9	73.9	79.5	80.3	76.8	69	60.7	55.1
Low	43	44.6	46.4	50	55.2	59.3	64	64.5	61.4	54.6	46.5	41.7
Precipitation	2.09	2.51	1.66	0.77	0.15	0.08	0.04	0.11	0.13	0.51	0.83	1.45

Month

*Charts are based on the most current information gathered from NOAA as of May 2017
Source:
http://www.bestplaces.net/climate/city/california/riverside
https://www.ncdc.noaa.gov/cdo-web/datatools/normals

2.3 Population Trends

Population growth in Riverside County has been quite rapid over the past two decades as can be seen in Figure 3 on the next page. According to the California Department of Finance, the population grew from approximately 1.2 million 1990 to nearly 2.3 million as of January 1, 2016. During this period, the county's population nearly doubled, making it one of the fastest growing counties in California.

Figure 4: Unincorporated Area Population

RIVERSIDE COUNTY

7,295.6 sq.miles — Incorporated in 1893

POPULATION CHARACTERISTICS

Population	
1970	459,074 (*1)
1980	663,166 (*1)
1990	1,170,413 (*1)
1995	1,365,500 (*2)
1996	1,391,800 (*2)
1997	1,420,600 (*2)
1998	1,451,400 (*2)
1999	1,490,500 (*2)
2000	1,545,387 (*1)
2001	1,589,708 (*2)
2002	1,655,291 (*2)
2003	1,730,219 (*2)
2004	1,814,485 (*2)
2005	1,895,695 (*2)
2006	1,975,913 (*2)
2007	2,049,902 (*2)
2008	2,102,741 (*2)
2009	2,140,626 (*2)
2010	2,189,641 (*1)
2011	2,205,731 (*2)
2012	2,227,577 (*2)
2013	2,255,059 (*2)
Projections	
2020	2,595,259 (*3)
2035	3,354,958 (*3)

2013 Racial & Ethnic Population (*4)

	Number	Percent
White	904,279	40.1%
African American	135,304	6.0%
Asian	130,793	5.8%
Amer Indian/Alaska Native	11,275	0.5%
Hawaiian and Pac Islander	6,765	0.3%
Some Other Races	6,765	0.3%
Two or More Races	45,101	2.0%
Hispanic*	1,014,777	45.0%
Total	2,255,059	100.0%

* Hispanic can be of any race

Vital Statistics (*5)

Year	Total Births	Birth Rate*	Total Death	Death Rate*
2009	31,512	14.7	13,747	6.4
2010	29,417	11.2	13,971	6.3
2011	30,609	13.9	14,638	6.6
2012	30,427	13.6	14,739	6.6

* Rates per 1,000 population

2013 Voter Registration (*6)

	Number	Percent
Democrat	340,932	35.9%
Republican	377,774	41.7%
Other	45,466	4.6%
No Party Preference	169,784	17.7%
Total Registered	933,956	100.0%

2013 Population by Age (*4)

	Number	Percent
< 5	170,643	7.6%
5-9	172,958	7.7%
10-14	184,825	8.2%
15-19	191,278	8.5%
20-24	157,741	7.0%
25-34	291,743	12.9%
35-44	308,615	13.7%
45-54	298,117	13.2%
55-59	116,524	5.2%
60-64	98,312	4.4%
65-74	142,726	6.3%
75-84	90,836	4.0%
85+	30,740	1.4%
Total	2,255,059	100.0%

Median Age: 33.5

2013 Population by Sex (*4)

	Number	Percent
Male	1,123,019	49.8%
Female	1,132,040	50.2%
Total	2,255,059	100.0%

Sources: (*1) Decennial Census, US Census Bureau
(*2) January Estimate, CA State Department of Finance
(*3) Riverside County Projections 2010 (RCP10)
(*4) American Community Survey 2007-2011 5-Year Estimates and CA State Department of Finance
(*5) Riverside County Department of Public Health
(*6) California Secretary of State, February 2013
Note: Totals might not add up due to rounding.

*Chart was developed by Riverside County GIS in 2013 and is the most current information available

Source:
http://gis.rivcoit.org/Portals/0/Documents/rcd/progress_reports/pr_2013/riverside_county.pdf

Figure 5: Historical Population Estimates for Riverside County Cities

Riverside County Center for Demographics

Riverside County Economic Development Agency
P.O. Box 1180 * Riverside, CA 92502 * (951) 955-8916

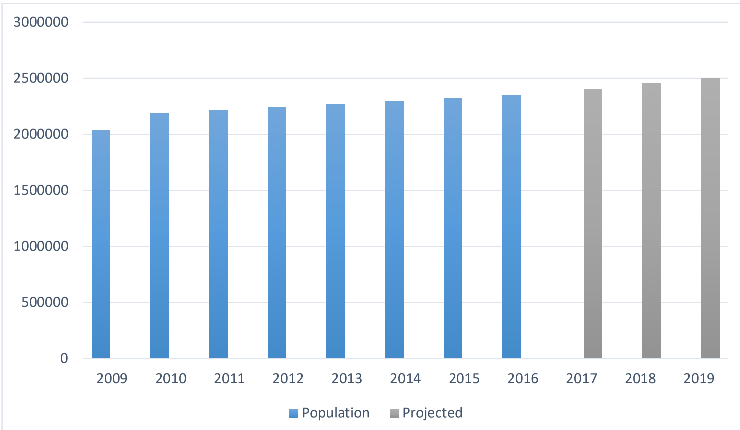
RIVERSIDE COUNTY
Historical Population Estimates, with 2010 Census Counts

City	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Banning	29,603	29,818	30,133	30,332	30,483	30,659	30,834			
Beaumont	36,877	38,201	39,359	40,666	41,864	43,601	45,118			
Blythe	20,817	20,121	20,570	19,894	19,305	19,254	19,813			
Calimesa	7,879	7,923	7,956	7,932	8,040	8,138	8,289			
Canyon Lake	10,561	10,623	10,629	10,543	10,564	10,608	10,681			
Cathedral City	51,200	51,604	52,485	53,163	53,480	53,859	54,261			
Coachella	40,704	41,517	42,426	43,676	44,614	45,001	45,407			
Corona	152,374	153,665	156,178	159,469	162,000	163,317	164,659			
Desert Hot Springs	25,938	27,393	27,973	28,385	28,605	28,794	29,048			
Eastvale	*	54,263	55,881	57,458	59,375	60,825	63,162			
Hemet	78,657	79,412	79,489	78,842	79,176	79,548	80,070			
Indian Wells	4,958	5,012	5,103	5,199	5,265	5,336	5,412			
Indio	76,036	77,168	79,185	83,450	84,655	86,683	88,058			
Jurupa Valley	*	*	95,970	95,731	96,025	96,898	98,177			
Lake Elsinore	51,821	52,484	53,457	56,039	57,368	59,142	61,006			
La Quinta	37,467	37,784	38,100	38,156	38,720	39,311	39,977			
Menifee	77,519	79,472	81,540	83,885	85,455	87,286	89,004			
Moreno Valley	193,365	195,200	198,353	200,889	202,191	203,696	205,383			
Murrieta	103,466	104,636	107,214	110,183	111,226	112,576	113,795			
Norco	27,063	27,062	27,314	27,048	27,037	26,392	26,896			
Palm Desert	48,445	48,957	48,924	48,282	48,494	48,835	49,335			
Palm Springs	44,552	44,943	45,326	45,465	45,818	46,204	46,654			
Perris	68,386	69,693	70,307	70,700	71,743	72,476	73,722			
Rancho Mirage	17,218	17,454	17,583	17,685	17,783	17,920	18,070			
Riverside	303,871	307,207	311,332	316,162	318,511	321,655	324,696			
San Jacinto	44,199	44,616	45,385	46,216	46,649	47,087	47,656			
Temecula	100,097	101,507	103,133	104,145	105,368	107,794	109,064			
Wildomar	32,176	32,543	33,050	33,685	34,271	34,758	35,168			
Incorporated	1,685,249	1,760,278	1,884,355	1,913,280	1,934,085	1,957,653	1,983,415			
Unincorporated	504,392	452,596	355,360	353,269	357,008	360,271	364,413			
County Total	2,189,641	2,212,874	2,239,715	2,266,549	2,291,093	2,317,924	2,347,828			

Source: California Department of Finance

*Current as of May 2017

Figure 6: Riverside County Population Growth - 2009 – 2019



Source: Riverside County Center for Demographics 2017

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
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Table 3 below displays Riverside County's population change and the components of this population change from 1971 through a projection of 2020. Net migration (in-migration minus out-migration) has accounted for the majority of the of the population growth for Riverside County for the past four (4) decades.

Population growth has slowed in recent years, but remained relatively high in 2016 at roughly 1.3 percent. Migration continues to be positive in the County, though at slower rates than early in the decade. Population growth will accelerate over the forecast, but does not approach the previous peak levels.

Table 3: Riverside County Population Change (1971-2020)

RIVERSIDE COUNTY

AVERAGE ANNUAL COMPONENTS OF POPULATION CHANGE

YEAR 1971 - 2010

Years	Change	Births	Deaths	Natural Increase	Net Migration	Net Migration % of Change
1971-75	14580	7602	4960	2642	11938	82%
1976-80	27060	9657	5844	3812	23248	86%
1981-85	33320	13436	7001	6435	26885	81%
1986-90	70380	19310	8691	10679	59761	85%
1991-95	38108	25154	10205	14949	23159	61%
1996-00	36055	23597	11538	12060	23995	67%
2001-05	72862	27475	13088	14387	58475	80%
2006-10	47529	32969	14145	18824	28705	60%
2011-15	23460	30538	15777	14761	22530	96%
2016-20	31471	30303	16474	13829	24883	79%

Source: CA Department of Finance 2016

2.4 Economy

California Department of Transportation Long-Term Social-Economic Forecast: Riverside

Riverside County is the fourth largest county in California in terms of total land area. Riverside County has a population of 2.3 million people and a total of 649,700 wage and salary jobs. The income per capita is $35,495, and the average salary per worker is $52,144.

In 2015, total employment increased by 2.6 percent across Southern California. Riverside County added a total of 27,200 jobs, representing a growth rate of 4.4 percent. The unemployment rate improved rapidly, falling from 8.3 percent in 2014 to 6.7 percent in 2015.

In 2015, job growth was strongest in construction (+4,600 jobs), education and healthcare (+4,500 jobs), leisure and hospitality (+3,800 jobs), and transportation and warehousing (+3,300 jobs). Job losses were not observed in any major sector.

Over the past five years, the population has increased at an average annual rate of 1.2 percent. A substantial portion of this growth was the result of net migration, as an average of 12,200 each year.

Forecast Highlights

- In 2016, total wage and salary employment will increase by 3.0 percent. From 2016 to 2021, total employment will grow at an annual average rate of 1.6 percent.
- Average salaries are currently below the California state average, and will remain so over the foreseeable future. In Riverside County, inflation-adjusted salaries are forecasted to rise by an average of 1.0 percent per year between 2016 and 2021.
- From 2016 to 2021, employment growth will be broad-based, as most sectors will increase by at least 1.5 percent per year. The strongest growth will be observed in education and healthcare, retail trade, and professional services. Combined, these industries will account for 54 percent of net job growth.
- The population is expected to increase by 1.3 percent in 2016. Annual growth in the 2016-2021 period is expected to average 1.5 percent.
- Net migration will gradually increase. An average of 24,883 net migrants are projected to enter the county each year between 2016 and 2021.

- Real per capita income is expected to rise by 2.0 percent in 2016, and increase by an average of 0.9 percent per year between 2016 and 2021.
- Total taxable sales are projected to increase by an average of 2.6 percent per year over the next five years.
- Industrial production will rise by 3.3 percent in 2016. From 2016 to 2021, the growth rate of industrial production is expected to average 2.5 percent per year.

Source: http://www.dot.ca.gov/hq/tpp/offices/eab/index_files/2016/Riverside2016.pdf

Figure 7: Riverside County Economic and Labor Force Characteristics

RIVERSIDE COUNTY

ECONOMIC AND LABOR FORCE CHARACTERISTICS

Labor Force Participation (*1)

Year	Labor Force	Employed	Unemployed	Unemployment Rate
2007	903,800	849,400	54,300	6.0%
2008	912,100	834,700	77,400	8.5%
2009	916,600	793,600	123,000	13.4%
2010	913,800	779,500	134,300	14.7%
2011	938,400	810,600	127,800	13.6%
2012	937,300	824,500	112,700	12.0%
2013*	944,500	828,800	115,600	12.2%

* Preliminary August 2013

2011 Employment/Jobs by Industry Sector (*2)

Agriculture, Forestry, Fishing and Hunting	13,783
Mining, Quarrying, and Oil and Gas Extraction	405
Utilities	4,488
Construction	33,602
Manufacturing	39,733
Wholesale Trade	22,625
Retail Trade	82,169
Transportation and Warehousing	20,453
Information	7,105
Finance and Insurance	10,944
Real Estate and Rental and Leasing	7,613
Professional, Scientific, and Technical Services	18,789
Management of Companies and Enterprises	2,937
Administration & Support, Waste Mngt and Remediation	35,130
Educational Services	67,761
Health Care and Social Assistance	61,087
Arts, Entertainment, and Recreation	19,543
Accommodation and Food Services	68,997
Other Services (excluding Public Administration)	29,384
Public Administration	34,922
Total All Jobs	**581,470**

*Jobs within county

Employment/Jobs Projections (*3)

2020	927,300
2035	1,285,284

* Jobs within county

Median Household Income

2000	$ 42,887 (*4)
2011	$ 58,365 (*5)

Taxable Sales in 1,000s of Dollars (*6)

Year	Total
2003	$21,709,135
2004	$25,237,148
2005	$28,256,491
2006	$29,816,237
2007	$29,023,609
2008	$26,003,595
2009	$22,227,877
2010	$23,152,780
2011	$25,641,497

Sources: (*1) CA Employment Development Department (County residents working anywhere. Data are not seasonally adjusted)
(*2) U.S. Census Bureau Local Employment Dynamics
(*3) Riverside County Projections 2010 (RCP10)
(*4) Decennial Census, US Census Bureau (in 1999 inflation-adjusted dollars)
(*5) 2007-2011 American Community Survey 5-Year Estimates (in 2011 inflation-adjusted dollars)
(*6) State Board of Equalization
Note: Totals might not add up due to rounding.

*Chart was developed by Riverside County GIS in 2013 and is the most current information available

Source:
http://gis.rivcoit.org/Portals/0/Documents/rcd/progress_reports/pr_2013/riverside_county.pdf

Figure 8: Annual Labor Force and Employment Averages

EDA

Riverside County Economic Development Agency
P.O. Box 1180 * Riverside, CA 92502 * (951) 955-8916

ANNUAL LABOR FORCE AND EMPLOYMENT AVERAGES
County of Riverside

Year	Civilian Labor Force	Employment	Unemployment Number	Unemployment Percent
1999	691,500	653,600	37,900	5.5
2000	680,700	644,200	36,500	5.4
2001	711,100	672,000	39,100	5.5
2002	750,400	701,800	48,600	6.5
2003	781,700	730,700	51,100	6.5
2004	820,900	771,600	49,300	6
2005	854,300	808,100	46,100	5.4
2006	886,300	841,700	44,600	5
2007	907,400	852,900	54,500	6.0
2008	916,700	838,800	77,900	8.5
2009	916,600	793,600	123,000	13.4
2010	913,400	779,100	134,300	14.7
2011	938,400	810,600	127,800	13.6
2012	944,500	828,800	115,600	12.2
2013	953,200	855,300	97,900	10.3
2014	1,011,500	928,200	83,400	8.2
2015	1,035,200	965,500	69,600	6.7
2016	1,047,800	983,800	64,000	6.1

2016 Monthly Labor Force and Employment Data **
County of Riverside

Month	Civilian Labor Force	Employment	Unemployment Number	Unemployment Percent
January	1,041,000	979,400	61,600	5.9
February	1,041,100	979,600	61,400	5.9
March	1,041,400	980,000	61,400	5.9
April	1,036,500	977,300	59,300	5.7
May	1,033,500	978,000	55,500	5.4
June	1,044,300	974,500	69,800	6.7
July	1,049,600	974,600	75,000	7.1
August	1,050,500	978,300	72,200	6.9
September	1,053,800	985,800	68,000	6.5
October	1,059,800	993,200	66,600	6.3
November	1,062,500	1,002,300	60,200	5.7
December*	1,059,400	1,002,900	56,500	5.3

* Preliminary data

** Labor force data for all geographic areas now reflect the March 2012 benchmark and Census 2010 population controls at the state level.

Source: State of California Employment Development Department.

https://www.rivcoeda.org/LinkClick.aspx?fileticket=POJLaM6rSMQ%3d&tabid=1110

Figure 9: County of Riverside Major Employers

Riverside County Economic Development Agency
P.O. Box 1180 * Riverside, CA 92502 * (951) 955-8916

Major Employers			
County of Riverside			
Employer	Number of Employees	Location	Description
County of Riverside	21,984	Countywide	County Government
March Air Reserve Base	8,500	March ARB	Military Reserve Base
University of California, Riverside	8,306	Riverside	University
Amazon	7,500	Moreno Valley	E-retailer
Stater Bros. Markets	6,900	Countywide	Supermarkets
Kaiser Permanente Riverside Medical Center	5,300	Riverside	Hospital
Corona-Norco Unified School District	5,098	Corona	School District
Desert Sands Unified School District	4,202	La Quinta	School District
Riverside Unified School District	3,973	Riverside	School District
Pechanga Resort & Casino	3,931	Temecula	Resort Casino
Riverside University Health System - Medical Center	3,600	Moreno Valley	Hospital
Hemet Unified School District	3,468	Hemet	School District
Moreno Valley Unified School District	3,454	Moreno Valley	School District
Eisenhower Medical Center	3,365	Rancho Mirage	Hospital
Morongo Casino, Resort & Spa	3,359	Cabazon	Resort Casino
Temecula Valley Unified School District	2,951	Temecula	School District
Lake Elsinore Unified School District	2,539	Lake Elsinore	School District
City of Riverside	2,500	Riverside	City Government
JW Marriott Desert Springs Resort & Spa	2,304	Palm Desert	Resort & Spa
Palm Springs Unified School District	2,243	Palm Springs	School District
Coachella Valley Unified School District	2,209	Thermal	School District
Agua Caliente Band of Cahuilla Indians	2,152	Palm Springs	Tribal Government/Casinos
Jurupa Unified School District	2,144	Jurupa Valley	School District
Murrieta Valley Unified School District	2,128	Murrieta	School District
Alvord Unified School District	2,113	Riverside	School District
Riverside Community Hospital	2,017	Riverside	Hospital
Abbot Vascular	2,000	Temecula	Medical & Surgical Instruments Manufacturer
Riverside Community College District	1,965	Riverside	Community College District
Desert Regional Medical Center	1,906	Palm Springs	Hospital
Riverside County Office of Education	1,555	Riverside	Education
Naval Surface Warfare Center	1,450	Norco	Naval Weapons Research
Parkview Community Hospital Medical Center	1,439	Riverside	Hospital
Professional Hospital Supply	1,300	Temecula	Medical & Surgical Supplies Distributor
La Quinta Resort & Club	1,233	La Quinta	Resort
Ironwood State Prison	1,150	Blythe	Level I & III Prison
California Rehabilitation Center	1,139	Norco	Level II Prison
Fantasy Springs Resort Casino	1,100	Indio	Resort Casino
Corona Regional Medical Center	1,059	Corona	Hospital
Mt. San Jacinto College	1,016	San Jacinto	Community College District

Source: Employers Listed, Websites & Public Records, 2015

Figure 10: Employment Growth Projections

Industry sector	Thousands of jobs			Change		Percent distribution			Annual rate of change	
	2002	2012	2022	2002–2012	2012–2022	2002	2012	2022	2002 – 2012	2012 – 2022
Total[1]	142,294.9	145,355.8	160,983.7	3,060.9	15,627.9	100.0	100.0	100.0	0.2	1.0
Nonagriculture wage and salary[2]	131,028.3	134,427.6	149,751.3	3,399.3	15,323.7	92.1	92.5	93.0	.3	1.1
Goods producing, excluding agriculture	22,486.7	18,360.3	19,554.2	–4,126.4	1,193.9	15.8	12.6	12.1	–2.0	.6
Mining	512.3	800.5	921.7	288.2	121.2	.4	.6	.6	4.6	1.4
Construction	6,715.7	5,640.9	7,263.0	–1,074.8	1,622.1	4.7	3.9	4.5	–1.7	2.6
Manufacturing	15,258.7	11,918.9	11,369.4	–3,339.8	–549.5	10.7	8.2	7.1	–2.4	–.5
Service providing	108,541.6	116,067.3	130,197.1	7,525.7	14,129.8	76.3	79.9	80.9	.7	1.2
Utilities	596.3	554.2	497.8	–42.1	–56.4	.4	.4	.3	–.7	–1.1
Wholesale trade	5,652.4	5,672.8	6,143.2	20.4	470.4	4.0	3.9	3.8	.0	.8
Retail trade	15,025.1	14,875.3	15,966.2	–149.8	1,090.9	10.6	10.2	9.9	–.1	.7
Transportation and warehousing	4,223.8	4,414.7	4,742.0	190.9	327.3	3.0	3.0	2.9	.4	.7
Information	3,394.6	2,677.6	2,612.4	–717.0	–65.2	2.4	1.8	1.6	–2.3	–.2
Financial activities	7,847.1	7,786.3	8,537.3	–60.8	751.0	5.5	5.4	5.3	–.1	.9
Professional and business services	15,976.2	17,930.2	21,413.0	1,954.0	3,482.8	11.2	12.3	13.3	1.2	1.8
Educational services	2,642.8	3,346.9	4,022.2	704.1	675.3	1.9	2.3	2.5	2.4	1.9
Health care and social assistance	13,555.6	16,971.8	21,965.9	3,416.2	4,994.1	9.5	11.7	13.6	2.3	2.6
Leisure and hospitality	11,986.0	13,745.8	15,035.0	1,759.8	1,289.2	8.4	9.5	9.3	1.4	.9
Other services	6,129.0	6,174.5	6,823.4	45.5	648.9	4.3	4.2	4.2	.1	1.0
Federal government	2,766.0	2,814.0	2,406.5	48.0	–407.5	1.9	1.9	1.5	.2	–1.6
State and local government	18,746.7	19,103.2	20,032.2	356.5	929.0	13.2	13.1	12.4	.2	.5
Agriculture, forestry, fishing, and hunting[3]	2,245.4	2,112.7	1,889.2	–132.7	–223.5	1.6	1.5	1.2	–.6	–1.1
Agriculture wage and salary	1,217.4	1,306.9	1,281.8	89.5	–25.1	.9	.9	.8	.7	–.2
Agriculture self-employed and unpaid family workers	1,028.0	805.8	607.4	–222.2	–198.4	.7	.6	.4	–2.4	–2.8
Nonagriculture self-employed and unpaid family workers	9,021.2	8,815.5	9,343.2	–205.7	527.7	6.3	6.1	5.8	–.2	.6

Source: U.S. Bureau of Labor Statistics, Employment Projections Program.

Governing Body

Riverside County is governed by a five-member Board of Supervisors. By law, Supervisorial district boundaries are adjusted every ten years based on population changes reported by the U.S. Census Bureau. Map 1 outlines the current Supervisorial Districts.

In 2016, the population by districts is the following:

- District 1 (Kevin Jeffries): 458,407
- District 2 (John Tavaglione): 458,372
- District 3 (Chuck Washington): 477,763
- District 4 (Manuel Perez): 467,430
- District 5 (Marion Ashley): 480,820

Map 1: Riverside County Supervisor Districts

2.5 Land Use and Development Trends

Existing land use within Riverside County is a mosaic of varying types of uses, ownership, character, and intensity. Uses include:

- Rural residential
- Single family detached
- Single family attached
- High-density residential (apartments)
- Mobile homes
- Recreational open space
- Other open space
- Heavy industrial
- Warehouse
- Vacant
- Agriculture
- Water
- Utilities
- Public facilities
- Schools
- Retail / Office
- Tourism / Commercial recreation
- Light industrial /Business Park
- Mineral extraction

While population growth continues, so does the need for further development. There are Land Use policies and elements within the Riverside County General Plan to help assure orderly development.

In addition, the Local Agency Formation Commission (LAFCO) of Riverside County is tasked with the mission to provide an orderly pattern of growth that reconciles the varied needs of the County. One of the fundamental principles of LAFCO is to ensure the establishment of an appropriate and logical municipal government structure for the distribution of efficient and appropriate public services.

LAFCO Land Use Objectives include:

- Discouragement of urban sprawl;
- Preservation of the physical and economic integrity of agricultural lands;
- Preservation of open space within urban development patterns;
- Orderly formation and development of agencies by shaping local agency boundaries;
- Minimization of agencies providing services to a given area; and
- Utilization of Spheres of Influence to guide future development of agency boundaries.

Examples of development in Riverside County are:

Keller Crossing was approved on October 9, 2013. This “Green Concept” environment set to create a mixed-use pedestrian-friendly community that is based on sustainability. This 200-acre property is located in western Riverside County, near Murrieta.

Completed in July 2013, Temecula added a new hospital with in its city limits to accommodate the needs of its residents. The medical facility sits on a 35-acre parcel and holds a total of 320 beds.

Belle Terre is a 342.3- acre residential community located in Riverside’s French Valley. This development proposed a community of up to 1,282 homes. The Zoning Ordinance was approved on December 1, 2014.

The Wine Country on the outskirts of Temecula is continuing to see a lot of development activity. Recognizing this, the Board of Supervisors adopted the Wine Country Community Plan in 2014, which consisted of revisions to the County General Plan, new design guidelines, and new zone classifications. The area has been classified as a Wine County Zone with the purpose of encourage agricultural cultivation, vineyards, wineries, equestrian uses, preserve the wine-making atmosphere, estate living, equestrian life-style and protect this area and its residents from incompatible uses which could result in reduced agricultural productivity and increased urbanization within the policy area.

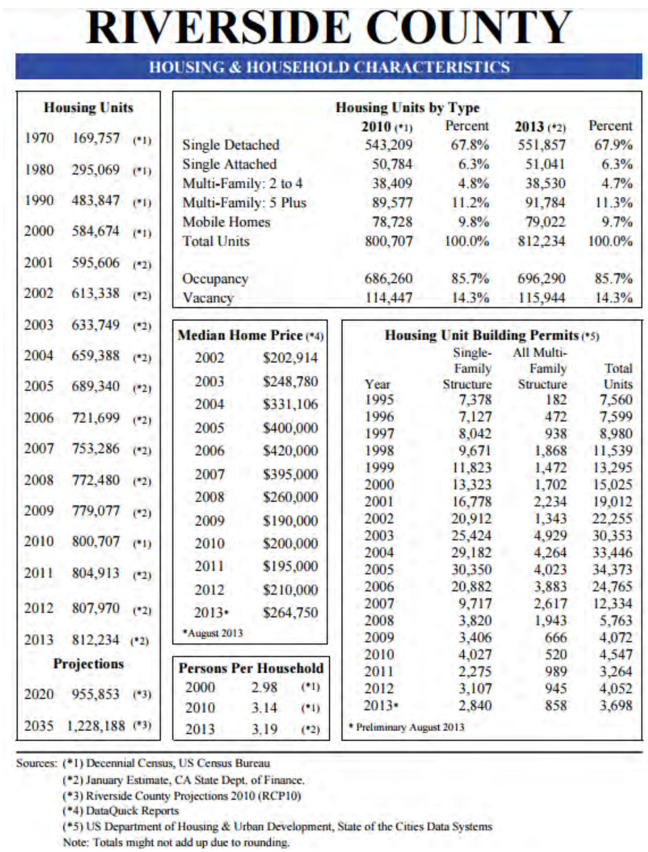
The Cabazon Outlet Mall in has expanded to add an additional 50 stores, an increase of 30%. The expansion was completed in 2014 and it included: 50 new retail stores, a 1,100 parking space structure, wider walkways and improved landscaping. The Cabazon Outlet

Mall is now a 650,000 square foot complex with a total of 180 stores, making it one of the largest outlet centers in the state.

In February 2015, the Colina del Oro housing plan was initiated and approved by Riverside County Local Agency Formation Commission (LAFCO). It is a master-planned community consisting of both single and multi-family residential units. Within the community an array of recreational facilities would be built such as a community park, community center, trails, and an open space park. 490 dwellings were planned within the 11.4 acre community.

A new Kaiser Permanente health care facility is expected to open in 2023 in Murrieta. The plan is set to develop a 37-acre parcel of land. A press release from Kaiser Permanente, dated April 29, 2016, stated that they have broken ground for the new medical center.

Figure 11: Housing and Household Characteristics



RIVERSIDE COUNTY

HOUSING & HOUSEHOLD CHARACTERISTICS

Housing Units		
1970	169,757	(*1)
1980	295,069	(*1)
1990	483,847	(*1)
2000	584,674	(*1)
2001	595,606	(*2)
2002	613,338	(*2)
2003	633,749	(*2)
2004	659,388	(*2)
2005	689,340	(*2)
2006	721,699	(*2)
2007	753,286	(*2)
2008	772,480	(*2)
2009	779,077	(*2)
2010	800,707	(*1)
2011	804,913	(*2)
2012	807,970	(*2)
2013	812,234	(*2)
Projections		
2020	955,853	(*3)
2035	1,228,188	(*3)

Housing Units by Type	2010 (*1)	Percent	2013 (*2)	Percent
Single Detached	543,209	67.8%	551,857	67.9%
Single Attached	50,784	6.3%	51,041	6.3%
Multi-Family: 2 to 4	38,409	4.8%	38,530	4.7%
Multi-Family: 5 Plus	89,577	11.2%	91,784	11.3%
Mobile Homes	78,728	9.8%	79,022	9.7%
Total Units	800,707	100.0%	812,234	100.0%
Occupancy	686,260	85.7%	696,290	85.7%
Vacancy	114,447	14.3%	115,944	14.3%

Median Home Price (*4)	
2002	$202,914
2003	$248,780
2004	$331,106
2005	$400,000
2006	$420,000
2007	$395,000
2008	$260,000
2009	$190,000
2010	$200,000
2011	$195,000
2012	$210,000
2013*	$264,750

*August 2013

Persons Per Household		
2000	2.98	(*1)
2010	3.14	(*1)
2013	3.19	(*2)

Housing Unit Building Permits (*5)

Year	Single-Family Structure	All Multi-Family Structure	Total Units
1995	7,378	182	7,560
1996	7,127	472	7,599
1997	8,042	938	8,980
1998	9,671	1,868	11,539
1999	11,823	1,472	13,295
2000	13,323	1,702	15,025
2001	16,778	2,234	19,012
2002	20,912	1,343	22,255
2003	25,424	4,929	30,353
2004	29,182	4,264	33,446
2005	30,350	4,023	34,373
2006	20,882	3,883	24,765
2007	9,717	2,617	12,334
2008	3,820	1,943	5,763
2009	3,406	666	4,072
2010	4,027	520	4,547
2011	2,275	989	3,264
2012	3,107	945	4,052
2013*	2,840	858	3,698

* Preliminary August 2013

Sources: (*1) Decennial Census, US Census Bureau
(*2) January Estimate, CA State Dept. of Finance.
(*3) Riverside County Projections 2010 (RCP10)
(*4) DataQuick Reports
(*5) US Department of Housing & Urban Development, State of the Cities Data Systems
Note: Totals might not add up due to rounding.

*Chart was developed by Riverside County GIS in 2013 and is the most current information available

Source:http://gis.rivcoit.org/Portals/0/Documents/rcd/progress_reports/pr_2013/riverside_county.pdf

Table 4: Housing Projections by City

Housing Units					
Jurisdiction	**2015**	**2020**	**2025**	**2030**	**2035**
Banning	14,611	17,260	20,416	23,177	25,202
Beaumont	17,267	20,787	24,276	27,982	28,958
Blythe	5,947	6,537	6,798	7,046	7,303
Calimesa	5,300	6,804	8,135	9,984	11,858
Canyon Lake	4,549	4,641	4,733	4,825	4,917
Cathedral City	23,627	25,127	26,627	28,127	29,627
Coachella	13,200	19,010	25,200	31,349	36,542
Corona	47,368	48,162	48,974	49,894	50,891
Desert Hot Springs	18,149	20,229	22,251	24,341	26,501
Hemet	45,313	50,507	55,211	60,724	66,199
Indian Wells	5,296	5,450	5,603	5,653	5,706
Indio	32,027	34,321	36,552	38,857	41,240
La Quinta	22,719	23,353	23,913	24,462	24,978
Lake Elsinore	20,833	24,141	27,240	30,092	32,663
Menifee	35,226	40,259	43,870	47,442	51,461
Moreno Valley	59,797	64,427	69,011	74,467	78,065
Murrieta	36,162	37,512	38,861	40,210	41,560
Norco	7,849	8,362	8,719	8,888	9,083
Palm Desert	35,867	37,011	37,954	39,113	40,143
Palm Springs	35,190	36,381	37,671	38,912	40,153
Perris	20,816	24,468	27,845	31,220	34,747
Rancho Mirage	13,834	14,922	16,010	17,098	18,186
Riverside	107,325	113,000	116,883	122,659	126,968
San Jacinto	21,055	26,422	30,142	32,775	35,053
Temecula	35,270	36,321	37,979	38,690	39,400
Wildomar	12,722	14,537	15,837	17,124	18,573
Unincorporated County	186,938	221,346	255,534	286,562	324,571
Riverside County Total	884,258	981,297	1,072,247	1,161,671	1,250,549

Source: Western Riverside Council of Government Council (WRCOG)

2.6 Cities of Riverside County

Riverside County has 28 cities and multiple special districts. All cities, with the exception of Moreno Valley and Menifee are participants in the 2017 LHMP. The City of Jurupa Valley is our newest city and the Planning Commission held its inaugural meeting January 23, 2012.

All of the participating cities, tribes, special districts and school districts attended the workshops, several meetings and assisted with the hazard analysis for the region. The cities and special districts cooperated during the LHMP process, sharing information and discussing the issues that impacted their areas. The discussions increased the knowledge base of all participants in regards to hazards in their areas and across Riverside County. The participants provided insight on additional hazards and concerns their jurisdictions face, but are not "disasters" and are not common across the county.

Participating jurisdictions in the Riverside County LHMP have their own governing bodies (e.g., city councils, tribal councils, water district boards, hospital boards, etc.) and upon Cal OES and FEMA approval they will formally adopt the plan via resolution through their governing body.

2.6.1 Banning

The City of Banning is a corporate city in Riverside County in the San Gorgonio Pass area of California. It is approximately twenty-three (23) square miles in area and is 30 miles east of the County seat in the City of Riverside. Banning is 80 miles east of Los Angeles, 23 miles west of Palm Springs, 25 miles north of the resort mountain community of Idyllwild, and is immediately adjacent to Beaumont to the west and the Morongo Indian Reservation to the east.

The Union Pacific Railroad and California State Highway 10 both run through the middle of the City. Smith Creek, a waterway that starts in the mountains and runs through the lower part of the valley, is close to Banning's southern and eastern boundaries.

Banning enjoys a yearly average daily temperature of approximately 79 degrees. Average temperatures are in the high 90's during the summer and low 40's during the winter. The average rainfall for Banning is about 3 inches per year.

Incorporated in 1913, the City of Banning has a rich and colorful history. Initially, Banning served as a stagecoach and railroad stop between the Arizona territories and Los Angeles. Today, Banning is home to nearly 30,000 residents and features clean air, ample water supplies and the memorable and inspiring scenic vistas of Mt. San Gorgonio

and Mt. San Jacinto. Its signature community event is Stagecoach Days, an annual rodeo and parade that celebrates Banning's Western heritage.

2.6.2 Beaumont

The City of Beaumont is located in the westernmost portion of Riverside County and is bounded by City of Calimesa and unincorporated County areas, on the north by the unincorporated County areas (Cherry Valley), on the south by unincorporated County areas and the City of San Jacinto, and on the east by the City of Banning. The City straddles the San Gorgonio Pass, the only easterly link with the greater Los Angeles Metropolitan area. Beaumont is located approximately 70 miles northeast of Los Angeles, 21 miles northeast of Riverside, and 21 miles southeast of San Bernardino. The geographic area governed by the Beaumont General Plan includes the City's corporate boundaries as the existed in 2005 and the City's established Sphere of Influence. Because there is considerable variation within the area governed by the General Plan, the larger Beaumont Planning Area has been subdivided into eight smaller planning areas: 1) Town Center Planning Area, 2) Oak Valley Planning Area, 3) North Beaumont Planning Area, 4) East Beaumont Planning Area, 5) 6th Street Corridor Planning Area, 6) Southeast Beaumont Planning Area, Southwest Planning Area, 8) West Beaumont Planning Areas.

The City of Beaumont was incorporated in November 1912. Founded at the turn of the twentieth century, Beaumont is proud of its rich history and rural charm. The town served as a welcome "stopping-off point" for early travelers making their way from the Mohave desert to Los Angeles, and later for L.A. residents eager to vacation in Palm Springs. Some, however, set down roots, drawn by the beautiful mountain vistas, clean, crisp air, and the abundance of cherry and apple orchards. Beaumont is proud of these early settlers and their families, many of whom continue to live and thrive in Beaumont.

Population- City of Beaumont is estimated to have 45,118. (2015) The City of Beaumont provided specific information regarding extreme wind events, and the public notices that are sent during a wind event.

2.6.3 Blythe

The City of Blythe is a corporate city in Riverside County in the Palo Verde Valley of California. The City of Blythe comprises approximately 16,400 acres (approximately 27 square miles) in area and is 145 miles east of the County seat, the City of Riverside. The City's sphere of influence (SOI) surrounds the incorporated city limits and comprises approximately 12,800 acres (approximately 20 square miles). The jurisdiction sits directly adjacent to La Paz County, Arizona on its eastern boundary and Imperial County along its southern boundary. The Colorado River is a waterway that forms the eastern boundary of the City. Regional access to the City is provided by Interstate-10 (I-10), State Highway 78 (SR-78), and State Route 95 (US 95). The Greyhound bus line also provides access to and from Blythe.

Jurisdiction's climate can be described as moderate. Temperatures and rainfall for jurisdiction are typical of that of the rest of Riverside County.

The City of Blythe is a General Law city which was incorporated in 1916. It is located 225 miles east of Los Angeles and 150 miles west of Phoenix Arizona. The Colorado River embraces the east side of the Palo Verde Valley. The City has a Council-Manager form of municipal government. The City Council appoints the City Manager who is responsible for the day to day administration of City business and the coordination of all departments. The City Council is composed of five members elected biannually to alternating four-year terms. The City of Blythe encompasses an area of approximately 26.8 square miles and is situated 265 feet above sea level. Blythe enjoys a comfortable California desert climate with winter temperatures averaging 55-75 degrees, and summer temperatures averaging 85-110 degrees. Annual rainfall is approximately 3 inches per year.

2.6.4 Calimesa

The City is located in the northwestern portion of Riverside County, between the cities of Yucaipa and Beaumont, between San Bernardino and Palm Springs. Calimesa is located in the region known as the Inland Empire, which covers all of San Bernardino and Riverside Counties and is between the foothills of the San Bernardino and San Jacinto Mountains. The city's elevation ranges between 2,300 to 3,500 feet above sea level. According to the United States Census Bureau, the city has a total area of 14.8 square miles, all of it land.

Climatic Conditions: Generally, Calimesa has an arid climate. Annual rainfall varies from ten (10) to twenty three (23) inches within the San Gorgonio Pass area of Riverside County and the City. Hot, dry Santa Ana winds are common to areas within the City. These winds constitute a contributing factor, which causes small fires originating in rural and urban development to spread quickly and create the need for an increased level of fire protection.

The City of Calimesa was incorporated on December 1, 1990, soon after the incorporation of its northern neighbor, the City of Yucaipa. Prior to its incorporation, the City of Calimesa existed as an unincorporated town that straddled the Riverside–San Bernardino County line at the location where Interstate 10 climbs the San Gorgonio Pass going eastward from Redlands, California.

Historically, Calimesa is divided from the City of Yucaipa by the Wildwood Canyon Wash; but politically, "County Line Road" divides the two towns. Much of what was originally

known as "Calimesa" actually lies within the city boundaries of Yucaipa, including "I-Street" (Calimesa) Park, and Calimesa Elementary School. Because State of California law prohibits the incorporation or annexation of cities over county lines, the City was unable to adjoin what was considered the town of Calimesa when it finally incorporated. When Yucaipa incorporated, they included the area outside of the Yucaipa Valley on the "hilltop" or "mesa" that was traditionally known as Calimesa within its city boundaries, so as not to leave a gap of unincorporated area between the two towns. And although the two cities are in separate counties, both Yucaipa and Calimesa share same basic street grid system and addressing, including many named and alphabetical street which extend from Yucaipa well into Calimesa. The general boundary between the two cities is County Line Road, which ironically does not follow the exact county line in some places due to the alignment of Calimesa Creek, which meanders in and out of both Yucaipa and Calimesa.

The City Limits of Calimesa also extend southwest to the City of Beaumont, California. Although much less refined, the boundaries between Beaumont and Calimesa fall generally along the Southern California Edison (SCE) right-of-way that extends from the El Casco electrical sub-station facility near Moreno Valley, eastward. Near the I-10 freeway, Champions Drive is the common boundary between the two Cities. The City of Calimesa has an estimated population of 8,173.

2.6.5 Canyon Lake

The City of Canyon Lake is an incorporated city in Riverside County. It is approximately four and a half square miles in area and is 31 miles south of the County seat, the City of Riverside. The City of Canyon Lake sits directly adjacent to the City of Menifee on its eastern boundary, City of Lake Elsinore on its Western and southern boundaries. The City of Canyon Lake lies between the I-15 and I-215. Railroad Canyon Road, an arterial highway, bisects the community and provides the major connection to these freeways. The San Jacinto River, a waterway that starts in the Mountains and runs over 75 miles through the County, feeds into Canyon Lake and flows into Lake Elsinore.

The City of Canyon Lake climate in winter is rarely extreme, low temperatures almost never go below freezing. In the summer the high temperatures will hover in the high 90's but during heat waves can exceed 100 degrees. Rainfall is typical of that of the rest of Riverside County.

The City of Canyon Lake was established in March of 1968 as a relaxed private gated community offering recreational opportunities. Canyon Lake is primarily a bedroom community of mature and newer homes. As a private gated community, Canyon Lake has an equestrian center, campground, and many other amenities. The City of Canyon Lake incorporated on December 1, 1990 to become more responsive to its residents.

2.6.6 Cathedral City

The City of Cathedral City is a corporate city in Riverside County in the Coachella Valley of California. It is approximately 20 square miles in area and is 64 miles east of the County seat, the City of Riverside. All borders of Cathedral City are within Riverside County. The Union Pacific Railroad and Interstate Highway 10 both run through the northern-most portion of the City. The Santa Rosa Mountains border the southern-most portion of the city.

Cathedral City's climate can be described as arid most of the year, with summer heat in excess of 110 degrees Fahrenheit anytime from June through September, and colder winter evening temperatures as low as 25 degrees Fahrenheit from December through February.

The average rainfall is less than three inches per year. Temperatures and rainfall for Cathedral City are typical of the rest of the Coachella Valley (eastern Riverside County).

Cathedral City was established in 1925 and incorporated in 1981. Strategically located, with city limits on both sides of Interstate 10, Cathedral City is a haven for expanding and relocating businesses. Cathedral City's population ranks in the top three cities in the Coachella Valley.

Businesses view the region as a triangle of opportunity between Los Angeles and San Diego. Coachella Valley is situated inland, approximately equal distances from each metropolitan area. This triangle of commercial businesses, light industry, and professional services is expanding and becoming one metropolis of continued growth.

2.6.7 Coachella

Coachella is a city in Riverside County, California; it is the easternmost city in the region collectively known as the Coachella Valley. It is located 28 miles east of Palm Springs, 72 miles east of Riverside, and 130 miles east of Los Angeles.

The eastern half of the Coachella valley is below sea level, and the area's average elevation is 68 feet (35 m) below sea level. The Salton Sea, a saltwater lake located about 10 miles (16 km) South of Coachella, lies 227 feet (69 m) below sea level.

The city also lends its name to the Coachella grapefruit; the town's stretch of State Route 111 is named Grapefruit Boulevard in its honor. Harrison Street or State Route 86 is declared historic U.S. Route 99, the major thoroughfare that connects with Interstate 10 a few miles north of town.

Known as the "City of Eternal Sunshine", Coachella is largely a rural, agricultural, family-oriented community in the desert and one of the state's fastest growing cities in the late

20th century. When it first incorporated back in 1946, it had 1,000 residents, but the population was 45,407 at the 2010 census.

The city was originally founded as Woodspur in 1876, when the Southern Pacific Railroad built a rail siding on the site. In the 1880s the indigenous Cahuilla tribe sold their land plots to the railroads for new lands east of the current town site, and in the 1890s, a few hundred traqueros took up settlement along the tracks.

The origin of the name Coachella is unclear, but in 1901 the citizens of Woodspur voted on a new name for their community; at their town hall meeting, the homeowners settled on "Coachella". Some locals believe it was a misspelling of Conchilla, a Spanish word for the small white snail shells found in the valley's sandy soil, vestiges of a lake which dried up over 3,000 years ago.

Coachella began as a 2.5-square-mile (6.5 km2) territory gridded out on the mesquite covered desert floor. Not until the 1950s did Coachella begin to expand into its present range, about 32 square miles (83 km2), an area which contained large year-round agricultural corporate farms and fruit groves, particularly of citrus (lemons, oranges, grapefruit) and date palms.

Coachella became a city in 1946. During the incorporation voting process, the first city council was tentatively elected: Lester C. Cox, T. E. Reyes, John W. Westerfield, Lester True, and Paul S. Atkinson. Also elected on November 26, 1946, were City Clerk Marie L. Johnson and City Treasurer John C. Skene. John Westerfield was appointed mayor at the first meeting.

2.6.8 Corona

The City of Corona is located approximately 45 miles southeast of Los Angeles in western Riverside County. It is located in a valley, framed by mountains and the Prado Basin. Original settlements focused development in an area within and adjacent to Grand Boulevard. As the City grew, the geographic limitations imposed by the Cleveland National Forest to the south and the Prado Basin to the northeast created natural barriers that confined the City. The City is bordered by the City of Norco to the north, the City of Riverside to the east, and Riverside County to the west and south.

The City limits encompass 39.2 square miles and the population is approximately 159,132. A city whose heritage spans more than a century, Corona has emerged as an ethnically diverse community, where a significant percentage of the population is made up of young, well-educated families. The Corona community boasts many amenities that provide a first-rate quality of life for residents. The City has more than 394 acres of parks, with sports fields, basketball courts, playgrounds, tennis courts, two skate parks and an outdoor pool.

Two major freeways and one railroad transect Corona. The Riverside Freeway (SR-91) runs east/west directly north of the City's center, Interstate 15 (I-15) runs north/south near the eastern edge of the City, and the railroad parallels SR-91. These corridors are major transportation routes to the economic center of Orange County from the Inland Empire. Two geographical areas are considered to be within the boundaries of the City of Corona General Plan Planning area: lands within the City's corporate limits, and lands within its Sphere of Influence (SOI). .

The SOI was defined by the City, the Southern California Association of Governments (SCAG), and the Riverside County Local Agency Formation Commission (LAFCO). It represents the areas likely to be served by and potentially annexed to the City. The SOI includes three geographically distinct areas including the West, East and South Spheres. The West Sphere encompasses three geographic areas: the Prado Basin, Coronita and the Foothill area. The East Sphere includes the areas of Home Gardens, Eagle Valley East, and El Cerrito. Temescal Canyon makes up the South Sphere.

The City of Corona Planning area is within the South Coast Air Basin of California. The air basin is a 6,600-square mile area encompassing the non-desert portions of Riverside, Los Angeles, and San Bernardino Counties and all of Orange County. Bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east, the South Coast Air Basin is an area of high air pollution poten0tial.

The climate of the South Coast Air Basin is dominated by the strength and position of the semi-permanent high-pressure center over the Pacific Ocean near Hawaii. It creates the climate conditions typical of Southern California, (i.e., relatively cool summers, mild winters, infrequent rainfall, cool daytime sea breezes, comfortable humidity, and ample sunshine). Periods of extremely hot weather, winter storms, or Santa Ana wind conditions interrupt this pattern. Unfortunately, the same atmospheric processes that create the desirable living climate combine to restrict the ability of the atmosphere to disperse the air pollution generated by the region's population.

The location of the Planning Area, east of the Chino Hills and Santa Ana Mountains, insulates it from the moderating effect of the ocean. Temperatures and precipitation in Corona varies more dramatically than coastal areas of the basin. Average summertime high temperatures range between about 85 to 92 degrees Fahrenheit from June through September, and average wintertime low temperatures are generally near 40 degrees in December and January. Rainfall is highly variable and confined almost exclusively to the winter months. Rainfall in Corona averages about 12.6 inches annually.

Predominating winds travel from the ocean, across the urbanized coastal areas of Orange and Los Angeles Counties, to Corona through the Santa Ana River Canyon. The canyon

acts as a funnel for air masses moving across the basin. Daytime winds are typically channeled through the canyon to create steady, abnormally high (greater than 12mph) wind velocities from the west. Typical nighttime conditions reverse, and light winds (less than 1 mph) drift back towards the ocean. Exceptions to this pattern occur when a high-pressure center forms over the western United States and creates the strong, hot, dry, gusty Santa Ana winds, which move through Corona from the eastern deserts into the canyon.

Corona's historic resources are those physical elements, both structural and natural, which define Corona's past. They help give the City its unique identity, charm, and orientation. These resources, when well preserved and maintained, provide the community with a sense of permanence, which fosters civic pride and stewardship among its residents and businesses. Information describing the historic and cultural resources were derived from the California Environmental Resources Evaluation Systems (CERES) website, as well as the Riverside County Integrated Project (RCIP) (March 2000) existing setting conditions. Corona's history is an evolution of Native American inhabitation, Missionary influence, agricultural development, and eventual rapid urbanization. The City's growth and development is typical of many other areas in Southern California.

In the early 1700s, prior to the arrival of the Spanish, the Gabrieleno and Luiseno Indians occupied the Corona area. These Native Americans used the hot waters in Temescal Canyon for bathing and religious ceremonies. Current residents and visitors still enjoy the rejuvenating mud baths and hot springs at the Glen Ivy Springs resort. Luiseno religious ceremonies were strictly followed, and remnants of some of their artistic pictographs and petroglyphs can still be found on rocks in undeveloped areas.

In the early 1800s, the agricultural and cattle ranching base developed and portions of Corona became part of the Mexican land grants (Rancho La Sierra Yorba, Rancho Jurupa, Rancho El Rincon, and Rancho El Sobrante de San Jacinto). With the Treaty of Guadalupe Hidalgo (1846), Mexico ceded the Corona area as part of California to the United States. The Yorba, Serrano, Sepulveda, Cot, and Botiller families' ranched sheep and cattle on the original ranchos in the area. Remnants of the Serrano tanning vats are still found on Old Temescal Canyon Road. In 1849, the California gold rush brought prospectors, settlers, and new development to southern California. The Butterfield Stage stops and the Serrano adobes are found along this road.

In 1886, developer Robert Taylor persuaded his partners: Rimpau, Joy, Garretson and Merrill to form the South Riverside Land and Water Company. Together they raised approximately $110,000 to purchase approximately 12,000 acres of good agricultural land. Taylor realized the importance of water for the soon to be developed community, and additional funds were used to ensure that sufficient water rights were obtained. Taylor hired Anaheim engineer H. C. Kellogg to design a circular Grand Boulevard three miles round. Early residents used to parade their fancy buggies on this circular street that enclosed the main functions of the community: schools, churches, residences and stores. To the north along the railroad tracks were the manufacturing plants and packing houses. The southern end of town was left to the citrus industry, and the mining companies were established just outside the city's southeastern and eastern city limits.

The town's founders initially named their development South Riverside after the successful citrus community of Riverside, just a few miles away. Almost all of the new settlers planted orange and lemon trees in hopes of gaining future profits. New groves continued to spring up and, by 1912, there were 5,000 acres of established lemon and orange groves. By 1913, Corona shipped more fruit than any other town in Southern California. In 1961, citrus was still considered the backbone of Corona's economy and the largest source of revenue. In that year, citrus covered 7,500 acres. The labor force fluctuated between 400 and 1,800 workers at the peak of the harvest. An additional 500 people worked at the Exchange Lemon Products plant. By 1982, Corona's agricultural industry faced a bleak future as production costs made the economics of farming financially unsuccessful. Plans were begun to replace the groves with approximately 12,500 dwelling units.

On July 13, 1896 residents voted to incorporate and change the name of the community to Corona, which is Spanish for crown, in honor of the City's circular Grand Boulevard. By 1900, the population had reached 1,434 people. On September 9, 1913, in observance of California's Admission's Day, Corona residents celebrated with an international automobile race on the Boulevard. The event attracted such auto racing greats as: Ralph DePalma, Barney Oldfield, Terrible Teddy Tetzlaff and Earl Cooper. More than 100,000 people came to the town of 4,000 to watch Cooper win the race and a prize of $8,250. It was so successful that races were held again in 1914 and 1916. The demise of the Corona road races was due not only to tragic deaths, which occurred in 1916, but also because of the cost and local effort needed to continually stage such an extravagant event.

2.6.9 Desert Hot Springs

Desert Hot Springs is located approximately 112 miles from Los Angeles, in the center of Riverside County. The City sits in the foothills of the San Bernardino Mountains, and overlooks the entire Coachella Valley. The southern city boundaries are adjacent to Palm Springs and Cathedral City, divided by Interstate 10. To the east of the city is the unincorporated community of Sky Valley. To the west are the unincorporated areas of North Palm Springs and White Water. To the north of the city is predominately Joshua Tree National Park and lands governed by the Department of Interior, Bureau of Land

Management (BLM). The City also sits at two entry points of the recently recognized, Sand to Snow National Monument.

The area has sparse vegetation, which is consistent with the Southern California lower desert. Annual grass and desert flowers are dependent on annual precipitation averaging just over 5 inches a year. Temperatures during the summer can reach 115 degrees during the peak day and the high 80's during the night. Winter temperatures are in the high 70's to low 80's and lows at night average in the 50's. Summers tend to produce occasional monsoonal thunder storms, while the winter tends to be windy, depending on the low pressures systems reacting with the local mountain ranges.

In 1913 Cabot Yerxa arrived in the City. He was the first Homesteader and discovered hot water on Miracle Hill. Due to the San Andreas Fault bisecting the hill, one side has cold water, the other has hot. His large adobe, hand built by Yerxa, is one of the oldest adobe structures in Riverside County and is listed on the Nation Register of Historic Places.

The town was founded by L. W. Coffee on July 12, 1941. The original site was centered on the intersection of Palm Drive and Pierson Blvd. and was only a square mile in area. He named it Desert Hot Springs in honor of the waters Yerxa had discovered.

The City of Desert Hot Springs incorporated in 1963, with 1,000 residents.

Since that time, Desert Hot Springs has solidified itself as a tourist destination through its small spa hotels. In its early days the city's seclusion appealed to urban "escapees".

Desert Hot Springs experienced periods of dizzying growth in the 1980s and 1990s when most of the vacant lots were filled with new houses and duplex apartments. The city's population doubled in the 1980s and increased by another 5,000 in the 2000 census. Between 2000 and 2010 the population grew by 9000 residents resulting in a final population count of 25,938 full time residents following the 2010 census.

With much of the City's land undeveloped, development in the city and population is expected to steadily grow for many years to come.

The City is the home to (5) Elementary Schools, (2) Middle Schools and (1) High School, (3) Parks and a Health and Wellness Center serving residents of the Community.

In 2014 the City Council adopted Ordinances allowing for Medical Marijuana Dispensaries and the large scale Cultivation of Medical Marijuana. Development of this rapidly growing industry is permitted in the Industrial Zone of the City.

2.6.10 Eastvale

Eastvale is one of the newest cities in Western Riverside County. Eastvale incorporated on October 1, 2010 since then it has grown to a population of over 63,162 residents. Eastvale is 13.2 square miles strategically poised between Interstate 15 and California State Routes 91, 60, and 71, making access easy for residents, visitors and businesses alike. Residents and visitors find the close proximity of Ontario International Airport to be a metropolitan advantage yet enjoy the small-town, neighborly charm of our young community.

2.6.11 Hemet

The City of Hemet is located in the San Jacinto Valley in Riverside County, approximately 80 miles southeast of Downtown Los Angeles. The city covers about half of the valley, which it shares with the neighboring City of San Jacinto to the north and Diamond Valley Lake to the south. The San Jacinto Mountains to north provide a beautiful natural backdrop to the City.

The average annual rainfall in Hemet is approximately 12 inches. The annual high temperature is 82 degrees while the annual low is 46 degrees. Average temperature in Hemet is 65 degrees. During the 19th century the land in Hemet was used for cattle ranching by Mission San Luis Rey. On January 20, 1910 the City of Hemet was incorporated and maintains a Council-Manager form of government. The incorporation helped to serve the growing city which also became a trading center for the San Jacinto Valley agriculture of citrus, apricots, peaches, olives and walnuts. During WWII the City of Hemet hosted the Ryan School of Aeronautics, training over 6,000 fliers for the Army Air Force. Hemet-Ryan Airport still exists today in the same location.

2.6.12 Indian Wells

Indian Wells is a small-scale residential-resort community located within the Coachella Valley in Riverside County. The City of La Quinta and the City of Palm Desert, along with unincorporated areas of Riverside County, adjoin the City. The current City limits encompass approximately 9,240 acres, or 14.4 square miles. Primary access to the City is from State Highway 111. Primary access to the region is by Interstate 10. State Route 74 also provides access to the Coachella Valley region from the south. Unincorporated lands to the northeast of the City are included within the Indian Wells sphere of influence.

Indian Wells is best known for its world class resorts, catering to golf and tennis enthusiasts, and quality residential lifestyle. Residents of the City enjoy an ideal climate, with over 330 days of sunshine each year. The City's beautiful surroundings include views of the Santa Rosa and San Jacinto Mountains.

Indian Wells officially became a city on July 14, 1967. At that time, Indian Wells was the 16th city to incorporate in Riverside County and the 400th in California. It was the fourth city, after Indio, Coachella, and Palm Springs, to incorporate in the Coachella Valley. The election for incorporation was held on June 27, 1967 and, according to the League of California Cities, had the largest percentage of approval for incorporation of any city in California. The voter turnout was 87 percent of the 285 registered voters with 93 percent in favor of becoming a city. At incorporation, there were an estimated 855 legal residents and 585 homes. The Indian Wells area was inhabited long before incorporation, however. The name Indian Wells originated from a Cahuilla Indian hand-dug well, documented on the earliest maps of California prior to 1850. The original well was generally located north of present day Highway 111 and east of Miles Avenue. The well serves as a stage station until a public well was established around 1870, and remained in use until 1910. Like most communities that were established in the Coachella Valley, Indian Wells' origins are based on travelers' needs for water and a place to rest. Both wells were destroyed by a massive flood in 1916.

2.6.13 Indio

The City of Indio is a corporate city located in Riverside County, within the Coachella Valley of Southern California's Colorado Desert region, approximately 70 miles east of the County seat (City of Riverside), and 125 miles east of Los Angeles. The City limits encompass approximately 29.2 square miles in area. The City of Indio sits directly adjacent to the City of La Quinta, the City of Coachella and the unincorporated areas of Riverside County. The Union Pacific Railroad, State Highway 111, and Interstate 10 run through the length of the City. The Coachella Valley Water District operates an aqueduct which conveys water from the Colorado River into the Coachella Valley and bisects the City from east to west and north to south.

The climate of the City of Indio is influenced by the surrounding mountain ranges that contribute to the unique year-round warm and dry climate, with some of the warmest winters west of the Rocky Mountains. Indio experiences warm winters and hot summer climates with average annual high temperatures of 89.5 degrees Fahrenheit, and average annual low of 62.1 Fahrenheit. Summer highs above 110 degrees Fahrenheit are common while summer night lows often stay above 90 degrees Fahrenheit. The City of Indio is adjacent to the geologic Salton Sink and within the site of historic Lake Cahuilla. Indio is an official National Bird Sanctuary, as seasonal bird migration flight routes cross the city en route to and from the Salton Sea.

Indio began as an Indian Village and winter home for Native Americans who regularly migrated from the surrounding mountains in the winter to the palm oases along the San Andreas Fault zone and other locations providing water, vegetation and shelter. The

Villages were located throughout the Coachella Valley and along the shores of ancient Lake Cahuilla. The discovery of gold in California in 1848 and the resulting Gold Rush brought a stream of miners and settlers through the Coachella Valley, providing a southern route to California less hazardous than crossing the Sierras. In 1872, Indio was selected as a division point for the Southern Pacific Railroad with the first train arriving in 1876 from Los Angeles and the completed southern transcontinental route in 1877. Indio's first settlers were mainly railroad employees and local shopkeepers. By 1909, the Indio School census indicated that the school district had 43 families and 82 children within its boundaries. In 1914 the Southern Sierras Power Company completed an electric power line to the Coachella Valley to provide power for pumping water and powering homes. In 1930, Indio became the Coachella Valley's first incorporated city.

2.6.14 Jurupa Valley

The City of Jurupa Valley is the newest city to incorporate within the State of California, in the County of Riverside, with an incorporation date of July 1, 2011. Jurupa Valley is approximately 44 square miles in area and is approximately 5 miles west of the County seat, the City of Riverside. Jurupa Valley is approximately 60 miles east of the City of Los Angeles and approximately 90 miles north of San Diego. It covers the area north and west of the Santa Ana River, south of the Riverside-San Bernardino County line, and east of Interstate 15 with CA Hwy 60 intersecting the length of the city from the east to the west.

The City of Jurupa Valley has a moderate climate with annual rainfall at approximately 2 – 3.5 inches per year. Vegetation is green and bountiful in the winter but can become dry and dense during the summer months. Summers are warm and can reach temperatures above 109 degrees during the peak of the day and remain in the high 80's during the evenings. Winter weather is mild averaging 65 – 76 degrees during the day and dropping down into the mid 30's or 40's in the evenings. Throughout most of the year, you can usually count on warm sunny days, with occasional mild to gusty winds throughout the late summer, fall, and early winter seasons. The population of Jurupa Valley was incorporated after the 2010 US State Census. Currently, the city's population is 100,314 according to the 2015 US State Census.

2.6.15 Lake Elsinore

The City of Lake Elsinore is a corporate city nestled at the foot of the Cleveland National Forest, within the southwest portion of Riverside County. The City boasts that Lake Elsinore is the largest natural recreational lake in Southern California and is bounded by wetlands. City of Lake Elsinore is located on the I-15 corridor at the intersection of State Route 74, 20 miles south of State Route 91. We are approximately a one-hour drive east from metropolitan Orange County and forty-five minutes southwest from Riverside. San

Diego is approximately a one-hour-and-fifteen-minute drive south on I-15. Highway 74 connects westward over the Ortega Mountains to Orange County beach communities and eastward to mountain and desert cities in Riverside County. Lake Elsinore is 73 miles southeast of Los Angeles and 74 miles northeast of San Diego. The average rainfall per year is less than 12 inches total. The average winter low temperature is 35.8 degrees, while the average summer high is 98.4 degrees. The community enjoys a yearly average daily temperature of 78.5 degrees.

The City of City of Lake Elsinore was organized, formed and incorporated under the laws of the State of California on April 9, 1888. From earliest times, the 300 natural Sulphur springs that fed Lake Elsinore were believed to have curative and magical properties by its Native American Indian inhabitants. These first inhabitants were called the Lake Entengvo Wumoma, which meant "Hot Springs by the Little Sea."

Joining the Native American Indian inhabitants, the Spanish missionaries, soldiers, ranchers and American trappers came to the valley. The Spanish padres renamed the lake "Laguna Grande."

Early settlers established a town site around the lake, which they renamed Elsinore, representing the immortality given the town of Elsinore in Denmark by Shakespeare in "Hamlet." In the 1920s and 1930s, the City became a playground for movie stars and the lake a destination for world-record-setting boat races and Olympic swim team training. Sportsmen hunted duck on the lake and deer in the hills.

Lake Elsinore has a "Council-Manager" general law form of government where the City Manager is appointed by the City Council and is the Chief Executive Officer of the Municipal Corporation. The Council acts as the board of directors of the municipal corporation and meets in a public forum where citizens may participate in the governmental process. The City Council consists of five members elected at-large, on a non-partisan basis. Residents elect the Mayor and four Council members, making each accountable to the entire citizenry.

2.6.16 La Quinta

The City of La Quinta is a corporate city in Riverside County. La Quinta is situated approximately 150 miles northeast of San Diego and 130 miles east of Los Angeles on the desert floor of the Coachella Valley. The valley is flanked on three sides by the Little San Bernardino, Santa Rosa, and San Jacinto Mountains. The protection afforded by the mountains contributes to the arid climate. Average rainfall per year is less than 5 inches total. Low temperatures rarely drop below freezing, while highs during the summer are usually in the triple digits and can reach into the 120 F degrees; however, it's a "dry" heat. Visitors from colder climates flock to La Quinta and surrounding cities in the Coachella

Valley from November to May because of our extremely mild winters. La Quinta's climate can be described as Lower California desert.

The City of La Quinta was organized, formed and incorporated under the laws of the State of California on May 1, 1982. It has a "Council-Manager" general law form of government where the City Manager is appointed by the City Council and is the Chief Executive Officer of the Municipal Corporation. The Council acts as the board of directors of the municipal corporation and meets in a public forum where citizens may participate in the governmental process. The City Council consists of five members elected at-large, on a non-partisan basis. Residents elect the Mayor and four Council members, making each accountable to the entire citizenry.

2.6.17 Menifee (Not Participating)

The City of Menifee is located in southwestern Riverside County approximately 30 miles southeast of the City of Riverside, California. The City encompasses approximately 50 square miles with an overall population of 83,447.

On June 3, 2008, the residents of the communities encompassing the City of Menifee voted to incorporate Menifee into Riverside County's twenty-sixth city. The new City of Menifee was officially established on October 1, 2008.

Interstate 215 traverses north and south through the center of Menifee, with existing community commercial areas located primarily along Newport, Bradley, and McCall Roads off of I-215.

2.6.18 Moreno Valley (Not Participating)

The City of Moreno Valley was officially incorporated on December 3, 1984 as a California general law municipality. Moreno Valley is comprised of three once-rural communities (Sunnymead, Edgemont and Moreno) and is located in the northwestern portion of Riverside County, approximately 66 miles east of Los Angeles, 42 miles west of Palm Springs and 100 miles north of San Diego. Moreno Valley is situated in a crescent of land bounded by the Box Springs Mountains to the north, the hills of the Badlands to the east and the mountains of Lake Perris State Recreation Area. The surrounding jurisdictions include the City of Riverside, the City of Perris, March Air Reserve Base, the San Jacinto Wildlife Area and Lake Perris State Recreation Area. The population of Moreno Valley is estimated at 201,175.

2.6.19 Murrieta

The City of Murrieta is an incorporated city in Riverside County. It is approximately 34 square miles in area and is 50 miles south of the County seat, the City of Riverside. The

City of Murrieta sits directly adjacent to the City of Temecula on the south, City of Menifee on the east, and the City of Wildomar on the northern boundaries. Murrieta is served by two major interstate freeways. I-215 runs through the eastern portion of the city, and I-15 runs through the western portion of the city. The Santa Margarita Watershed runs through the southwest portion of the City. Storm water runoff from portions of Lake Elsinore and Murrieta collects in the Murrieta & Temecula creeks and forms the Santa Margarita River south of the City.

The City of Murrieta's winters are almost never extreme, low temperatures rarely go below freezing. In the summer the high temperatures will hover in the 90's, but some days may go over 100 during heat waves. Rainfall for City of Murrieta is typical of that of the rest of Riverside County.

In 1980, Murrieta population was estimated to be 2,200. When Murrieta officially became a city on July 1, 1991, it was already home to more than 24,000 residents. By 2016, more than 113,000 people had moved into the City of Murrieta community, making it one of the five largest in Riverside County. The natural scenic beauty of the area and what is still by California standards reasonably priced housing continues to attract significant numbers of residents and businesses who are finding Murrieta a great place to grow. Those living in the community find distinguished schools, abundant recreation, excellent medical facilities, expanding employment opportunities and one of the lowest crime rates in Southern California. Entrepreneurs find a market growing larger by the day, above average household incomes, a skilled labor force and a business-friendly City Hall. It's a community with a past and vision for its future. One that welcomes challenges embraces opportunity. More and more people are discovering what the Murrieta fathers envisioned more than a century ago: Murrieta is, indeed, a great place to grow.

2.6.20 Norco

The City of Norco is located in the northwestern portion of Riverside County, near the convergence of Los Angeles, Orange, and Riverside Counties, approximately 45 miles southeast of the City of Los Angeles. It is located in a valley, framed by mountains and the Prado Basin. Original Settlements focused development in an area within and adjacent to Hamner Avenue, Highway. As the City grew, the geographic limitations imposed by the Norco Hills to the east and the Santa Ana River and the Prado Basin to the north and west created natural barriers that confined the City. The City is bordered by the City of Corona to the south and southwest, the City of Riverside to the east, and the cities of Eastvale and Jurupa Valley to the north and northeast.

One major freeway transects Norco with no railroads. Interstate 15 (I-15) runs north/south through the middle of the City. This corridor is the major north-south transportation route in Southern California between Las Vegas and San Diego with nearby direct freeway interconnects to Los Angeles and Orange counties and the rest of the Inland Empire. The current City corporate limits are fairly congruous with the City's Sphere of Influence (SOI). The City currently includes 15 square miles, with less than 50 acres currently in Riverside County remaining within the SOI.

The SOI was defined by the City, the Southern California Association of Governments (SCAG), and the Riverside County Local Agency Formation Commission (LAFCO). It represents those areas likely to be served by and potentially annexed to the City. The SOI includes two small geographically distinct areas including a single row of mostly developed single-family homes along Bluff Street at the City's southwestern edge along the river bluffs and undeveloped property largely in the river floodplain in the northeast corner of the City. The City currently manages approximately 690 acres of open space within its Park Lands and an internal trail system throughout the City and its public right away of approximately 120 miles.

The City of Norco Planning area is within the South Coast Air Basin of California. The air basin is a 6,600-square mile area encompassing the non-desert portions of Riverside, Los Angeles, and San Bernardino Counties and all of Orange County. Bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east, the South Coast Air Basin is an area of high air pollution potential. The climate of the South Coast Air Basin is dominated by the strength and position of the semi-permanent high-pressure center over the Pacific Ocean near Hawaii. It creates the climate conditions typical of Southern California, (i.e., relatively cool summers, mild winters, infrequent rainfall, cool daytime sea breezes, comfortable humidity, and ample sunshine). Periods of extremely hot weather, winter storms, or Santa Ana wind conditions interrupt this pattern. Unfortunately, the same atmospheric processes that create the desirable living climate combines to restrict the ability of the atmosphere to disperse the air pollution generated by the region's population.

The location of the Planning Area, east of the Chino Hills and Santa Ana Mountains farther south, insulates it from the moderating effect of the ocean. Temperatures and precipitation in Norco vary more dramatically than coastal areas of the basin. Average summertime high temperatures range between about 85 to 92 degrees Fahrenheit from June through September, and average wintertime low temperatures are generally near 40 degrees in December and January. Rainfall is highly variable and confined almost exclusively to the winter months. Rainfall in Norco averages about 12.6 inches annually. Predominating winds travel from the ocean, across the urbanized coastal areas of Orange and Los Angeles Counties, to Norco through the Santa Ana River Canyon. The canyon acts as a funnel for air masses moving across the basin. Daytime winds are typically channeled through the canyon to create steady, abnormally high (greater than 12mph) wind velocities from the west. Typical nighttime conditions reverse, and light winds (less

than 1 mph) drift back towards the ocean. Exceptions to this pattern occur when a high-pressure center forms over the western United States and creates the strong, hot, dry, gusty Santa Ana winds, which move through Norco from the eastern deserts into the canyon.

The pre-European history of Norco is much like the rest of Southern California where various tribes of Indians occupied the different portions of the region. The Luiseno Indians used and occupied a region that included the Norco-Corona area. The main village was in Temescal Canyon, and the Norco area was used as a hunting-gathering location. In 1846 the Norco area became part of the Mexican land grant, part of which was eventually purchased for the purposed of growing orange trees. That was not successful and the land was sold and subdivided as part of the Riverside Orange Heights Tract.

The concept of "Norco" began as a subdivision of the North Corona Land Company in 1910, which again attempted to develop the area with orchard citrus crops, avocados, olives, etc. Years of experimentation showed the area was not suited to that purpose due to high winds, frost, and poor soil conditions. In 1921 the property was sold to the North Corona Land Company. At that time, fewer than 100 families resided in the area which was mainly a small farming community. The farmers gradually ventured into animal raising, especially poultry and rabbits, some of which are still active today.

By the mid-1920's, the North Corona Land Company owned 5,409 acres in the area. When the first school and the Norconian Club were constructed, the Norconian Club was constructed at hot sulfur well discovered while digging for irrigation water. It occupied a 700- acre site and was for years a favorite of Hollywood celebrities. Its use declined during the 1930's and in 1941 the U.S. Navy bought the hotel and expanded it into a premier World War II-era hospital. Today, its grounds are divided between a weapons research facility and a state prison. Most of the resort remains intact, and its history and architecture have earned it a listing on the National Register of Historic Places. Today local leaders and organizations are working to ensure its recognition and preservation.

The community's first public recreational facility was developed in 1948 when the old Norco School was acquired as a community center. The Norco Recreation and Park District was then formed to maintain and operate the property. During the 1950's and 1960's Norco began to experience more growth, resulting from the population explosion occurring throughout the Southern California metropolitan area. The San Bernardino and Riverside freeways made the area more accessible from Los Angeles and Orange Counties, and Norco's animal keeping lifestyle came within commuting distance from major centers of employment. Because of rapid growth in surrounding communities, and the previous loss of other animal keeping communities in the Los Angeles and Orange Counties when development pressures increased there, the City of Norco was incorporated in 1964 to preserve the animal keeping community that had established roots here.

The development of the 130 acres of Silverlakes Equestrian and Sports Park along Hamner Avenue, between Norco and Eastvale, is currently attracting over 1 million visitors annually to the city and the region. The dominant activities in the park is soccer supplemented by equestrian horse competition.

City of Norco is located in the northwestern portion of Riverside County. The City of Norco is surrounded by the City of Eastvale, Corona and Riverside. During the late 50's and early 60's, southern California experienced rapid growth and due to the previous loss of other animal keeping communities in the Los Angeles and Orange Counties areas, the City of Norco was incorporated in 1964 to preserve the animal keeping community. The City of Norco currently includes 14.3 square miles. The current population is approximately 27,336.

2.6.21 Palm Desert

The City of Palm Desert is a charter city in Riverside County. The City of Palm Desert is a business, resort, and residential community centrally located in the heart of the Coachella Valley, in southeastern Riverside County, California. Known as the cultural and retail center of the desert communities, the City is 125 miles east of Los Angeles and just 15 miles east of Palm Springs. The valley is flanked on three sides by the Little San Bernardino, Santa Rosa, and San Jacinto Mountains. The protection afforded by the mountains contributes to the arid climate. Average rainfall per year is less than four inches. Low temperatures rarely drop below freezing, while highs during the summer are usually in the triple digits and can reach 115-120 degrees Fahrenheit; however, it's a "dry" heat, with occasional periods of high humidity in the late summer months. Visitors from colder climates flock to Palm Desert and surrounding cities in the Coachella Valley from November to May because of the extremely mild winters.

The City of Palm Desert incorporated as a charter city on November 26, 1973. It has a "Council-Manager" charter city form of government where the City Manager is appointed by the City Council and is the Chief Executive Officer of the Municipal Corporation. The Council acts as the board of directors of the municipal corporation and meets in a public forum where citizens may participate in the governmental process. The City Council consists of five members elected at-large, on a non-partisan basis.

2.6.22 Palm Springs

The City of Palm Springs is a charter city in Riverside County located in the State of California. The City is nestled at the base of the San Jacinto and Santa Rosa Mountains,

approximately 60 miles east of Riverside. Serving as the "gateway city" for the Coachella Valley, the City of Palm Springs comprises an incorporated area that encompasses 60,440 acres, or nearly 95 square miles. Palm Springs has a residential population of approximately 47,371 and an estimated seasonal population of over a 100,000 residents and guests.

The City of Palm Springs is located within Riverside County Region VI Southern Administrative Region of the California Office of Emergency Services Agency (Cal OES). Primary access to the City is provided by Interstate 10 and California State Highway 111; north–south access to the City is provided via Indian Canyon Drive and Gene Autry Trail. The Southern Pacific Railroad and Kinder Morgan natural gas pipeline run through the Coachella Valley and specifically through the City's northern boundary.

Palm Springs has an arid desert climate with annual rainfall of less than six inches. There are more than one hundred days a year when temperatures are 100°F or more. Hot, dry winds during the summer months along with seasonal Santa Ana winds are common to Palm Springs.

The San Andreas Fault is a major earthquake fault located only a few miles north of Palm Springs. In addition, there are numerous minor faults located throughout Riverside County which are subject to earthquakes.

The area encompassing the present City of Palm Springs was discovered centuries ago by the Agua Caliente Band of Cahuilla Indians, who established their village around the natural hot mineral springs (current site of the Spa Resort Casino) known for their medicinal and healing capabilities. Throughout the 19th century, many explorers, colonizers, and soldiers came through the desert, but it wasn't until 1853 that United States Topographical Engineers described the combination of palm trees and warm springs they encountered as "Palm Springs." The name became more commonly used several years later.

In 1877, the Southern Pacific Railroad completed its line through the desert to the Pacific Ocean. A Congressional policy established that every odd section of land for 10 miles on either side if the track become the property of the railroad. Early development in Palm Springs was associated with attempts to establish agricultural activity in the area and in the southern portions of the Coachella Valley.

In the 1920s, the region became a retreat for successful business and movie personalities, who took advantage of the warm weather, the remote location, and the hot water spas. The tourist and resort community of Palm Springs developed over the following decades and dramatically changed the character and economy of the Coachella Valley. In 1938, the City of Palm Springs was officially incorporated.

In the 1950s, about 3000 sections of land were transferred to the Agua Caliente Band of Cahuilla Indians in a checkerboard pattern. The checkerboard pattern is divided into Indian and non-Indian property holdings, based upon a grid pattern of square-mile sections of alternating ownerships. Indian land which has been subdivided into sections, half sections, and sometimes even smaller areas—is controlled by the Tribal Council or by individual allottees of the Agua Caliente Band of Cahuilla Indians (the Tribe). Over time, this checkerboard land-ownership pattern has led to inconsistent patterns of development, since the majority of development has occurred on non-Indian and non-Tribal owned lands.

The City has one hospital and the only trauma center for the Coachella Valley, Desert Regional Medical Center. The Medical Center is a 385-bed full service acute care facility that includes a Level II trauma center. There are four public full service elementary schools, one middle school, one high school, and one alternative school within the City of Palm Springs that are administered by the Palm Springs Unified School District. The city has a regional airport (Palm Springs International Airport), numerous large and small hotels, shopping centers, and commercial/industrial zones. Interstate 10 and State Highway 111 traverse the City as well as several main arterial roadways.

The City operates its own police and fire departments and also relies on local volunteer organizations for assistance in emergency response, communications, and other necessary emergency services.

2.6.23 Perris

The Jurisdiction is a corporate city in Riverside County in the Coachella Valley of California. The City of Perris is 35 Square Miles in size with a population of 77,000 people and is 10 miles southeast of the County seat, the City of Riverside. Jurisdiction sits directly adjacent to San Bernardino County on its southern boundaries, and San Bernardino County is ten miles to the north. The Burlington Northern and Santa Fe Railway Railroad and California State Highway 215 both run through the middle of the City. State Highway 74 is runs through 4th Street, continues as part of CA State Highway 215 then continues along Pincante Rd through Romoland on the west. Lake Perris is located on the northeast outside City of Perris. Perris Valley Airport is privately owned. It lies in the lower center of the city off Goetz Road. March Air Force Base is located just north of the city and its jurisdiction connects to City of Perris.

Jurisdiction’s climate can be described as sunny, mild Mediterranean climate. On average, Perris gets only 10 inches of rain per year. The humidity is quite low all year. The July high temperatures average 97 degrees, while January low temperatures average 35 degrees. There are 275 sunny days per year.

City of Perris was incorporated in 1911. The California Southern Railroad connected through the city in the 1880s to build a rail connection between the present day cities of Barstow and San Diego. This is how the City of Perris began to form. While the railroad had played an important part in establishing the new town, the people now turned to agriculture for their future development. Because of limited groundwater, dry grain farming was the main crop before water was brought to the valley by the Eastern Municipal Water district in the early 1950's. Alfalfa, the King potato (which would produce two crops a year), and still later, sugar beets became the mainstay of farming the Perris Valley.

With the construction of Lake Perris in the late 60's and early 70's - Perris once again became attractive - this time as a recreational area. In addition to the lake's activities Perris' hot air ballooning, Orange Empire Railway Museum and skydiving activities attract international recognition.

2.6.24 Rancho Mirage

The City of Rancho Mirage is located in Riverside County in the Coachella Valley of California. Rancho Mirage is approximately 24.8 square miles in area and is 70 miles east of the County seat, the City of Riverside. Riverside County covers 7,208 square miles (approximately the same size as the state of New Jersey) and stretches from Orange County to the Colorado River which forms the border with the state of Arizona. Adjacent counties include San Bernardino County to the north, La Paz county Arizona to the east, Imperial and San Diego counties to the south and Orange County to the west.

Rancho Mirage is located within the Coachella Valley, which extends for approximately 45 miles (72 km) in Riverside County southeast from the San Bernardino Mountains to the saltwater Salton Sea, the largest lake in California. The Valley is approximately 15 miles (24 km) wide along most of its length, bounded on the west by the San Jacinto Mountains, the south by the Santa Rosa Mountains and on the north and east by the Little San Bernardino Mountains. These mountains peak at around 11,000 feet (3,400 m) and tend to average between three to five thousand feet. This effectively blocks the marine layer familiar to most other Southern Californian areas. The Salton Sea is located to the southeast of the Coachella Valley with a surface elevation of 227 feet below sea level.

Regional geomorphology is largely due to the San Andreas Fault which enters the valley at the Chocolate Mountains and Salton Sea in the southeast corner and then follows the centerline of the Little San Bernardino Mountains on the north side of the Coachella Valley. The fault is easily visible along its northern length as a strip of intermittent green against an otherwise bare mountain.

Geographically, the county is mostly desert in the central and eastern portions of the county which includes the Coachella Valley and the City of Rancho Mirage. The Coachella Valley is considered the northwestern portion of the Sonoran Desert. In the summer months daytime temperatures range from 104 °F (40 °C) to 118 °F (48 °C) and nighttime lows from 77 °F (25 °C) to 86 °F (30 °C). During winter, the daytime temperatures range from 70 °F (21 °C) to 90 °F (32 °C) and corresponding nights range from 46 °F (8 °C) to 68 °F (20 °C) making it a popular winter resort destination. Due to its warm year-round climate, the region is well known for the production of tropical fruits such as mangoes, figs and dates. According to the Coachella Valley Water District, average annual rainfall is approximately three inches. The mountains that flank the west and south sides of the Valley are often covered in snow during the winter months, and it is not uncommon for snow levels to dip to 2000'.

The primary arterial to the Coachella Valley is Interstate 10, which runs east-west; while State Route 111 runs for about 30 miles along the southwestern rim of the valley and serves as the main arterial highway between almost all Coachella Valley cities. A four-lane expressway, State Highway 86S opened in the early 1990s as a "special" bypass (hence the "S" designation) of two-lane Highway 86 and connects with Imperial and San Diego counties. The rail right-of-way that parallels the I-10 freeway between San Bernardino and Indio is operated by the Union Pacific Railroad (UPRR). There are no surface roads crossing the railroad tracks within the City. One older two lane bridge (Ramon Road) and one newly constructed six lane bridge crosses the railroad and Interstate 10.

Currently the only passenger rail service in the Coachella Valley is a three times per week long distance train operated by Amtrak between Los Angeles and Florida. This train is known as the "Sunset Limited". The Sunset Limited train operates through this area in the very early hours of the morning in both directions and primarily serves the leisure and tourism market. The Riverside County Transportation Commission (RCTC) and the State of California have been evaluating the feasibility of establishing an intercity passenger rail route between Los Angeles, Fullerton, Riverside, Palm Springs, and Indio. The Union Pacific Railroad (UPRR) continues its firm opposition to any new passenger service on its tracks through this area. Notwithstanding this opposition, the California Department of Transportation (Caltrans) continues to propose such service in the California State Rail Plan. Caltrans has no unilateral powers to compel the UPRR to permit the operation of this train. Nevertheless, for intercity trains (as opposed to a commuter or Metrolink train), there are certain federal processes in place that can ultimately lead to an order compelling the railroad to operate the service.

The public agencies requesting the intercity service may be required to invest large sums in the physical infrastructure of the railroad. Some estimates place the capital investment

requirement at a minimum of $500 million for a new set of tracks. RCTC is working closely with the Coachella Valley and the Pass Areas on this issue and supports the expansion of rail service to additional areas of Riverside County.

Public transportation in the valley, including Rancho Mirage, is provided by the SunLine Transit Agency based in Thousand Palms, which was among the country's first transit agencies to totally convert to alternate fuel vehicles, including full-sized buses powered by fuel cells.

Aviation in the area is served by the Palm Springs International Airport in Palm Springs, Jacqueline Cochran Regional Airport in Thermal and Bermuda Dunes Municipal Airport in Bermuda Dunes. Palm Springs International airport (PSP) is currently served by ten airlines. In 2015, there were a total of 1,888,657 passengers embarking or disembarking at PSP. Although Alaska, SkyWest and American have the largest share of passenger travel; WestJet has grown significantly with the influx of Canadians purchasing vacation homes in the valley. Currently, WestJet serves Vancouver, Calgary, Edmonton, Winnipeg and Toronto (seasonally). Seasonal flights from PSP to New York (Virgin), San Jose (Horizon), Stockton (Allegiant), Denver (Frontier) and Houston (Continental).

The City of Rancho Mirage is a well-known desert resort and residential community in the Coachella Valley. With major regional medical facilities, the Valley's most vibrant and attractive commercial centers, and world-class resort hotels, Rancho Mirage is a desirable destination for residents and visitors alike.

The City has taken shape in a beautiful valley setting surrounded by dramatic views of the Santa Rosa and San Jacinto Mountains to the south and west and the Little San Bernardino Mountains to the north. Lushly landscaped golf course communities and broad arterial streets on the Coachella Valley floor have created a "garden in the desert".

The City of Rancho Mirage was incorporated on August 3, 1973, bringing autonomy to residents and businesses over land use and development on approximately 15.6 square miles of land. Since City incorporation, expansion has occurred without sacrificing the quality of life that originally attracted residents and the City now comprises approximately 16,070 acres or 25 square miles. Its Sphere of Influence (SOI) – County managed lands over which the City has an advisory role – total another 1,202 acres or 1.9 square miles. The City of Rancho Mirage has a Council/Manager form of government and became a Charter City in 1997.

From the beginning, Rancho Mirage was primarily a residential community. Succeeding decades brought new assets and resources. In the 1960s, commercial businesses expanded and "Restaurant Row" developed. The 1970s saw the introduction of the Eisenhower Medical Center as well as five of the City's country clubs. Residential construction boomed in the 1970s and 1980s and that period also saw the addition of world class destination resorts – Marriott's Rancho Las Palmas (now KSL's Rancho Las Palmas Resort & Spa), the Westin Mission Hills and The Lodge (now the Ritz Carlton Rancho Mirage).

Development in past years has focused along Highway 111 with the majority of future development expected to be near Interstate 10. From the 1990s to present day, the City has added entertainment and shopping venues such as The River (a 250,000 square foot mixed use entertainment/commercial development) and Monterey Marketplace (a 400,000 square foot "big-box" retail center); worked with the Annenberg Trust to transform the Sunnylands Estate and Visitors Center into a world class educational/conference facility, and completed the state-of-the-art Rancho Mirage Public Library. In addition, the recent completion of the Section 19 Specific Plan will permit a large scale mixed use development adjacent to the 16 story Agua Caliente Casino Resort and proposed multi-modal transit station.

2.6.25 Riverside

The City of Riverside is located in Riverside County, California, United States, and is the county seat. Named for its location beside the Santa Ana River, it is located at the center of the Inland Empire and is the largest city in the Riverside-San Bernardino-Ontario metropolitan area of Southern California, the 4th largest inland California City and is located approximately 60 miles (97 km) east of Los Angeles. Riverside is the 59th most populous City in the United States and the 12th most populous city in California. The City of Riverside is currently 81 square miles according to the 2015 U.S. Census Quick Facts, and has an estimated population of 322,424.

2.6.26 San Jacinto

The City of San Jacinto is a corporate city in Riverside County in the San Jacinto Valley of California. It is approximately 27 square miles in area and is approximately 30 miles east of the County seat, the City of Riverside. San Jacinto is approximately 90 miles east of the City of Los Angeles and approximately 90 miles north of San Diego. The City of San Jacinto sits directly north of City of Hemet on its southern boundary and approximately 10 miles southeasterly of City of Moreno Valley. California State Highway 79 runs north and south through the City. The San Jacinto River, normally a dry riverbed that begins in the San Jacinto Mountains, runs through the northern part of the San Jacinto Valley in a north westerly direction, sitting on the north-easterly boundary of the City. The Soboba Band of Luiseño Indians Tribe is also located northeasterly and adjacent to the City of San Jacinto.

The climate in San Jacinto is considered moderate. Summers are warm and winters are mild. You can usually count on a nice sunny day since San Jacinto averages 342 days of

sunshine each year, and are typical of that of the rest of Riverside County. Winter weather is mild averaging 70-75 degrees daytime, and summers are typically warm with highs averaging 90-95 degrees. The average rainfall is approx. 12.5 inches per year.

Founded in 1870, and incorporated in April 1888, San Jacinto is one of Riverside County's oldest communities, with roots that stretch back to the earliest days of California. Because of its mild climate and fertile land, the region became home to Native Peoples, Spaniards, Mexicans and Americans - all of whom have made a unique and indelible imprint on the character of the valley. Tourism also had an impact on the Valley, beginning around 1900.

Natural hot springs along the north side of the Valley stimulated the development of several tourist resorts with hotels, guest cabins and bath houses. Gilman Hot Springs was the best-known resort. It was originally developed in the 1880s, and was acquired in 1913 by the Gilman family, who ran the resort for 65 years. Soboba Hot Springs was also popular, with its Indian-style cottages scattered along the hillside. Further west was Eden Hot Springs.

The Estudillo Mansion is currently owned by the City of San Jacinto. The City of San Jacinto successfully completed the interior and exterior Estudillo Mansion Restoration project. There has also been the addition of a Water Conservation Garden, parking lot and landscape improvements with a dedication event on May 16, 2009

The City of San Jacinto is a general-law form of government with Council-Manager administration. Council members are elected, with the City Manager appointed by the five council-members elected at-large. The City of San Jacinto is not a participant in the Riverside County Operational Area Multi-Jurisdictional Local Hazard Mitigation Plan. The city has an estimated population of 45,563.

2.6.27 Temecula

The City of Temecula is an incorporated city in Riverside County in the Southwestern portion of the County. It has a population of approximately 106,780. Since incorporation in 1989, as a General Law City, the City has created a desirable community with exceptional public safety, community services, recreational amenities, and a robust commerce.

It is 30.17 square miles and is 30 miles south of the County seat, the City of Riverside. Temecula sits north of and adjacent to San Diego County. The City's eastern and western boundaries are with Riverside County Jurisdictions and to the north is the City of Murrieta. Interstate Highway 15 travels north and south through the western portion of the City. State Highway 79 travels east from the City on both the southern and northern portions of the city. Murrieta Creek which is a pathway from Lake Skinner Reservoir is on the western portion of the City and Temecula Creek which is a pathway from the Vail Lake

Reservoir is on the southern portion of the City. They combine to form the Santa Margarita River in the extreme southwest portion of the jurisdiction. The Santa Margarita Mountains run along the western portion of the jurisdiction.

The City of Temecula's mean yearly temperature 64.7°F with an average high temperature of 76.5°F and an average low of 52.9°F. The average annual rainfall is 11.11 inches.

2.6.28 Wildomar

The City of Wildomar is a corporate city in Riverside County in the Southwest County of California. It is approximately 24 square miles in area and is 41 miles south of the County seat, the City of Riverside. City of Wildomar sits directly adjacent to the City of Murrieta on the south, City of Menifee on the east, and the City of Lake Elsinore on the northern boundaries. The 15 freeway runs through the middle of the City. The Santa Margarita Watershed runs through the southwest portion of the City. Stormwater runoff from portions of Lake Elsinore and Wildomar collects in the Murrieta & Temecula creeks and forms the Santa Margarita River south of the City.

City of Wildomar's climate in winter is almost never extreme, low temperatures rarely go below freezing. In the summer the high temperatures will hover in the 90's, but some days may go over 100 during heat waves. Rainfall for City of Wildomar is typical of that of the rest of Riverside County.

Wildomar is a community of old and new, more mature homes and acreages with horses and other animals mixed with more modern housing tracts. Nestled between the cities of Murrieta and Lake Elsinore, Wildomar officially became a city on July 1, 2008, at that time home to about 28,000 residents.

The name Wildomar was coined from the names of its three founders -- the WIL from William Collier, the DO from Donald Graham and the MAR from Margaret Collier Graham.

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
July 2018

2.7 Tribes of Riverside County

Riverside County has 12 Indian Tribes within or bordering the County.

2.7.1 Agua Caliente Indian Reservation

The Agua Caliente Band of Cahuilla Indians is a federally-recognized Indian Tribe located in Palm Springs, Calif., with 32,000 acres of reservation lands that spread across Palm Springs, Cathedral City, Rancho Mirage, and into the Santa Rosa and San Jacinto mountains. The Tribe's developments include two Palm Springs golf courses, the Spa Resort Casino in downtown Palm Springs, and the Agua Caliente Casino Resort Spa in Rancho Mirage, which includes the 2,000 seat concert venue, The Show. It also operates the Indian Canyon and Tahquitz Canyon parks, both open to the public.

The Tribal Government employs approximately 200 employees, in addition to over 2,000 employees directly associated with its gaming and hospitality operations. The majority of these employees do not live on the Reservation, but commute from outlying communities, such as, Banning, Palm Desert, Desert Hot Springs, and the high desert mountains, increasing the population on the Reservation during the normal business hours.

Tribal employees work in Tribal offices or in the field. Normal business hours are between the hours of 7:00 a.m. to 6:00 p.m. Monday through Friday. It is common for certain employees (Rangers, Maintenance Crew) to work in remote areas of the Reservation where communications may prove difficult.

2.7.2 Augustine Indian Reservation

The Augustine Band of Cahuilla Indians (Tribe) is a federally recognized Indian tribe located in the County of Riverside, California. It was established by Executive Order in 1891. The Augustine Reservation is part of an area occupied for the last 1,000 years by the Cahuilla Indians. The Reservation consists of approximately 602 acres located in the Coachella Valley in southern California, adjacent to the City of Coachella and approximately thirty miles from the City of Palm Springs.

2.7.3 Cabazon Indian Reservation

The members of the Cabazon Band of Mission Indians (Tribe), a federally recognized Native American Indian tribe, are descendants of the Cahuilla Indians who have occupied the desert region of southern California for 2,500 to 3,000 years. As one of approximately a dozen independent clans of the Cahuilla, the Tribe claims its own name, territory and common ancestry. Although the Tribe numbered 600 in the mid-1800s, the population had dwindled to less than 50 by the start of the 1980's. Since that time, under a reorganized tribal government, the Tribe had increased their economic base by taking advantage of opportunities in the "Desert Resorts" area of California's Coachella Valley.

The Tribe is a sovereign nation under the laws of the United States of America and is operated under a democratic form of government. As a sovereign nation, the entire Cabazon community consists of tribal members. Tribal authority resides in the General Council, which meets every three months to confer and make decisions on tribal issues. All tribal members, age eighteen or older, sit on the General Council, which elects a Business Committee every four years. The Business Committee manages the day-to-day operations of the tribe, including making decisions about new business ventures. As Cabazon is a relatively small tribe, this organizational strategy assures that all viewpoints of the tribal community are considered and that the skills and resources of all community members are incorporated into all facets of formulation and implementation of tribal decision making.

The Cabazon Band of Mission Indians' Reservation was established by an act of Congress in 1876 and occupies three separate areas of land consisting of 1,701 acres in the eastern end of the Coachella Valley. This land is held in trust by the federal government for the benefit of the tribe under the jurisdiction of the tribal government.

2.7.4 Cahuilla Indian Reservation

The Cahuilla Reservation is located in Riverside County near the town of Anza. It is 18,884 acres in total, but 16,884 acres of the reservation belongs to individual members of the tribe. 2,000 acres belong to the entire tribe in common. It was founded in 1875. The Cahuilla Band of Mission Indians is headquartered in Anza, California. They are governed by a democratically elected tribal council. Their current tribal chairman is Daniel Salgado and the Vice-Chairwoman is Andrea Candelaria.

2.7.5 Colorado River Indian Reservation

The Colorado River Indian Tribes include four distinct Tribes - the Mohave, Chemehuevi, Hopi and Navajo. There are currently about 4,277 active Tribal members.

The CRIT Reservation was created in 1865 by the Federal Government for "Indians of the Colorado River and its tributaries," originally for the Mohave and Chemehuevi, who had inhabited the area for centuries. People of the Hopi and Navajo Tribes were relocated to the reservation in later years.

The reservation stretches along the Colorado River on both the Arizona and California side. It includes almost 300,000 acres of land, with the river serving as the focal point and lifeblood of the area.

The primary community in the CRIT Reservation is Parker, Arizona, which is located on a combination of Tribal land, leased land that is owned by CRIT and land owned by non-Native Americans. There are other, smaller communities on the reservation, including Poston, located 10 miles south of Parker.

2.7.6 Morongo

The Morongo Reservation is located in the northern and western half of Riverside County, California, approximately 90 miles east of Los Angeles. The Reservation, with an area of approximately 54 square miles, covers portions of the southern flank of the San Gorgonio Mountains, the northern flank of the San Jacinto Mountains, and the valley floor of the San Gorgonio River. It has contiguous boundaries with the City of Banning and the unincorporated community of Cabazon (the only city in California to unincorporated) in the San Gorgonio Pass Area.

The Tribe is one of 107 federally recognized Indian tribes in California. The Tribla Hazard Mitigation Plan (THMP) addresses all the property, infrastructure, and natural environment of the Reservation and under the authority and control of the Tribe. The plan is purposely exclusive of specific sites in its address to protected historical, religious, and cultural resources outside of the Reservation, as the interest in their protection is greater than the potential benefit of identifying their location in this plan.

The Morongo Tribal Council functions as legislative body of the Tribe and additionally manages tribal economic enterprise functions that are normally outside the scope of other governmental agencies. The Tribe provides full municipal like services to its residents including, security, fire, public work functions, water and wastewater treatment, environmental protection, waste management and recycling, natural and cultural resource preservation, emergency management, and other functions typical of a functioning community. According to the United States Census Bureau's "Profile of General Demographic Characteristics: 2010 the population on the Reservation is 1,353 persons.

2.7.7 Pechanga Indian Reservation

The Pechanga Indian Reservation borders the City of Temecula to the northwest, the Town of Rainbow to the southwest, and the Cleveland National Forest to the south and east. The General Council of the Tribe is made up of the adult voting members of the band and elects the Pechanga Tribal Council. The Pechanga Indian Reservation encompasses over 6,700 acres with the most recent lands added in 2008. The current land use is mostly rural residential, with homes generally located along the central portion of the reservation along Pechanga Creek.

2.7.8 Ramona Band of Cahuilla

The Ramona Band of Cahuilla is a southern California Indian tribe whose reservation is located approximately thirty miles east of Temecula and four miles north of the unincorporated town of Anza, off Highway 371 in Riverside County. The Ramona Reservation was set aside by Executive Order in 1891 and a trust patent for the Reservation was issued in 1893.

The Ramona Reservation encompasses approximately 560 acres. The Reservation is situated at the southwestern base of Thomas Mountain in the southern San Jacinto Mountains. Hog Lake Road provides the only access to the Ramona Reservation.

There are 3 homes on the Reservation and seven residents. There are also several additional buildings, including a maintenance yard, a power house and 5 yurts associated with the Band's Eco-tourism project. All electricity for the homes/buildings is provided by hybrid electrical systems consisting of solar and wind generation with generator back-ups. None of the homes/buildings on the reservation are connected to the "grid".

In early 2017, approximately 82 acres of land were transferred from fee simple into trust status by the Ramona Band of Cahuilla. Thus, the lands are now tribal lands under the jurisdiction of the Ramona Band of Cahuilla. The lands transferred include approximately 75 acres along Bautista Road just south of the Ramona Reservation and approximately 6.73 acres along SR 371 in Anza.

There are three (3) buildings located on the lands in Anza. The buildings included the Ramona Band's administrative offices and library. Each of the buildings has access to the power grid. Water is provided to the buildings via wells located on the property, and each of the buildings has a septic system. Moreover, a tiger tank of 5000 gallons provides water storage for use, if needed, for fire suppression.

The lands located along Bautista Road are all unimproved. One of the parcels lies at the junction of Bautista Road and Hog Lake Road and is the access point to the Ramona Reservation. The other parcels are covered with vegetation.

2.7.9 Santa Rosa Indian Reservation

The Santa Rosa Band of Cahuilla Indians Reservation is part of an area, which has been occupied by the Cahuilla for the past 1,000 years. The Reservation consists of 11,021 acres in four separate parcels and is located in the Santa Rosa Mountains near the community of Anza in Riverside California.

They are descendants from the Mountain Cahuilla Band, which historically occupied the mountains south of San Jacinto Peak. The largest parcel is called the Santa Rosa Parcel

and is located 1.25 miles east of the junction of SR –74 and SR – 371. Three separate parcels completely occupy Sections 32, 34, and 36 of T7S, R5E and are one-mile southeast of the main Santa Rosa Parcel. The parcel in Section 34 is called the Old Village Parcel, where their ancestors first settled and the parcel in section 36 is called the Toro Parcel, which is leased out as a microwave relay communications site.

The Santa Rosa Reservation was established on February 2, 1907, under authority of the Act of 1891 as amended. The Act of April 17, 1937 authorized the Secretary of the interior to purchase 640 acres to be held in trust for the Tribe. All reservation land is tribally owned and un-allotted, though some of the land is under assignment and has been passed from generation to generation.

Currently there are approximately 70 people living on the reservation. They are a customs and traditions tribe with a total of 118 members. A tribal council governs with members elected to two-year terms. Because of the very limited size of the band, the Tribal Council also acts as the Planning Committee.

2.7.10 Soboba Band of Mission Indians

The Soboba Band of Luiseno Indians ancestral home is the Soboba Reservation located on the San Jacinto River at the base of the western foothills of the San Jacinto Mountains in Riverside County, California. The Tribal trust lands consist of approximately 7,877 acres of reservation including a large parcel of adjoining undeveloped property called the "Jones Ranch". The current population on the Soboba Reservation is approximately 1,200.

2.7.11 Torres-Martinez Indian Reservation (partly in Imperial County, California)

The Torres Martinez Desert Cahuilla Indians (Tribe) is a Sovereign Indian Nation and a federally recognized Indian Tribe located in Southern California. Its Tribal land base was established by Executive Order of the United States Federal government on May 15, 1876 as the Torres Martinez Reservation. The Tribal land base consists of 24,822 acres of harsh rugged desert terrain in a checkerboard pattern located in the most rural parts of the Coachella Valley in Southern California. A portion of the Tribal area is submerged under the Salton Sea. The Reservation lands straddle Imperial and Riverside Counties and lie about 50 miles north of the US – Mexico International Border. Temperatures reach 120 degrees Fahrenheit in the summer.

The majority of those living on the reservation live in the Tribe's housing development project which was funded by HUD (36 homes) located about 6 miles away from the Tribe's headquarters (boundaries: Avenue 62 North, Avenue 64 South, Monroe St./Wilma Jean Way West, and Jackson St. East).

The Tribal school-age children who live on the reservation for primarily attend public schools (Grades K-12th) administered by the Coachella Valley School Unified District (CVUSD) or the Desert Sands Unified School District (DSUSD). Several public schools are located within or near the reservation boundaries of the Tribe.

2.7.12 Twenty-Nine Palms Indian Reservation (partly in San Bernardino County)

The Twenty-Nine Palms Band of Mission Indians is a United States federally recognized Tribe located in Southern California. The Tribe's members are descendants of the Chemehuevi, who are indigenous people that migrated from the Colorado River area. Geographically, the Tribe has two Reservation sections located near the City of Twenty-nine Palms in San Bernardino County and near the City of Coachella in Riverside County. The San Bernardino County section contains 150 acres of undeveloped land which is adjacent to the Joshua Tree National Park. The Riverside County section contains 242 acres, which has rights-of-way for the Interstate 10 freeway and State Highway 86. On this section, the Tribe has an operating Class 3 Gaming Facility, Tribal Administrative Offices, and Tribal Environmental Protection Agency, which accounts for more than 700 employees. Currently, there is no residential development on either Reservation section.

2.8 Special Districts

2.8.1 Participating School Districts

Beaumont Unified School District

The Beaumont Unified School District is located in the westernmost portion of Riverside County and is located at the intersection of Interstate 10 and Interstate 60. The District is west of the city of the Banning, North of the city San Jacinto, east of the city of Calimesa and unincorporated areas of Riverside lie to the north and east. The student population of the school district is 9,719.

Desert Sands Unified School District

The Desert Sands Unified School District is a pre K-12 grade school district located in the heart of Riverside County's Coachella Valley. DSUSD currently has 34 school sites. Included here are 20 elementary schools, 7 middle schools, 6 high schools, and 1 Early Childhood Education Center. Alternative education and continuation programs are offered at two of the district's high schools, Summit/Horizon and Amistad. DSUSD serves the communities of La Quinta, Palm Desert, Indio, Indian Wells, Bermuda Dunes, and portions of Rancho Mirage and Coachella, California. The combined student population of DSUSD is approximately 30,000 students. In addition to the schools, DSUSD also has a District Education Center complex, and Maintenance and Transportation facilities located in the City of La Quinta.

Hemet Unified School District

The HUSD is a public school district in Riverside County in the San Jacinto Valley of California. Broken down into 3 categories of schools, with it is approximately 1,250 certificated staff are employed by the district, along with approximately 1,480 classified employees plus approximately 960 substitutes, the district employs over 3,690. These employees work from our 28 sites and district offices to serve our student enrollment of over 21,700. The District serves the cities of Hemet, Anza, Aguanga, Winchester, and Idyllwild.

Lake Elsinore Unified School District

The Lake Elsinore Unified School District (LEUSD) was formed in 1989 when Elsinore Union High and Elsinore Elementary merged and unified. It covers 140 square miles including the city of Lake Elsinore, Canyon Lake, Wildomar, as well as a portion of North Murrieta including the communities in and around Ortega Highway and Horsethief

Canyon. Lake Elsinore Unified serves several communities with a combined population of approximately 100,000 and specifically educates 22,000 students.

Moreno Valley Unified School District

The Moreno Valley Unified School District is located in the western portion of Riverside County. The District is bound by the City of Perris to the south, and the City of Riverside to west. The District is bounded by the unincorporated areas to the north and east. The student population of the school district is 34,000.

Perris High Unified School District

The Perris Union High School District (PUHSD) is located in the City of Perris, a community fifteen miles southeast of the City of Riverside. PUHSD covers approximately 184 square miles and includes the City of Perris, City of Menifee and the unincorporated communities of Romoland as well as a portion of Nuview.

PUHSD currently educates approximately 9,000 students residing through (1) 7-8 middle school, (3) comprehensive high schools, (2) alternative high school programs and (1) dependent charter military school. The school district also provides adult educational services.

Riverside Community College District (RCCD)

Riverside Community College District is a three-college higher education system serving residents of Riverside and surrounding counties in California. It is the seventh oldest community college in the state and the fifth largest. RCCD colleges are located in the cities for Riverside, Moreno Valley and Norco. The District's service area is over 450 square miles with a wide range of social, economic, and ethnic diversity in one of the most rapidly growing counties in the nation. Colleges and Annex sites sit within 1/2 mile of major California Freeways and Railroad tracks. Riverside Community College District's average enrollment exceeded 35,000.

Riverside County Office of Education (RCOE)

RCOE directly serves over 8,368 students; over 2,100 of those students are classified as special needs students.

RCOE has a total of 138 sites: (4) School of Career Education campuses (Accredited post-secondary occupational training programs); (14) Career Technical Education sites at district school locations; (40) RCOE Alternative Education program sites on school district sites, independent RCOE sites, and detentions; (40) Special Education program sites located on school districts sites, RCOE sites as well as youth/adult Jails/detention

centers; and (22) Head Start / Migrant Head Start sites. Three of which are located in Imperial County with one site approximately 1-mile from the Mexico border.

RCOE provides support and professional development opportunities to (23) school districts comprised of (4) Elementary Districts; (1) High School District; and (18) Unified school districts (totaling over 407 K-12 school sites and representing over 427,000 students, 30,000 of those students are classified as special needs students). In addition to providing services to county school districts, RCOE provides support to: one (1) Tribal school; one (1) California School for the Deaf; four (4) community colleges; and twenty-seven (27) charter schools.

Riverside Unified School District

Riverside Unified School District (RUSD) covers just over 92 square miles and encompasses most of the City of Riverside from Van Buren Blvd. and La Sierra Ave. to the west, the Santa River and County line to the north, the city limits to the east and the unincorporated areas of Lake Mathews and Woodcrest to the south.

Riverside Unified is currently the 15th largest school district in the state serving approximately 42,300 K-12 students. The district has 30 elementary schools, 7 middle schools, 5 comprehensive high schools, two continuation schools, one virtual school, and one special education school. The school district also provides pre-school and adult educational services.

San Jacinto School District

San Jacinto School District is in the City of San Jacinto that encompasses seven (7) elementary schools, three (3) middle schools, one (1) traditional high school, one (1) continuation high school and two (2) pre-schools for a total of 14 schools. The jurisdiction also includes a District Office, Facilities and Operations Department, and Nutrition Services. The San Jacinto Unified School District has a staff number of 1,522 and student population of 9,825. San Jacinto School District has a total population of 11,347.

2.8.2 Fire Protection

Idyllwild Fire District

The Jurisdiction is a Special Fire District located in the unincorporated mountain community of Idyllwild, located in Riverside County. It is approximately 5 square miles in area located about 60 miles east of the county seat, the City of Riverside. The community of Idyllwild is surrounded on all sides by the San Bernardino National Forest and is transected from NE to SW by Strawberry Creek. Even though there is a creek running through the community, there is no land that would be considered "flood plain".

The “District” is in mountainous terrain running from 5,000’ to 6,500’ elevation in a mixed conifer forest fuel type. The Clark section of the San Jacinto Fault runs NW to SE and is SW of the community approximately 7 miles at the closest point. The San Jacinto Fault is considered to be the most active fault in Southern California (D.M. Morton and J.C. Matti, USGS 2005, revised 2008)

Idyllwild averages 26 inches of rain per year with some of that falling as snow in three to four storms per winter. Summer thunderstorms also contribute to the rainfall total as well as wildland fires from lightning.

2.8.3 Health Care Facilities

Kaiser

Kaiser Permanente, as a whole, had 10.2 million health plan members, 186,497 employees, 18,652 physicians, 51,010 nurses, 38 medical centers, and 622 medical offices reported in 2015. The non-profit Kaiser Foundation Health Plan and Kaiser Foundation Hospitals entities reported a combined $1.9 billion in net income on $60.7 billion in operating revenues. Each Permanente Medical Group operates as a separate for-profit partnership or professional corporation in its individual territory, and while none publicly reports its financial results, each is primarily funded by reimbursements from its respective regional Kaiser Foundation Health Plan entity. KFHP is one of the largest not for profit organizations in the United States.

Kaiser Permanente Riverside Medical Center is a general medical and surgical hospital in Riverside, CA. Kaiser Permanente Riverside Medical Center has 226 beds and was opened in 1989. Currently, we provide care for over 500,000 members throughout Riverside County.

2.8.4 Water Districts

Eastern Municipal Water District

Eastern Municipal Water District (EMWD), headquartered in Perris, California provides water, wastewater and recycled water service to nearly 800,000 people across a 555 square mile service area from Moreno Valley to Temecula and east to the San Jacinto Valley. EMWD is California’s sixth largest water provider and the largest in Riverside County and was established in 1950 through a public vote. It is one of 26 member agencies of The Metropolitan Water District of Southern California. EMWD owns and operates two potable water filtration plants, two groundwater desalination facilities, four regional water reclamation facilities, more than 2,400 miles of potable water pipeline, 1,800 miles of sewer pipeline and 200 miles of recycled water pipeline. EMWD’s water

supply sources include local groundwater (potable and desalinated), imported water from the Colorado River and State Water Project systems and recycled water. EMWD also wholesales to seven water agencies within or adjacent to its service area boundaries.

Imperial Irrigation District

Imperial Irrigation District (IID) was formed under the State Water Code and is considered a Special District under the governance structure of the State of California. IID is the energy provider to all of Imperial County and portions of Riverside and San Diego Counties, and is also the raw water provider to all municipalities and agricultural users in Imperial County. Throughout the past several years, the district’s water and energy operations have been impacted by severe storms (micro bursts), floods and earthquakes varying in magnitude, with the largest being 7.2 on the Richter scale. Imperial Irrigation District provides service to 100,000 customers in the County of Riverside.

Rancho California Water District

The Rancho California Water District (RCWD) serves the area known as Temecula/Rancho California, which includes the City of Temecula, portions of the City of Murrieta and unincorporated areas of southwest Riverside County. The area served is approximately 156 square miles in area and is 42 miles east of the County seat, the City of Riverside. The population of the RCWD service area was estimated 108,920 in 2015.

High Valleys Water District

The High Valleys Water District, Banning, CA, is located in an unincorporated area known as Twin Pines/Poppet Flats, in Riverside County in the Coachella Valley of California. It is approximately 5 square miles in area and is 44 miles east of the County seat, the City of Riverside. The High Valleys Water District was founded in 1971 and serves the Poppet Flats, Twin Pines and Mt. Edna communities. Since they do not have any natural water resources, they purchase our water (which is already treated) from the City of Banning. The water is pumped up eight (8) miles to the mountain through three separate booster stations, into three storage tanks and 40 miles of pipe and delivered to approximately 225 customers. They have five (5) elected Board members, a Board Secretary, Office Administrative Assistant, a General Manager, two Field Techs, and an on-call/as-needed office assistant. There is no sewer service as the communities are all on septic tanks. Some residents have well-systems, which annual backflow testing is done at those locations.

Santa Ana Watershed

The Santa Ana Watershed Project Authority is a Joint Powers Authority formed in 1969 by Eastern Municipal Water District, Inland Empire Utilities Agency, Orange County Water District, San Bernardino Valley Municipal Water District and the Western Municipal Water District. One of SAWPA's main functions is to operate the Inland Empire Brine Line, a 73-mile large diameter regional brine disposal system created to protect water quality in the Santa Ana River and its tributaries. The Brine Line is located in both San Bernardino and Riverside Counties. The Brine Line collects high salt discharges from municipal groundwater treatment plants, power plants, various industries and it serves as an emergency connection to several municipal wastewater treatment plants. Currently, there are a total of 32 active facilities discharging to the Brine Line. All flows collected by the Inland Empire Brine Line are conveyed to Orange County Sanitation District Facilities for treatment and disposal.

The Inland Empire Brine Line serves the portion of the Santa Ana River Watershed within Riverside (1,244 sq. miles) and San Bernardino (1,014 sq. miles) Counties. According to the 2010 U.S. Census, the total population within the Inland Empire Brine Line service area is 3,415,953 inhabitants: 1,686,024 in Riverside County and 1,729,929 in San Bernardino County.

Western Municipal Water District

Western Municipal Water District is a Special District in Riverside County in the Inland Empire of California. It services approximately 510 square miles in area and serves portions of the Cities of Riverside, Corona, Perris, Murrieta, and Norco, as well as unincorporated areas of Western Riverside County. The District has areas adjacent to Orange County on its western boundary, San Bernardino County on its north and eastern boundaries, and San Diego County to the south. The Burlington Northern & Santa Fe Railroad and California State Highways 90 and 215 both run alongside sections of the perimeter of the District in Riverside and Perris. Interstate Highway 15 runs along a section of the District's service areas near Murrieta and Corona. The Santa Ana River, a waterway that starts in the Mountains and runs through the cities of Riverside, Corona and Norco, is close to the District's northern boundary. Murrieta Creek runs through the District's service area in Murrieta.

Western Municipal Water District was established on January 19, 1954. On November 12, 1954 Western was annexed to and became a member of Metropolitan Water District of Southern California providing water for mostly agricultural use. In the early 1960's Western began retail water service to domestic water customers. Western originally depended on Colorado River water and in 1979 it changed its primary source of water to

the State Water Project drawing water from Northern California. Today the District serves over 25,000 retail and eight wholesale customers.

Section 3.0 - The Planning Process

While the Disaster Mitigation Act of 2000 ("DMA 2000") requires that local communities address only natural hazards, the Federal Emergency Management Agency (FEMA) recommends that local comprehensive mitigation plans address man-made and technological hazards to the extent possible. In the 2012 Multi-Jurisdictional Local Hazard Mitigation Plan, the Riverside County Operational Area (RCOA) addressed an expansive set of hazards. Upon review of the hazards since 2012 and the number of incidents that had man-made causes, the Riverside County OA will continue to address the large set of man-made and technological hazards.

The 2017 Riverside County Multi-Jurisdictional Local Hazard Mitigation Plan update review process initially started August 2016.

3.1 Planning Process Overview

The Riverside County Emergency Management Department (EMD) formed an internal EMD Planning Team, a Local Hazard Mitigation Plan Steering Committee and continued to utilize the Operational Area Planning Committee (OAPC) as an external planning committee.

Each Planning Team was comprised of various EMD personnel, Riverside County Department leaders, emergency managers and key personnel to discuss the most practical methodology to review and update Riverside County's 2017 plan.

A plan template and other various tools were developed and sent to participants to assist them with creating a new plan or to review and update their existing plan. The County held multiple meetings, workshops and conference calls to assist participants with drafting or updating plans.

(See Appendix B for Participants).

3.2 Hazard Mitigation 2017 Planning

Riverside County recognizes the importance of involving all of the stakeholders and utilized the following planning methodologies:

- Reviewed the process of risk assessments and hazard identification with all submitting participants
- Reviewed mitigation actions that are proposed, pending and completed
- Encouraged participation with the planning process by holding community meetings, individual workshops and conference calls
- Coordinated staffing resources to cities and special districts to assist with plan development and provided pertinent detailed information specific to jurisdictions
- Posted information on official Riverside County Emergency Management Department websites
    - RivCoEMD.org
    - RivCoReady.org
- Provided a list of upcoming mitigation training information on Riverside County Public Health Emergency Preparedness and Response (PHEPR) website
    - RivCoPHEPR.org

Project Pre-Plan Research:

- Reviewed the 2012 LHMP, Crosswalk and Comments from Reviewer
- Reviewed the 2013 Local Mitigation Planning Handbook (FEMA)
- Reviewed the 2011 Local Mitigation Plan Review Guide
- Reviewed the 2013 State of California Multi-Hazard Mitigation Plan
- Identified gaps and discuss findings with management team
- Determined resolutions for gaps and discuss what updates are necessary

Project Plan

- Continually update the Operational Area Plan
- Perpetual maintenance of Local Hazard Mitigation Plan
- Engage all participants through outreach efforts
- Submittal of participant annex and worksheets

3.3 2012 LHMP Tools

The LHMP Steering Committee determined the best approach was to use the tools that were developed in 2009 to assist in updating the LHMP. The following worksheets and tools were utilized as a reference for each jurisdiction to evaluate its capabilities, determine its need and to assist in developing goals and strategies:

- Local Jurisdiction Contact Information worksheet
- Hazard Identification Questionnaire
- Specific Hazards Summary Worksheet
- Jurisdiction Vulnerability Worksheet/ Severity Table
- Local Jurisdiction Proposed Mitigation Action and Strategy Proposal
- Local Development Trends Questionnaire
- Provided website: http://myplan.calema.ca.gov
- EMD personnel assigned to assist with the development of the plan and provide additional information when necessary
- Hosted and provided facilities for workshops
- Developed and provided step by step instruction guides
- Provided assistance via email, phone calls and one-on-one meetings
- Assisted jurisdictions obtain/create maps
- Provided maps for individual jurisdictions
- Provided incident information for their jurisdiction or authority
- Provided information on mitigation trainings and seminars

3.4 Participating Jurisdictions Planning Process

The 2017 LHMP has a variety of participants and parties with vested interest across the County. The submitting participants include cities, education, fire protection, hospital, and water districts.

The Participants List is found in Section 1.4 or Appendix B: Participants.

The goals of the Operational Area are to ensure the plan is comprehensive and easy to utilize and implement. The final 2017 Multi-Jurisdictional Local Hazard Mitigation Plan consists of the Riverside County Operational Area Plan and the individual Annexes. Each annex is designed to be a stand-alone Local Hazard Mitigation Plan for the cities and special districts, yet clearly show a linkage to the Operational Area Plan, other County Plans (e.g. County General Plan) and the State Hazard Mitigation Plan. (See Annexes A1-46)

The 2017 LHMP outreach presentations were given in 12 community outreach meetings, 12 LHMP workshops and 32 meetings were held with individual cities or special districts. (See Appendix D)

During the LHMP process, participants were provided directions on how to complete the "Annex" and other templates. Resources provided to participants included: worksheets, templates, examples, websites, mapping sites and other resources to assist in the process. Riverside County Emergency Management Department personnel were available to assist each participating jurisdiction during the LHMP process.

Additional information and resources were emailed to the participants as they became available through "E-Blasts" (mass email sent to every participant). An example is the "My Plan" mapping website on the Hazard Mitigation Portal for Cal OES.

A flexible timeline was presented in the meetings, and sent out via email as changes occurred. The review process of the draft annexes is outlined as follows:

- Participants submitted draft LHMP via email to EMD for review and comments.
- EMD reviewed plans, crosswalks and inventory worksheet to ensure completeness
- Checklists were utilized to document all components of the plans were complete and accompanied with all worksheets and attachments referenced in the plan
- Acknowledgement and checklists were sent back to the participants noting identified gap findings and comments. We requested additional information as necessary
- After revisions were completed by participants, the draft was resubmitted to EMD for adoption into the Multi-Jurisdictional Local Hazard Mitigation Plan
- All correspondence, meetings, and conference calls were recorded in a database to track status of plan

3.5 Regional Planning Process (Riverside County Operational Area)

The Operational Area began the regional planning process by creating the EMD Planning Team who has extensive experience in Emergency Management and vast knowledge of the hazards and mitigation efforts in Riverside County.

EMD's external LHMP Steering Committee included EMD Management and the Operational Area Planning Committee (OAPC). The committee includes representatives from EMD, the Board of Supervisors, city emergency managers, city elected officials, tribal representatives, school districts and special districts. The initial coordination of the LHMP update process was presented to the OAPC attendees and letters of commitment and participation were sent via email to reginal stakeholders through the Operational Area Planning Committee distribution list.

The quarterly Operational Area Planning Committee (OAPC) meetings are intended to engage:

- local jurisdictions
- businesses
- non-profit organizations
- faith-based organizations
- governmental agencies
- tribal communities
- special districts
- educational institutions
- utility companies
- public transportation
- healthcare facilities

The Operational Area Planning Committee (OAPC) Mission:

- To provide facilities, systems, and emergency management training for the officials of the Riverside County Operational Area, including County and City government personnel and participating special districts.
- To effectively and efficiently manage a disaster affecting jurisdictions within the Riverside County Operational Area (Govt. Code 8550 et. seq.).

The Riverside County Operational Area is governed by the Board of Supervisors and the Operational Area Planning Committee (OAPC). OAPC meets quarterly.

OAPC has several subcommittees who are responsible for determining the use and distribution of funds from grants channeled directly through the Operational Area, i.e., Homeland Security, Buffer Zone Protection Plan grant programs, Local Hazard Mitigation Steering Committee, Mass Care and Shelter Task Force and Community Emergency Response Team (CERT) Program Manager Committee.

Please see Appendix D: Meetings for list of OAPC attendees and sign-in sheets.

3.6 EMD Planning Team

The internal EMD Planning Team consists of the EMD Management and key personnel of EMD. The job classifications of the committee included:

- Director
- Deputy Director
- Program Chief II

- Emergency Services Manager
- Program Coordinator II
- Emergency Services Coordinators (7)
- Emergency Medical Services Specialist (3)
- Senior Health Educator
- Health Education Assistant
- Volunteer Services Program Manager
- Grants Personnel (Administrative Services Analyst II, Contracts and Grants Analyst and Account Technician II)
- Office Assistant III
- Secretary

EMD as a whole department is structured to resemble the Incident Command System (ISC) Organizational Chart. There are four divisions; Preparedness, Operations, Business and Finance, and Emergency Medical Services. The Department is able to expand or contact similarly to ICS and places an importance on Span of Control. The following pages have figures of the Emergency Management Department Organizational Chart.

Figure 12: Riverside County Emergency Management Department Organizational Chart:

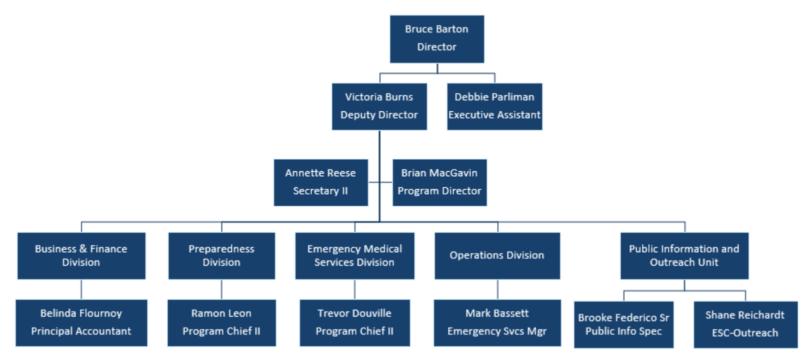


Figure 13: EMD Preparedness Division

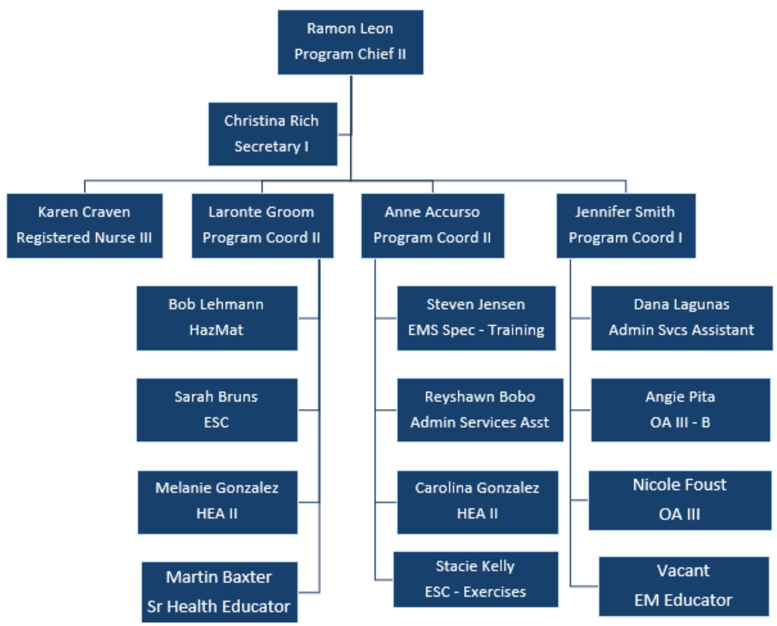


Figure 14: EMD Operations Division

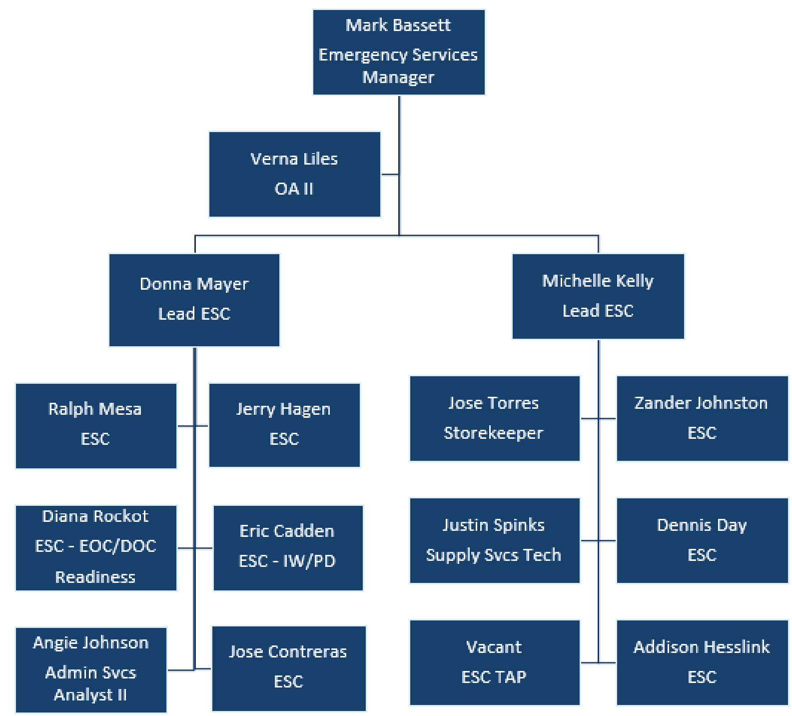


Figure 15: EMD Riverside Emergency Medical Services Agency Division

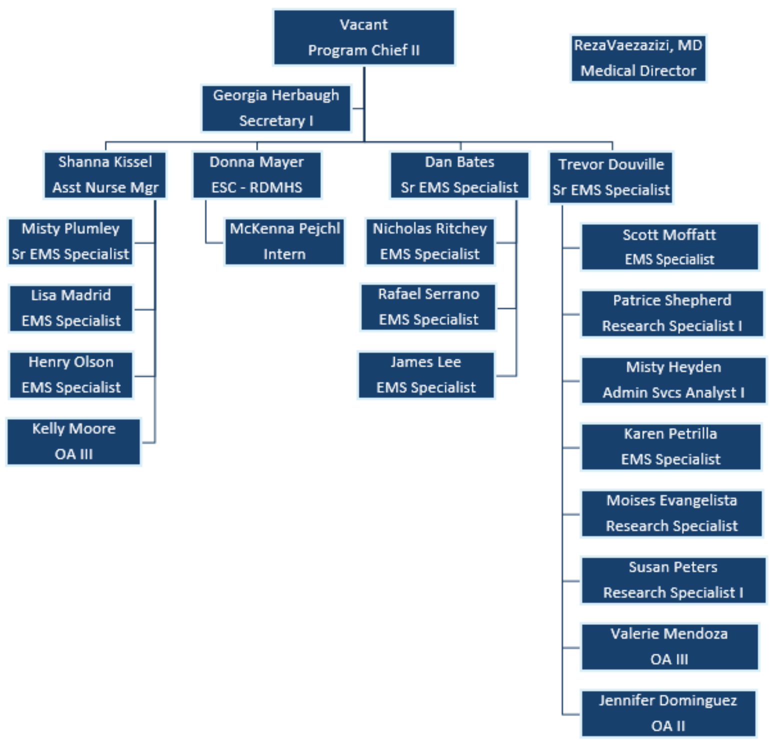


Figure 16: EMD Business and Finance Division

3.7 LHMP Steering Committee Partners

Riverside County recognizes that any successful planning activity, such as the development of a comprehensive plan, involves bringing together a cross-section of the public to reach consensus on how to achieve a desired outcome or resolve a community problem. Using this inclusive process, the public gains a better understanding of the problem or issue and strives to develop a vision along with goals, priorities, and actions.

The result is a common set of community values and widespread support for directing financial, technical, and human resources to an agreed upon course of action, usually identified in a plan. The same is true for mitigation planning. An effective and open public involvement process ensures that all citizens understand risks and vulnerability so that they will work with the jurisdiction and support policies, actions and tools that over the long-term will lead to reduction and/or eliminate long-term risk to human life and property in the event of a disaster or hazard.

An introductory meeting was held with County Department leaders and a presentation given to develop a planning and review process. The following table identifies the agencies that were represented.

Table 5: Internal Steering Committee Partnering Agencies

DEPARTMENTS	POSITION	TOPIC
Agricultural Commissioner's Office	Deputy Ag Commissioner	Insect Infestation, Drought
Animal Services	Commissioner of Field Services, Lieutenant of Field Services	Animals affected
Assessor's Office	Secretary	Population and Building Data
Cal OES	Emergency Services Coordinator	Drought, Earthquake, Insect Infestation, State Representative
Economic Development Agency	Aviation Facilities Specialist/Grants, Aviation Secretary, Assistant Director, Facilities Management Division	Population and Demographics
Emergency Management Department	Program Director, Program Coordinator II, Emergency Services Coordinator, Health Education Assistant, Office Assistant	Goals and Objectives, Nuclear, Power Outage, Pipeline, Communication Failure, Cyber Attack, Extreme Weather, Landslides, Aqueduct
Environmental Health	Deputy Director	Hazardous Materials, Earthquake
Flood Control	Principle Engineer	Dam failure, Flood Hazard
Imperial Irrigation Water District	Emergency Services Coordinator	Aqueduct, Power Outage
NOAA	Acting Meteorologist In Charge	Extreme Weather, Drought
Public Health	Branch Chief	Pandemic and Disease/Contamination,
RC-HR / County Hospitals	Safety Coordinator	Health Care Facilities, Health Impact, Behavior Health
Riverside County Fire	Chief, Division Chief	Wildfire, Pipeline, Transportation and Hazardous Materials
Riverside County IT	Deputy Chief Information Security Officer, Chief Information Security Officer, Information Technology Officer II, Supervising Communications Analyst	Communication Failure and Cyber Attack
Riverside County Office of Education	Safety, Emergency Preparedness Coordinator	Schools, Shelters, Critical Facilities
Sheriff's Office	Sergeant	Civil unrest, Jails, Terrorism
SoCal Edison	Local Public Affairs Officer	Power Outages
SoCal Gas	Public Affairs Manager	Pipeline
Transportation and Land Management Agency	Chief Engineering Geologist, Admin Services Manager	Earthquake, Landslide, GIS, General plan references

Various portions of the 2012 plan included information that was provided by internal county departments. These sections were highlighted and given to the originating departments for review, comments, and updates by utilizing the following methodology:

- Review information provided and identify necessary corrections for updates
- Review definition for hazards to ensure accuracy
- Provide any additional incidents that occurred between 2012 to present
- For revisions or updates, provide supporting documentation with credible sources including but not limited to, studies (planning, safety, mitigation, etc.) maps, charts, tables, photos, surveys, cost-benefit analysis or technical guidance
- Facilitate discussions for each hazard prioritization and mitigation measure
- Develop a group or team from your department to review the document and changes prior to sending the information back to EMD
- Contact EMD to answer any questions or to provide additional comments
- Provide updated maps
- Return all revisions to EMD

The Transportation and Land Management Agency (TLMA) provided updated county-wide maps that had been included in the 2012 Multi-Jurisdictional Plan and the County's 2015 General Plan.

As part of the planning process, a review of the unincorporated area was conducted to assess existing and new hazards through utilization of MyPlan though Cal OES.

Emergency Management Agencies in the neighboring and surrounding counties were contacted to discuss their mitigation efforts and plans, inclusive of:

- Orange County
- San Bernardino County
- San Diego County
- La Paz County (Arizona)

Outreach was conducted with tribal communities in Riverside County. Most of the tribes have completed Tribal Hazard Mitigation Plans. The participating tribe that joined the County in the 2017 update expressed their intent to build a stronger partnership with the County.

(See Section 2.7 for all tribes located in Riverside County)

3.8 Public Outreach

Public notice of the LHMP update was posted on the Emergency Management Department Website (RivCoEMD.org), Twitter and announced at various community meetings throughout the County. All meetings were open to the public and allowed public comment. The audience represented various vested individuals who provided input, insight, and concerns regarding the hazards affecting their specific communities. Comments made were regarding the incorporation of particular hazards that the plan already addresses.

(Please see Appendix D for all outreach and meeting information)

In an attempt to seek public comment postcards with LHMP and National Flood Insurance Program (NFIP) information was distributed thought the County. The post cards will be presented at County owned Fire stations as well as community events. Every year during National Preparedness Month the postcards will be distributed again to continue to seek comments throughout the plan cycle. English and Spanish versions were available. For 2017 National Preparedness Month locations where postcards were distributed, please see Appendix D.

Figure 17: EMD LHMP Website

LHMP URL: http://www.rivcoemd.org/LHMP

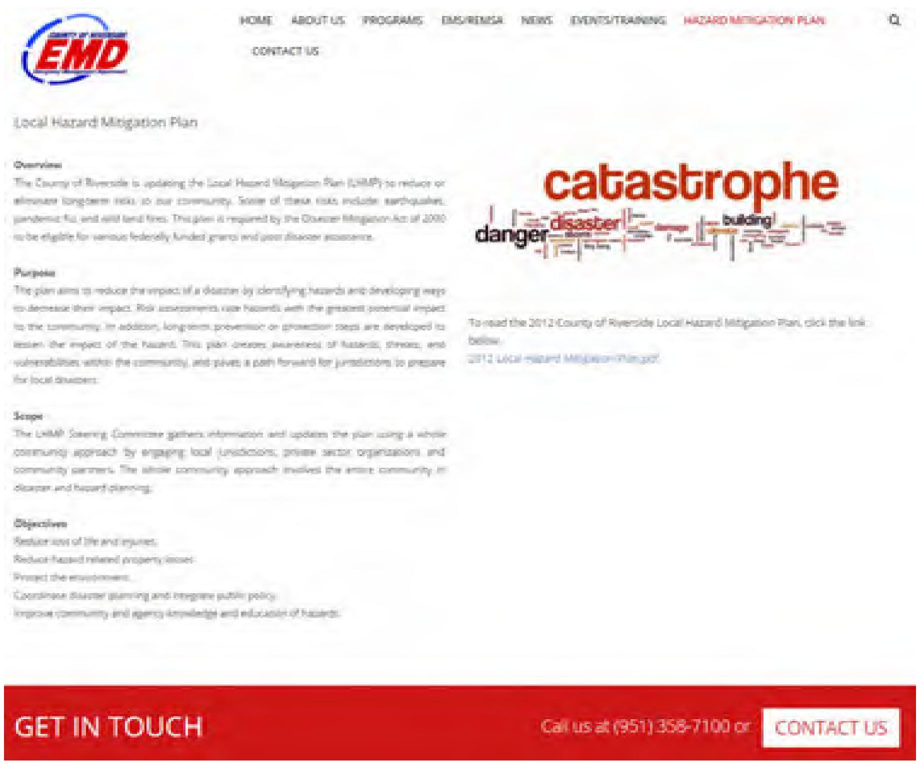


Figure 18: Twitter Post

Twitter URL:
https://twitter.com/RivCoReady?ref_src=twsrc%5Etfw&ref_url=http%3A%2F%2Frivcoemd.org%2Frivcoready%2F

Figure 19 LHMP Postcard Side 1

Figure 20 LHMP Postcard Side 2

Figure 21: LHMP Spanish Postcard Side 1

Figure 22: LHMP Spanish Postcard Side 2

3.8.1 Hazard Mitigation Meetings

Internal EMD Planning meetings were held to discuss review findings and the process was planned as explained in Section 3.1. The EMD Planning Team met regularly to discuss plan progress, participant status and any other matters as necessary.

Organizational efforts were initiated with the County and participating jurisdictions to inform and educate the plan participants of the purpose and need for updating the countywide hazard mitigation plan. An initial meeting was held with key community representatives to discuss the plan update process. The initial jurisdiction kick-off meetings were held on December 6th, 8th, 13th and 15th in 2016. In 2017 workshops were then held the first two weeks of February and June. FEMA's two day course G-318 (Mitigation Planning for Local and Tribal Communities) was hosted by EMD on April 3rd and 4th.

Table 6: Table of Presentations and Meetings

The following table documents public outreach efforts and community meetings:

Public Outreach Presentations and Updates				
Date	**Name of Meeting, Location**	**Type of Presentation**	**Number Attending**	**Hours**
6/22/2016	Western Riverside Emergency Council (WREC) Meeting, Riverside	Informed Council of upcoming Plan update and encouraged participation	19	20 mins.
7/14/2016	Operational Area Planning Committee (OAPC) Meeting, Beaumont	Informed OA on upcoming Plan to update	163	15 mins
9/19/2016	Palo Verde COMM. Meeting, Blythe, CA.	LHMP discussion, Local Hazard Mitigation Plan update process, encouraged East County participation and Public Outreach	16	1
9/29/2016	Email Distribution #1	Email blast, Distributed contact verification emails for partnering jurisdictions and agencies. Provided LHMP informational guides and resources.	–	–

10/6/2016	Local Hazard Mitigation Plan Steering Committee Kick-Off for County Departments	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide Update Process County Inventory Checklist County Risk Assessment Participants, New, Returning, and Not Participating	19	2
10/11/2016	Emergency Management Project Committee	Project Overview, LHMP introduction, planning process	34	10 mins.
10/13/2016	Operational Area Planning Committee (OAPC) Meeting, Beaumont	Updated OA on progress of update, offered participants opportunity to reach out to county for technical support, offered public opportunity to ask questions and provide comment (no comments made)	64	2
10/19/2016	Steering Committee Email Distribution #1	Informed the members of the google drive that contains LHMP documentation for additional support Informed about the next steps and what about the next meeting date Provided contact information for EMD LHMP staff	–	–
12/1/2016	Email Distribution #2	Invitation to LHMP Template workshop, update on county hazard identification/ranking, and general information on where they should be in the update process	–	–
12/6/2016	Tribal Workshop, Riverside	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide County Update Process and Progress Mitigation Websites and Resources Technical Support	7	1
12/8/2016	City Workshop, Riverside	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide County Update Process and Progress Mitigation Websites and	15	2

		Resources Technical Support		
12/8/2016	Mountain Emergency Communications COMM. Meeting, Idyllwild, CA	LHMP discussion, Local Hazard Mitigation Plan update process	7	2
12/13/2016	Special District Workshop, Riverside	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide County Update Process and Progress Mitigation Websites and Resources Technical Support	8	1
12/15/2016	School District Workshop, Riverside	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide County Update Process and Progress Mitigation Websites and Resources Technical Support	7	2.5
12/15/2016	Northwest COMM. Meeting, Jurupa Valley, CA	LHMP discussion, Local Hazard Mitigation Plan update process	12	2
12/20/2016	Southwest COMM. Meeting, Murrieta, CA	LHMP discussion, Local Hazard Mitigation Plan update process	6	2
12/29/2016	Steering Committee Email Distribution #2	Sent each member questions about specific hazards that pertained to the department they work for	–	–
1/4/2017	Email Distribution #3	Informed LHMP participants of additional LHMP workshops that will be hosted to provide further assistance	–	–
1/11/2017	Local Hazard Mitigation Plan Steering Committee, Riverside	Group Discussion, Hazard Identification/Ranking Final Review, Mitigation Actions and Strategies Brainstorm	16	2

1/12/2017	Operational Area Planning Committee (OAPC) Meeting, Beaumont	Updated OA on progress of update, offered participants opportunity to reach out to county for technical support, offered public opportunity to ask questions and provide comment (no comments made)	74	2
1/19/2016	Steering Committee Email Distribution #3	Thanked all members for participating in the previous meeting. Provided the risk scores of the hazards that were discussed at the previous meeting. Provided the most current updates for the mitigation actions from 2012 & asked for each of them to provide new actions for current county hazards. Informed about the next meeting date	–	–
2/7/2017	City Workshop, Riverside	Answered LHMP questions & concerns. Provided additional assistance if needed Reviewed LHMP drafts if needed	10	1
2/8/2017	School District Workshop, Riverside	Answered LHMP questions & concerns. Provided additional assistance if needed. Reviewed LHMP drafts if needed	2	1
2/9/2017	Special District Workshop, Riverside	Answered LHMP questions & concerns Provided additional assistance if needed Reviewed LHMP drafts if needed	4	1
2/14/2017	Email Distribution #4	Informed LHMP participants about the final 2017 LHMP County Hazard Ranking. Talked about a possible LHMP Training that EMD is deciding on hosting Informed about the Senate Bills 1000 & 379. Provided a link to help participants obtain maps for their jurisdiction if they are having trouble with Hazus	–	–

2/23/2017	Email Distribution #5	Informed LHMP participants about the cancellation of the April workshops due to the substation of having the LHMP FEMA Training. Informed about the confirmation of the FEMA G-318 Training that will be hosted April 3-4 and provided the sign-up link. Informed that the June workshops are still going to be held to provide any additional assistance on the plan	–	–
2/27/2017	Riverside County Emergency Managers Committee	Provided Cities and various County Departments information on the status of the update. Offered information on how committee participants could become involved in the planning process		2
3/1/2017	Steering Committee Reminder Email	Reminded members that the date for submitting new mitigation actions for the current top 10 county hazards was approaching	–	–
3/15/2017	Palo Verde COMM. Meeting, Blythe, CA	LHMP discussion, Local Hazard Mitigation Plan update process	18	1.5
4/5/17	Operational Area Planning Committee and Annual Disaster Council Meeting	Updated OA on progress of update, offered participants opportunity to reach out to county for technical support, offered public opportunity to ask questions and provide comment		2
4/21/2017	Steering Committee Email Distribution #4	Provided minutes from previous meeting, informed about reviewing LHMP mitigation actions and goals/objectives, sent calendar invite for next meeting	–	–
4/24/2017	Steering Committee Email	Sent selected committee members to provide input on LHMP hazard profiles depending on the hazard that corresponds to the department they represent	–	–

6/5/2017	Tribal Workshop, Riverside	Answered LHMP questions & concerns. Provided additional assistance if needed Reviewed LHMP drafts if needed	4	1
6/6/2017	City Workshop, Riverside	Answered LHMP questions & concerns. Provided additional assistance if needed Reviewed LHMP drafts if needed	8	1
6/7/2017	School District Workshop, Riverside	Answered LHMP questions & concerns. Provided additional assistance if needed Reviewed LHMP drafts if needed	6	1
6/8/2017	Special District Workshop, Riverside	Answered LHMP questions & concerns, Provided additional assistance if needed Reviewed LHMP drafts if needed	6	1
7/13/2017	Operational Area Planning Committee (OAPC) Meeting, Beaumont	Updated OA on progress of update, offered participants opportunity to reach out to county for technical support, offered public opportunity to ask questions and provide comment (no comments made)		2
8/17/2017	Local Hazard Mitigation Plan Steering Committee, Riverside	Review completed sections for finalization	10	1
9/2/2017	Indio Preparedness Month Booth, Home Depot, at 42100 Jackson Street from 9 a.m. - 12 p.m.	Personal preparedness and mitigation information		3
9/5/2017	Twitter Post	LHMP and NFIP information		
9/9/2017	Riverside Preparedness Month Booth, Galleria at Tyler, 1299 Galleria at Tyler from 11 a.m. - 3 p.m.	Personal preparedness and mitigation information		4
9/9/2017	Farm Barn, Wildomar Preparedness and Mitigation Presentation	Personal preparedness and mitigation information		1
9/12/2017	County Preparedness Month Booth, County of Riverside Administration Center, 4080 Lemon Street, from 10:30 a.m. - 1:30 p.m.	Personal preparedness and mitigation information		5

9/16/2017	Lake Elsinore Preparedness Month Booth, 710 W. Graham Ave., Lake Elsinore, CA	Personal preparedness and mitigation information		4
9/16/2017	Perris Preparedness Month Booth, Walmart, 1800 N. Perris Blvd from 8 a.m. - 12 p.m.	Personal preparedness and mitigation information		4
9/23/2017	Jurupa Valley Preparedness Month Booth, K-Mart, 7840 Limonite Avenue from 8 a.m. - 12 p.m.	Personal preparedness and mitigation information		4
9/30/2017	Hemet Preparedness Month Booth, Hemet Valley Mall, 2200 W. Florida Ave. from 8 a.m. - 12 p.m.	Personal preparedness and mitigation information		4

Table 7: Participant Meetings

The following table documents participant facilitated meetings:

LHMP Meetings Attended				
Date	**Location**	**Type of Meeting**	**Number Attending**	**Hours**
8/24/2016	City Emergency Operations Center, Riverside	One to One Assistance LHMP Process Familiarity and HAZUS/GIS information	3	1
11/10/2016	Hemet Fire Administration Building, Hemet	Plan review, update process and clarification assistance	3	2.5
11/15/2016	Riverside EMD	Plan review, update process and clarification assistance	2	1
12/13/2016	Conference call to Mather	CA SHMPT Quarterly Meeting	N/A	4.5
12/14/2016	Hemet	Plan review, update process and clarification assistance	3	2
12/15/2016	Moreno Valley	Plan review, update process and clarification assistance	6	1
2/7/2017	Riverside EMD	Plan review, update process and clarification assistance	2	1
3/14/2017	Perris	Participation with Eastern Municipal Water Districts Planning Committee	10	2.5
3/15/2017	Riverside EMD	Plan review, update process and clarification assistance	3	5

3/28/2017	Riverside EMD	Plan review, update process and clarification assistance	3	2
3/29/2017	Beaumont Police Department	Plan review, update process and clarification assistance	4	2
4/11/2017	Mather	CA SHMPT Quarterly Meeting	N/A	4.5
4/11/2017	Murrieta Fire Administration	Plan review, update process and clarification assistance	4	1.15
4/13/2017	Cathedral City Fire Station	Plan review, update process and clarification assistance	2	2
4/20/2017	Banning City Hall	Plan review, update process and clarification assistance	3	1.5
4/20/2017	Desert Sands USD	Plan review, update process and clarification assistance	4	2
4/25/2017	Calimesa City Hall	Plan review, update process and clarification assistance		
4/25/2017	Temecula City Hall	Plan review, update process and clarification assistance	4	1.15
4/26/2017	Perris	Participation with Eastern Municipal Water Districts Planning Committee	6	2
4/27/2017	San Jacinto City Hall	Meeting with City Manager and staff to discuss joining the County LHMP	5	
5/1/2017	Moreno Valley USD	Plan review, update process and clarification assistance	3	1.5
5/1/2017	Lake Elsinore USD	Plan review, update process and clarification assistance	2	1.15
5/2/2017	Banning - High Valley Water District	Plan review, update process and clarification assistance	3	2
5/3/2017	Indian Wells & Palm Desert	Plan review, update process and clarification assistance	2	7
5/9/2017	La Quinta City Hall	Plan review, update process and clarification assistance	2	1.5
5/17/2017	Beaumont Police Department	Plan review, update process and clarification assistance	5	1.5
5/18/2017	Desert Hot Springs	Plan review, update process and clarification assistance	3	3
5/24/2017	Riverside EOC	Participation in Riversides LHMP planning meeting	6	1
5/25/2017	Wildomar City Hall	Plan review, update process and clarification assistance	3	2
5/25/2017	San Jacinto City Hall	Plan review, update process and clarification assistance	2	2.5
5/31/2017	Murrieta Fire Administration	Plan review, update process and clarification assistance	3	3
6/19/2017	Riverside EMD	LHMP and HMGP assistance for La Quinta	2	1

For complete meeting lists, sign-in sheets, and agendas please see Appendix D.

The public outreach meetings for the LHMP process were conducted in multiple venues. The meetings outlined a brief history of previous hazards, mitigation actions, and the benefits of a multi-jurisdictional hazard mitigation plan in Riverside County.

As part of the public outreach and the regional outreach and planning, the audience was asked at different times during the presentations if there are any hazards they were concerned about, not addressed or problem that has occurred in their living or working areas in the county.

The documented concerns are the following:

- High Winds
- Wildfire
- Earthquake
- Flooding
- Communication Failures
- Lack of trained volunteers
- Information on Jurisdictional Hazards

All of these concerns are being addressed in the hazard profiles located in Section 5, as well as current and future mitigation actions.

For a complete list of actions please see Appendix C

3.9 Existing Plans and Studies

Coordination with other community planning efforts is also paramount to the success of this plan. Hazard mitigation planning involves identifying existing policies, tools and actions that will reduce a community's risk and vulnerability to hazards. Riverside County uses a variety of comprehensive planning mechanisms, such as general plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of this plan incorporated information from the following existing plans,

ordinances, studies, reports and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

- General Plan
- Zoning Ordinances
- Subdivision Ordinances
- Water Conservation
- Wildfire Ordinance
- California Building Codes
- Riverside County Flood Control Master Drainage Plan
- Safety Element General Plan
- Community Wildfire Protection Plan(s)
- Riverside County Flood Insurance Studies
- Riverside County General Plan and Background Report
- Riverside County Multi-Hazard Mitigation Plan, 2012
- Riverside Operational Area Emergency Operations Plan
- State of California Multi-Hazard Mitigation Plan

Section 4.0 – Updates and Mitigation Actions

4.1 Updates to 2012 Plan

In the 2012 plan cycle, Riverside County identified Pandemic Influenza as a hazard because populations worldwide are at risk for infection and illness. In the past influenza has spread worldwide within months and is expected to spread even more quickly today with air travel. In the 2012 plan Pandemic was ranked fairly low in the list of County hazards. In the 2017 plan Pandemic ranked in our top 3 hazards with earthquakes and wildfires.

The LHMP Steering Committee felt Communication Failure should be added to the 2017 plan because it has the potential to affect response capabilities in both small and large events. In 2016 a 911 failure impacted the EMS system. This had the potential to lead to loss of life in the Coachella Valley. During disasters, communication failures can have a detrimental effect on the operation of the County Emergency Operation Center (EOC) ultimately hindering the OA's agencies ability to return to normal operations.

Dependence on computer systems has opened up vulnerabilities. Sensitive security information stored along with personal information is now stored on networks. For those reasons, computer networks have become a target for hackers and organizations with the intent to do harm. In 2016 the County of Riverside was a target for Ransom Ware.

The maps that are in the 2017 plan are current maps from County Transportation GIS Division and Cal OES's MyPlan Program.

Some revisions to the 2012 plan mitigation actions included:

- Revised Risk Assessment, concerning updated hazard information
- Changed jurisdictional and Special Districts participants.
- Incorporation of existing plans, ordinances and studies.

New Goals and Mitigation Strategies were added that reflect our top ten (10) hazards and risks for Riverside County.

1. Earthquake
2. Pandemic Flu
3. Wildland Fire
4. Electrical Failure
5. Emergent Disease/Contamination
6. Cyber Attack
7. Terrorist Event
8. Communications Failure

9. Flood
10. Civil Disorder

4.2 Hazard Updates

The hazards identified in the 2012 LHMP remain fairly similar in 2017, however the 2017 LHMP Steering Committee added Communication Failure and Cyber Attack as additional hazards. The overall ranking of the hazards has changed as well.

Table 8: Hazard Identification Table

Hazard	Reason Hazard Identified
Earthquake	• History of events • Presence of fault lines and geologic activity
Pandemic Flu	• Due to air travel and urban expansion there is increasing probability of health related emergencies
Wildland Fire	• History of events • Presence of a large amount of timber and brush
Electrical Failure	• History of events
Emergent Disease/Contamination	• History of events
Cyber Attack	• History of events and danger to sensitive security information for Health Care Facilities
Terrorist Event	• Heightened sense of awareness since September 2001 • History of event in December 2015
Communications Failure	• History of events • Impact level of events
Flood	• History of events and the presence of a large number of rivers and channels
Civil Disorder	• Vulnerability due to number of public venues
Drought	• History of events • Potential to drastically increase wildfire hazard
Nuclear/Radiological Incident	• Vulnerability due to transportation routes and relative proximity of San Onofre Nuclear Generating Station (SONGS)
Extreme Weather	• History of events
Transportation Failure	• History of events and the presence of a large number of transportation corridors and airport flight paths
Dam Failure	• Vulnerability of dams
Aqueduct	• Presence of aqueducts serving multiple counties
Tornado	• History of events
Insect Infestation	• History of events
Jail/Prison Event	• Vulnerability of State and County correctional facilities
Pipeline Disruption	• History of events • Multiple pipelines within the OA
Landslide	• History of events
HazMat Incident	• History of events • Many transportation corridors and Hazardous Materials Facilities
Water Supply Disruption/Contamination	• History of events • Potential disruption to the OA

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
July 2018

4.3 Mitigation Actions and Updates

4.3.1 2012 Plan Updated Mitigation Actions

2012 mitigation strategies and projects are summarized in the following table to show progress made:

Table 9: Mitigation Actions and Updates

Mitigation Actions Table

Type of Hazard	Mitigation Actions	Departments/ Jurisdictions	Status Update
ALL	Incorporate Updated Local Hazard Mitigation Plan into Riverside County General Plan	Transportation, Land Management Agency and Riverside Office of Emergency Services	Recently updated and approved on December 2015 by Board of Supervisors. Adopted 2015, which includes a new reference to implement the Local Hazard Mitigation Plan within the Safety Element.
DROUGHT	Construct reservoirs and water tanks to increase water storage	Water Conservation, Agriculture and County Fire	On-going, no update has been made
EARTHQUAKE	CREWS Earthquake Mitigation Project	County-wide	Ongoing process of recruiting non-participating cities in the Coachella Valley area into the early earthquake warning program.
FIRE	Purchase Masticator to remove vegetation and brush in heavily populated areas prone to fires.	Riverside County Fire	No change. Project still on hold due to lack of funding. Potential future purchase

FIRE	Shake Shingle Roof Replacement Project	Idyllwild	In 2013 Mountain Communities Fire Safe Council was awarded a FEMA grant to replace hazardous shake/wood shingle roofs in the San Jacinto WUI (Wildland Urban Interface) One hundred homes were reroofed with Class A roofing material. The grant was completed in October 2016.
FIRE	Single Tree Removal – removed dying and dead trees.	Idyllwild	Ongoing: dead and dying trees are continuously monitored and removed as needed.
FIRE	Hazard Abatement- Fuel treatment program to remove 1120 acres of natural fuel	Mountain Communities Fire Safe Council Program - Idyllwild	Reducing fuels on private property in the San Jacinto WUI is an on-going activity of Mountain Fire Safe Council. To date, more than 1,600 acres have been treated with the financial help of grant funds awarded to MCFSC
FLOOD	Norco Storm Drain This project is an underground storm drain which will address flooding along Pedley Avenue/Sixth Street.	Riverside County Flood Control	Project completed on 04/05/2011.
FLOOD	Santa Ana River, Norco Bluffs [Corps Project] –Stabilization Project is a Corps of Engineers project that consists of a soil cement structure constructed to the 100-year flood level at the base of the bluff.	Riverside County Flood, Transportation Land Management Agency and Riverside County Fire	The bluff stabilization work was completed in 2004. The District is continuing to work with the Corps on wrapping up the project, including completion of a Project Operation and Maintenance Manual. Once the Corps approves the O&M Manual, the project can be transferred to the District for ownership, operation and maintenance.
FLOOD	Temescal Creek-Foster Road Storm Drain (2-8-00493-01) - This project is an underground storm drain in Foster Road extending from Interstate 15 to Temescal Creek.	Riverside-Corona Resource Conservation District Riverside County Flood Control	Project completed on 09/01/2015
FLOOD	Dillon Road – State Hwy 62 Road Project to clear debris. Road has 25 dips that cause flooding during storms.	Transportation, Land, Management Agency Riverside County Fire	Ongoing; The current action plan is to barricade the low dip sections when they are flooded and remove the storm debris when the water recedes.

FLOOD	Underground storm drain which will extend approximately 1,300 feet south on Pedley Avenue from Norco MDP Line NA on Sixth Street. This project will address localized flooding along Pedley Avenue.	Flood Control and City of Norco	Finished Spring 2011
FLOOD	Restore 100 yr level flood protection to the three million residents within the floodplain downstream from Prado Dam. The Corps proposes to increase both the storage capacity of Prado Dam and its outlet discharge capacity. The embankment will be raised 30 feet, while the spillway sill will be raised 20 feet and the gated discharge capacity will be tripled.	Flood Control	**Part 1** of this project involving Riverside County Flood Control and TLMA was completed **Part 2** of this project involving only Riverside County Flood Control is still pending approval
FLOOD	Ultimate channel improvements for the existing interim channel from 6th Street to the terminus near Rose Court.	City of Norco	Project has not started with no estimation on start date. The District is currently working on 60% design plans and anticipates 90% design plans will be completed in 2017. FEMA processing will be necessary to revise the currently mapped floodplain once the construction is completed.
FLOOD	Improvements to the existing channel between Parkridge Avenue and River Road. The channel is planned as a concrete lined open channel	City of Norco and Riverside County Transportation Land Management Agency	Project began Circa 7/2013 and was finished Circa 2/2014. Lead Agency was RCFC & WCD
FLOOD	Underground storm drain extending from the existing Stage 1 near Pedley Avenue, east on 7th Street to California Avenue then south on California approximately 800 feet to a sump.	Transportation, Land, & Management Agency and Flood Control	Project completed on 04/05/2011
FLOOD	Collection of "mitigation" charges from builders in Mockingbird Canyon with the intention of providing relief to flood prone properties in the lower canyon	Mockingbird Canyon	In process of collecting funds. Charging investors $500 per lot. Talks about whether to keep this project or abandon it. Considered a “mini” ADP (Area Drainage Project)
FLOOD	Storm Drain Last portion will be constructed as part of the same	City of Corona	Project completed on 04/24/2012, Project revised on 04/25/2012.

	contract as the Ontario Avenue Storm Drain project		
FLOOD	A 1,050-foot drain to de-water a sump in Frank Avenue in the south Mira Loma area	Riverside County Flood Control and City of Eastvale	Project completed on 01/31/2012
FLOOD	The original project consisted of a 54 acre-foot debris basin at the southerly end of Smith Road and a concrete rectangular channel extending northerly to Cajalco Road. Mitigation required for the basin project includes removal of non-native vegetation, debris and remnants of abandoned structures as well as re-grading and establishment of native vegetation.	Riverside County Flood Control	Project completed on 01/10/2006
FLOOD	Underground storm drain in the City of Corona extending from East Grand Boulevard north in Joy Street to Temescal Creek Channel. Design began on this project in 2003 at which time it was discovered during a field check of the preliminary drawings that a recently installed Edison conduit in Joy Street overlapped the only viable alignment for the storm drain. The street is so heavily laden with utilities here is no longer room to install a drain.	City of Corona	Design Phase Schedule for advertisement in March 2017
FLOOD	Underground storm drain in Ontario Avenue extending upstream from the District's existing El Cerrito Channel at El Cerrito Road about 3,000 feet to State Street just west of Interstate 15.	Riverside County Flood Control and Transportation Land & Management Agency	Project revised on 04/25/2012
FLOOD	Underground storm drain in Foster Road extending from Interstate 15 to Temescal Creek	Temescal Creek-Foster Road Storm Drain	Construction began in January 2015 and was completed in September 2015.

FLOOD	Multi-year plan to construct a levee system (approximately 1,200 feet river bottom width) between the existing Corps of Engineers' levee 9,500 feet upstream of State Street, and a point about 8,200 feet downstream of Sanderson Avenue, a distance of about 5 miles. Floodwalls are required to be constructed over the Metropolitan Water District facilities just east of State Street.	San Jacinto and Transportation and Land Management	Funding was received in November 2015 - the levee was included in a suite of projects that received Proposition 84 grant funding from the California Department of Water Resources. The Prop 84 contribution is anticipated to be about $3.5 million.
FLOOD	Project to build MDP extending from South W. Esplanade to east Midway Street to South San Jacinto Street to collect flows from the larger Park Hill basin watershed	City of San Jacinto	Construction for the project began on April 25, 2014 and was completed on July 2, 2015.
FLOOD	Construction of an underground storm drain that extends from a proposed detention basin at the intersection of Potter Road and De Anza Drive then southwest in De Anza to Young Street. The City of San Jacinto is administering the project.	City of San Jacinto and Transportation and Land Management	Project still pending
FLOOD	Underground storm drain from an outlet north of Holland Road southerly in Hawthorne Avenue to a collection system south of Craig Avenue	City of Menifee and Transportation and Land Management	Project Completed 3/01/2011
FLOOD	Project is an underground storm drain that extends from near Yale Street east on Stetson Avenue approximately 1 mile to Dartmouth Street	City of Hemet	Project completed on 09/04/2007
FLOOD	Project is an underground storm drain on Whittier Boulevard extending from the existing storm drain at Palm Avenue east to San Jacinto Street	Riverside County Flood Control and City of Hemet	Project completed on 08/23/2016
FLOOD	Underground storm drain extending from an existing storm drain in Meridian Street near Berkeley venue south in Meridian Street to Whittier Avenue.	Riverside County Flood Control and City of Hemet	Stage 1 completed on 06/21/2016. Stage 2 still pending approval.

FLOOD	Project is for major flood control project to extend from the San Jacinto River near Goetz Road east approximately 6 miles to Juniper Flats Road and incorporates both lined and unlined open channel, underground storm drains and two major detention basins.	City of Menifee and Transportation, Land and Management Agency	Project built in 4 stages. Some stages have been completed, but others still not finished.
FLOOD	Open channel along Nuevo Road from Dunlap Drive to Perris Valley Channel	City of Perris, Riverside County Transportation and Flood Control	Under new contract: Starting Jan. 2017 and will range about 2.5 yrs. for this entire project to be completed; first part will take about 180 days to complete, but time frame will be extended.
FLOOD	East Ironwood Avenue to Petit Street. Part of the work the City of Moreno Valley is doing in association with improvements to the Moreno Beach Drive & 60 freeway interchange.	City of Moreno Valley and Transportation and Land Management	Storm Drain Line K-1 – City completed design in 2014. Currently seeing construction funding of approximately $2.5m.
FLOOD	Project is an open channel extending from Nason Basin northeasterly approximately 2,500 feet to Ironwood Avenue	City of Moreno Valley and Transportation and Land Management Agency	Storm Drain Line K from Ironwood to the Nason Basin – RCFC&WCD secured an easement in 2014 to receive flows from Line K-1 noted above. Action completed in 2014.
FLOOD **EARTHQUAKE**	Norco Streambank Stabilization. Project consists of a soil cement toe protection structure constructed to the 100-year flood level at the base of the bluff, and a stable earthen buttress fill constructed to the top of the bluff from I-15 Bridge to Center Avenue	Riverside County Flood Control and Transportation Land & Management Agency	Project Completed
FLOOD **EARTHQUAKE**	Stabilization of Interstate 15 near Alhambra Street, as a part of the Prado Dam enlargement feature of the Santa Ana River Mainstream Project at no cost to the District. The project involves the construction of a toe-protection-only structure from Hamner Avenue downstream to approximately 5th Street	Transportation Land Management Agency	Project still pending

LANDSLIDE EARTHQUAKE FLOOD	Proposed improvements include installation of slope protection along the Green River Mobile Home Park, as well as the exposed slopes adjacent to the Green River Homeowners Association and Highway 91 just downstream of Highway 71.	Transportation and Land Management Agency	**Phase 2A-**The District has completed its acquisition of the necessary easements and fee interests from Riverside County, private lands, and Caltrans. Construction of Phase 2A was completed in Fiscal Year 2015/2016. **Phase 2B-Construction** of this segment was completed in Fiscal Year 2014/2015.

4.3.2 2017 New Mitigation Actions

The 2017 LHMP Steering Committee identified the following Mitigation Actions since the completion of the 2012 plan update. These mitigation actions were prioritized based on the top ten high priority county hazards. This was determined using the county risk assessment that is shown on section 5.2 page 195 "**Figure 23:** 2017 County Hazard Ranking and Risk Scores." The actions below list ways that "all hazards" can be mitigated following the county's top ten hazards starting from the highest. The financial impact of each action does not affect the ranking.

Table 10: 2017 New Mitigation Actions Table

2017 Mitigation Actions Table

Type of Hazard	Mitigation Actions	Departments/ Jurisdictions	Status Update/Timeframe	Potential Funding Source
All Hazards	CERT Training and retention	Riverside County Emergency Management Department	July 2018 – Ongoing On-going for the life of the current plan (yrs. 2018-2023). There will be one training in each of the county districts per year to ensure community members throughout the county get the opportunity to refresh and reinforce their CERT skills. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Homeland Security Program (SHSP)
All Hazards	Continue to utilize the Safety Element of the Riverside County General Plan and the Riverside County FD Master Plan as base documents to implement goals, objectives, and mitigation actions	All Riverside County Departments	On-going for the life of the current plan (yrs. 2018-2023). The Safety Element in the General Plan is continuously updated as new information and changes arise. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Earthquake	Working with CalOES & FEMA to revise the Southern California Catastrophic	All Cities in Riverside County	On-going for the life of the current plan (yrs. 2018-2023). Riverside County will continue to collaborate with Cal OES/ FEMA to improve and update	County General Fund

	Earthquake Response Plan		this plan as needed. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	
Earthquake	Reviewed Office of Statewide Health Planning and Development (OSHPD), Structural Performance Categories and Nonstructural Performance Categories (SPC/NPC) Ratings of Acute Care Hospital Buildings and reported the findings at EM Healthcare Coalition	Riverside County Emergency Management Department & Riverside County Hospitals	On-going for the life of the current plan (yrs. 2018-2023).These reports will continuously be reviewed to make sure they are up to date and consistent with any changes. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	Hospital Preparedness Program (HPP) Grant
Earthquake	Worked with local City Emergency Manager (EM) to address '08 Golden Guardian Riverside County Shake Out Scenario/Assumptions	Riverside County Emergency Management Department	On-going for the life of the current plan (yrs. 2018-2023). County will continuously work with City EM to update and inform of changes or thoughts to improve the annual Shake Out Scenario and help the community increase their preparedness skills. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Earthquake	Mitigate potential seismic hazards through adoption and strict enforcement of current building codes	Riverside County Transportation, Land, Management Agency	On-going for the life of the current plan (yrs. 2018-2023). The codes will be revised and updated to be consistent with emergency measures that can help prevent earthquake impacts in county buildings. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

Pandemic Flu	Provide training on immunization techniques	Riverside University Health System-Public Health	On-going for the life of the current plan (yrs. 2018-2023). Continue training to teach any new techniques, strategies, and to ensure all staff are proficient. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	Public Health Emergency Preparedness Grant (PHEP)
Pandemic Flu	Participated and conducted a Non-Medical Intervention Tabletop Exercise	Riverside County Emergency Management Department & Riverside University Health System-Public Health	Completed on 09/28/2015	Pan Flu Grant PHEP Grant
Pandemic Flu	Participated and conducted a Flu vaccination exercise	Riverside County Emergency Management Department & Riverside University Health System-Public Health	Completed on 11/10/2016	Pan Flu Grant PHEP Grant
Pandemic Flu	Generate a draft Crisis Care Plan	Riverside County Emergency Management Department & Riverside University Health System-Public Health	Completed 08/30/2016	Pan Flu Grant PHEP Grant HPP Grant
Pandemic Flu	Training Medical Reserve Corp (MRC) in hospital surge exercises	Riverside County Emergency Management Department	Started in 2011 and is on-going for the life of the current plan (yrs. 2018-2023). Continue training to keep updating and informing volunteers to increase their skills. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	HPP Grant State Homeland Security Program (SHSP)
Pandemic Flu	Training Medical Reserve Corp. (MRC) volunteers in Alternate Care Site	Riverside County Emergency Management Department	Completed in 2014	HPP Grant State Homeland Security Program (SHSP)Pan Flu Grant

Wildland Fire	Create wildfire protection zones that reduce the risks to citizens and firefighters from fire dangers	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously update and develop protection zones that can help decrease wildfire risks in the community. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Strengthen defensible space inspections in fire prone areas	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continue inspections in locations that are susceptible to fires. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State and County General Funds & Structural Fire Taxes
Wildland Fire	Continue maintenance of existing fire roads throughout the county to provide fire department access	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continue keeping the roads well paved and easy to have fire trucks be able to drive on. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Fuel reduction projects throughout the county to reduce fire potential	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously improve and develop projects to lower the impact of fires in the county. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Develop and enforce construction and design standards that ensure the development incorporates fire prevention features	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously enforce and update measures to prevent fire hazards. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	Developer Fees
Wildland Fire	Conduct and implement long range fire safe planning through code adoption/policies	Riverside County Fire Department & CAL Fire & Riverside County Transportation,	On-going for the life of the current plan (yrs. 2018-2023). Continuously implement code policies to integrate them into the Safety Element as they are developed/updated and	County General Fund and Fire Marshal Fees

	consistent with the Safety Element of the General Plan	Land, Management Agency (Planning Division)	approved. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	
Wildland Fire	Ben Clark Training Center to provide wildland fire protection related classes to fire personnel	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously make sure that this center is available to provide wildland fire protection classes to fire staff to improve their skills on fire mitigation and preparedness. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund, private colleges fees, and State Mission Grant funding
Wildland Fire	Continue wildland fire suppression/preparedness to maintain a state of readiness throughout the year	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide skills training to the community to be prepared for disasters. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Rapid intervention, identification and mitigation of Goldspot Oak Bore Beetle (GSOB) trees at various infestation levels on State Responsibility Area (SRA) lands throughout the county. Herbicide or tree removal if necessary	CAL Fire Unit Forester	On-going for the life of the current plan (yrs. 2018-2023).Continuously monitor infestation levels of GSOB trees to continue removing infested trees if necessary. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Rapid intervention, identification and mitigation of Pine Bark Beetle infestation, epidemic during times of drought. Removal of trees that are symptomatic or the	CAL Fire Unit Forester	On-Going for the life of the current plan (yrs. 2018-2023).Continuously monitor infestation levels of Pine Bark Beetle to continue removing infested trees or to continue using pesticides if necessary. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding

	use of pesticide when applicable			
Wildland Fire	Continue Truck Trail and road maintenance to provide access for fire suppression vehicles and personnel.	CAL Fire Unit Forester	On-Going for the life of the current plan (yrs. 2018-2023). Continuously preserve and improve Truck Trail and roads, if needed, for rapid available access to fire suppression vehicles. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Continue Fire Road maintenance of culverts and road prisms in open space areas on SRA land to allow for adequate drainage.	CAL Fire Unit Forester	On-Going for the life of the current plan (yrs. 2018-2023). Continuously preserve and improve culverts and road prisms, if needed, for sufficient drainage. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Electrical Failure	Coordinated with Southern California Edison to be included in their power outage notifications	Riverside County Emergency Management Department	On-going for the life of the current plan (yrs. 2018-2023). EMD joined SoCal Edison's recipient list as of Dec. 2016 to continuously be informed of any emergency notifications to help prevent electrical failure impacts. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Emergent Disease/ Contamination	Drafted a Region VI Highly Contagious Disease Transportation Plan	Riverside County Emergency Management Department	Completed on 12/08/2016	HPP Grant Ebola Grant
Emergent Disease/ Contamination	Facilitated a Region VI Highly Contagious Disease Transportation Tabletop Exercise	Riverside County Emergency Management Department	Completed on 09/29/2016 The situation manual for this was completed on 11/14/2016	HPP Grant Ebola Grant

Emergent Disease/ Contamination	Drafted a Riverside County Viral Hemorrhagic Fever Preparedness and Response Plan (VHF Plan)	Riverside County Emergency Management Department & Riverside University Health System-Public Health	Completed on 11/2016	HPP Grant Ebola Grant
Cyber Attack	**Enterprise Intrusion Prevention System (IPS)** Protects the county network from Internet-based threats and attacks (~140,000 attacks/day on average)	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continue to update and maintain the IPS network to protect the county from any form of cyber-attacks or threats. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Cyber Attack	**Enterprise Breach Detection System** Inspects all internal/lateral county network traffic for indicators of compromise (IOCs) enabling the ISO to rapidly detect, respond to, contain, and prevent cyber-attacks, malware outbreaks, network reconnaissance, data exfiltration, and C2 (command & control) and botnet activities	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously inspect the county network to detect forms of threats or attacks. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Cyber Attack	**Albert Sensor** Monitors and reports to the Center for Internet Security (CIS) Multi-State Information Sharing and Analysis Center (MS-ISAC) all Domain Name	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously maintain the Albert Sensor in order keep having the association with the Department of Homeland Security's database on alerting network threats for the county. This action will be reassessed during the monitoring and	County General Fund

	System (DNS) and NetFlow traffic for correlation with the Department of Homeland Security's threat intelligence database for real-time alerting of malicious network connections to blacklisted IP address on the Internet		update phase of the County's 2017 LHMP.	
Cyber Attack	**Countywide Security Awareness Training** SANS Securing The Human information security and privacy training modules deployed on county learning management system (LMS) Educates our workforce on how to be extra vigilant and things to look out for to avoid falling victim to a targeted attack	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to the county's workforce on signs of cyber-attacks and prevent them from being a victim of these attacks. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Cyber Attack	**Enterprise Security Information Event Management (SIEM)** Serves as the county's centralized security event log management repository and correlation engine	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continue to maintain the SIEM to monitor and prevent security threats. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

Cyber Attack	**Enterprise Internet Proxy (Web Filter)** Prevents county employees and malware from accessing compromised/malicious websites and C2 (command & control) servers, in addition to non-county authorized websites based on category/content filtration policies/rules	Riverside County Technology Information	May 2017 – December 2018 Product (Blue Coat Proxy Advance Secure Gateway (ASG)) has been procured and is in the process of being deployed.	County General Fund
Cyber Attack	**Governance, Risk, & Compliance (GRC) Software Suite** Platform on which our security operations (active network monitoring, breach detection, incident response, business impact analysis, threat containment/eradication, alerting/reporting, process workflow automation, security audits, risk assessments/register, regulatory compliance checks) will be carried out	Riverside County Technology Information	Implementation estimated to begin in June 2017 – July 2018. Product (RSA Archer GRC) has been procured and is in the process of being deployed.	County General Fund
Cyber Attack	**Security Operations Center (SOC)** Planning phase completed, construction estimated to begin in September 2017	Riverside County Information Technology	September 2017 – September 2018. The County's Cyber Security Operations Center (SOC) is under construction.	County General Fund

Cyber Attack	**Information Security Forum (ISF)** Convene on a quarterly basis with department information security officers/liaisons to discuss key security topics, risk trends, and other related matters, including: Formation of a Critical Security Incident Response Team (CSIRT) Conducting security incident/breach simulations and tabletop exercises	Riverside County Information Technology	October 2018 – ongoing This forum will be on-going for the life of the current plan (yrs. 2018-2023). Will continue to conduct constant security incident/breach simulations and tabletop exercises that can help prevent cyber-attacks in the future. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP. The ISO is in the process of identifying members to serve on the Critical Security Incident Response Team (CSIRT). Estimated timeline for formation and initial kickoff meeting is October 2018.	County General Fund
Terrorist Event	SWAT team trained to respond to terrorism events	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to reflect personnel attrition and train on new tactics. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Terrorist Event	Hazard Device Team trained to respond to terrorism events	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to reflect personnel attrition and train on new tactics and trends. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Terrorist Event	Sheriff Emergency Response Team trained to respond to terrorism events	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to reflect personnel attrition and train on new trends. This action will be reassessed during the	County General Fund

			monitoring and update phase of the County's 2017 LHMP.	
Terrorist Event	Sheriff personnel are assigned to the Joint Terrorism Task Force	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously integrate new sheriff personnel to improve this group's structure and capabilities. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Terrorist Event	Ben Clark Training Center provides terrorism related classes for Law Enforcement and First Responders.	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Classes are funded each year through the State Homeland Security Program (SHSP) to continuously educate and train personnel on new skills and improve their abilities. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Terrorist Event	Tactical response training	Riverside County Sheriff & Riverside County Fire Department	On-going for the life of the current plan (yrs. 2018-2023). Continuously train and improve on tactical response. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Communications Failure	**County of Riverside Network (CORNET)** Redundant Internet connections Backbone links are configured with a mesh topology to provide full redundancy	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously configure links to prevent the termination of internet connections. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Communications Failure	**Enterprise Voice Network (VoIP)** Centralized SIP trunking for	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide accessibility to phone carrier	County General Fund

	ingress/egress PSTN access via 8 geographically separated locations Carrier failover protection for inbound voice traffic Enterprise call processing for VoIP Endpoints are logically and physically separated into 3 datacenters ensuring a High-Availability solution Remote site routers configured for SRST; in times of WAN outages, local IP Phones will re-register to local equipment, providing inter-site calling and access to the PSAP via carrier provided analog circuits		connection and call processing. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	
Communications Failure	**Enterprise Best Practices** Internal escalation contact list for all essential personal readily available 24x7 On-Call staffing availability for both Voice and Data Networks Vendor support available at 24x7x4 for all critical	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continue to update contact list when staff support is needed in case of emergencies. Continue to train staff on technologies that arise and equip facilities with power backup supplies. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

	Network and Voice equipment Regular professional staff training on emerging technologies Frequent equipment configuration backups to SAN Critical Enterprise level equipment is located at facilities with full battery and generator backup power			
Communications Failure	**Enterprise Emergency Notification System** InformaCast Advanced on-premise notification solution for immediate reach to the County's 20,000+ VoIP endpoints InformaCast Mobile cloud-based notification solution to extend the County's reach off-network to mobile devices such as cellular phones and tablets	Riverside County Technology Information	On-Premise solution has been rolled out to all County VoIP endpoints. Mobile Solution has been rolled out to EMD. Mobile solution is ready to be rolled out to other departments as requested. On-going for the life of the current plan (yrs. 2018-2023). Continue to have a notification system to be able to have the ability to connect with off-network devices in case of a communications failure, including Wi-Fi. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund Department Funds; departments who wish to take advantage of this service will be billed back to the departments based on how many users

Communications Failure	**Network Connectivity** Use of Cellular based redundant WAN links for critical county locations. Introduction of MPLS technologies to provide alternate network paths for County locations	Riverside County Technology Information	Several locations have purchased a Cellular based redundant WAN link . Solution can be purchased by other departments. Installation can take up to 6 weeks to install, based on equipment availability. On-going for the life of the current plan (yrs. 2018-2023). Continue to provide alternate network paths for County locations in the case of a communication failure. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund Department Funds; billable by the cellular carrier to requesting departments
Flood	**University Wash Channel, Stage 3 Project No. 221-1-8-00120-03-12** This project will increase public safety and improve local economics by retrofitting an older, built-out commercial/industrial area with drainage infrastructure to alleviate repeated flood damage to existing businesses. The project will also address street and intersection flooding	Riverside County Flood Control and Water Conservation District	Notice To Proceed 2/21/17 Completed 11/14/17	Riverside County Flood Control funds Cost: $3,044,500
Flood	**Monroe MDP – Monroe Channel Project No. 1-8-00071 Stage 4** At request of the City of Riverside, replacement of	Riverside County Flood Control and Water Conservation District	Expected to be advertise in 4th Quarter 2016 Notice to Proceed 8/30/17 Completed 5/01/18	Riverside County Flood Control funds Cost:$2,489,067

	City's existing open channel with underground reinforced concrete box with 10-year storm capacity. Project limits are from California Avenue upstream to Magnolia Avenue			
Flood	**Jurupa – Pyrite MDP Line A-2 Project No. 1-8-00234 Stage 1** Master planned lateral stormdrain to Jurupa Channel. Project is east-west drain crossing Agate Street about 1,000 feet south of Jurupa Road. Outlet point at Jurupa Channel is unimproved and likely to remain so	Riverside County Flood Control and Water Conservation District	30% Plans & R/W Acquisition as of 1/10/17 Projected Start: 9/2018 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $338,332
Flood	**University MDP Line 3 Project No. 1-8-09020 Stage 1** The MDP proposes Line 3 as approximately 2,900 feet of 30" RCP east in Blaine Street then northeast to Blaine Street Retention Basin. The Blaine Street Retention Basin is located 600 feet north of Blaine Street between Valencia Hill Drive and Mt. Vernon Avenue.	Riverside County Flood Control and Water Conservation District	Pending approval Projected Start: 12/2020 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $2,926,028

	Budgeted for scoping study and evaluation of FEMA map floodplain limits only			
Flood	**Santa Ana River Stabilization Project No. 1-8-00010 Stg. 90** The USACE is expected to initiate restoration of the federally constructed reach of the Santa Ana River Levee system downstream of San Bernardino County line to Tequesquite. Exact form of project not set. Work will likely include repair of groins and toe protection	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $10,685,000
Flood	**Box Springs Dam – Outlet Modification Project No. 1-8-00041** Reconstruct outlet structure to prevent blockage from sediment accumulation	Riverside County Flood Control and Water Conservation District	Pending until Woodcrest Dam is complete 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $981,842
Flood	**Sycamore Dam – Outlet Structure Modifications Project No. 1-8-00042** This project will upgrade the level of safety and serviceability. Initial project components	Riverside County Flood Control and Water Conservation District	Pending until Woodcrest Dam is complete 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $1,854,991

	include the repair/reinforcement of the existing outlet channel; construction of a new debris rack structure; erosion controls on the embankment of the dam; construction of a safer access road into the facility; design for a safer routing of flood waters from the emergency spillway to Central Avenue; and the installation of a control section to measure outflow from the outlet pipe of the dam. Completion of this project is planned to follow the Woodcrest Dam Outlet Modification project.			
Flood	**Alessandro Dam Outlet Modification Project No. 1-8-00043** Reconstruct outlet structure to prevent blockage from sediment accumulation	Riverside County Flood Control and Water Conservation District	Pending until Woodcrest Dam is complete 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $907,682
Flood	**Prenda Dam Outlet Modification Project No. 1-8-00044**	Riverside County Flood Control and Water Conservation District	Pending until Woodcrest Dam is complete 5 year CIP (Capital Improvement Plan)	Riverside County Flood Control funds Cost: $1,238,312

	Reconstruct outlet structure to prevent blockage from sediment accumulation		Projected start and end: during the life of the plan (2018-2023)	
Flood	**Woodcrest Dam Outlet Modification Project No. 1-8-00045** This project will upgrade the level of safety and serviceability. The approved Project Charter identifies the primary scope of work for the project as follows: design and construction of a new inlet structure to reduce potential for clogging of the outlet works; rehabilitation of the existing outlet gate assembly and control stem; implementation of an automated gate control system; rehabilitation of the outlet pipe; restoration of the outlet channel; and installation of surficial erosion controls on the surface of the dam embankment. Once completed, this project will serve as an example for performing similar upgrades to the remaining	Riverside County Flood Control and Water Conservation District	Development of design plans and specifications on hold until latest Geotechnical investigation is complete Projected Start: March 2019 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $2,216,529

	Riverside Reservoirs			
Flood	**North Norco Channel Stage 10 Project No. 222-2-8-00140-10-12** The project is located just upstream of River Road within the city of Norco in Riverside County, California. This project consists of approximately 550 lineal feet of triple cell reinforced concrete box and 125 lineal feet of open concrete channel transition, will replace the existing interim dirt channel. The project remedies ongoing flooding problems in the area thus resulting in positive impacts to residents and businesses	Riverside County Flood Control and Water Conservation District	Completed 9/9/14	Riverside County Flood Control funds
Flood	**Corona MDP Line 5 Stage 1 Project No. 2-8-00280** This project includes the construction of an underground storm drain beginning in Sherman Avenue south of Railroad Street and	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $1,397,201

	extending down Railroad Street westerly to Smith Street. The City is willing to undertake the design and construction of this project using District funding.			
Flood	**Corona MDP Line 52 Stage 1 Project No. 2-8-00350** An underground storm drain extending north from Third Street along E. Grand Boulevard then under the 91 Freeway to Temescal Creek Channel	City Of Corona	Notice to Proceed 7/29/17 Expected Completion: Summer 2018	Riverside County Flood Control funds City of Corona Funds Cost: $4,522,000
Flood	**Coldwater Canyon Structural Improvements Project 2-8-00505** Proposed conceptual improvements include 1) reducing flood risk and nuisance to traveling public on Temescal Canyon Road at the intersection of Glen Ivy Road; and 2) an armored berm along the east bank of Coldwater Wash downstream of the intersection of Temescal Canyon Road and Glen Ivy Road. The armored berm would	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $6,005,806

	prevent the migration of the active Coldwater Wash Channel, thereby protecting the west side of the Mountain Cove Development. Conceptual improvements are pending friendly acquisition of the underlying parcels needed for the project			
Flood	**Coldwater Canyon Floodplain Acquisition Project No. 2-8-00505** Funded portion of project includes a hydrologic and geomorphologic assessment of Coldwater Canyon Wash from Glen Ivy Road to Temescal Wash. Study will evaluate the stability of Coldwater Canyon Wash and recommend potential minimalist interventions, if necessary, to protect Squaw Mountain Bridge and prevent erosion of Painted Hills development canyon slopes along Coldwater Canyon Wash. Balance of funds	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: included in the $6,005,806 amount for Coldwater Canyon Structural Improvement project listed above

	would support potential interventions recommended by the report including floodplain buyout			
Flood	**Southeast Compton Wash At Corona Sanitary landfill Project No. 2-8-09054** Riverside County Waste Management District has requested assistance solving ongoing flooding and erosion problems along the southeast side of the landfill	Riverside County Waste Management District**	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $500,000
Flood	**Lake Mathews Estates Water Quality Pond Project No. 2-8-09058** Proposed in the "Drainage Water Quality Management Plan for the Lake Matthews Watershed", this roughly 10-acre project is to be located on the south side of Cajalco Road about ¾-mile west of Wood Road. The project will capture first flush runoff from Cajalco Creek and carry it to an off-channel pond to	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $2,794,983

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	be treated and/or infiltrated			
Flood	**Temescal Wash Floodplain Project No. 2-8-00052** Acquisition of floodplain area for flood protection, water conservation and habitat mitigation banking	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $23,534,000
Flood	**Arroyo Del Toro Channel Stage 1 Project No. 223-3-8-00170-01-12** This project collects flows that pass under Interstate 15, flow through the cemetery and flood the intersection of Riverside Drive and Collier Avenue. The flows will now be collected in a channel and conveyed via an underground storm drain system to the Collier Marsh area	Riverside County Flood Control and Water Conservation District	Completed 6/16/15	Riverside County Flood Control funds

Flood	**Ortega Channel Retrofit Project No. 3-8-00070** Project will replace a portion of the clog-prone storm drain with a more easily accessible and maintainable open channel	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $1,628,761
Flood	**LITTLE LAKE MDP LINE B, STG 1 STETSON AVENUE CHANNEL, STG 7 aka HEMET MDP LINE D Project Nos. 224-4-8-00265-01-12 224-4-8-00211-07-12** The District constructed a segment of the District's Little Lake MOP Line B. This infrastructure will diminish neighborhood flooding and damage to private property and businesses and improve the safety of the traveling public during storm events. This new drain will also permanently reduce flood-related street maintenance and repair costs for the City of Hemet. Little Lake MDP Line B Stage 1 is located primarily within the City of	Riverside County Flood Control and Water Conservation District	Stage 1 Completed 06/21/16 Stage 2 Pending approval Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $6,398,777

	Hemet, with small portions extending into the City of San Jacinto and unincorporated Riverside County beginning approximate 300 feet north of Berkley Ave and terminating approximately 200 feet south of Florida			
Flood	**Homeland MDP Line 2, Stage 2 Project No. 224-4-8-00337-02-12** The District constructed a segment of drainage infrastructure described in the District's Romoland Master Drainage Plan as Romoland MOP Line A, Stages 4, 5 and 6, Romoland MOP Lines A-2 and A-3, Stage 1, and Briggs Basin. In conjunction with the District's Homeland MDP Line 1, Stage 1, completion of this drainage infrastructure will reduce the floodplain by approximately 1, 762 acres and enable revisions to the FEMA Flood Insurance Rate Maps that result in	Riverside County Flood Control and Water Conservation District	Completed 6/5/12	Riverside County Flood Control funds

	a significant reduction in flood insurance premiums. The District's Homeland MDP Line 1, Stage 1 project is currently ongoing with an anticipated completion in February 2017			
Flood	**Sunnymead MDP Line P-6 Stage 2 Project No. 224-4-8-00716-02-12** The District constructed a segment of drainage infrastructure described in the District's Sunnymead Master Drainage Plan which remedies ongoing flooding problems in the area thus resulting in positive impacts toresidents and businesses.	Riverside County Flood Control and Water Conservation District	Completed 3/25/2014	Riverside County Flood Control funds
Flood	**San Jacinto MDP Line C, Stage 2, Lines C-4, C-5 & B Project No. 224-4-8-00124-02-12** The District constructed a segment of drainage infrastructure described in the District's San Jacinto Master Drainage Plan, which remedies the	Riverside County Flood Control and Water Conservation District	Completed 6/30/15	Riverside County Flood Control funds

	ongoing flooding problems at the intersections of San Jacinto Avenue and Menlo Avenue, San Jacinto Avenue and Midway Street, and Santa Fe Street and Midway Street. Consequently, the removal of ponding water at these intersections during storm events improves traffic and pedestrian safety and public access to the businesses along San Jacinto and Menlo Avenues. The District partnered with the City of San Jacinto to further improve normal residential traffic safety by replacing and reconstructing Midway Street between San Jacinto Avenue and Santa Fe Street			
Flood	**West End Moreno MDP Line LL Project No. 224-4-8-00783-01-12** The District constructed a segment of drainage infrastructure described in the District's West End Moreno MDP which remedies ongoing flooding problems in the	Riverside County Flood Control and Water Conservation District	Completed 5/12/15	Riverside County Flood Control funds

	area, thus resulting in positive impacts to residents and businesses			
Flood	**Romoland MDP Line A, STGS 4,5,6, Homeland MDP Line 1 Briggs Basin, Romoland MDP Lines A-2 and A-3 Project No. 224-4-8-00310-04-12** The District constructed a segment of drainage infrastructure described in the District's Romoland Master Drainage Plan as Romoland MOP Line A, Stages 4, 5 and 6, Romoland MOP Lines A-2 and A-3, Stage 1, and Briggs Basin. In conjunction with the District's Homeland MDP Line 1, Stage 1, completion of this drainage infrastructure will reduce the floodplain by approximately 1, 762 acres and enable revisions to the FEMA Flood Insurance Rate Maps that result in a significant reduction in flood insurance premiums. The District's	Riverside County Flood Control and Water Conservation District	Completed 8/23/16	Riverside County Flood Control funds

	Homeland MDP Line 1, Stage 1 project is currently ongoing with an anticipated completion in February 2017			
Flood	**Little Lake MDP Line B Stage 2 Project No. 4-8-00265** An underground storm drain from just south of Florida Avenue, southerly in Meridian Street to Whittier Avenue.	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $6,804,257
Flood	**San Jacinto River Stage 3 Project No. 4-8-00020** "Stage 3" covers the nearly 10-mile river reach beginning at the entrance to Railroad Canyon and ending upstream at the Ramona Expressway crossing near the Bernasconi Hills. This environmentally and fiscally challenged project has been through several evolutions and has been essentially dormant for nearly a decade. Funding shown is for intensive planning/engineering study of options for managing future development. Goal	Riverside County Flood Control and Water Conservation District	Pending approval Projected Start: 11/2019 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds ADP (Area Drainage Plan) Funds Cost: $70,000,000

	is to develop a viable project for the San Jacinto River from Ramona Expressway to Railroad Canyon considering flood management, transportation, environmental and other opportunities and constraints			
Flood	**Gilman Home Channel Lateral A Stage 3 Gilman Home Channel Stage 90 Project No. 225-5-8-00171-03-12** The District constructed a segment of drainage infrastructure described in the District's Banning Master Drainage Plan which remedies ongoing flooding problems in the area, thus resulting in positive impacts to residents and businesses. Moreover, this project will enable revision of the FEMA Flood Insurance Rate Maps in the impacted area resulting in a significant reduction in flood insurance premiums. Many owners with federally insured	Riverside County Flood Control and Water Conservation District	Completed 9/22/15	Riverside County Flood Control funds

	home loans will realize savings of several thousands of dollars per year			
Flood	**Beaumont MDP Line 16 Stage 1 Project No. 5-8-00201** Project would build MDP Line 16 in Grand Avenue from Beaumont Cherry Valley Water District (BCVWD) infiltration ponds easterly to Bellflower Avenue as an element of a cooperative project with the BCVWD to provide both flood control and storm water capture to recharge groundwater	Riverside County Flood Control and Water Conservation District	Pending approval Projected Start: 12/2020 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $5,353,074
Flood	**Eagle Canyon Dam Stage 1 Project No. 6-8-00190** The District constructed a segment of drainage infrastructure described in the District's Palm Springs Master Drainage Plan. Construction of this project also includes remediation of potentially hazardous and nonhazardous illegally dumped materials and	Riverside County Flood Control and Water Conservation District	Completed 11/17/15	Riverside County Flood Control funds

	remedies ongoing flooding problems in the area, thus resulting in positive impacts to residents and businesses. Additionally, Palm Springs MDP Line 43 and Lateral 43A, the underground dam outlet, is currently under construction and completion is anticipated for February 2016. Completion of the underground infrastructure will enable revisions to the FEMA Flood Insurance Rate Maps in the impacted area immediately downstream of Eagle Canyon and will result in a significant reduction in flood insurance premiums			
Flood	**Palm Springs MDP Line 43 and Lateral 43A Project No. 226-6-8-00163-01-12** The District constructed a segment of drainage infrastructure described in the District's Palm Springs Master Drainage Plan as Palm Springs MOP Line 43 and Lateral	Riverside County Flood Control and Water Conservation District	Completed 3/15/16	Riverside County Flood Control funds

	43A. Construction of this project serves as the underground outlet to the District's Eagle Canyon Dam facility that was completed on September 21, 2015 with the Notice of Completion accepted by the Board as Agenda Item Number 11-1 on November 17, 2015. Completion of both District facilities will enable revisions to the FEMA Flood Insurance Rate Maps in the impacted area immediately downstream of Eagle Canyon Dam and will result in a significant reduction in flood insurance premiums			
Flood	**Murrieta Creek Channel (Phase II & III) Project No. 7-8-00021** Murrieta Creek Flood Control Project from Old Town Temecula to Elm Street in Murrieta	Riverside County Flood Control and Water Conservation District/United States Army Corps of Engineers*	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $82,000,000

Flood	**Whitewater River Levee Restoration Project No. 6-8-00250** Restoration work to increase freeboard and bring levee adjacent to Cimarron Golf Resort into compliance with FEMA certification guidelines	Riverside County Flood Control and Water Conservation District	Pending – Full scope of restoration work not yet established but funding figure shown is based on preliminary engineer's estimate 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost:1,260,000
Flood	**Palm Canyon Wash – Cherley Creek Levee Restoration Stage 90 Project No. 6-8-00040** Major construction to bring levee serving small tributary upstream of South Palm Canyon Wash into compliance with FEMA certification guidelines. Project will be combination of RSP and soil-cement lined channel and levee	Riverside County Flood Control and Water Conservation District	Expected Advertise Date: 2nd Quarter 2018 Projected Start: 08/2019 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $6,187,021
Flood	**Banning MDP Line D-2 Stage 1 Project No. 5-8-00169** This project is over one mile of underground storm drain that connects to the existing Ramsey Street Storm Drain at the intersection of Hargrave Street and Ramsey Street. It includes Line D-2, Stage 1 which will	RCFC/City of Banning	Notice to Proceed: 5/15/17 Completed: 2/27/18	Riverside County Flood Control funds

	continue northerly along Hargrave Street for approximately 5,250 feet before terminating at Indian School Lane. Line D-2A, Stage 1 will tie into Line D-2 at the intersection of Hargrave Street and Theodore Street. Line D-2A will continue westerly along Theodore Street for approximately 600 feet before terminating at Florida Street.			
Civil Disorder	Trained and equipped Mobile Field Force Teams throughout the county	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to reflect personnel attrition; Less-lethal equipment acquired. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

Note: Please refer to individual annexes for a full listing of jurisdictional Mitigation Actions

Figure 24: Riverside County FY Capital Assets

Capital asset activity for the year ended June 30, 2016 was as follows (in thousands):

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June 30, 2016

NOTE 8 – CAPITAL ASSETS

Capital asset activity for the year ended June 30, 2016 was as follows (In thousands):

	Balance July 1, 2015	Additions	Retirements	Transfers	Balance June 30, 2016
Governmental activities:					
Capital assets, not being depreciated:					
Land & easements	$ 529,883	$ 7,889	$ (188)	$ -	$ 537,586
Construction in progress	757,220	295,880	(221)	(343,280)	709,599
Total capital assets, not being depreciated	1,287,103	303,769	(409)	(343,280)	1,247,185
Capital assets, being depreciated:					
Infrastructure					
Flood channels	266,840	-	-	1,656	268,496
Flood storm drains	423,741	1,094	-	27,064	451,899
Flood dams and basins	33,968	-	-	10,559	44,527
Roads	1,886,995	29,398	-	217,937	2,134,330
Traffic signals	38,113	197	-	4,496	42,806
Bridges	202,814	2,285	-	5,191	210,290
Runways	24,179	-	-	-	24,179
Sewer systems	-	-	-	2,924	2,924
Communication towers	16,146	-	-	-	16,146
Parks trails and improvements	15,562	-	-	1,578	17,140
Land improvements	110	-	-	-	110
Structures and improvements	1,592,498	22,642	(1,089)	67,735	1,681,786
Equipment	524,781	54,434	(26,963)	4,116	556,368
Total capital assets, being depreciated	5,025,747	110,050	(28,052)	343,256	5,451,001
Less accumulated depreciation for:					
Infrastructure	(1,221,481)	(121,966)	-	-	(1,343,447)
Land improvements	(25)	(1)	-	-	(26)
Structures and improvements	(424,466)	(39,587)	882	300	(462,871)
Equipment	(311,223)	(37,550)	25,725	(276)	(323,324)
Total accumulated depreciation	(1,957,195)	(199,104)	26,607	24	(2,129,668)
Total capital assets, being depreciated, net	3,068,552	(89,054)	(1,445)	343,280	3,321,333
Governmental activities capital assets, net	$ 4,355,657	$ 214,715	$ (1,854)	$ -	$ 4,568,518

Source: (Riverside County Comprehensive Annual Financial Report 2016)

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4.4 Critical Facilities and Infrastructures

Critical facilities are facilities that pose unacceptable risks to public safety if severely damaged or non-operational. In Riverside County, critical facilities include schools, hospitals, fire stations, police stations, emergency operation centers, communication centers, dams, and industrial sites that use or store explosives, toxic materials. It is essential that critical facilities have no structural weaknesses that can lead to collapse.

Critical facilities may provide only limited services if lifelines are disrupted. Seismic hazard mitigation for lifeline structures is complex given the diversity of lifeline facilities. Earthquake ground motion could affect a variety of lifeline structures such as the control tower in an airport or the buildings that house computers and telephone circuits that are central to communications networks. Strong ground motion can also result in damage to freeway interchanges and bridges that are essential for successful transportation of goods and services. Buried pipelines are generally not damaged by strong ground motions, but can be severely disrupted in areas of surface rupture, liquefaction, or landslides.

Figure 25: Riverside County Capital Assets

COUNTY OF RIVERSIDE
Capital Asset Statistics by Function
Last Ten Fiscal Years
June 30, 2016

Function/Program	2016	2015	2014	2013	2012
				Fiscal Year Ending June 30	
County Libraries					
Branch libraries	35	35	35	35	33
Book mobiles	2	2	2	2	2
Books in collection	1,168,364	1,382,932	1,393,689	1,657,925	1,570,834
Museum	1	-	-	-	-
Riverside University Health Systems - Medical Center					
Major clinics	4	4	4	4	4
Routine and specialty clinics	44	44	44	37	
Beds licensed	439	439	439	439	439
Fire					
Stations	37	37	37	38	42
Trucks	158	158	145	142	145
Parks and Recreation					
Regional parks	11	14	11	11	11
Historic sites	5	5	5	5	5
Nature centers	4	4	4	4	4
Archaeological sites	6	5	6	6	6
Wildlife reserves	9	7	9	9	9
RV and mobile home parks	2	2	3	3	3
Managed areas	5	5	5	5	5
Recreational facilities	3	1	3	2	2
Community centers	1	1	-	-	-
Sheriff					
Patrol stations	10	10	10	10	10
Patrol vehicles	930	932	928	916	915
Waste Resources					
Landfills	6	6	6	6	6
Capacity in tons	62,191,202	54,232,021	54,230,474	54,230,474	54,189,339

Source: (Riverside County Comprehensive Annual Financial Report, 2016)

*Note: this data reflects the asset statistics for the unincorporated portions of Riverside County. Please refer to individual annexes for participating jurisdiction data.

4.4.1 Mitigation Goals and Strategies Relating to Critical Facilities

From approximately 2011 to 2013 the Riverside County General Plan is/was undergoing an update. It was approved and adopted in 2015. The Riverside County Multi-Jurisdictional Local Hazard Mitigation Plan was included in the Safety Element of the 2015 General Plan. Upon completion of the LHMP plan update and FEMA approval, EMD will coordinate an update with the Riverside County Transportation and Land Management Agency to the Safety Element of the General Plan in accordance with Senate Bill 1000.

The General Plan identified the following policies relating to critical facilities.

S 7.7 Strengthen the project permit and review process to ensure that proper actions are taken to reduce hazard impacts and to encourage structural and nonstructural design and construction. Damage must be minimized for critical facilities, and susceptibility to structural collapse must be minimized, if not eliminated

A. Ensure that special development standards, designs, and construction practices reduce risk to tolerable levels for projects involving critical facilities, large-scale residential development, and major commercial or industrial development through conditional use permits and the subdivision review process. If appropriate, impact fees should be assessed to finance required actions.

B. Require mitigation measures to reduce potential damage caused by ground failure for sites determined to have potential for liquefaction. Such measures shall apply to critical facilities, utilities, and large commercial and industrial projects as a condition of project approval.

C. Require that planned lifeline utilities, as a condition of project approval, be designed, located, structurally upgraded, fit with safety shutoff valves, be designed for easy maintenance, and have redundant back up lines where unstable slopes, earth cracks, active faults, or areas of liquefaction cannot be avoided.

D. Review proposed uses of fault setback areas closely to ensure that county infrastructure (roads, utilities, and drains) are not unduly placed at risk by the developer. Insurance, bonding, or compensation plans should be used to compensate the County of Riverside for the potential costs of repair.

S 7.8 Promote strengthening of planned and existing utilities and lifelines, the retrofit and rehabilitation of existing weak structures, and the relocation of certain critical facilities. S 7.9 Find alternatives that improve site safety for the protection of critical facilities. Property acquisition for open space, change in building use or occupancy, or other appropriate measures can be employed to reduce risks posed by hazards. (AI 101)

S 7.10 Discourage development of critical facilities that are proposed in dam failure inundation areas, and apply hazardous materials safety guidelines within such zones

S 7.11 Coordinate with the Public Utilities Commission (PUC) and/or utilize the Capital Improvement Program, to strengthen, relocate, or take other appropriate measures to safeguard high-voltage lines, water, sewer, natural gas and petroleum pipelines, and trunk electrical and telephone conduits that (AI 4):

- Extend through areas of high liquefaction potential.
- Cross active faults.
- Traverse earth cracks or landslides.

S 7.12 Require extra design considerations for lifelines across subsidence areas

Source: (All from Safety Element S-7: Critical Facilities and Lifelines)

Note: The Mitigation Goals and Strategies related to each hazard are found in Section 5 of the 2017 LHMP.

4.4.2 Loss Factors

The loss estimates provided in this LHMP are based on data currently available and result in an approximation of risk used to understand relative risk from various hazards and potential losses. There are uncertainties inherent in any loss estimation methodology, in part from incomplete knowledge concerning the different hazards, as well as approximations and simplifications used in the analysis. You can see from the map below that the region of Riverside County has the highest number of declared disasters since 1950.

Figure 26: 2013 California State Hazard Mitigation Plan, Primary Sources of Disaster Losses

Table 4.F from the 2013 SHMP Chapter 4, identifies disaster incidents, casualties, and Cal OES costs by type. Cal OES has revised the database during the preparation of the 2013 State Hazard Mitigation Plan (SHMP).

Table 11: Disaster Incidents, Casualties, and Cost by Type

Table 4.F: Disaster Incidents, Casualties, and Cost by Type, 1950 - 2012

Disaster Type	Emergencies Through 2012	State Emergency Proclamations Though 2012	Federal Disaster Declarations Though 2012	Deaths Through 2012*	Injuries Through 2012*	Cal OES-Administered Costs Though 2012*
Fire	178	75	122	129	2,139	$2,735,466,734
Flood	129	116	47	294	759	$4,548,964,020
Earthquake	23	21	13	193	18,962	$8,110,772,990
Agricultural	18	17	0	0	0	$389,895,974
Freeze	9	8	4	0	0	$1,017,890,620
Landslide	9	8	1	24	0	$126,172,037
Economic	6	6	1	0	0	$32,823,425
Civil Unrest	6	6	1	85	3,331	$167,722,732
Drought	8	8	0	0	0	$2,686,858,480
Hazardous Material	5	3	0	0	0	0
Wind	3	3	0	0	0	$82,100
Air Disaster	2	2	0	232	2	0
Facility	2	2	0	0	0	$654,897
Road Damage	3	3	0	0	0	$462,986
Tsunami	3	3	2	13	1	$49,617,379
Invasive Species	1	1	0	0	0	0
Storms	6	6	1	0	0	$69,392,668
Tornado	1	1	0	0	0	0
Other	5	5	0	0	0	$10,660,320
Total	***417***	***294***	***192***	***970***	***25,194***	***$19,947,437,362***

Source: Cal OES database

Table 4.F from the SHMP, which shows the pattern of statewide emergencies, disasters and associated losses by hazard types since 1950, when coupled with seismic knowledge, suggests the following findings:

- Earthquakes occur less frequently than the other primary hazards causing disasters but account for the greatest combined losses (deaths, injuries, and damage costs).

- Wildfires are the most frequent source of declared disasters and account for the third highest combined losses.
- Floods are the second most frequent disaster source and account for the second highest combined losses.
- Earthquake costs exceeded wildfire costs by four times, using limited measures identified in these tables.
- Although floods have resulted in a greater number of total deaths during this period, earthquakes have accounted for the highest number of combined deaths and injuries.
- Earthquakes represent by far the greatest long term catastrophic disaster threat.

From this analysis it is clear that these three hazards – earthquakes, fires, and floods – are the predominant disasters in California since 1950. For this reason these hazards are being addressed in the 2017 Mitigation Strategies and are among the top ten hazards for the County.

For Riverside County, fires occur more often, but there have been more declarations for Flooding. The Earthquake hazard for Riverside County is compounded by the three major faults that traverse the county: San Andreas, Elsinore and San Jacinto Faults.

Earthquake hazard mitigation is particularly relevant to SHMP Goal 1 (Significantly reduce life loss and injuries) and SHMP Goal 2 (Minimize damage to structures and property), set forth in Chapter 2 of the SHMP. In light of both the social and economic disruption caused by moderate-sized earthquakes, together with the significant potential for catastrophic earthquakes greater in magnitude than those experienced since 1950, heightened attention is needed for mitigation strategies relating to this particular hazard. Earthquake mitigation actions often involve expensive projects that will be considered as funding becomes available.

The 2013 State Hazard Mitigation Plan (SHMP) is the data source contained in Figure 26 "2013 California State Hazard Mitigation Plan, Primary Sources of Disaster Losses" and Table 14 "Disaster Incidents, Casualties, and Cost by Type." Once the 2018 SHMP is completed and approved, Figure 26 and Table 14 will be updated to include the most recent maps and new information.

4.4.3 2015 General Plan Policies on High Risk Facilities

Many essential public facilities and hazardous materials sites are located within the 100-year flood zones of Riverside County making them a high risk facility. These facilities include: 14 of Riverside County's 39 airports; 4 of 18 hospitals; 47 of 109 police stations, fire stations and emergency operation centers; 92 of 380 schools; 446 of 1,306 highway bridges; and 695 of 1,978 hazardous materials sites.

In attempts to mitigate future damages from hazards Riverside County has adopted the following policies related to high risk facilities:

S 4.12 Require certain existing essential, dependent care, and high-risk facilities that are not in conformance with provisions of the County zoning to upgrade or modify building use to a level of safety consistent with the inundation risk.

S 4.13 Require that facilities storing substantial quantities of hazardous materials within inundation zones shall be adequately flood-proofed and hazardous materials containers shall be anchored and secured to prevent flotation and contamination.

S 4.14 Require that dependent care facilities have all flood-vulnerable electrical circuitry flood-proofed.

S 4.15 Require that high-risk facilities maintain and rehearse inundation response plans.

S 4.16 Utilize power of public land acquisition and other land use measures to create open space zoning of inundation zones in areas that are destined for redevelopment; when this is not feasible, low density land uses should be employed.

S 4.17 Continue to assess and upgrade inundation risk and protection in the County.

S 4.18 Require that the design and upgrade of street storm drains be based on the depth of inundation, relative risk to public health and safety, the potential for hindrance of emergency access and regress from excessive flood depth, and the threat of contamination of the storm drain system with sewage effluent. In general, the 10-year flood flows shall be contained within the top of curbs and the 100-year flood flows within the street right-of-way.

S 4.19 Encourage periodic reevaluation of the 500-year, 100-year and 10-year flood hazard in the county by state, federal, county, and other sources, and use such

studies to improve existing protection, to review protection standards proposed for new development and redevelopment, and to update emergency response plans.

S 4.20 Balance flood control mitigation with open space and environmental protection.

S 4.21 Encourage the use of specific plans to allow increased densities in certain areas of a proposed development; or apply Transfer of Development Credits to encourage the placement of appropriate land uses in natural hazard areas, including open space, passive recreational uses, or other development capable of tolerating these hazards.

S 4.22 Take an active role in acquiring property in high-risk flood zones and designating the land as open space for public use or wildlife habitat.

Source: (All from Safety Element S-4: High Risk Facilities)

4.5 Estimated Property Loss

Table 12: Riverside County Property Values by City

RIVERSIDE COUNTY ASSESSOR
ASSESSED VALUE FOR CITIES
2016/2017

CITY	TOTAL 2016/2017 LOCAL ROLL	LESS NON-REIMBURSED EXEMPTIONS	NET TANGIBLE VALUE	LESS HOMEOWNER'S EXEMPTIONS	2016/2017 NET TAXABLE VALUE	2015/2016 NET TAXABLE VALUE	ASSESSED VALUE CHANGE	PERCENTAGE CHANGE
BANNING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BEAUMONT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BLYTHE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CALIMESA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CANYON LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CATHEDRAL CITY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
COACHELLA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CORONA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DESERT HOT SPRINGS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EASTVALE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
HEMET	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
INDIAN WELLS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
INDIO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
JURUPA VALLEY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LA QUINTA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LAKE ELSINORE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MENIFEE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MORENO VALLEY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MURRIETA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NORCO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PALM DESERT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PALM SPRINGS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PERRIS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
RANCHO MIRAGE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
RIVERSIDE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAN JACINTO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TEMECULA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WILDOMAR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CITY TOTALS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 13: Unincorporated Riverside County Property Values

RIVERSIDE COUNTY ASSESSOR
ASSESSED VALUE FOR UNINCORPORATED AREAS
2016/2017

AREA	TOTAL 2016/2017 LOCAL ROLL	LESS NON-REIMBURSED EXEMPTIONS	NET TANGIBLE VALUE	LESS HOMEOWNER'S EXEMPTIONS	2016/2017 NET TAXABLE VALUE	2015/2016 NET TAXABLE VALUE	ASSESSED VALUE CHANGE	PERCENTAGE CHANGE
Alvord	1,230,054,315	4,293,168	1,225,761,147	13,185,200	1,212,575,947	1,168,289,865	44,286,082	3.79%
Banning	857,212,468	6,125,583	851,086,885	4,479,983	846,606,902	852,236,383	(5,629,481)	-0.66%
Beaumont	648,297,773	15,075,109	633,222,664	10,993,484	622,229,180	586,683,054	35,546,126	6.06%
Coachella	1,671,093,056	80,010,632	1,591,082,424	8,069,138	1,583,013,286	1,510,147,344	72,865,942	4.83%
Colton	116,664,357	2,395,678	114,268,679	1,022,000	113,246,679	109,632,339	3,614,340	3.30%
Corona-Norco	3,875,856,489	25,066,596	3,850,789,893	37,439,128	3,813,350,765	3,662,399,145	150,951,620	4.12%
Desert Center	225,135,919	268,078	224,867,841	286,731	224,581,110	230,368,870	(5,787,760)	-2.51%
Desert Sands	3,278,845,921	24,635,707	3,254,210,214	29,894,896	3,224,315,318	3,160,090,327	64,224,991	2.03%
Elsinore	1,751,940,102	26,941,744	1,724,998,358	20,938,252	1,704,060,106	1,619,779,503	84,280,603	5.20%
Hemet	4,630,913,679	178,713,683	4,452,199,996	60,345,499	4,391,854,497	4,219,200,805	172,653,692	4.09%
Menifee	723,454,268	4,564,864	718,889,404	5,084,800	713,804,604	633,826,810	79,977,794	12.62%
Moreno	675,058,135	6,544,761	668,513,374	1,183,000	667,330,374	667,642,315	(311,941)	-0.05%
Murrieta	2,324,077,841	6,592,272	2,317,485,569	11,002,600	2,306,482,969	2,232,361,878	74,121,091	3.32%
Nuview	748,064,054	5,474,709	742,589,345	9,152,982	733,436,363	684,809,351	48,627,012	7.10%
Palm Springs	2,056,242,569	80,765,934	1,975,476,635	25,297,200	1,950,179,435	1,901,356,909	48,822,526	2.57%
Palo Verde	632,543,996	2,784,631	629,759,365	2,604,106	627,155,259	595,860,635	31,294,624	5.25%
Perris	690,091,152	2,975,783	687,115,369	7,771,056	679,344,313	639,320,863	40,023,450	6.26%
Riverside	3,199,609,739	36,371,239	3,163,238,500	33,399,108	3,129,839,392	2,912,917,501	216,921,891	7.45%
Romoland	477,974,775	4,577,213	473,397,562	9,274,571	464,122,991	429,229,956	34,893,035	8.13%
San Jacinto	253,872,969	124,842,772	129,030,197	1,572,281	127,457,916	122,212,421	5,245,495	4.29%
Temecula	6,526,157,456	97,664,677	6,428,492,779	48,139,000	6,380,353,779	5,988,694,048	391,659,731	6.54%
Val Verde	1,597,610,712	148,031,619	1,449,579,093	14,465,706	1,435,113,387	1,369,550,576	65,562,811	4.79%
Yucaipa	99,434,526	135,778	99,298,748	917,000	98,381,748	94,389,584	3,992,164	4.23%
TOTALS	38,290,206,271	884,852,230	37,405,354,041	356,517,721	37,048,836,320	35,391,000,482	1,657,835,838	4.68%

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Section 5.0 – Risk Assessment

5.1 Overview and Risk Assessment Process

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The Risk is measured by hazard, vulnerability and exposure probability.

The Riverside County Multi-Jurisdiction Hazard Mitigation Plan's risk assessment follows the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses* (FEMA 386-2, 2002), which breaks the assessment down to a four-step process:

- Identify Hazards
- Profile Hazard Events
- Inventory Assets
- Estimate Losses

This risk assessment covers the entire geographical extent of Riverside County, including the incorporated communities and other participating jurisdictions. Since this plan is a multi-jurisdictional plan, participating jurisdictions completed their own hazard analysis and risk assessment and many have ranked their hazards differently than the County to match the needs of their jurisdiction. The County Local Hazard Mitigation Steering Committee has evaluated how these identified hazards and risks vary from jurisdiction to jurisdiction. These individual hazards and assessments are briefly outlined in this chapter with more details found in the jurisdiction's annex. If no additional data is provided in an annex, it should be assumed that the risk and potential impacts to the affected jurisdiction are similar to those described here for the entire Riverside County Operational Area LHMP.

The Riverside County Operational Area LHMP update involved a comprehensive review and update of each section of the risk assessment with new data, where available, and new analyses.

5.1.1 Results and Methodology

The County Local Hazard Mitigation Steering Committee utilized the existing 2012 Local Hazard Mitigation Plan identified hazards. Using existing hazard data and input gained through planning meetings, the Hazard Mitigation Steering Committee agreed upon a list of natural, man-made and technological hazards that could affect Riverside County.

Hazard data from the California Office of Emergency Services (Cal OES), FEMA, and many other sources were examined to assess the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage. The natural hazards evaluated as part of this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future. Man-made and technological hazards were evaluated in the same manner. During the assessment of the identified County hazards the Steering Committee realized the need to add Cyber Attack and Communication Failure to the Local Hazard Mitigation Plan. The Committee based this decision off of the history of events and probability of future occurrences.

Please see table 4.1 Hazard Identification Table for justification of each hazards ranking.

Table 14: 2017 LHMP Top 5 Identified Hazards

Riverside County Multi-Jurisdictional Local Hazard Mitigation Plan Risk Assessment Chart						
Jurisdiction	Priority Risk/ Hazards					Differs from County Priorities?
County	**#1**	**#2**	**#3**	**#4**	**#5**	
Riverside OA	Earthquake	Pan Flu	Wildfire	Electrical Failure	Emergent. Disease	See Section 5.3
Cities						
Banning	Earthquake	Fire	Transportation	HazMat	Flood	Yes
Beaumont	Earthquake	Fire	Flood	HazMat	Transportation	Yes
Blythe	Extreme Weather	Wind	Power Failure	Transportation	HazMat	Yes
Calimesa	Fire	Earthquake	Flood	Extreme Weather	Drought	Yes
Canyon Lake	Flood	Earthquake	Fire	Transportation	Nuclear Incident	Yes
Cathedral City	Earthquake	Flood	Wind	Landslide	Extreme Weather	Yes

Coachella	Earthquake	Extreme Weather	HazMat	Power Failure	Wind	Yes
Corona	Earthquake	Fire	Power Failure	Terrorism	Flood	Yes
Desert Hot Springs	Earthquake	Flood	Fire	Extreme Weather	Wind	Yes
Eastvale	Earth	Flood	Fire	Pipeline	Insect Infestation	Yes
Hemet	Earthquake	Pan Flu	Fire	Electrical Failure	Emergent Disease	No
Indian Wells	Earthquake	Flood	Extreme Weather	Power Failure	Wind	Yes
Indio	Earthquake	Extreme Weather	Emergent Disease	Pan Flu	Drought	Yes
Jurupa Valley	Earthquake	Pan Flu	Fire	Power Failure	Emergency Disease	No
La Quinta	Earthquake	Flood	Power Failure	Extreme Weather	Drought	Yes
Lake Elsinore	Fire	Flood	Power Failure	Extreme Weather	Drought	Yes
Murrieta	Earthquake	Pan Flu	Fire	Power Failure	Emergent Disease	No
Norco	Flood	Fire	Earthquake	Extreme Weather	Agricultural Hazard	Yes
Palm Desert	Earthquake	Flood	Extreme Weather	Power Failure	Drought	Yes
Palm Springs	Earthquake	Power Failure	Transportation	Extreme Weather	Wind	Yes

Perris	Fire	Flood	Earthquake	HazMat	Power Failure	Yes
Rancho Mirage	Earthquake	Flood	Fire	Drought	Civil Unrest	Yes
Riverside	Earthquake	Flood	Drought	Terrorism	Fire	Yes
San Jacinto	Earthquake	Extreme Weather	Flood	Landslide	Drought	Yes
Temecula	Transportation	Earthquake	Flood	Terrorism	Fire	Yes
Wildomar	Earthquake	Fire	Drought	Flood	Extreme Weather	Yes
Tribes						
Morongo	Wildfire	Severe Wind Event	Earthquake	Electrical Failure	Transportation	Yes
Special Districts						
Eastern Municipal Water	N/A	N/A	N/A	N/A	N/A	See Annex
High Valleys Water	Extreme Weather	Drought	Fire	Wind	Power Failure	Yes
Idyllwild Fire Protection	Fire	Drought	Insect Infestation	Earthquake	Pan Flu	Yes
Imperial Irrigation District	Earthquake	Extreme Weather	Terrorism	N/A	N/A	Yes
Kaiser	Earthquake	Fire	Extreme Weather	Drought	Wind	Yes

Rancho California Water	Earthquake	Drought	Flood	Fire	N/A	Yes
Santa Ana Watershed	Earthquake	Wind	N/A	N/A	N/A	Yes
Western Municipal Water	Pipeline	Power	Extreme Weather	Drought	Wind	Yes
School Districts						
Beaumont Unified	Earthquake	Wind	Drought	Fire	Flood	Yes
Desert Sands Unified	Earthquake	Flood	Extreme Weather	HazMat	Drought	Yes
Hemet Unified	Civil Disorder	Extreme Weather	Wind	Flood	Fire	Yes
Lake Elsinore Unified	Earthquake	Pan Flu	Extreme Weather	Flood	Nuclear	Yes
Moreno Valley Unified	Earthquake	Fire	Extreme Weather	Power Failure	Wind	Yes
Perris Union High School	Earthquake	Fire	Wind	Pan Flu	Flood	Yes
Riverside Community College	Insect Infestation	Jail/Prison Event	Civil Disorder	Nuclear	Terrorism	Yes
Riverside County Office of Education	Earthquake	Wildland Fire	Pandemic	Flood	Severe Wind	Yes
Riverside Unified	Earthquake	Power Failure	Pipeline	HazMat	Extreme Weather	Yes
San Jacinto Unified	Earthquake	Fire	Flood	Wind	Extreme Weather	Yes

Please refer to individual annexes for additional hazard priorities for participating jurisdictions.

5.2 Agency Inventory Description

All participants were asked to evaluate the potential for an event to occur in their jurisdiction by hazard and the potential impact based on:

1. Economic loss and recovery
2. Physical loss of structures (residential, commercial, and critical facilities)
3. Infrastructure loss or damage
4. Continuity of operations for a normal daily governmental activities
5. Ability to quickly recover from the event and return to normal daily activities
6. Loss of life and potential injuries from the event.

The participants were then asked to rate the potential and severity using a scale of between 0 and 4 (4 being the most severe). The jurisdictions were also asked to rank the listed hazards as they relate to their jurisdiction from 1 to 20 (1 being the highest overall threat to their jurisdiction).

The following table was given to participants during the 2012 plan update and again for the 2017 update. Participants were informed that the county hazards were likely to be re-ranked and Communication Failure and Cyber-attack would be added.

Figure 27: 2012 and 2017 Participant Ranking Chart

NAME:	AGENCY:		DATE :		
	COUNTY		LOCAL JURISDICTION		
HAZARD	SEVERITY 0 - 4	PROBABILITY 0 - 4	SEVERITY 0 - 4	PROBABILITY 0 - 4	RANKING 1 - 20
1. EARTHQUAKE					
2. WILDLAND FIRE					
3. FLOOD					
OTHER NATURAL HAZARDS					
4. DROUGHT					
5. LANDSLIDES					
6. INSECT INFESTATION					
7. EXTREME SUMMER/WINTER WEATHER					
8. SEVERE WIND EVENT					
AGRICULTURAL					
9. DISEASE/CONTAMINATION					
10. TERRORISM					
OTHER MAN-MADE					
11. PIPELINE					
12. AQUEDUCT					
13. TRANSPORTATION					
14. POWER OUTAGE					
15. HAZMAT ACCIDENTS					
16. NUCLEAR ACCIDENT					
17. TERRORISM					
18. CIVIL UNREST					
19. JAIL/PRISON EVENT					
MEDICAL					
20. PANDEMIC					

Note: Please refer to the individual Local Hazard Mitigation Plans for participating jurisdiction

Please See Appendix E for the Inventory Worksheet template provided to participants.

The County Ranking used a similar format when looking at the probability and severity of a potential hazard but also included information on Healthcare Impact and Mitigation Capabilities. The following chart was used by the Local Hazard Mitigation Steering Committee while ranking the 2017 Hazards.

Figure 28: 2017 County Hazard Ranking and Risk Scores

HAZARD	PROBABILITY	SEVERITY	HEALTHCARE	EMS	BEHAVIORAL / MENTAL HEALTH	RESPONDER AGENCIES	COMMUNITY AGENCIES	*RISK SCORE*
	Improbable: 0 Remote: 1 Occasional: 2 Probable: 3 Frequent: 4	NA: 0 Negligible: 1 Marginal: 2 Critical: 3 Catastrophic: 4	NA: 0 Negligible: 1 Marginal: 2 Critical: 3 Catastrophic: 4	NA: 0 Negligible: 1 Marginal: 2 Critical: 3 Catastrophic: 4	NA: 0 Negligible: 1 Marginal: 2 Critical: 3 Catastrophic: 4	NA: 0 Low: 1 Moderate: 2 High: 3 Extreme: 4	NA: 0 Low: 1 Moderate: 2 High: 3 Extreme: 4	
Aqueduct	2	3	2	2	2	2	3	0.38
Drought	3	3	2	2	2	2	2	1.13
Earthquake	2	4	4	4	3	2	2	3.50
Extreme Weather	2	3	2	2	2	2	2	0.75
Flood	3	3	2	3	2	2	3	1.13
Insect Infestation	3	2	2	1	1	2	2	0.00
Landslide	3	3	1	1	1	2	2	-0.56
Tornado	1	2	2	2	2	2	2	0.25
Wildland Fire	4	3	3	3	3	3	3	2.25
Civil Disorder	2	3	3	3	1	4	0	1.13
Communications Failure	2	3	3	3	3	3	3	1.13
Cyber Attack	4	2	3	2	2	3	1	1.50
Dam Failure	1	3	2	3	2	2	3	0.38
Electrical Failure	4	4	2	2	2	2	2	2.00
HazMat Incident	4	3	2	2	1	3	3	-0.75
Jail/Prison Event	1	2	1	1	1	4	0	-0.13
Nuclear/Radiological Incident	1	4	2	3	3	2	2	1.00
Pipeline Disruption	2	3	2	2	1	3	3	-0.38
Terrorist Event - MCI	1	3	3	3	4	3	1	1.13
Transportation Failure	2	3	2	2	1	2	2	0.38
Water Supply Disruption/Contamination	3	2	0	0	0	2	2	-1.50
Emergent Disease/Contamination	3	3	3	3	2	3	2	1.69
Pandemic Flu	2	4	4	4	4	3	2	3.50

5.3 Hazard Profiles and Descriptions

Hazard Assessment and Identification

The County utilized the tools described in Section 3.3 for the hazard identification process and provided them to the individual cities and special districts. Cal OES MyPlan was used for information about floods, earthquake, fire and some critical facilities locations. Additionally, Riverside County Transportation and Land Management Agency provided maps detailing where hazards and critical facilities are located.

All participating jurisdictions and special districts conducted a risk assessment and identified hazards specific to their jurisdiction, document the impact of those hazards, and develop specific goals and strategies to address the risks and hazards.

The probability of each hazard in Riverside County was determined by rating their occurrence level from 0 - 4, in which each level or number represented a specific descriptor. For example, improbable = (0), remote = (1), occasional = (2), probable = (3), and frequent = (4). Each descriptor was defined according to how often each hazard occurs in Riverside County.

- *Improbable* means it is not likely to happen in more than ten years
- *Remote* means it happens once in ten years
- *Occasional* means it happens once in five years
- *Probable* means it happens once every two years (biannual)
- *Frequent* means it happens at least once a year (annually)

Identification of Hazards

With its varying topography; a mix of urban and rural areas and rapidly growing permanent, transient, and recreational populations, the Riverside County Operational Area is subject to potential negative impacts from a broad range of hazards and threats. There are three broad categories of hazards that threaten the OA:

- Natural hazards
- Technological hazards
- Man-Made hazards

5.3.1 Earthquake

Severity: 4

Probability: 2

Risk Score: 3.50

OA Jurisdictions Affected by Earthquakes

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

An earthquake is a sudden, rapid shaking of the ground caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates.

Where earthquakes have struck before, they can strike again, often without warning. The major form of direct damage from most earthquakes is damage to construction. Bridges are particularly vulnerable to collapse and dam failure may generate major downstream flooding. Buildings vary in susceptibility depending on their construction and the types of soils on which they are built. Earthquakes destroy utility infrastructure which, in turn, may set off fires, hinder rescue efforts, and impact normal functions for an extended period of time. The hazard of earthquakes varies from place to place depending on the regional and local geology. Ground shaking may occur 65 miles or more from the epicenter (the point on the ground surface above the focus). Ground shaking can change the mechanical properties of some fine grained, saturated soils, where upon the soils liquefy and act as a fluid (liquefaction).

Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking.

Figure 29: Historical Earthquakes in the Riverside County Area - 5.0 and Above

Year	Richter Scale Magnitude	Description
1812	7.0	Occurred on the southern section of the San Andreas fault near Wrightwood.
1857	7.9	Occurred 60 miles northwest of Fort Tejon and ruptured 225 miles of the San Andreas fault.
1890	6.5	Occurred in the "San Jacinto or Elsinore Fault region" on the Rockhorse Truck Trail, north of the Borrego Valley Airport.
1890	6.5	Occurred in the same region as the 1890 earthquake.
1899	6.4	San Jacinto earthquake destroys San Jacinto and Hemet
1910	5.0	Occurred on the Elsinore fault northwest of the City of Lake Elsinore.
1918	6.9	San Jacinto earthquake strikes the same area that was damaged by an earthquake 19 years earlier.
1923	6.3	North San Jacinto Fault earthquake damaged the San Bernardino and Redlands area. This the last known time that this fault, which runs under the I-215/I-10 interchange, ruptured in this area.
1937	6.0	Terwilliger Valley earthquake was in the same general area as the 1890 earthquake.
1942	6.3	Fish Creek Mountains earthquake was south of the Ocotillo airport.
1954	6.2	Arroyo Salada earthquake was west of the Salton Sea.
1968	6.5	Borrego Mountain Earthquake was northeast of Ocotillo Wells
1987	6.6	Superstition Hills earthquake near the Salton Sea
1992	7.2	Occurred near Landers, California and caused the rupture of five different faults. Those faults were: Johnson Valley, Landers, Homestead Valley, Emerson, and Camp Rock.
1992	7.3	Occurred 3 hours after the Landers Earthquake with an epicenter near Big Bear, CA
1994	6.8	Northridge Earthquake
1999	7.4	Hector Mine Earthquake
2010	5.4	Borrego Springs earthquake believed by seismologists to have been possibly triggered by the strong earthquake which occurred near Calexico in 2010.

Located within Riverside County are several known active and potentially active earthquake faults, including the San Andreas Fault, San Jacinto Fault, and Elsinore Fault In the event of an earthquake, the location of the epicenter, as well as the time of day and season of the year, would have a profound effect on the number of deaths and casualties, as well as property damage.

Research centers devoted to the detection and logging of earthquake events record the ongoing weekly activity of small magnitude in Riverside County faults. The most recent earthquake in Riverside County was located in Banning on July 7, 2017, and had a magnitude of 1.1. There are a number of small scale earthquakes that happen weekly but larger scale or catastrophe shaking is less likely.

A **moderate** earthquake occurring in or near Riverside County could result in deaths, casualties, property damage, environmental damage, and disruption of normal government and community services. The effects could be aggravated by collateral emergencies such as fires, flooding, hazardous material spills, utility disruptions, landslides, transportation emergencies, and the possible failure of several dams in Riverside County. The community needs would most likely exceed the response capability of the County's emergency management organizations, requiring mutual assistance from volunteer and private agencies, the California Office of Emergency Services (Cal OES), and the Federal Emergency Support Functions.

A **catastrophic** earthquake in Riverside County could cause thousands of casualties, extensive major property damage, disruption in communications and utility systems, disruption in supply and distribution systems, and general panic. An earthquake of this magnitude could directly affect all of Riverside County and most of southern California, causing a critical demand on mutual aid resources and competition for national relief.

Key effects and response considerations:

- **Effects on people and housing.** In any earthquake, the primary consideration is saving lives. Time and effort must also be dedicated to providing for mental health for reuniting families, providing shelter to displaced persons, and restoring basic needs and services. Major efforts will be required to remove debris and clear roadways, demolish unsafe structures, assist in re-establishing public services and utilities, and provide continuing care and temporary housing for affected citizens.

  A survey of local, State, and Federal government emergency plans indicate that although there is a general capacity to respond to small and intermediate-sized earthquakes, it is unlikely that any of these governmental units will be able to cope with the immediate impact of a great quake, such as a Magnitude (M) 8.3 event on the south-central San Andreas fault. The general public must realize that the assistance that they have been used to expecting simply will not be immediately available. In fact, in the event of an earthquake of such magnitude, citizens must be prepared to wait for up to 72 hours or more for any type of organized response.

- **Effects on commercial and industrial structures.** After any earthquake, individuals are likely to lose wages due to the inability of businesses to function because of damaged goods and/or facilities. With business losses, the County of Riverside and the cities in the Riverside County Operational Area will lose revenue. Economic recovery from even a minor earthquake will be critical to the communities involved.

- **Effects on infrastructure.** The damage caused by an earthquake can lead to the paralysis of the local infrastructure: police, fire, medical and governmental services.

- **Effects on Critical Facilities.** A large number of critical facilities have been identified as being adjacent to the various faults in the County and surrounding counties. The list of facilities includes hospitals, fire stations, law enforcement facilities, and schools.

  Effects on agriculture. Earthquakes can cause loss of human life, loss of animal life, and property damage to structures and land dedicated to agricultural uses. The most significant long-term impacts on agriculture from earthquakes are those that arise from the cascading effects of fire and flood.

Historically, the San Andreas Fault is the most active among the fault network that cuts through rocks of the California coastal region. The entire San Andreas Fault system is more than 800 miles long and extends to depths of at least 10 miles within the earth. The San Andreas Fault in California forms a continuous, narrow break in the earth's crust that extends from northern California southward to Cajon Pass near San Bernardino; southeastward from Cajon Pass. Several branching faults, including the San Jacinto and Banning faults, share the movement of the crustal plates as the fault continues to the south east, on to the Salton Sea and on to Baja California Sea of Cortez.

Recent studies of the eastern section of the San Andreas near San Gorgonio Pass reveal that this area is more advanced in the cycle of strain accumulation than the western area at the Cajon Pass. Earthquake activity around the Southern San Andreas, including the June 1992 Landers-Big Bear earthquakes, has prompted scientists to increase their studies of this area.

The San Jacinto fault has had a higher level of moderate-to- large earthquakes during the past 50 to 100 years, although the rate of slip is not as high. Geodetic data indicates there is an "appreciable" strain accumulation across both faults, implying that either one or both may be primed for release. One of the larger and more active fault segments of

the San Jacinto fault, the Casa Loma Faults, runs from near Perris Reservoir to just north of Anza. Also, another large and active named segment is the Clark Fault, which runs from near Hemet to just 9 miles southwest of the shore of the Salton Sea. Historically, this section of the San Jacinto Fault produced a series of large earthquakes starting in 1899 on average every 14 years with the longest interval being 19 years. The last slip occurred on the Superstition Hills and Elmore Ranch sequence in1987. In 2015, the Working Group on California Earthquake Probabilities (WGCEP) estimated 30-year probabilities of 19 percent for an M 6.7 and larger event on the Southern San Jacinto Fault.

A third major fault zone that traverses Riverside County is the Elsinore Fault. The Elsinore Fault Zone is one of the largest in southern California. The main trace of the Elsinore fault zone has only seen one historical event greater than magnitude 5.2 – the earthquake of 1910, a magnitude 6 shock near Temescal Valley.

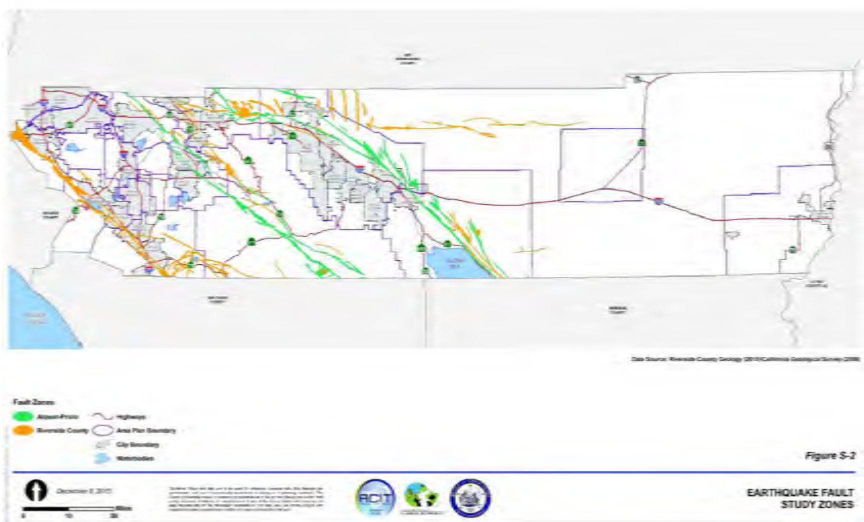
Risk Assessment Conclusion.

Riverside County is at risk for a significant earthquake causing catastrophic damage and strains on response and mitigation resources. Both property and human life are at high risk. The County experiences hundreds of minor quakes and tremblers each month from the myriad of faults in the area. Studies indicate that stress is building up in major faults like the San Andreas. A major quake could happen at any time.

Earthquake risk is very high in the most heavily populated western portion of the County and the Coachella Valley, due to the presence of two of California's most active faults, the San Andreas and San Jacinto. The risk is moderate in the eastern portion of the County beyond the Coachella Valley.

The following maps have been provided by the Riverside County Transportation and Land Management Agency and developed using Cal OES MyPlan.

Map 2: Riverside County Faults and Zones



Map 3: Fault Activity

Map 4: Ground Shaking Potential

Relationship to Other Hazards – Cascading Effects

Earthquakes can cause many cascading effects such as fires, flooding, hazardous material spills, utility disruptions, landslides, transportation emergencies, electrical failure and the possible failure of several dams in Riverside County.

Hazus Assessment

HAZUS®MH was used to generate general building stock and essential facility loss estimates for five different natural hazard scenarios. Two of the scenarios were large scenario earthquakes. The earthquakes chosen for analysis were an M6.8 Elsinore Fault Scenario Earthquake, and the M7.8 "ShakeOut" Scenario Earthquake on the Southern San Andreas Fault.

Risk assessment results were generated using the following HAZUS®MH analysis options:

- **General Buildings**
  - Ground Motion
  - Damage State Probabilities
  - Damage
  - Direct Economic Loss
- **Essential Facilities**
  - Medical Care
  - Police Stations
  - Fire Stations
  - Emergency Response
  - Schools
- **Transportation Systems**
  - Highways
  - Railways
  - Light Rail
  - Bus System
  - Port and Harbor
  - Ferry System
  - Airport Transportation
- **Utility Systems**
  - Potable Water
  - Waste Water
  - Oil
  - Natural Gas

  - Electric Power
  - Communication
- **Induced Physical Damage**
  - Fire following
  - Debris
- **Direct Social Losses**
  - Casualties
  - Shelter

Table 18 (ES-2) provides a summary of HAZUS®MH-estimated regional impacts for Riverside County for the two earthquake scenarios. As shown in the tables, the total estimated direct economic loss related to building damage ranges from $1.8B to $9.8B in the two scenario events. It should be noted that these totals are for Riverside County only. Both earthquake scenarios have the potential to cause additional damage in adjacent counties (for example, the Elsinore scenario would also significantly impact San Diego and Orange counties), whose losses are not tabulated here.

Table 15: Summary of HAZUS estimated Impacts on Riverside County for Two Earthquake Scenarios

Table ES-2. Summary of HAZUS®MH-estimated Impacts on Riverside County for Two Earthquake Scenarios

Impact Category	M6.8Elsinore	M7.8"ShakeOut" San Andreas*
Economic Loss due to Building Damage	$1.2B	$6.9 B
Total Building-related Direct Economic Loss	$1.8B	$9.8 B
# Buildings in Complete Damage State	100	25,000* (many MH)
Debris Generated (million tons)	0.3	3.5
Displaced Households	110 Households	19,000 Households*
People Needing Short-term Shelter	90 People	8,600 People*
Fatalities (2 am, 2 pm, 5 pm)	<10,<10,<10	60 bldg (70 all causes)*
Total Injuries (2 am, 2 pm, 5 pm)	200, 200, 220	11,600 bldg (11,900 all)*
% of Households without Water	<1%	99%
# Highway Bridges w/ at least Moderate Damage (potentially closed)	None expected	100

*Note: selected custom estimates for the "ShakeOut" scenario have been taken from the full USGS technical report, "*The ShakeOut Scenario*": http://pubs.usgs.gov/of/2008/1150

Table 19 summarizes expected essential facility performance in the two earthquake events. Estimated building damages to essential facilities in Riverside County ranges from about $64M - $351M. These loss totals should not be considered all-inclusive, as replacement cost data was not available for many hospitals, and a small number of schools and police facilities.

Table 16: Summary of HAZUS – estimated Impacts for Riverside County Essential Facilities in Two Earthquake Scenarios

Essential Facility	Category	M6.8 Elsinore		M7.8 "ShakeOut" San Andreas	
		Mean Damage	Economic Loss ($1,000)	Mean Damage	Economic Loss ($1,000)
Hospitals*	Medium	2%	$4,858	14%	$3,842
	Large	0%	$899	26%	$5,180
Schools	K-12 (default data)	1%	$2,375	2%	$3,708
	K-12 (providing data)	1%	$54,774	6%	$314,182
	CCD (providing data)	0%	$706	5%	$24,465
EOCs		1%	$3	6%	$20
Police Stations		0%	$3	7%	$35
Fire Stations		1%	$3	4%	$14
TOTALS			**$63,620**		**$351,446**

*Note: In Riverside County, there are no hospitals which would be categorized by HAZUS as "Small" (<50 licensed acute care beds)

Elsinore Earthquake Scenario – Regional Impacts

The M6.8 Elsinore scenario earthquake will impact the western-most communities and infrastructure of Riverside County. A summary of regional impacts is provided in Figure 29. These impacts are described below.

Of the approximately 647,000 buildings modeled within the improved general building stock data for Riverside County, less than 1% (approximately 100) are expected to suffer "complete" damage in the Elsinore scenario earthquake. These buildings would be considered "red-tagged" or unsafe for continued occupancy. A small percentage of these buildings (15% or less) have the potential for collapse, suggesting the need for Urban

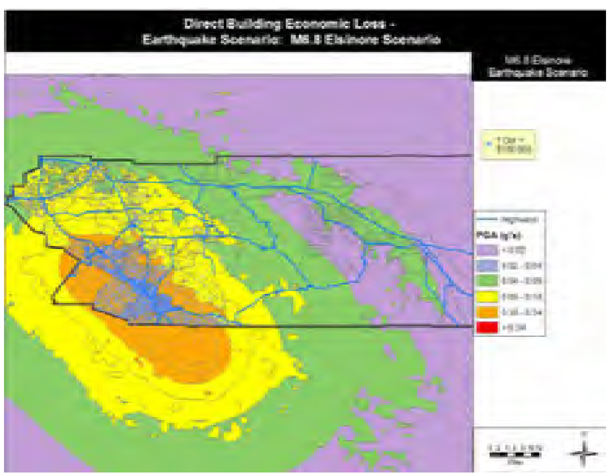
Search & Rescue (USAR). Approximately 2,200 buildings (0.3%) are expected to suffer "extensive" damage, and would be considered "yellow-tagged", with restrictions on continued use. While the remainder of buildings would be considered "green-tagged" (safe for occupancy, although some damage may have occurred), as many as 3% (20,500) would be expected to suffer "moderate" damage, and an additional 13% (82,700) would suffer "slight" damage.

As much as 0.3 million tons of debris may result from these damaged buildings – 47% is expected to be heavy debris (concrete and steel), requiring heavy equipment to break down and remove, while 53% is expected to be light debris (wood, brick and other debris).

The number of people killed as a result of shaking-induced and transportation system damage is expected to be less than 10, regardless of the time of day that the earthquake occurs.

Total injuries, including the range of injuries from minor injuries treated with basic medical care to mortal injuries (deaths), are expected to be on the order of 200-220. Transportation of the injured for treatment is not expected to be impacted by transportation system damage, as no bridge in the County is expected to suffer "moderate" damage or greater.

Figure 30: Direct Building Economic Loss



"ShakeOut" San Andreas Earthquake Scenario Regional Impacts

The M7.8 "ShakeOut" San Andreas scenario earthquake will impact most of the populated portions of Riverside County. A summary of impacts is provided in Table 19. It should be noted, however, that some impact estimates have been taken from the improved estimates developed by the extensive community modeling effort (Jones, et al., 2008) conducted for the "ShakeOut" exercise. The use of these estimates is noted where appropriate.

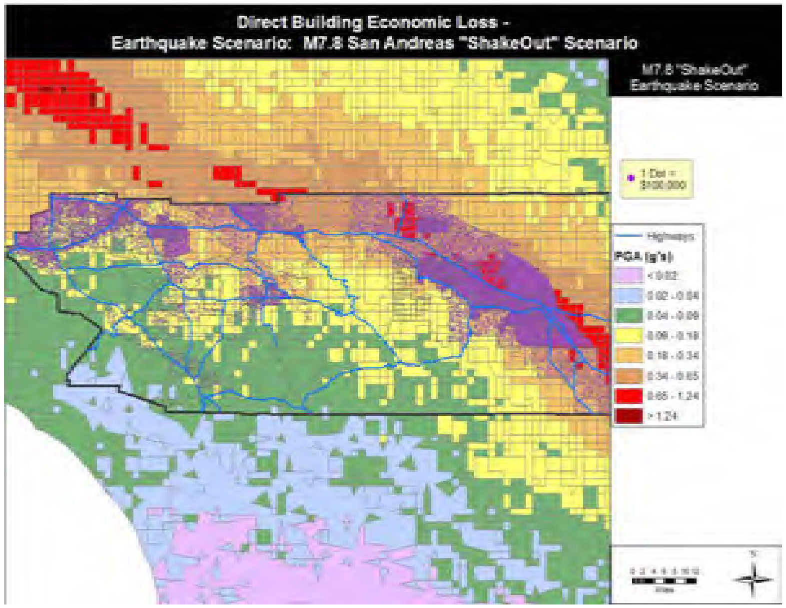
Table 17: Summary of HAZUS – Estimated Impacts for Riverside County Due to an M7.8 Scenario Earthquake on the "ShakeOut" San Andreas Fault

Economic Loss due to Building Damage	$6.9 B
Total Building-related Direct Economic Loss	$9.8 B
# Buildings in Complete Damage State	25,000* (many MH)
Debris Generated (million tons)	3.5
Displaced Households	19,000 Households*
People Needing Short-term Shelter	8,600 People*
Fatalities (2 am, 2 pm, 5 pm)	60 in buildings (70 all causes)*
Total Injuries (2 am, 2 pm, 5 pm)	11,600 in buildings (11,900 all)*
% of Households without Water	99%
# Highway Bridges w/ at least Moderate Damage (potentially closed)	100

*Note: selected custom estimates for the "ShakeOut" scenario have been taken from: http://pubs.usgs.gov/of/2008/1150

In the M7.8 "ShakeOut" Scenario earthquake on the San Andreas Fault, dollar losses related to shaking-induced building damage are estimated to reach $6.9 billion, while total direct economic losses are expected to be approximately $9.8 billion. The geographic distribution of total direct economic loss is mapped in Figure 4-9.

Figure 31: Direct Economic Loss in Riverside County Resulting from an M7.8 Scenario Earthquake on the "ShakeOut" San Andreas Fault



According to the published "ShakeOut" scenario (Jones, et al., 2008), approximately 25,000 buildings would be expected to suffer "Complete" damage in the scenario earthquake. These building, predominantly residential mobile homes, would be considered "red-tagged" or unsafe for continued occupancy. A small percentage of these buildings (15% or less) have the potential for collapse, suggesting the need for Urban Search & Rescue. More than 18,000 buildings are expected to suffer "Extensive" damage in this scenario earthquake and would be considered "yellow-tagged", with restrictions on continued use. While the remainder of buildings would be considered "green-tagged" (safe for occupancy, although some damage may have occurred), approximately 63,000 would be expected to suffer "Moderate" damage, and an additional 137,000 would suffer "Slight" damage.

Almost 3.5 million tons of debris may result from these damaged buildings – 58% is expected to be heavy debris (concrete and steel), requiring heavy equipment to break down and remove, while 42% is expected to be light debris (wood, brick and other debris).

In the "ShakeOut" scenario (Jones, et al., 2008), damage to single family and multi-family dwellings is expected to result in the displacement of approximately 19,000 households. Immediately after the earthquake, significant disruption to the water supply and distribution system is expected, essentially impacting the entire county. While many of the displaced may find shelter with friends and family, or in available hotels, approximately 8,600 people are expected to seek public shelter.

The number of people killed as a result of shaking-induced building, transportation system damage, and post-earthquake fire may be on the order of 60 to 70 people. Total injuries, including the range of injuries from minor injuries treated with basic medical care to mortal injuries (deaths) from all causes, are estimated to reach 11,900 within the County.

Transportation of the injured for treatment could be impacted by transportation system damage with as many as 100 bridges in the County suffering at least "Moderate" damage.

Essential Facility Impacts

Table 19 provides an overview of essential facility performance in the "ShakeOut" San Andreas Scenario earthquake. The table lists the number of essential facility sites and buildings (these numbers will differ for multi-building campuses, such as schools and hospitals). The table also provides the total building replacement value and the number of buildings for which value data was available. As can be seen in the table, replacement cost data for hospitals was generally not available, unlike most other essential facility types. Expected building performance in this earthquake event is on the order of 7% damage or less for EOCs, fire stations, police stations, and schools, but as much as 26% damage for large hospitals. The total economic loss for essential facilities has been estimated to exceed $351 million, with 97% of the total loss occurring in schools. It should be noted that although cost data is only available for 31 hospital buildings (out of 77), these 31 buildings suffer more than $9 million in loss, indicating that the actual total economic loss for hospitals would be significant, but can't be estimated at this time because of the lack of replacement value data.

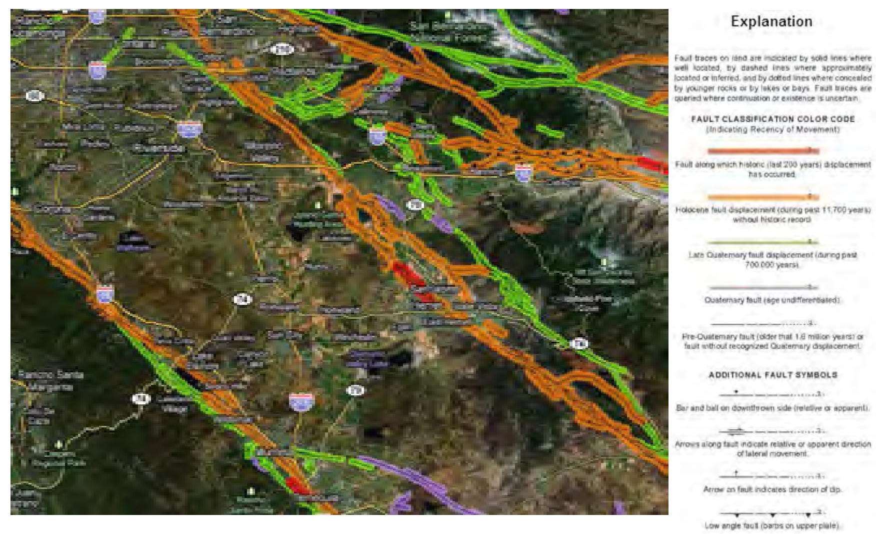
Table 18: Riverside County Essential Facility Loss Estimates – M7.8 “ShakeOut” San Andreas Fault Scenario Earthquake

Essential Facility	Category	No. of Facilities/ Sites	No. of Buildings	No. of Beds	Replacement Cost ($1,000)	# Buildings w/ replacement cost data	Functionality Day 1 (%)	Mean Damage	Economic Loss ($1,000)
Hospitals*	Medium	8	28	793	$162,827	21	64	14%	$3,842
	Large	8	49	2,467	$200,792	10	26	26%	$5,180
Schools	K-12 (default data)	152	152		$219,600	152	74	2%	$3,708
	K-12 (providing data)	689	9,981		$6,049,534	9,213	64	6%	$314,182
	CCD (providing data)	12	258		$356,708	257	54	5%	$24,465
EOCs		43	43		$310,273	43	60	6%	$20
Police Stations		51	51		$675,299	48	57	7%	$35
Fire Stations		156	156		$366,493	156	72	4%	$14
TOTALS		**1,119**	**10,718**	**3,260**	**$8,341,525**	**9,900**			**$351,446**

*Note: In Riverside County, there are no hospitals which would be categorized by HAZUS as “Small” (<50 licensed acute care beds)

The following three maps are from the Fault Activity Map of California, California Geologic Survey, Data Map

Map 5: Fault Activity Map of California, Western Riverside County



Map 6: Fault Activity Map of California, Central Riverside County

Map 7: Fault Activity Map of California, Eastern Riverside County

5.3.2 Pandemic Flu

Severity: 4

Probability: 2

Risk Score: 3.50

OA Jurisdictions Affected by Pandemic and Epidemic

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

A disease outbreak can cause illness and result in significant casualties. Since 1900, there have been four influenza pandemics that killed approximately 600,000 people in the United States. In 2009 the H1N1 flu was first identified in Imperial and San Diego counties, killing more than 550 Californians, sent thousands more to hospitals, caused widespread fear and anxiety and the declaration of a public health emergency. H1N1 in 2009 tested the State's medical infrastructure as never before. H1N1 quickly spread nationwide and then around the globe, taking a heavy toll on people not usually susceptible to serious influenza.

History

2009 - Rise of H1N1, popularly referred to as the Swine Flu. According to the California Center for Infectious Diseases, the H1N1 flu (2009 H1N1 influenza virus) is a type of influenza virus that causes respiratory disease that can spread between people. While most people who have been sick have recovered without needing medical treatment, hospitalizations and deaths from infection with this virus has occurred. The spread of H1N1 flu occurs in the same way that seasonal flu spreads. Flu viruses are spread mainly from person to person through coughing or sneezing by people with influenza. As a result of preparation and mitigation strategies such as vaccinations and public education, the threat of a full-blown H1N1 pandemic in the U.S. is receding. However, the possibility of another pandemic still exists.

2003 - A previous pandemic flu threat that still looms is the avian flu. Birds can contract avian flu and pass it along to humans. Some strains of the avian flu are more virulent than others. Public health experts continue to be alert to the risk of a possible re-emergence of a 2003 epidemic of avian flu among people primarily in Asia. People who had been very close contact with infected birds (for example, people who lived with chickens in their houses) contracted a virulent form of avian

flu and there was a significant death rate from this disease. Thus far, the avian flu virus has not mutated and has not demonstrated easy transmission from person to person. However, were the virus to mutate in a highly virulent form and become easily transmissible from person to person, the public health community would be very concerned about the potential for a pandemic influenza outbreak. Such a pandemic could disrupt all aspects of society and severely affect the economy.

Risk Assessment

Influenza, also known as the flu, is a disease that attacks the respiratory system (nose, throat, and lungs) in humans. Although mild cases may be similar to a viral "cold," influenza is typically much more severe. It usually comes on suddenly; may include fever, headache, tiredness, dry cough, sore throat, nasal congestion, and body aches; and more often results in complications such as pneumonia. Seasonal influenza is a yearly occurrence that causes serious flu-related complications primarily for persons aged 65 and older and those with chronic health conditions (such as asthma, diabetes, or heart disease), pregnant women, and young children. Those who are exposed but do not succumb develop immunity to the strain circulating that year. Worldwide pandemics of influenza occur when a novel virus emerges to which the population has little immunity. The 20th century saw three such pandemics, the most notable of which was the 1918 Spanish influenza pandemic that was responsible for 20 million deaths throughout the world. Secondary impacts include significant economic disruption that can occur due to loss of employee work time and costs of treating or preventing spread of the flu.

Source: https://archive.cdph.ca.gov/HealthInfo/discond/Pages/Influenza(Flu).aspx

California Department of Public Health

The 2009 H1N1 influenza (flu) pandemic occurred against a backdrop of pandemic response planning at all levels of government including years of developing, refining and regularly exercising response plans at the international, federal, state, local, and community levels. At the time, experts believed that avian influenza A (H5N1) viruses posed the greatest pandemic threat. H5N1 viruses were endemic in poultry in parts of the world and were infecting people sporadically, often with deadly results. Given that reality, pandemic preparedness efforts were largely based on a scenario of severe human illness caused by an H5N1 virus. Despite differences in planning scenarios and the actual 2009 H1N1 pandemic, many of the systems established through pandemic planning were used and useful for the 2009 H1N1 pandemic response.

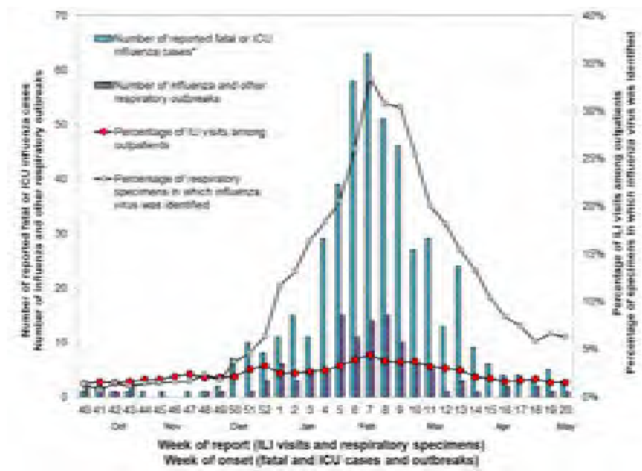
http://www.cdc.gov/h1n1flu/cdcresponse.htm (see attachment for complete document report)

The California Department of Public Health (CDPH) monitors flu conditions on an annual bases, including all virologic, case based and syndromic surveillance. CDPH works with Riverside County to help the community prepare and mitigate the effects of Pandemic Flu.

- **Effects on people and housing.** The risk to people can be severe, leading to hospitalization and possibly loss of life. Damage to housing as a result of Pandemic Flu is not likely.
- **Effects on commercial and industrial structures**. The risks are minimal to structures.
- **Effects on infrastructure.** The risks are minimal, but if there is a pandemic the risk will decrease the numbers of workers that go to work, which can have economic and functional effects to the organizations in a community. Continuity of Business and Continuity of Government planning goes into action in these cases.
- **Effects on agriculture.** The risk of animals borne disease can be great in a pandemic, depending on the disease. The impact to agriculture can be great, again depending on the disease.

The following charts are from the CDPH Influenza and Other Respiratory Diseases

Figure 32: Surveillance Report for the 2015–2016 Flu Season.



October 4, 2015–October 1, 2016

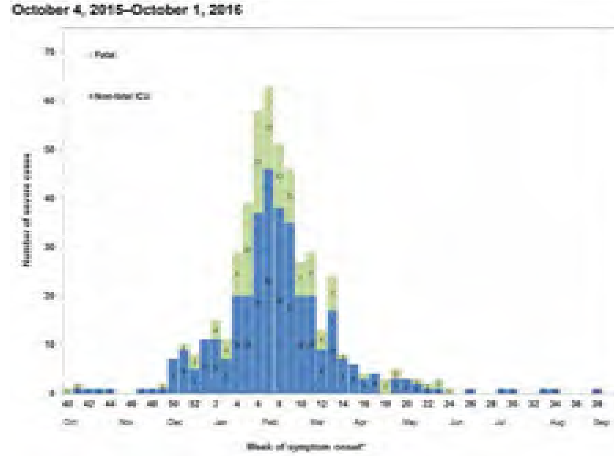


Table 19: Statewide 2011-2016 Influenza Cases0

Appendix I. Number of fatal and non-fatal ICU cases of laboratory-confirmed influenza in persons <65 years of age reported to the California Department of Public Health, by local health jurisdiction, 2011–2012 influenza season through 2015–2016 influenza season

	2011-2012*		2012-2013*		2013-2014*		2014-2015*		2015-2016*	
Jurisdiction	Fatal	Non-fatal ICU	Fatal	Non-fatal ICU	Fatal	Non-fatal ICU	Fatal	Non-fatal ICU	Fatal	Non-fatal ICU
CALIFORNIA	51	166	116	241	416	837	79	290	144	355
Alameda[†]	6	9	3	3	12	26	2	12	5	19
Berkeley City	0	0	0	0	0	1	0	0	0	1
Alpine	0	0	0	0	0	0	0	0	0	0
Amador	0	0	0	0	0	3	0	1	0	1
Butte	0	2	0	1	3	3	0	0	0	1
Calaveras	0	0	0	0	2	2	0	0	0	0
Colusa	0	0	0	0	0	1	0	0	0	0
Contra Costa	0	9	1	12	9	40	1	8	1	11
Del Norte	0	0	1	0	0	0	0	0	0	0
El Dorado	0	0	0	0	3	8	0	1	0	3
Fresno	3	10	7	14	22	18	4	14	5	8
Glenn	0	0	0	0	1	1	0	0	0	0
Humboldt	0	0	0	3	1	6	1	1	1	1
Imperial	0	0	0	0	2	6	0	0	0	1
Inyo	0	0	0	0	0	0	0	0	0	1
Kern	1	2	2	0	11	23	0	5	1	1
Kings	0	0	0	0	7	5	0	2	1	2
Lake	0	2	0	0	1	5	0	3	0	1
Lassen	0	0	0	0	1	1	0	0	0	0
Los Angeles[†]	12	0	32	0	75	22	16	7	36	0
Long Beach City	1	2	1	0	8	4	1	5	1	10
Pasadena City	0	0	0	0	0	0	0	0	0	0
Madera	0	0	2	1	3	6	1	1	1	1
Marin	0	0	0	1	2	1	0	2	0	0
Mariposa	0	0	0	0	0	0	0	1	0	0
Mendocino	0	1	0	1	4	12	0	0	0	1
Merced	0	1	0	0	5	6	0	0	0	1
Modoc	0	0	0	0	0	0	0	0	0	0
Mono	0	0	0	0	0	0	0	0	0	0
Monterey	0	1	0	4	7	12	2	6	1	2
Napa	0	0	0	0	0	7	1	1	0	3
Nevada	1	0	0	0	1	4	0	2	0	0
Orange	2	18	6	31	22	35	11	23	14	40
Placer	0	0	0	2	1	9	1	3	1	3
Plumas	0	0	0	0	0	0	0	1	0	0
Riverside	0	16	6	14	23	43	2	14	9	22
Sacramento	3	25	10	40	29	96	4	27	8	42
San Benito	0	0	0	1	0	0	0	0	0	1
San Bernardino	5	15	7	13	31	52	4	15	6	32
San Diego	5	10	17	43	44	112	8	59	28	64
San Francisco	0	1	2	1	4	28	1	0	0	0
San Joaquin	2	5	0	8	8	23	3	8	2	9
San Luis Obispo	0	0	2	2	1	7	0	3	0	3
San Mateo	2	10	1	3	6	18	5	12	2	6
Santa Barbara	0	2	1	4	3	9	2	6	4	10
Santa Clara	1	8	9	10	20	45	2	14	6	17
Santa Cruz	0	1	0	4	5	6	0	6	0	4
Shasta	0	0	0	0	3	10	0	1	0	5
Sierra	0	0	0	0	0	0	0	0	0	0
Siskiyou	0	0	0	0	2	5	0	0	0	0
Solano	0	1	0	7	3	14	2	10	2	6
Sonoma	0	0	0	1	7	19	1	2	5	4
Stanislaus	2	6	1	3	13	31	2	2	1	2
Sutter	0	0	0	1	1	3	0	0	0	0
Tehama	0	0	1	2	0	2	0	0	0	1
Trinity	0	0	0	0	0	0	1	0	0	0
Tulare	1	1	1	2	5	25	0	2	0	3
Tuolumne	0	0	0	0	1	1	0	0	0	0
Ventura	4	7	3	6	3	11	1	9	3	7
Yolo	0	1	0	3	1	10	0	1	0	4
Yuba	0	0	0	0	0	0	0	0	0	1

* 2011–2012: October 2, 2011–September 29, 2012; 2012–2013: September 30, 2012–September 28, 2013;
2013–2014: September 29, 2013–September 27, 2014; 2014-2015: September 28, 2014-October 3, 2015; 2015-2016: October 4, 2015-October 2, 2016

[†] Does not include city counts

Source:Https://archive.cdph.ca.gov/HealthInfo/discond/Documents/CA%20Year%20End%20Flu%20Summary_2015-2016_final.pdf

5.3.3 Wildland Fire

Severity: 3

Probability: 4

Risk Score: 2.25

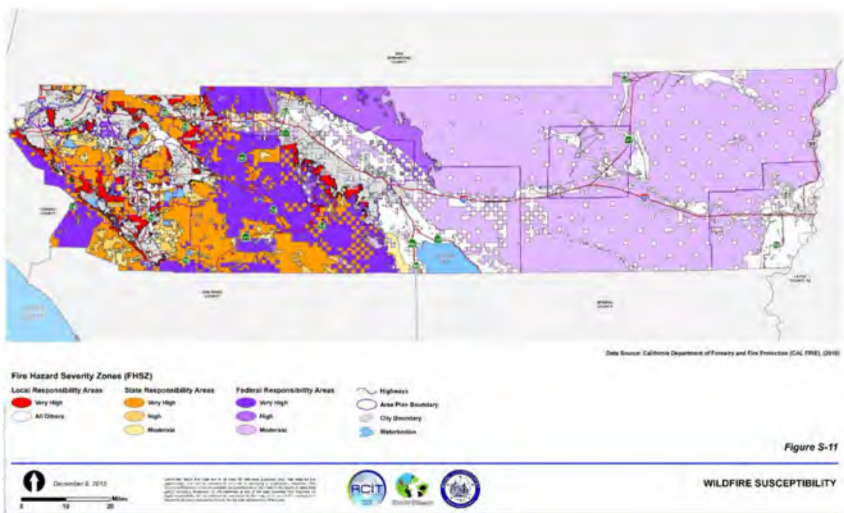
OA Jurisdictions Affected by Wildfire

- Fern Valley Water District
- Idyllwild Fire Protection District
- Idyllwild Water District
- Menifee Union School District
- Temecula Valley Unified School District
- Riverside County Office of Education
- Riverside Unified School District
- San Jacinto Unified School District

Cities in which CAL FIRE has made recommendations on Very High Fire Hazard Severity Zones (VHFHSZ) in Riverside County (22 cities)

- Banning
- Beaumont
- Calimesa
- Canyon Lake
- Cathedral City
- Corona
- Desert Hot Springs
- Hemet
- Jurupa Valley
- Lake Elsinore
- Menifee
- Moreno Valley
- Murrieta
- Norco
- Palm Desert
- Palm Springs
- Perris
- Rancho Mirage
- Riverside
- San Jacinto
- Temecula
- Wildomar

Map 8: Riverside County Wildland Fire Threat



Hazard Definition

A wildfire is an uncontrolled fire spreading through vegetative fuels, posing danger and destruction to property. Wildfires can occur in undeveloped areas and spread to urban areas.

Public Resources Code §4114 and §4130 authorize the State Board of Forestry and Fire Protection (Board) to establish a fire plan which, among other things, establishes the levels of statewide fire protection services for State Responsibility Area (SRA) lands. These levels of service recognize other fire protection resources at the federal and local level that collectively provide a regional and statewide emergency response capability. In addition, California's integrated mutual aid fire protection system provides fire protection services through automatic and mutual aid agreements for fire incidents across all ownerships where structures and other human development are more concentrated.

The California Fire Plan is the state's road map for reducing the risk of wildfire. The Fire Plan is a cooperative effort between the State Board of Forestry and Fire Protection and the California Department of Forestry and Fire Protection. By placing the emphasis on what needs to be done long before a fire starts, the Fire Plan looks to reduce firefighting costs and property losses, increase firefighter safety, and to contribute to ecosystem health.

State Responsibility Areas (SRAs)

State Responsibility Areas (SRAs) are those lands within California that meet specific geographic and environmental criteria. These are areas where CAL FIRE has legal and financial responsibility for wildland fire protection and where CAL FIRE administers fire hazard classifications and building standard regulations. SRAs are defined as lands that 1) are county unincorporated areas, 2) are not federally owned, 3) have wildland vegetation cover rather than agricultural or ornamental plants, 4) have watershed and/or range/forage value, and 5) have housing densities not exceeding three units per acre.60 Similar to the Federal Responsibility Areas (FRAs), where SRAs contain built environment or development, the responsibility for fire protection of those improvements (non-wildland) is that of a local government agency.

Local Responsibility Areas (LRAs)

Local Responsibility Areas (LRAs) include land within incorporated cities, cultivated agriculture lands and non-flammable areas in unincorporated areas and those lands that do not meet the criteria for SRA or FRA. LRA fire protection is typically provided by city fire departments, fire protection districts, and counties, and by CAL FIRE under contract to local governments. LRAs may include flammable vegetation and Wildland-Urban Interface (WUI) areas where the financial and jurisdictional responsibility for improvement and wildland fire protection is that of a local government agency.

Homes in Wildland-Urban Interface (WUI) Areas

Wildfire poses a significant risk to the people of California and their homes, as evidenced by an increasing trend in structural losses from wildland fires. The risk is predominantly associated with wildland-urban interface (WUI) areas. WUI is a general term that applies to development interspersed within or adjacent to landscapes that support wildland fire.

Housing Unit Density Classes:

Class Description

- Rural/Outlying: From one housing unit per five acres to one housing unit per twenty acres.
- Urban: Dwelling unit density of 2 to 8 units per acre.
- Wildland Urban Interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.
- Wildland Intermix Interface is a condition where homes and other structures are scattered throughout a wildland area.

Managing the human/wildfire conflict requires a commitment of resources and a focused mitigation plan over the long term. The approach must be system-wide and include the following:

- An informed, educated public that takes responsibility for its own decisions relating to wildfire protection
- An effective wildfire suppression program
- An aggressive hazardous fuels management program

- Land use policies and standards that protect life, property, and natural resources
- Building and fire codes that reduce structural ignitions from windblown embers and flame contact from WUI fires and impede or halt fire spread within the structure once ignited
- Construction and property standards that provide defensible space

While some wildfires start by natural causes, humans cause four out of every five wildfires. Wildfires started by humans are usually the result of debris burns, arson, or carelessness. As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on state and national forest lands. The predominate dangers from wildfires are:

1. Injury or loss of life to people living in the affected area or using the area for recreational facilities.
2. Injury or loss of life to first responders.
3. The destruction of timber, property, wildlife

History

There is a long history of wildfires in Riverside County. The table below represents Wildland Fires of 100 acres or greater from 2001 to 2017. The source of the information is the California Department of Forestry and Fire Protection.

Table 20: Riverside County Large Fires 300 Acres and Greater (2001-2017)

Wildland Incidents within Riverside to include Local and State Incidents.

YEAR	NUMBER OF LARGE FIRES
2017	6 (as of July 2017)
2016	3
2015	5
2014	1
2013	5
2012	7
2011	1
2010	4
2009	3
2008	3
2007	6
2006	12
2005	7
2004	6
2003	9
2002	5
2001	5

Source: http://cdfdata.fire.ca.gov/incidents/incidents_search_results?search=riverside

Interestingly, the preceding Riverside County Wildland Fire Threat map points out the distinct bi-lateral character of Riverside County. The western end of the County is more

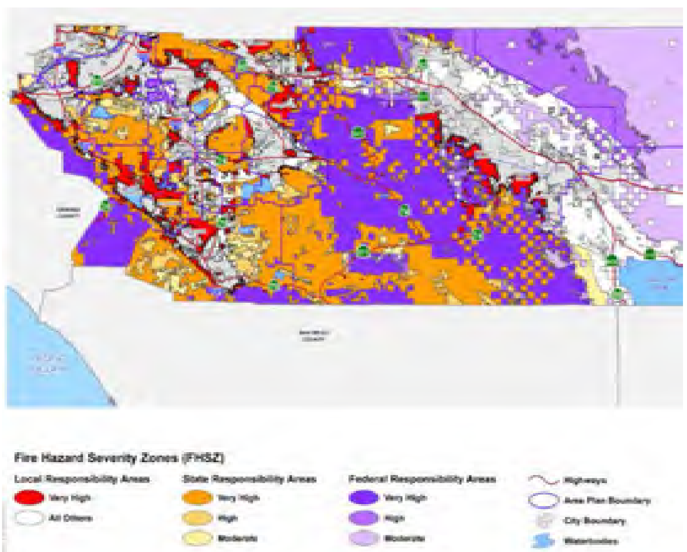
urban, densely populated, and covered with vegetation that is susceptible to wildfires. The eastern end of the County is primarily desert, with far less population and far less vegetation than the western end of the County.

The categories are:

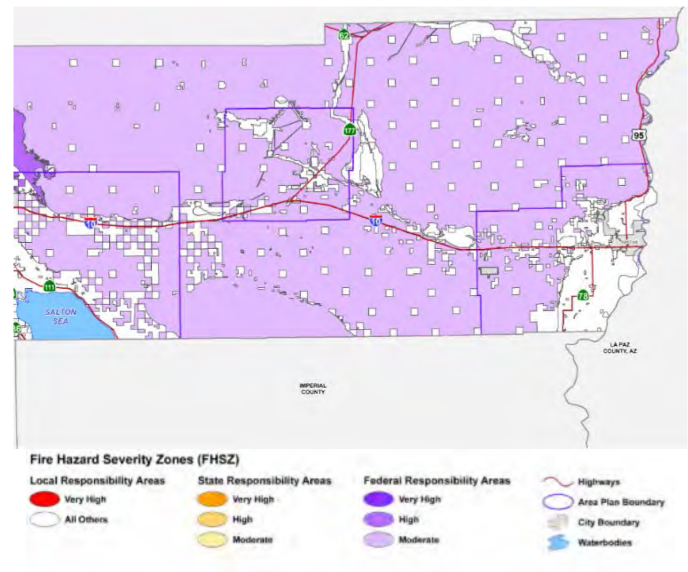
- Little or No Threat
- Moderate
- High
- Very High
- Extreme

The following two maps are maps of Fire Hazard Severity Zones. They show the wildfire susceptibility Risks and the local responsibility area, and the state or federal responsibility areas.

Map 9: Western Riverside County Wildfire Susceptibility Risks Map



Map 10: Eastern Riverside County Wildfire Susceptibility Risks Map



Risk Assessment

Fire is a continuous threat in Southern California, particularly in Riverside County. The major areas of concern are the wildland and urban interfaces. Hundreds of homes now border major forests and brush areas. With thousands of people living near and visiting wildland areas, the probability of human-caused fires is growing. Although occurring with less frequency, the threat of fire from lightning strikes also exists. The Idyllwild area, San Jacinto Mountains is heavily forested and high hazard area.

Generally, the dry seasons are a major time for an increase in the number of forest fires and structure fires. The standard "shake roof" is a particular hazard, as is the poor control of flammable growth around structures. During times of the strong "Santa Ana" winds, fire danger is particularly high.

The increase of industrial complexes, transportation networks, and utility networks pose a threat that is not seasonal, but rather year-round. Associated with industry and transportation networks is the ever present problem of hazardous materials. Although not necessarily a wildland threat, a fire occurring in an urban area involving hazardous materials could have serious consequences.

Due to the undeveloped and rugged terrain in parts of Riverside County, highly flammable brush- covered land, and long, dry summers, many portions of the County have experienced numerous wildland fires in the recent past.

- **Effects on people and structures.** The effects on people and housing can be significant. Many fires shown in the table above resulted in the evacuation of homes. Wildfires have the potential to destroy residential and commercial buildings, as well as critical infrastructure.

- **Effects on infrastructure.** Due to destroyed powerlines, wildfires often result in power outages. These outages can be extensive in geographic area and numbers of persons affected.

- **Effects on Critical Facilities.** There are approximately 15 fire stations that are in potential direct risk from wildland fires. There are additional critical locations within the Idyllwild area that are at a high danger risk from wildland fires. In many cases (i.e. fire stations and schools) these facilities cannot be relocated into a safer area.

- **Effects on agriculture.** Effects on agriculture can be devastating. In addition to the obvious impacts on animals and crops, wildfire can have deleterious effects on soil and water that will affect agriculture for an extended period of time.

Relationship to Other Hazards – Cascading Effects

Major wildfires can completely destroy ground cover causing flooding and erosion. If heavy rains follow a major fire, flash floods, heavy erosion, landslides and mudflows can occur. These cascading effects can have ruinous impacts on people, structures, infrastructure, and agriculture.

Risk Assessment Conclusion.

The western end of Riverside County is far more susceptible to wildfire than the eastern end of the County. The effects can be far-reaching in terms of the number of acres involved, the toll on human life, and the economic consequences. Wildfire will continue to be a high-risk hazard for Riverside County.

5.3.4 Electrical Failure – Power Outage

Severity: 4

Probability: 4

Risk Score: 2.00

OA Jurisdictions Affected by Power Outage Incidents

- Cathedral City
- City of La Quinta
- City of Palm Springs
- Desert Water Agency
- Imperial Irrigation District
- Western Municipal Water District

Hazard Definition

Identifying Energy Shortage Hazards

California continues to experience both population growth and weather cycles that contribute to a heavy demand for power. Climate change may also increase California's vulnerability to energy shortage hazards. Predicted increases in heat waves, as well as increasingly severe winter storms, will put ever greater strain on California's electricity system.

Hydro-generation provides approximately 20 percent of California's electric power, with the balance coming from fossil fuels, nuclear, and renewable sources. Rotating outages and/or blackouts such as those experienced in 2000 and 2001 can occur due to losses in transmission or generation and/or extremely severe temperatures that lead to heavy electric power consumption.

The electric power industry does not have a universal agreement for classifying disruptions.

Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. Electric power disruptions can be generally grouped into two categories: intentional and unintentional.

There are four types of intentional disruptions:

1. Planned (Maintenance): Some disruptions are intentional and can be scheduled. For example, a disruption may be necessary when components of the power system are taken out of service for maintenance or upgrading. Scheduled intentional disruptions can last from several minutes to several hours, and customers are usually notified in advance.
2. Unscheduled (Repair): Some intentional disruptions must be done "on the spot." As a result, advance notice cannot be provided. For example, a fire department or a police department may request a disruption in service during a fire or an accident.
3. Demand-Side Management: Some customers (i.e., on the demand side) have entered into an agreement with their utility provider to curtail their demand for electricity during periods of peak system loads. In return for agreeing to these disruptions, these customers receive a lower electric rate and/or a rebate.
4. Load Shedding (Rotating): When the power system is under extreme stress due to heavy demand and/or failure of critical components, it is sometimes necessary to intentionally interrupt the service to selected customers to prevent the entire system from collapsing. In such cases, customer service (or load) is cut, sometimes with little or no warning. One form of load shedding called a "rotating blackout" involves cutting service to selected customers for a predetermined period (usually not more than two hours). As power is restored to one block of customers, the power to another block of customers is interrupted to reduce the overall load on the system.

Unintentional or unplanned disruptions are outages that come with essentially no advance notice. This type of disruption is the most problematic. The following are categories of unplanned disruptions:

- Accident by the utility, utility contractor, or others.
- Malfunction or equipment failure due, for example, to age, improper operation, excessive operation, or manufacturing defect; special subcategories cover broken fuse links and underground cable, joint, or termination failures.
- Equipment overload (utility company or customer).

- Reduced capability (equipment that cannot operate within its design criteria).
- Tree contact other than from storms.
- Vandalism or intentional damage.
- Weather, including ice/snow, lightning, wind, earthquake, flood, and broken tree limbs taking down power lines.
- A wildfire that damages transmission lines.

Table 21: Riverside County Power Outages (1993-2017)

Location	Date	Incident Description
Riverside County	10/28/1993	Variety of fires. 129 structures destroyed. Power outages. 6 injuries.
Greater Jurupa Area	1/6/1996	Property damage, power disruption, road damage.
Beaumont	2/17/1999	60mph winds damaged roofs, downed trees and power lines, and created a dense dust storm. A plume of dust penetrated homes and covered all surfaces and filled closets and cupboards. Yards had 3" to 6" of silt. 1128 homes damaged. 27 vehicles.
Hector Mine Earthquake	10/16/1999	Minor damage to buildings, power interruption, communication interruption, gas line break causing a leak.
Blythe	8/23/2000	Power outage from storms. Provided shelter for 24 people.
Desert Cities	8/27/2000	Thunderstorm and wildfires caused power interruption. 2,800 customers without power.
Eastern Coachella Valley	7/3/2001	Power failure. Several thousand people affected.
Riverside County	2/9/2002	High wind. Damage throughout the County. Roof damage, structure fires, wildfires started but were contained before 15 acre point. Power outages from the wind.
Moreno Valley	7/22/2002	51 home blackout. Transformer fire. Illegal dumping of used motor oil into the transformer vault.
Mira Loma, Jurupa, Rubidoux, Pedley, Sky Country	1/6/2003	High wind caused road closures, downed trees and power lines. Semi-truck overturns. Power outages affecting 10,000. Fire.
Riverside County	1/14/2003	Power lines down with 936,569 people affected, trees felled, homes damaged, fire triggered from downed lines,

Elsinore, Hemet, Moreno Valley, Perris, San Jacinto and Temecula in the southeastern area of Riverside County	4/23/2009	Substation load interruption led to loss of power to 280.000 residents
Riverside County, Orange County, parts of Arizona and Mexico	9/8/2011	Cascading outages led to approximately 2.7 million customers without power due to an 11-minute system disturbance. Power loss lasted as long as 12 hours for some affected. Riverside County's Imperial Irrigation District was directly affected.
Thousand Palms, Indio and Desert Hot Springs	4/30/2014	A cut fiber ring led to communication failure for 261 residents. Power outages for 10,500 residents due to windy conditions.
Riverside	3/11/2016	Micro-burst caused down powerlines and power outages, 3,000 people affected.
Riverside	4/29/2016	Power outage led to 20,020 SoCal Edison customers affected.
Moreno Valley	2/10/2017	8,137 residents lost power due to substation malfunction
Riverside University Health System	5/11/2017	Scheduled maintenance required the hospital to switch to partial generator power for 16 hours.
Desert Reginal Hospital	5/17/2017	Experience power outage and ran off generators for
Riverside	10/26/2017	Load shedding caused loss of power to 104,000 residents

Risk Assessment

The possibility of catastrophic damage to property or loss of life due directly to power failure is slight. An individual could lose their life if they come into contact with a downed power line. Although the risk of a power outage is high, the direct damage potential is low.

Power outages or interrupted service often occur during electrical storms and high winds. Wildfires also cause power outages in Riverside County. There is a very real possibility of a widespread blackout due to the earthquake.

- **Effects on people and housing**. Impacts due directly to power failure are slight. If the persons require electric powered medical equipment, they will be at greater risk. In the areas of the county that can be impacted by high temperatures, or very cold temperatures, a power outage can have an on the heating or cooling abilities.
- **Effects on commercial and industrial structures**. Impacts due directly to power failure are slight. If the outage lasts many days, the impact would be of a greater severity.
- **Effects on infrastructure.** Impacts to the ability of infrastructure in the area of failure to support emergency response may be significant, although not permanent.
- **Effect on Critical Facilities.** Most critical facilities are required to have a back- up generator, but there is no official list of "all" critical having and maintain working back- up generators. Depending on the facility, the power outage can have strong effects on parts of the population that need medical devices, also for cooling and heating purposes.
- **Effects on agriculture.** Impacts due directly to power failure are slight.

Relationship to Other Hazards – Cascading Effects

As noted, other hazards such as an earthquake, wildfire, electrical storms, and high winds may be causes of blackouts.

Risk Assessment Conclusion

The County needs to be prepared to restore power should there be a failure due to downed lines caused by another hazardous condition or any other reason.

5.3.5 Emergent Disease/Contamination

Severity: 3

Probability: 3

Risk Score: 1.69

OA Jurisdictions Affected by Emergent Disease/Contamination

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

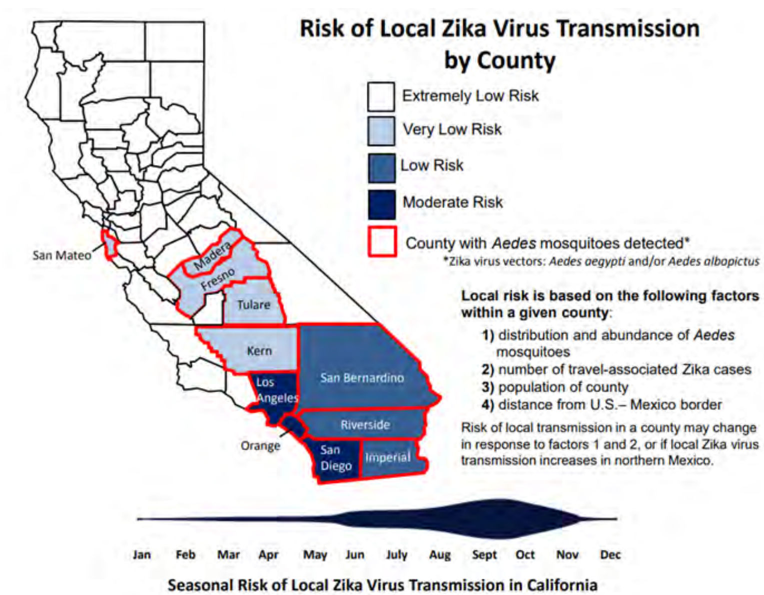
According to the Center for Disease Control, the term "emerging infectious diseases" refers to diseases of infectious origin whose incidence in humans has either increased within the past two decades or threatens to increase in the near future. Emergent diseases are new, new to the area, reappearing in the area after being fairly dormant, or a strain has become resistant to antibiotics. These illnesses are caused by bacteria, viruses or fungi that have entered into the body and began to multiply. Infectious diseases can be spread throughout the County population in a number of different ways:

- Vector (Bug bites)
- Person to person
- Contaminated food water or soil

Zika

Zika is a virus that is predominantly transmitted through the vector. Female Aedes ageypti are more dangerous than males. This is due to the fact that females have blood meals and males do not. They also spread the infection through laying eggs in standing water. Riverside County has detected Aedes ageypti, however, the ones that have been tested do not carry the virus. The reported cases in Riverside County have all been travel related illnesses. The threat of transmission is still present due to the potential sexual transmission of the virus.

Figure 33: Zika Risk Map by County



Source:https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/LocalZikaRiskMap.pdf

Ebola

Ebola is dominant in African countries, though with the ease of travel it has the potential to make its way to California. It is transmitted through blood, bodily fluids, direct contact with broken skin, contaminated needles and infected primates. When infected it can be fatal. Ebola can spread rapidly within Health Care Facilities when staff are not properly trained of not wearing adequate personal protective gear.

Risk Assessment

- **Effects on people and housing.** The risk to people can be severe, leading to hospitalization and possibly loss of life. Damages to housing as a result of Pandemic Flu are not likely.
- **Effects on commercial and industrial structures.** The risks are minimal to structures.
- **Effects on infrastructure.** The risks are minimal, but if there is an emergent outbreak the risk to people will lessen the numbers of workers that can go to their regular employment, which can strain the maintaining the infrastructure. Continuity of Business and of Government may become an issue. Outbreaks also but a strain on schools, hospitals, doctor offices and businesses.
- **Effects on agriculture:** Agriculture can be devastatingly affected by emergency diseases. There are a number of vector borne illnesses that can affect livestock such as Lyme disease, Salmonella and rabies. Plant pests or viruses can cause huge losses in crops that can threaten food safety and farmer livelihood stability.

History of Events

2015/17 – Zika was confirmed in Riverside County in 2015 with 14 infections. In 2017, there were 2 confirmed cases. All cases were travel related. Report accuracy reflects confirmed cases. Due to the symptoms mirroring a cold, the number could be higher but the mortality rate for this disease is very low. Its greatest impact is on a pregnant woman. 153 cases were reported within the state of California as of August 2016. Sexual transmission is a possibility with this virus. Transmitting mosquitos, Aedes ageypti, are present within the County.

2014/16 – Riverside County was alerted of the 2014 West Africa Ebola Outbreak in West African countries. Worldwide, a total of 1,975 cases where confirmed and 1,069 deaths were reported in August 2014. In 2016 the numbers had grown to 15,261 confirmed cases and 11,325 fatalities, It was the largest outbreak in history. Infection Control Measures were released from the Riverside Department of Public Health to first responders and EMS professionals. Though Riverside did not experience an outbreak or confirm a case, they were on high alert of the potential spread of the disease.

2015 – West Nile was contracted by 737 people within the county and there were 45 reported deaths.

2013 – Large scale Tuberculosis testing. 2 cases were confirmed and 72 were treated for latent TB infections.

2004 – Botulism Type A was detected in four inmates with in Riverside County.

2003 – West Nile Virus was detected in birds in the City of Riverside and the Coachella Valley. There was one reported human case within the County. Imperial and Los Angeles Counties also reported human cases.

Relationship to Other Hazards – Cascading Effects

This hazard has the potential to impact EMS first responders and Health Care Facilities. In the event that the timing of an outbreak coincided with another hazard, the healthcare impact could be extensive.

Risk Assessment Conclusion

Public Health Departments for the County, State, nation and the world constantly monitor all emerging diseases. This gives medical personnel the necessary time to prepare or mitigate possible effects of an emerging disease.

As a result of the Ebola and Zika outbreaks, Riverside County EMS Agency released Policy 3307, Emerging Viruses. Its purpose is to specify procedures to be followed when highly pathogenic emerging viruses are suspected during emergency call taking and response, or confirmed prior to interfaculty transport.

5.3.6 Cyber Attack

Severity: 2

Probability: 4

Risk Score: 1.50

OA Jurisdictions Affected by Cyber Attack

- All incorporated cities of Riverside County

Hazard Definition

Cyber-terrorism is the use of computer network tools to shut down critical government infrastructures such as energy, transportation, and government operations, or to coerce or intimidate a government or civilian population. The premise of cyber terrorism is that as nations and critical infrastructure became more dependent on computer networks for their operation, new vulnerabilities are created. A hostile nation or group could exploit these vulnerabilities to penetrate a poorly secured computer network and disrupt or even shut down critical public or business operations.

The goal of cyber terrorism is believed to be aimed at hurting the economy of a region or country, and to amplify the effects of a traditional physical terrorist attack by causing additional confusion and panic.

Cyber-terrorism. Recent incidents illustrate the County's vulnerability to cyber- terrorism.

- **Effects on people and housing**. If a Cyber-attack were to happen at a Healthcare Facility the effects could be detrimental to patients. Sensitive Security Information could be obtained and the hackers could release patient files, payment information and other personal data that could harm individuals and employees.
- **Effects on commercial and industrial structures**. Depending on levels of contamination and exposure, effects could range from minimal to devastating.
- **Effects on infrastructure**. Cyber-terrorism can have profound effects on infrastructure. If an attack were to happen in a critical facility it could potentially make it inoperable.
- **Effects on agriculture.** Depending on levels of contamination and exposure, effects could range from minimal to devastating.

History of Events

In 2016 the County of Riverside Emergency Management Department was targeted for a ransomware attack that resulted in a disruption of work. It also affected the DOC shared drive, which could have hindered response to a disaster.

Relationship to Other Hazards – Cascading Effects

Cyber-attacks have the ability to shut down entire facilities. If an attack were to happen during a disaster it could greatly affect the response of first responders and EOC personnel.

Risk Assessment Conclusion

Cyber-attacks happen within the County on a daily basis. The Riverside County Information Technology Department (RCIT) has multiple prevention systems in place that protect County servers and network systems. RCIT monitors County systems 24 hours a day and has the Albert Sensor that will report to the Center for Internet Security (CIS), Multi-State Information Sharing and Analysis Center (MS-ISAC) all Domain Name System (DNS) and NetFlow traffic for correlation with the Department of Homeland Security's threat intelligence database for real-time alerting of malicious network connections to blacklisted IP address on the Internet. Another implemented system is the Enterprise Breach Detection System that inspects all internal/lateral county network traffic for indicators of compromise (IOCs) enabling the ISO to rapidly detect, respond to, contain, and prevent cyber-attacks, malware outbreaks, network reconnaissance, data exfiltration, and C2 (command & control) and botnet activities.

RCIT is also in the process of implementing more programs for the safety of the County's networks. Due to the level of security, the threat of a Cyber-attack is fairly low, but the potential damages could be very damaging.

5.3.7 Terrorist Event

Severity: 3

Probability: 1

Risk Score: 1.13

OA Jurisdictions Affected by Terrorism

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

Terrorism is the use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives. Terrorist acts or and acts of war may cause casualties, extensive property damage, fires, flooding, and other ensuing hazards.

Terrorism takes many forms, including:

- Chemical
- Biological
- Radiological
- Nuclear
- Explosive
- Cyber-terrorism
- Active shooters
- Vehicle Ramming

Chemical: Chemical weapons have been used primarily to terrorize an unprotected civilian population and not as a weapon of war. This is because of fear of retaliation and the likelihood that the agent would contaminate the battlefield for a long period of time.

Some analysts suggest that the possibility of a chemical attack would appear far more likely than either the use of nuclear or biological materials, largely due to the easy availability of many of the necessary precursor substances needed to construct chemical weapons. Additionally, the rudimentary technical knowledge needed to build a working chemical device is taught in every college level chemistry course in the world.

Some chemical agents are odorless and tasteless and are difficult to detect. They can have an immediate effect (a few seconds to a few minutes) or a delayed effect (several hours to several days).

Biological: Biological weapons are defined as any infectious agent such as a bacteria or virus used to produce illness or death in people, animals, or plants. This definition is often expanded to include biologically-derived toxins and poisons. Biological agents can be dispersed as aerosols or airborne particles. Terrorists may use biological agents to contaminate food or water because the agents are extremely difficult to detect.

Radiological: A radioactive material is a material made up of unstable atoms which give off excess energy in the form of radiation through the process of radioactive decay.

Radiation cannot be detected by human senses. Wherever radioactive materials are used, transported, or stored there is a potential for a radiological accident to occur. Some of their most common uses include:

- By doctors to detect and treat serious diseases.
- By educational institutions and companies for research.
- By the military to power large ships and submarines.
- By companies in the manufacture of products.
- As a critical base material to help produce the commercial electrical power that is generated by a nuclear power plant.
- As one of the critical components in nuclear weapons, which are relied upon to help deter the threat of war.

Nuclear: The possibility exists that a terrorist organization might acquire the capability of creating a small nuclear detonation. A single nuclear detonation in the United States would likely produce fallout affecting an area many times greater than that of the blast itself. There is also the possibility that a terrorist will construct a “dirty bomb”, a bomb that is used to distribute nuclear-contaminated materials. It would have less of an effect than a “traditional” nuclear bomb, but the terror effect on the population would be great.

Explosive: The possibility exists that a terrorist may attack with conventional explosives, particular in a public setting. Innumerable incidents have occurred around the world involving car bombs, truck bombs, and bombs attached directly to terrorist individuals.

Cyber Terrorism: Please see Section 5.3.6

Active shooters: Active shooter events in the nation have increased dramatically over the last 17 years. According to the report "a Study of Active Shooter Incidents in the United States Between 2000 and 2013" produced by the Department of Justice, it states that there have been 160 Active Shooter incidents from 2000-2013. Furthermore, in the updated version of that report for 2014-2015, it states that there has been an additional 40 Active Shooter incidents spanning 26 states. These attacks have led to 92 casualties and 139 wounded.

Vehicle Ramming: The use of vehicle ramming has steadily increased and it is likely that this tactic will continue to rise. This attack style required little specialized training or skill and poses little risk to the assailant. It is seen as an effective style due to its minimal detection when acquiring the weapon and overall flexibility when planning target location and targets. Known terrorist organizations encourage ramming and have even released tips on maximizing casualties.

History

Fortunately, Riverside County has little history of incidents of terrorism. However, threats and incidents have been on the rise over the last 17 years.

Riverside County has also been impacted by terrorist acts in surrounding counties. On December 2nd, 2015 a disgruntled employee shot and killed many former coworkers in San Bernardino County. The "Waterman Incident" affected Riverside County in the following ways:

- Activation of the Riverside County Medical Health Operational Area Coordinator (MHOAC) for outreach to Riverside Environmental Health and Riverside Behavioral Health representatives.
- The MHOAC completed a comprehensive list of available Riverside resources (to include name, contact info, and wrap around service requirements).
- The MHOAC provided the resource list to the Regional Disaster Medical Health Specialist (RDMHS).
- Riverside Environmental Health sent 63 employees and Behavioral Health sent 89 employees to San Bernardino County to support the initial response and re-establishment of the San Bernardino County Environmental Health Division from December 2015 through June 2016.

Risk Assessment

Chemical. A terrorist would not have to build a complicated chemical release device. During favorable weather conditions, an already existing chemical plant could be sabotaged or bombed releasing a toxic cloud to drift into a populated area. The result could be just as dangerous as having placed a smaller chemical device in a more confined space. This type of incident would cause the maximum amount of fear, trepidation, and potential panic among the civilian population, and thus achieve a major terrorist objective.

Biological. The agents are cheap, easy to make, and simple to conceal. Even small amounts, if effectively deployed, could cause massive injuries and overwhelm emergency rooms. The production of biological weapons can be carried out virtually anywhere — in simple laboratories, on a farm, or even in a home.

However, experts say it remains very difficult to transform a deadly virus or bacterium into a weapon that can be effectively dispersed. A bomb carrying a biological agent would likely destroy the germ as it explodes. Dispersing the agents with aerosols is challenging because biomaterials are often wet and can clog sprayers. Most agree that, while a biological attack could be devastating in theory, in reality, the logistical challenges of developing effective agents and then dispersing them makes it less likely a terrorist could carry out a successful widespread assault.

Radiological/Nuclear. Under extreme circumstances an accident or intentional explosion involving radiological materials can cause very serious problems. Consequences may include death, severe health risks to the public, damage to the environment, and an extraordinary loss of, or damage to, property.

Explosive. While generally more limited in the extent of the damage inflicted, explosive terrorist attacks may have consequences including death and damage to property. Targets would include county fairs, music festivals, critical facilities and sporting events.

Active shooters: The increase of violent crimes throughout the nation has increased awareness within Riverside County. The possibility of an attack has increased. Though the threat to infrastructure is fairly limited this hazard could result in loss of life, injury and economic disruption. Targets could include public events, government facilities, schools and shopping centers.

Vehicle Ramming: This terrorist tactic has been increasing over the last five years. Riverside County has a very low history of this event but moderate probabilities of it happening again. This tactic is very hard to detect and mitigation is extremely difficult to carry out. Riverside County Sheriff's Department has increased their awareness of this terrorist style in an attempt to foil any attempted ramming incident.

Extremists, especially in European countries have moved towards filling the vehicles with explosives to increase the number of fatalities in an attack. Though this approach has not yet made it to Riverside County, the potential threat has increased.

Relationship to Other Hazards – Cascading Effects

Terrorism has the potential to cause a cascading event. After a terrorist incident people may display signs of civil disorder driven by fear.

Risk Assessment Conclusion.

The western end of Riverside County is far more susceptible to terrorism than the eastern end of the County. The effects can be far-reaching in terms of the number of buildings involved, the toll on human life, and the economic consequences.

5.3.8 Communications Failure

Severity: 3

Probability: 2

Risk Score: 1.13

OA Jurisdictions Affected by Network Communications Failure

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

CoRNet

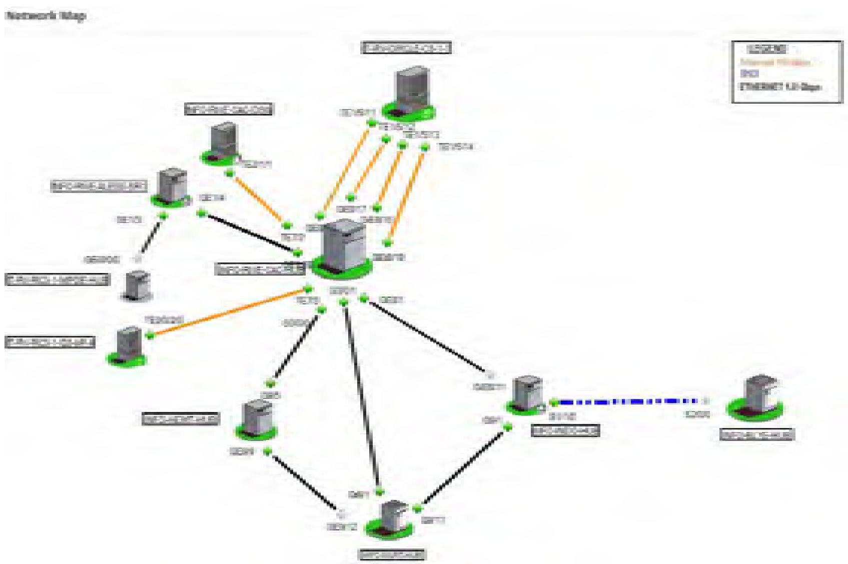
The County of Riverside Network (CoRNet) provides Voice and Data communication for most County departments and facilities. CoRNet is a distributed design consisting of Regional Hub locations to which sites in each region have their point to point circuits connected. Each of these Hub locations is then connected to its adjacent Hub locations via high bandwidth circuits.

Voice Services are controlled from the County Administration Center Hub with redundancy provided by the Indio Hub location. Application Services and Internet Services for the County are delivered via the County Administration Center Hub location and soon from the RC3 Data Center.

With the completion of the Converged Network Project in 2016, CoRNet now provides both Voice and Data over the same network infrastructure. The same network connection that provided a data connection for the customers hardwired PC's now provides the connectivity for all phone communications and wireless devices.

A loss of Network connectivity now impacts both Voice and Data and wireless (Wi-Fi) communications. In the event of a Communication Failure, the entire County would be affected.

There are multiple hazards that could result in a "Network" failure such as Earthquake, Power Outage and other Natural Disasters.



Indio Hub Failure

- Sites impacted
  - o All CoRNet connected Desert locations
- Services impacted
  - o All Voice, Data and Wifi services for this region.

Murrieta (SWJC) Hub Failure

- Sites impacted
  - o All CoRNet connected South County locations
- Services impacted
  - o All Voice, Data and Wifi services for this region.

Hemet Hub Failure

- Sites impacted
  - o All CoRNet connected Hemet area County locations
- Services impacted

  - o All Voice, Data and Wifi services for this region.

Riverside Hub Failure

- Sites impacted
  - o All Central Riverside locations (Voice, Data and Wifi)
  - o All County Hubs will lose all application and Internet based services
  - o All State and Vendor provided application services.
- Services impacted
  - o All Voice communications for Central Riverside locations.
  - o All other Hubs would fail over to the Indio Hub for Voice.
  - o All County Hubs will lose all application, Internet and Wifi based services.

PSEC

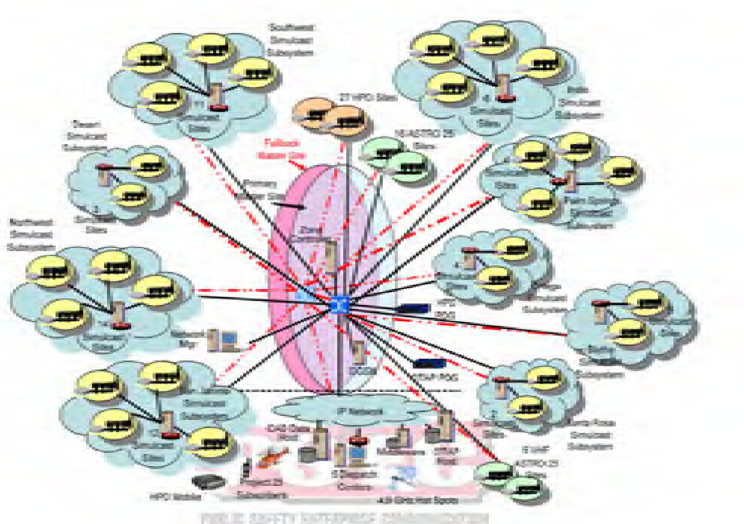
The Riverside County Information Technology/Public Safety Enterprise Communications (RCIT/PSEC) Division provides public safety communications for all participating City and County law enforcement, fire service, public works, and allied agencies in Riverside County. In January of 2014, RCIT/PSEC replaced an aging countywide Enhanced Digital Access Communications System (EDACS) system with a Motorola 7.x APCO P25 Phase 2 high availability and Dynamic System Resilience voice radio system and a High-Performance Data system with a mobile VPN client for multiple network access. PSEC provides and manages all aspects of Public Safety Radio Services and mobile data for participating agencies which include almost all County agencies and the city police departments of Banning, Murrieta, Riverside, and Corona.

Thirty plus full-time staff provide 24/7/365 Public Safety Communications for over 6,800 voice and data mobile users who operate over a 7,303 square mile area. The PSEC radio system provides all levels of government communications for the 2,189,641* residents of Riverside County including first responder dispatch for Law Enforcement 9-1-1 Dispatch Centers. The staff maintains:

- 76 radio and microwave remote sites
- 75 PSEC radio Voice and Data transmitter Sites
- 1 – Primary Motorola (M)- Core Site
- 1 Motorola (M) Core Dynamic System Resilience (DSR) Site
- 86 licensed Microwave Hops
- Approximately 5500 Voice Users
- Approximately 1300 Mobile and Tablet Data Users
- 8 Dispatch Centers

The PSEC Division of RCIT processed 24,421,574.0 Public Safety Transmissions for FY16/17

Figure 34: PSEC System Architecture



System Redundancy

A significant and material attribute of the System is how it performs during various failure conditions. The PSEC ASTRO 25 Radio System is designed with multiple levels of redundancy and the ability to provide continued communications should failures occur. Because the System can be a lifeline to County users and citizens, there is no tolerance for System failure. The System can withstand multiple failures and still provide full-featured trunked communications.

At each remote site, dispatch location and Master site, components that have the potential to interrupt communications have been backed up with redundant components. The system is designed such that multiple component failures must occur before users will notice a degradation in performance (other than a brief period during the switch over to a redundant component).

Master Sites

There are two Master sites. In the event of a catastrophic failure of the one Master site, the second Master site will take over operation of the entire system. In the event of a loss of microwave communications links between the east side and the west side of the county, one Master site can take over system operations in the east county, while the second will continue to control the west county. In this scenario, dispatchers at either location of the Master sites would not be able to reach units operating on the east side of the county, nor the west.

History of Events

CoRNet

Riverside County has not experienced a large scale Communication Failure with CoRNet.

PSEC

In early 2017 the PSEC radio system had a technical issue that led to the temporary disruption of 911 services in the Indio/Palm Springs area.

Risk Assessment Conclusion

CoRNet

As RCIT continues working toward redundancy in many areas (Data Center, MPLS, Redundant Internet Connections etc.), it is important to understand the scope of an outage depending on where it occurs on CoRNet under the current design.

While a single Hub failure would only impact the locations serviced through that Hub. Other hub locations would not be affected. A failure of the Riverside Hub would have a widespread impact. A failure at the Riverside Hub would result in the loss of all Application, Internet and Wi-Fi services for the entire county.

PSEC

The RCIT/PSEC Division has developed hardened sites to maintain Public Safety two-way communications to support first responders during natural disasters and civil disturbance. All of the microwave and core sites are hardened with towers that are rated to either 85 or 120 mph wind, Seismic Zone 4, and are maintained by professionals dedicated to Public Safety Communications.

The PSEC system is highly redundant with several layers of fault tolerance. There are multiple routing paths for routers, switches, trunked repeaters, overlapping coverage and core roaming services. Although individual sites may be affected by a major earthquake or another disaster, the PSEC system has been designed to offer a high level of operability overall.

Restoration of downed infrastructure could take hours to a month(s) depending on the severity of the damage with the worst case being a loss of physical infrastructure.

The PSEC system has already performed well in minor earthquakes and major fires. The system has also been highly available on a day to day basis. The probability of the system working to support first responders is high if the PSEC Division properly maintains the system and is funded to do so.

The Core and Radio Network Interface (RNI) has intrusion detection and is isolated from the outside with multiple layers of firewalls to protected from Cyber Attacks. A comprehensive assessment by RCIT ISO and the manufacturer Motorola was performed when the PSEC radio system was deployed. RCIT ISO can be contacted to provide more details on how the RCIT network is protected

Relationship to Other Hazards – Cascading Effects

Any loss of The RCIT/PSEC Public Safety Voice and Data system would affect first responder performance during emergencies of all types in Riverside County for Law, Fire, EMS and local government entities like Public Works.

5.3.9 Flood

Severity: 3

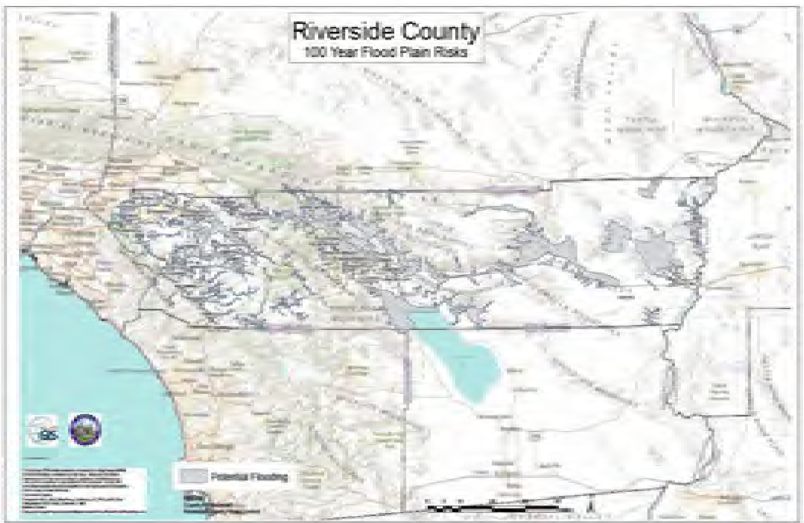
Probability: 3

Risk Score: 1.13

OA Jurisdictions Affected by Flooding

- City of Blythe
- City of Calimesa
- City of Canyon Lake
- City of Cathedral City
- City of Desert Hot Springs
- City of Eastvale
- City of Indian Wells
- City of Jurupa Valley
- City of La Quinta
- City of Lake Elsinore
- City of Norco
- City of Palm Desert
- City of Perris
- City of San Jacinto
- City of Temecula
- City of Wildomar
- Rancho California Water District
- Riverside County Office of Education
- Riverside Unified School District

Map 11: Riverside County 100 Year Flood Plain Risks



Hazard Definition

A flood is defined as an overflowing of water onto an area of land that is normally dry. Floods generally occur from natural causes, usually weather-related, often in conjunction with a prolonged period of seasonal precipitation or with sudden and very heavy rain falls. Floods can, however, result from human causes as a dam impoundment bursting. Dam break floods are usually associated with intense rainfall or prolonged flood conditions. In the Riverside County area, a major earthquake could cause a dam failure. In a dam failure scenario, the greatest threat to life and property typically occurs in those areas located immediately below the dam since flood depths and discharges generally decrease as the flood wave moves downstream.

Floods are generally classed as either slow-rise or flash floods. Slow-rise floods may be preceded by a warning time lasting from hours to days, or possibly weeks. Evacuation and sandbagging for a slow rise flood may lessen the flood-related damage. Conversely, flash floods are characterized by extremely short warning times.

Hydrologic Regions

Although Riverside County occasionally experiences periods of significant drought, the County can also experience periods of substantial rainfall. When Riverside County does experience heavy rain, or rain over a period of days or weeks, many areas of the County are subject to flooding. Runoff from rain drains either naturally into rivers, washes, and creeks or into flood control facilities. Flash flooding is also a common problem, especially in the Coachella Valley and the easterly portions of the county. Flash flooding is typically associated with short duration, high-intensity precipitation events often associated with summer thunderstorms. Such events can occur even during a drought.

The topography of the County varies from mountainous areas several thousand feet above sea level to low desert areas that are actually below sea level. Riverside County falls within two distinct Natural Hydrologic Regions as described in the State of California Multi-Hazard Mitigation Plan (SHMP):

South Coast Region

The South Coast hydrologic region extends up from the U.S. - Mexico border to the Tehachapi, San Bernardino, San Gabriel, and San Jacinto mountains. Nearly one-third of the area is coastal plain. This region contains major urban centers, including the counties of Los Angeles, Orange, and San Diego. Much of the flooding is sudden and severe, resulting in massive slides, debris flows, and mudflows. The western portion of

Riverside County falls within the South Coast Region and contains portions of the Santa Ana River, San Jacinto River and Santa Margarita River watersheds.

Colorado River – Desert Region

The dominant hydrologic features of this region are the Colorado River, which forms its eastern boundary, and the Salton Sea, which lies just shy of its western boundary. The region is marked by the San Bernardino and San Jacinto mountains. The region is also bounded by the U.S.- Mexico border to the south and the South Lahontan region to the north. This is generally a sparsely populated agricultural region that experiences sporadic flooding; however, the upper Coachella Valley has a much higher population density. Both common winter storm events and summertime monsoonal flows from Mexico's Pacific Coast can spawn massive rainstorms, general flooding and flash floods. The Eastern portion of Riverside County falls within the Desert Region and contains portions of the Whitewater River and Colorado River watersheds.

Characteristic Weather Patterns

In Riverside County, various weather patterns are associated with flood events such as El Niño conditions, La Niña conditions, Summer Monsoons, and "Pineapple Express".

Floods that affect Riverside County can be attributed to three different types of storm events:

1. A general winter storm that combines high-intensity rainfall and a rapid melting of the mountain snow pack.
2. A tropical storm out of the southern Pacific Ocean.
3. A summer thunderstorm, particularly in the desert areas.

There are three principal types of flood hazards:

1. Stream flooding (including bridge scour and stream erosion)
2. Flash flooding (including debris and mud flows)
3. Sheet flow flooding (including alluvial fan flooding)

The major rivers in the South Coast hydrologic region of Riverside County are dry most of the year and pose flood threats to developments within the floodplain during general storms of long duration. When a major storm moves into the area, the excess precipitation becomes surface runoff. Resultant flood flows have predominantly short durations and

sharp peaks. Increased urbanization increases flood potential by increasing the percentage of impervious surfaces.

In the Desert hydrologic region, high-intensity rainfall from the period of July to August can produce severe flash flooding. Winter rains are generally more widespread in the desert and flash flood potential is less due to the lower intensity of rainfall. Winter rains are nonetheless capable of producing flooding but are somewhat more predictable. There is a severe danger to motorists who may attempt to drive through flooded washes which are typically dry.

Storms with high volumes of precipitation in a short period of time have occurred in the County causing flash floods, contaminated drinking water, disrupted electrical service, and damaged homes and contents. In addition, land that has been denuded of foliage and trees due to fire or human activity has experienced serious erosion from the rainfall.

Excessive precipitation can inundate soil in slopes causing mudslides and landslides. These events can destroy homes, block highways, and destroy power lines. The County is vulnerable to this type of flood damage. Heavy storms also can strand individuals playing near or crossing streams, rivers, flood control channels and intersections.

Riverside County has several major river systems, dams, and reservoirs. Excessive rainfall can stress these systems causing serious damage to property and potential loss of life. Rivers can overflow their banks, destroying bridges and washing out roads and highways during major flood events. Dam failure is discussed in a separate section of this LHMP on that specific hazard.

History

Table 22: Riverside County Flood History

Location	Date of Incident	Reported Damage	Number Injured	Incident Description
Riverside County	1/17/1993	$12,629,191	0	Flooding
Idyllwild	3/5/1995	$1,000,000	Not Avail.	Flooding caused by rains. 3,000 acres of farmland flooded. Portions of Highway 74 washed away
Mecca	3/6/1995	$1,000,000	2	Flooding caused by rains.
Riverside County	2/6/1998	12,629,191	0	El Nino storms flooding, debris, road damage water damage to homes

Cherry Valley, Calimesa, Yucaipa-Oak Glen Conservation Camp, Banning	7/11-12/1999	$750,000	3	Flash flood. Camp and property damaged.
Desert Hot Springs	3/5/2000	$300,000	1	Flooding caused by rain and snow
Moreno Valley	3/7/2000	$1,500,000	Not Avail.	Flooding caused by rain. Mudslides. Homes and property destroyed.
Eastern Riverside County	8/29/2000	Not Avail.	0	Flash flood due to severe thunderstorm, hail, heavy rain.
Eastern Riverside County	7/6/2001	$3,383,000	0	Flash flood. Road damage, farmland damage, crop damage.
County Areas & Riverside City	11/24/2001	Not Avail.	Not Avail.	Flood channel blocked. Homes flooded.
Moreno Valley, Cathedral City	8/18/2003	$500,000	Not Avail.	Flash flood Government buildings flooded
Anza, Banning	9/4/2003	$150,000	Not Avail.	Flash flood.
Corona, Palm Springs	11/12/2003	$10,000	0	Flash flood.
Mira Loma, Moreno Valley	2/2/2004	$10,000	Not Avail.	Flash flood.
Temecula, Riverside, Mira Loma	2/18/2004	$55,000	Not Avail.	Flash flood.
Mira Loma, Moreno Valley, Perris, Sun City, Lake Elsinore	10/20/2004	$500,000	0	Flash flood.
Riverside County FEMA DR -1577	12/27/2004	Not Avail	Not Avail	Severe Storms, Flooding, Debris Flows and mud slides
Riverside County FEMA DR -1585	2/16/2005	Not Avail	Not Avail	Severe Storms, Flooding, Debris Flows and mud slides
Riverside County FEMA DR -1884	3/8/2010	Not Avail	Not Avail	Severe Storms, Flooding, Debris Flows and mud slides
Riverside County FEMA DR -1952	12/17/2010	Not Avail	Not Avail	Severe Storms, Flooding, Debris Flows and mud slides

Hemet, Coachella Valley and Thousand Palms	9/7-8/2014	Not Avail	Not Avail	Flash flooding in Coachella Valley. Mud and water closed roads and stranded vehicles in La Quinta, Palm Desert, and Thousand Palms. Homes in La Quinta were surrounded by water. Moving water was 3 feet deep on roads and 4 to 5 feet of standing water submerged vehicles.
Throughout County	12/3-4/2014	Not Avail	1	Flooding resulted, with mud, debris and water closing several roadways and stranding vehicles. Mud with debris 10 feet high piled up on Soboba Rd. north of San Jacinto. A swift water rescue was needed.
Throughout County	7/19/2015	Not Avail	1	Flooding in the county lead to the need for a swift water rescue, the washout of Interstate-10 near Desert Center, and neighborhood in and near Moreno Valley flooded causing damage to resident's homes and property.
Menifee	9/8/2015	Not Avail	Not Avail	Flooding
Temecula	1/5-7/2016	Not Avail	Not Avail	Flooding
Throughout County	2/27/2017	Not Avail	1	Flooding resulted from the storm. A swift water rescue was needed in Temecula. Heavy road damage disrupted traffic.

Source: https://www.weather.gov/media/sgx/documents/weatherhistory.pdf
http://www.cnrfc.noaa.gov/storm_summaries/dec2010storms.php
http://ks.water.usgs.gov/pubs/reports/wsp.2499.sumca0193.html
http://www.floodcontrol.co.riverside.ca.us/Downloads/AnnualReports/DistrictAnnualReport15-16.pdf

Flood Hazard Mapping

For floodplain management purposes, the following discussion describes the Federal Emergency Management Agency (FEMA) definition of “100-year flood.” The term "100-

year flood" is misleading. It is not a flood that will occur once every 100 years. Rather, the flood elevation has a 1 percent chance of being equaled or exceeded each year. Thus, a 100-year flood could occur more than once in a relatively short period of time. The one percent chance flood is used by the National Flood Insurance Program (NFIP) as the minimum standard for floodplain management regulation and, in most cases, triggers the need for mandatory flood insurance coverage. A structure located within a FEMA Special Flood Hazard Area has a 26 percent chance of suffering flood damage during the term of a 30-year mortgage.

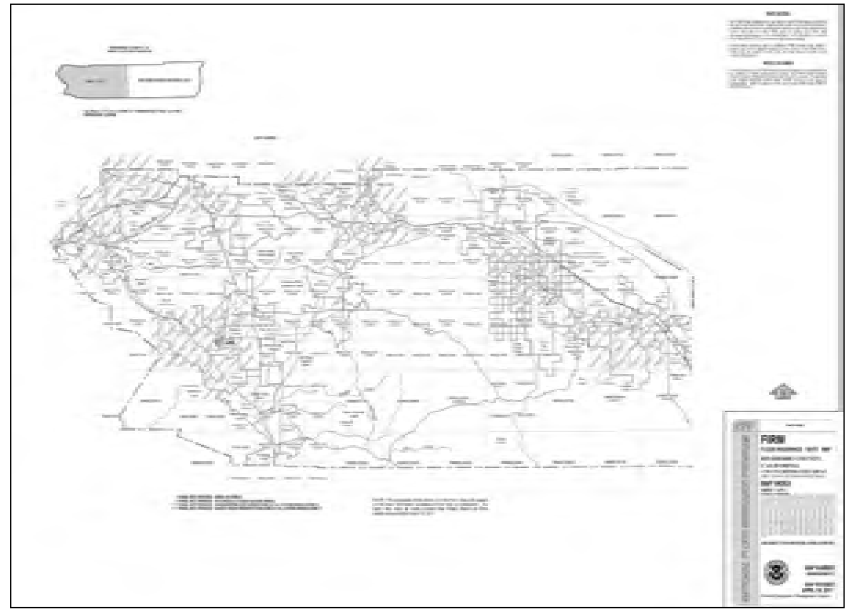
Riverside County utilizes several sources to determine local flood hazards: FEMA Flood Insurance Rate Maps, DWR Awareness Maps, and local flood zone delineation maps as identified in Riverside County Ordinance 458 (updated 6/9/2017). For floodplain management purposes, the County regulates unincorporated development within each of the above maps. Each of the incorporated Cities administers its own floodplain management program and may or may not utilize floodplain information beyond that provided by FEMA's Flood Insurance Rate Maps.

FEMA Flood Insurance Rate Mapping

FEMA updated the Digital Flood Insurance Rate Maps (DFIRMS) effective range from August 28, 2008, to April 19, 2017, depending on when jurisdictions requested maps to be updated. The DFIRMS are available for public viewing from FEMA's website:

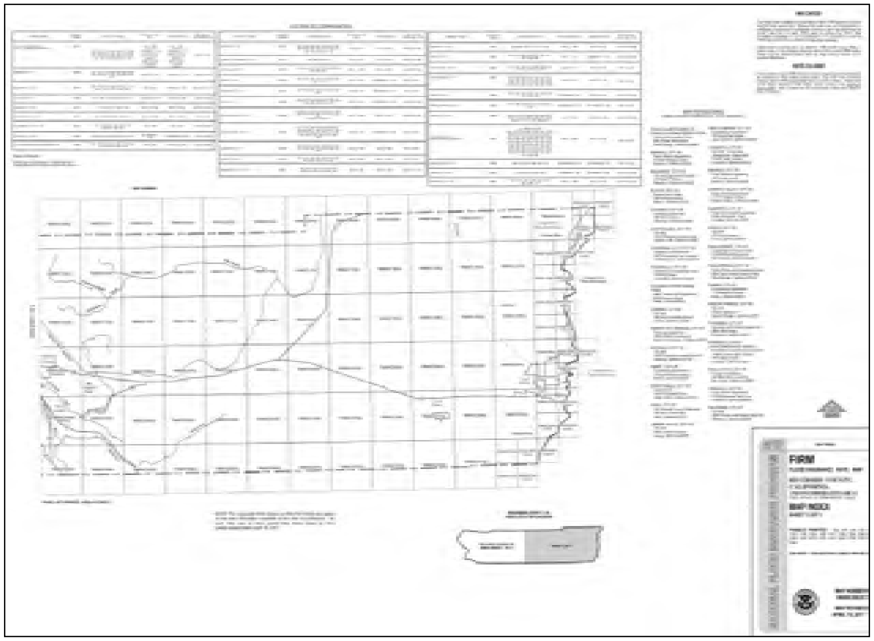
Source: http://msc.fema.gov/portal/advanceSearch#searchresultsanchor

Map 12: FEMA FIRM Map 2017 – West County



Source: http://msc.fema.gov/portal/advanceSearch#searchresultsanchor

Map 13: FEMA FIRM Map 2017 – East County



Source: http://msc.fema.gov/portal/advanceSearch#searchresultsanchor

Table 23: FIRM Flood Zones

Zone	Description
A	Area with a 1% annual chance of flooding. No depths or Base Flood Elevations (BFEs) are shown.
AE	Base floodplain where BFEs are provided. AE Zones are now used on digital FIRMs instead of A1 - A30 Zones.
A1 through 30	Known as numbered A Zones, these are the base floodplains in the old FIRM format where a BFE is shown.
AH	Area with a 1% annual chance of shallow flooding with an average depth ranging from 1 to 3 feet. BFEs are shown at selected intervals.
AO	River or stream flood hazard area, or area with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow with an average depth ranging from 1 to 3 feet. Average flood depths derived from detailed analyses are shown.
AR	Area with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam).
A99	Area with a 1% annual chance of flooding protected by a federal flood control system where construction has reached specified legal requirements. No depths or BFEs are shown.
V	Coastal area with a 1% or greater chance of flooding and an additional hazard associated with storm waves. No BFEs are shown within these zones.
VE or V1 through 30	Coastal area with a 1% or greater chance of flooding and an additional hazard associated with storm waves. BFEs are shown at selected intervals.
B, C, X	Zones considered having moderate to low risk of flooding, although flood insurance is available to property owners and renters in communities that participate in the NFIP.
D	Area with possible but undetermined flood hazards, where no flood hazard analysis has been conducted.

FEMA also conducted a Flood Insurance Study and determined that the following areas have the potential to flood.

Figure 24: Flood Insurance Study Areas

Water Source Studied	Water Source Studied	Water Source Studied
Acacia Creek Drain	Lincoln Avenue Drain	San Sevaine Channel
Alessandro Wash	Little Morongo Wash	Santa Ana River
All American Canal	Long Canyon Wash	Sheet Flow along Ocotillo Road
Arlington Canal	Macomber Palms Channel	Smith Creek
Arroyo Del Toro	Magnesia Falls Road	Smith Creek West Tributary
Bear Creek	Magnesia Springs Channel	South Norco Channel and Trib.s A and B
Beaumont Chanel	Main Street Drain	Spring Brook
Bedford Canyon Wash	Mangular Channel	Spring Brook Wash
Big Morongo Wash	Marshall Creek	Stetson Avenue Channel
Biskra Palms Channel	McVicker Canyon Wash	Stovepipe Canyon Creek
Blind Canyon Channel	Metz Road Basin	Stream A (Vicinity of Des. Hot Springs)
Bly Channel	Mirage Indian Trail Wash	Sun City Channels A-A, C-C, H-H and X-X
Box Springs Wash	Mission Creek	Sun City Southeast Tributary
Calimesa Channel	Mockingbird Canyon Wash	Sunny Slope Channel
Carrizo Alluvial Fan	Montgomery Creek	Sunnymead Storm Channel
Channel H	Mountain Avenue Wash	Taylor Avenue Drain
Cherry Avenue Channel	Murrieta Creek	Temecula Creek
Coachella Valley Stormwater Channel	North Cathedral Channel	Temescal Wash
Country Club Creek and North Tributary	North Norco Channel and Trib.s A, B and C	Tequesquite Arroyo
Day Creek Santa Ana River	North Palm Springs Wash	The Veldt
Dead Indian Alluvial Fan	North Side Wolf Valley Creek	Third Street Basin
Deep Canyon Alluvial Fan	Oak Street Channel	Thousand Palms Canyon Wash
Deep Canyon Storm Water Channel	Ocotillo Drive Wash	Thousand Palms Main Channel
Desert Hot Springs Channel	Orange Lateral	Thousand Palms Tributaries A, B and C
Dunes View Road Channel	Ortega Wash	Thunderbird Wash
Dry Morongo Wash	Ortega Channel	Tramview Wash
East Cathedral Channel	Palm Canyon Wash	Tramview Wash Tributary
East Gilman Home Channel	Palm Valley Drain	University Wash
East Rancho Mirage Storm Channel	Park Hill Drain	Wash G
El Cerrito Channel	Pechanga Creek	Wash I
Elsinore Spillway Channel	Perris Valley Storm Drain	Wasson Canyon Creek
Garden Air Gold Course Wash	Pigeon Pass Channel	West Cathedral Channel
Gilman Home Channel	Prenda Wash	West Norco Channel
Harrison Wash	Pushawalla Canyon Wash	West Pershing Channel
Hemet Storm Channel	Pyrite Channel	Whitewater River
Highland Springs Channel	Rache Channel	Whitewater River (C.V.S.C.)
Interstate-10 Wash	Ramsey Street Drain	Whittier Avenue Channel
Kalmia Street Wash	Rice Canyon Wash	Woodcrest Wash
Lake Elsinore	Salt Creek and Tributary	Unnamed Stream A
Lakeland Village Channel	Salt Creek Overflow	Unnamed Stream B
Lakeview Wash	San Gorgonio River	Unnamed Stream C
Leach Canyon Channel	San Jacinto River	1001 Ranch Drain
Lime Street Channel	San Jacinto Lateral	1001 Ranch Drain West Tributary

DWR Awareness Floodplain Mapping

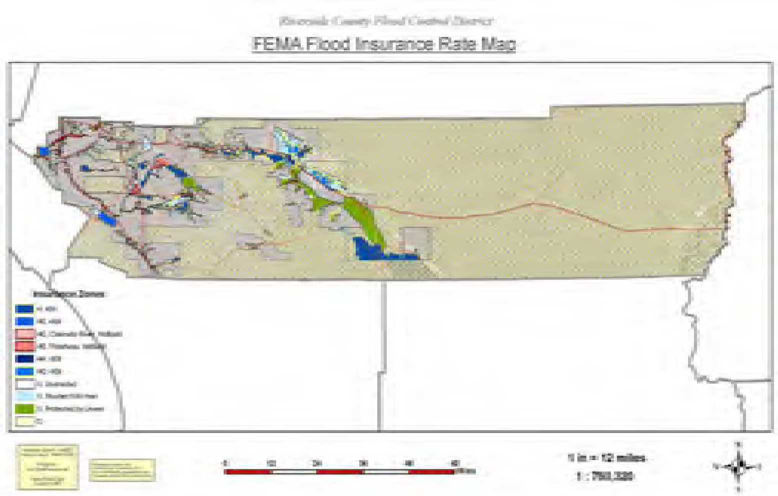
The intent of the California Department of Water Resources (DWR) Awareness Floodplain Mapping project was to identify all pertinent flood hazard areas by 2015 for areas that are not mapped under the FEMA National Flood Insurance Program (NFIP) and to provide the community and residents an additional tool in understanding potential flood hazards currently not mapped as a regulated floodplain. The awareness maps identify the 100-year flood hazard areas using approximate assessment procedures. These floodplains are shown as flood-prone areas without specific depths and other flood hazard data. Awareness Floodplain Maps were incorporated into County Ordinance 458.

The maps that were originally adopted are available on the DWR website. DWR will not be modifying these maps since it was a one-time project. As development occurs and the floodplains change due to channelization, the floodplain limits of the Awareness floodplains are being updated by Riverside County Flood Control (RCFC) and will be reflected on the RCFC interactive maps found at:

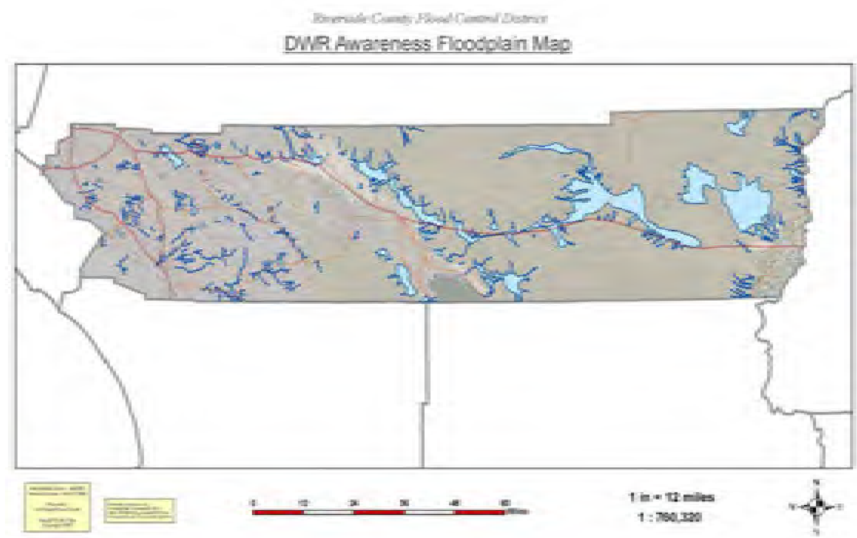
http://rcflood.org/FloodDetermination/FloodDetermination_V09.aspx

California Department of Water Resources Awareness Floodplain Maps can be found at http://www.water.ca.gov/floodmgmt/lrafmo/fmb/fes/awareness_floodplain_maps/

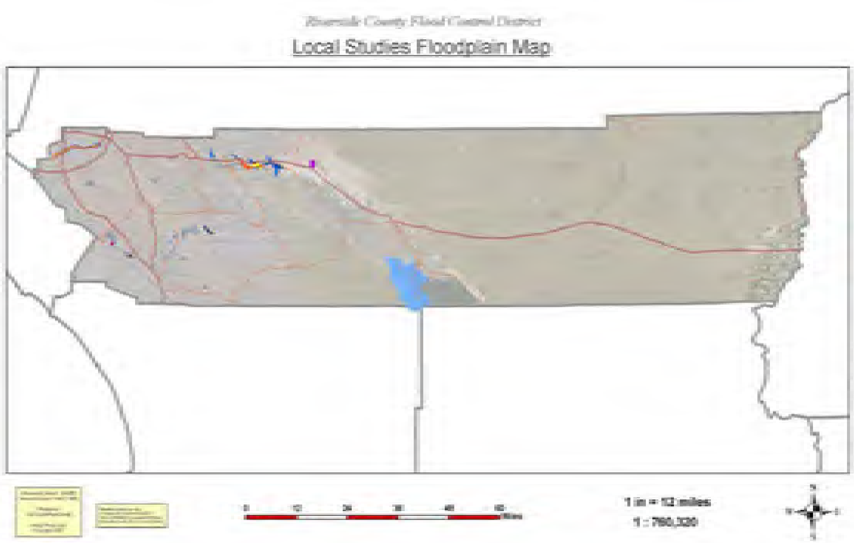
Map 14: FEMA Flood Insurance Rate Map



Map 15: DWR Awareness Floodplain Map



Map 16: Local Studies Floodplain Map



Risk Assessment

As stated in the State of California Multi-Hazard Mitigation Plan, Riverside County has 27 declared flood disasters from the period of 1950 – December 2012. The total can be updated to 29 when adding the two flood disaster declarations in 2015 and 2017. The State's plan also shows Riverside County has a population of 295,081 living within FIRM-Designated Floodplains (based on 2000 Census Data). According to the 2017 Southern California Association of Governments (SCAG) Unincorporated Area of Riverside County Report, the number of residents living in the unincorporated area has increased to 364,413.

HAZUS was used to generate general building stock and essential facility loss estimates for three different floods in the County – a 1% annual chance flood event (100-year flood) with the existing certified levee system in the County intact, a 1% annual chance flood event without consideration of these levees, and a 500-year (0.2% chance per year) flood. Flood hazard data from DFIRM maps available at FEMA's Map Service Center were used to develop the flood scenarios.

Table 24: Summary of HAZUS – Estimated Impacts on Riverside County for Three Flood Scenarios

Impact Category	100-Year	100-Year w/o Levee	500-Year
Economic Loss due to Building Damage, Total Building-related Direct	$0.81 B $1.7 B	$2.3 B $4.9 B	$3.6 B $7.8 B
# Buildings in Complete Damage State	1,356	3,655	6,262
Debris Generated (million tons)	0.20	0.50	0.78
Displaced Households, People Needing Short- term Shelter	16,896 41,846	79,078 223,787	125,887 357,092
# Highway Bridges w/ at least Moderate Damage (potentially closed)	0 (of 4 damaged)	0 (of 4 damaged)	0 (of 4 damaged)

Table 25: Summary of HAZUS – Estimated Impacts for Riverside County Essential Facilities in Three Flood Scenarios

Essential Facility	Category	100-Year		100-Year w/o Levee		500-Year	
		Time to Restore (Days)	Economic Loss ($1,000)	Time to Restore (Days)	Economic Loss ($1,000)	Time to Restore (Days)	Economic Loss ($1,000)
Hospitals*	Medium	0	$0	540	$0	540	$0
	Large	0	$0	540	$0	360-540	$0
Schools	K-12 (default data)	480	$115	480	$865	480	$2,232
	K-12 (providing data)	360-720	$12,482	360-720	$38,838	360-720	$66,911
	CCD (providing data)	0	$0	360-480	$6,285	360-480	$6,285
EOCs		0	$0	480	$560	360-480	$5,113
Police Stations		480	$0	360-480	$0	360-480	$796
Fire Stations		480	$692	360-480	$692	360-630	$1,994
TOTALS		**360-720**	**$13,289**	**360-720**	**$47,240**	**360-720**	**$83,331**

*Note: In Riverside County, there are no hospitals which would be categorized by HAZUS as "Small" (<50 licensed acute care beds)

- **Effects on People and Housing:** Of the approximately 647,000 buildings modeled within the general building stock for Riverside County, about 1% (6,262) are expected to suffer "complete" damage in the 0.2% annual chance flood event (500-year flood) scenario. These building would be considered "red-tagged" or unsafe for continued occupancy. About 94% of the 6,262 buildings are manufactured housing (i.e., mobile homes). Approximately 43,000 buildings (6.6%) are expected to suffer more than 20% damage or more while about 18,000 buildings are estimated to suffer flood damage of less than 20%. As much as 0.78 million tons of debris may result from these damaged buildings – 21% is expected to be heavy debris (concrete and steel), requiring heavy equipment to break down and remove, while 79% is expected to be light debris (wood, brick, drywall and other debris).

Damage to single family and multi-family dwellings is expected to result in the displacement of almost 126,000 households. While many of the displaced may find shelter with friends and family, or in available hotels, as many as 357,000 people are expected to seek short-term public shelter. This large number of people would likely overwhelm the emergency sheltering capacity of the county. The displaced populace should be able to move to safe locations without too much difficulty. While four (4) bridges in the county's transportation system are expected to suffer minor flood damage, the bridges are expected to remain functional.

- **Essential Facility Impacts:** Table 29 provides an overview of essential facility performance in the 0.2% annual chance flood event (500-year flood) with levees scenario. The table lists the number of essential facility sites and buildings (these numbers will differ for multi-building campuses, such as schools and hospitals). The table also provides the total building replacement value, and the number of buildings for which value data was available. As can be seen in the table, replacement cost data for hospitals was generally not available, unlike most other essential facility types. Expected building damage in this flooding event ranges from 0% damage for numerous essential facility types with some, but minimal, flooding, to as much as 7.1% mean damage for one school district. The total economic loss for essential facilities has been estimated to reach about $83 million, almost 91% of which ($75 million) will occur in schools and about 6% of which will occur in EOCs ($5.1 million). It should be noted that no hospital losses were estimated since all hospitals impacted by this flooding scenario did not provide replacement value data. (The full economic impact on hospitals can't be estimated at this time because of the lack of comprehensive replacement value data).

Table 26: Riverside County Essential Facility Loss Estimates – 0.2% Annual Chance Flood Scenario

Essential Facility	Category	No. of Facilities/Sites	No. of Buildings	No. of Beds	Replacement Cost ($1,000)	# Buildings w/ replacement	# Non-Functional Buildings	Time to Restore (Days)	Economic Loss ($1,000)
Hospitals*	Medium	8	28	793	$162,827	21	0	540	$0
	Large	8	49	2,467	$200,792	10	0	360-540	$0
Schools	K-12 (default data)	152	152		$219,600	152	31	480	$2,232
	K-12 (providing data)	689	9,981		$6,049,534	9,213	1,111	360-720	$66,911
	CCD (providing data)	12	258		$356,708	257	92	360-480	$6,285
EOCs		43	43		$310,273	43	4	360-480	$5,113
Police Stations		51	51		$675,299	48	2	360-480	$796
Fire Stations		156	156		$366,493	156	8	360-630	$1,994
TOTALS		**1,119**	**10,718**	**3,260**	**$8,341,525**	**9,900**	**1,248**	**360-720**	**$83,331**

Note: In Riverside County, there are no hospitals which would be categorized by HAZUS as "Small" (<50 licensed acute care beds)

Table 27: Estimated Impacts on Riverside County Fire Stations in a 1% Annual Chance Flood Scenario

Agency	Number of Buildings	Replacement Cost ($1,000)	# Buildings w/ replacement cost data	No. Non-Functional Buildings	Restoration Time (Days)	Mean Building Damage	Economic Loss ($1,000)
Cathedral City FD	3	$10,500	3	0	360-480	0.0%	$0
Corona FD	7	$23,170	7	2	480	7.0%	$385
Hemet FD	5	$15,360	5	1	480-630	6.2%	$604
Murrieta FD	4	$9,530	4	0	0	0.0%	$0
Norco FD	2	$4,750	2	0	480	0.0%	$0
Palm Springs FD	5	$6,115	5	0	360-480	0.0%	$0
Pechanga FD	2	$5,430	2	0	0	0.0%	$0
Riverside County FD	95	$249,411	95	3	360-480	1.0%	$740
Riverside FD	17	$11,875	17	1	480	4.5%	$60
Other Agencies	4	$10,600	4	0	0	0.0%	$0
USFS	12	$19,752	12	1	480	4.4%	$205
TOTALS	**156**	**$366,493**	**156**	**8**	**360-630**	**2.9%**	**$1,994**

Table 28: Estimated Impacts on Riverside County EOCs in a 0.2% Annual Chance Flood (Levees Intact) Scenario

County	No. of Buildings	Replacement Cost ($1,000)	No. Non-Functional Buildings	Restoration Time (Days)	Mean Damage	Economic Loss ($1,000)
Riverside	43	$310,273	4	360-480	1.7%	$5,113

Table 29: Estimated Impacts on Riverside County Police Facilities in a 0.2% Annual Chance Flood (Levees Intact) Scenario

Agency	Number of Buildings	Replacement Cost ($1,000)	# Non-Functional Buildings	Time to Restore (Days)	Mean Damage	Economic Loss ($1,000)
Riverside County Sheriff	30	$491,973	2	360-480	1.2%	$796
Other Agencies	21	$183,326	0	360-480	0.0%	$0
TOTALS	**51**	**$675,299**	**2**	**360-480**	**0.2%**	**$796**

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Table 30: Estimated Impacts on Riverside School Districts in a 0.2% Annual Chance Flood Scenario

Category	District Name	Number of Facilities/ Sites*	No. of Buildings	Replacement Cost ($1,000)	# Buildings w/ replacement cost data	# Non-Functional Buildings	Restoration Time (Days)	Mean Damage	Economic Loss ($1,000)
K-12 (default data)		151	**152**	$219,600	152	31	480	5.2%	$2,232
K-12 (providing data)	Alvord USD	26	**525**	$274,026	525	8	360-480	1.4%	$583
	Banning USD	11	186	$92,169	180	30	360-480	2.7%	$892
	Beaumont USD	20	209	$179,231	208	36	360-480	4.7%	$6,424
	Coachella Valley USD	30	707	$271,777	691	128	360-480	2.3%	$4,392
	Corona-Norco USD	49	855	$718,384	855	128	360-480	2.0%	$6,792
	Desert Center USD	2	25	$13,438	25	0	0	0.0%	$0
	Desert Sands USD	33	681	$519,732	655	212	360-480	2.0%	$16,475
	Hemet USD	29	621	$294,809	620	81	360-480	2.0%	$5,681
	Jurupa USD	29	547	$285,015	547	8	360-480	1.3%	$330
	Lake Elsinore USD	29	539	$0	0	116	360-720	7.1%	$0
	Menifee Union SD	13	213	$116,628	211	0	0	0.0%	$0
	Moreno Valley USD	36	639	$361,250	639	31	480	6.0%	$1,451
	Murrieta Valley USD	18	470	$299,250	470	0	0	0.0%	$0
	Nuview Union SD	5	79	$38,186	79	7	360-480	1.2%	$901
	Palm Springs USD	31	493	$414,806	492	150	360-360	3.3%	$7,922
	Palo Verde USD	9	121	$83,907	121	0	0	0.0%	$0
	Perris SD	12	175	$98,885	174	13	360-480	3.1%	$1,315
	Perris Union High SD	13	226	$202,431	221	12	360-480	2.6%	$5,405
	Riverside Co Office of	167	326	$149,923	159	66	360-480	4.4%	$2,013
	Riverside USD	47	1,015	$497,272	1,015	22	360-480	1.8%	$941
	Romoland SD	5	63	$46,793	63	0	0	0.0%	$0
	San Jacinto USD	16	213	$130,375	213	62	360-480	1.6%	$5,380
	San Jacinto Valley	1	13	$1,105	13	1	360-480	0.4%	$14
	Temecula Valley USD	32	643	$548,085	642	0	0	0.0%	$0
	Val Verde USD	25	386	$388,179	384	0	0	0.0%	$0
	Yucaipa-Calimesa	1	11	$23,878	11	0	0	0.0%	$0
CCD (providing data)	Desert CCD	1	75	$84,687	74	62	360-480	4.1%	$4,130
	Mt. San Jacinto CCD	2	73	$96,439	73	30	360-480	4.5%	$2,155
	Palo Verde CCD	5	12	$37,440	12	0	0	0.0%	$0
	Riverside CCD	4	98	$138,142	98	0	0	0.0%	$0
TOTALS		**852**	**10,39**	**$6,625,842**	**9,622**	**1,234**	**360-720**	**3.3%**	**$75,428**

Table 31: Estimated Impacts on Riverside County Hospitals in a 0.2% Annual Chance Flood Scenario

Hospital Size20	Supervisorial District	No. of Hospital Sites	Number of Buildings	Number of Licensed Beds	Replacement Cost ($1,000)	No. Buildings w/ replacement cost data	# Non-Functional Buildings	Restoration Time (Days)	Mean Damage	Economic Loss ($1,000)
Medium	1st	1	7	122	$36,575	7	0	0	0.0%	$0
Large		2	5	406	$0	0	0	360-540	0.0%	$0
Medium	2nd	0								
Large		2	8	533	$0	0	0	0	0.0%	$0
Medium	3rd	3	5	297	$98,000	5	0	540	0.0%	$0
Large		1	10	433	$200,792	10	0	0	0.0%	$0
Medium	4th	2	11	196	$7,474	5	0	540	0.0%	$0
Large		2	25	656	$0	0	0	540	0.0%	$0
Medium	5th	2	5	178	$20,778	4	0	0	0.0%	$0
Large		1	1	439	$0	0	0	0	0.0%	$0
TOTALS		**16**	**77**	**3,260**	**$363,619**	**31**	**0**	**360-540**	**0.0%**	**$0**

Note: In Riverside County, there are no hospitals which would be categorized by HAZUS as "Small" (<50 Licensed acute care beds)

- **Effects on Infrastructure:** A slow-rising flood situation will progress through a series of stages, beginning with minor rainfall and evolving to a major event such as substantial flooding. Once flooding begins, personnel will be needed to assist in rescuing persons trapped by floodwaters, securing utilities, cordoning off flood areas, and controlling traffic. These actions may overtax local agencies, and additional personnel and resources may be required. It is anticipated that existing mutual aid resources would be used as necessary to augment local resources.

  Many essential public and quasi-public facilities and hazardous materials sites are located within the 100- or 500-year flood zones of Riverside County. As of the writing of the Safety Element of the County's General Plan, these included 14 of the County's 39 airports; 4 of 18 hospitals; 47 of 109 police stations, fire stations, and emergency operation centers; 92 of 380 schools; 446 of 1,306 highway bridges; and 695 of 1,978 hazardous materials sites.

- **Effects on Agriculture:** As the historical events in Riverside County show, effects on agriculture can be devastating. Flooding can damage crops, livestock, and dairy stock. In addition to the obvious impacts on animals and crops, flooding can have deleterious effects on soil and the ability to reinvigorate the agricultural activities affected once the flood waters recede.

Risk Assessment Conclusion

Flooding due to heavy precipitation or dam failure is a potential hazard in Riverside County, with the resultant possibilities for damage to property and loss of life. Severe flooding can be particularly costly. In a relative sense, flooding due to precipitation does not present the degree of danger posed by other hazards such as major earthquakes. If there is flooding due to dam failure, the danger could be cataclysmic.

Relationship to Other Hazards – Cascading Effects

Fire can breakout because of dysfunctional electrical goods. Hazardous materials can also get into floodways, causing health concerns and polluted water supplies.

5.3.10 Civil Disorder

Severity: 3

Probability: 2

Risk Score: 1.13

<u>OA Jurisdictions Affected by Civil Disorder</u>

- All incorporated cities of Riverside County

Hazard Definition

Civil disorder or unrest is usually triggered by dramatic political or social events. Every major metropolitan area in California has experienced and is at risk for, civil disorder. The most significant civil unrest incident in the State was the 1992 Los Angeles Civil Disturbance that resulted in 53 deaths, over 2,300 injuries and over $800 million in damages. This event also precipitated simultaneous, but smaller, incidents throughout California and the country.

Civil disorder is an incident intended to disrupt community affairs and threaten the public safety. Civil disorder includes riots, mob violence, and any unlawful demonstration resulting in police intervention and arrests. Civil Unrest is generally associated with controversial political, judicial, and/or economic issues and events.

History

Riverside County is not a place where there has been a lot of historic civil disturbance events of noticeable magnitude. There are locations within Riverside County where large public gatherings take place. These locations have the potential for unstable conditions, possibly affecting the ability of a jurisdiction in the County to provide sufficient law enforcement and fire protective services.

May 1, 2017 – “May Day” protest in Riverside to oppose President Trump’s actions against undocumented workers, LGBT rights, fair wages, Black Lives Matter, refugees and immigrants.

January 31, 2017 – Protests held in Riverside to protest President Trumps Travel restrictions from seven primarily Muslim countries.

January 21, 2017 – Thousands marched in Downtown Riverside for Woman’s rights.

November 10, 2016 – UC Riverside students marched in an anti-Trump rally.

May 7, 2016 – Trump supporters rally in Temecula approximately 350 people attended.

July 13, 2012 – Rally against violent crimes at the Riverside Public Library.

January 31, 2012 – Union Strike at various locations in Riverside County.

December 2, 2011 - Protests at all of the main entrances to the Mission Inn where Buster was holding a re-election fundraiser.

November 6, 2011 - There was an “Occupy” protest near City Hall, and 8 protesters were arrested.

November 22, 2011 - 200 to 300 students gathered at UCR’s bell tower at the center of campus to protest. (Occupy UC Riverside).

April 15, 2010 - Riverside County Tax Day Tea Parties' Protest Rally (Tea Party).

January 13, 2009 - The Riverside County Board of Supervisors today temporarily suspended an ordinance it passed last week to limit protests outside a large Church of Scientology compound near Hemet. Protesters show up about once a month outside Golden Era Productions, home to 500 Scientologists, on Gilman Springs Road.

December 2004 - A demonstration at county administrative buildings that was part of a nationwide protest sponsored by the American Family Rights Association.

Risk Assessment

During a Civil Unrest incident that affects Riverside County, there are certain critical facilities within the County that may be more at risk than others. These critical facilities include venues for musical concerts and sporting events, facilities where legal and illegal demonstrations are held, and any other facilities with events that attract large numbers of people. All of these situations create significant traffic congestion and the potential for disruptive behavior.

- **Effects on people and housing.** The effects of a Civil Unrest are varied and usually based on the type, severity, scope, and duration of the disturbance. Effects may include illegal assemblies, injuries, and even loss of life.
- **Effects on commercial and industrial structures**. Effects may include traffic congestion or gridlock, illegal assemblies, disruption of utility service, and property damage.

- **Effects on infrastructure.** Effects may include traffic congestion or gridlock, disruption of utility service, and property damage.
- **Effects on agriculture.** Effects may include traffic congestion or gridlock, disruption of goods transportation services, and property damage.

Risk Assessment Conclusion

The overall risk of civil unrest in Riverside County is low.

Relationship to Other Hazards – Cascading Effects

Civil Unrest may lead to a fire, destruction of property, disruption of power, injury to persons, and even loss of life. It also has the potential to affect first responder response times by traffic blocking protesting techniques.

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5.3.11 Drought

Severity: 3

Probability: 3

Risk Score: 1.13

<u>OA Jurisdictions Affected by Drought</u>

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

A drought is a long period of extremely dry weather when there is not enough rain for the successful growing of crops or the replenishment of water supplies.

Drought is a gradual phenomenon. Normally, one dry year does not constitute a drought in California but rather serves as a reminder of the need to plan for droughts. California's extensive system of water supply infrastructure (reservoirs, groundwater basins, and interregional conveyance facilities) generally mitigates the effects of short-term dry periods for most water users.

Drought can have secondary impacts. For example, drought is a major determinant of wildfire hazard, in that it creates greater propensity for fire starts and larger, more prolonged conflagrations fueled by excessively dry vegetation, along with reduced water supply for firefighting purposes. Drought is also an economic hazard. Significant economic impacts on California's agriculture industry can occur as a result of short and long term drought conditions; these include hardships to farmers, farm workers, packers, and shippers of agricultural products. In some cases, droughts can also cause significant increases in food prices to the consumer due to shortages.

Past experience with California droughts tells us that drought impacts are felt first by those most dependent on or affected by annual rainfall – agencies fighting forest fires, ranchers engaged in dryland grazing, rural residents relying on wells in low yield rock formations, or small water systems lacking a reliable water source.

The driest single year in California's measured hydrologic history is 1977.

California's last major statewide drought was 2014-2017. On April 17, 2017, Governor Jerry Brown issues EO B-40, officially ending the drought state of emergency.

Climate scientists studying California weather patterns find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years underscore the need to examine more closely the state's water storage, distribution, management, conservation, and use policies.

California Progress as of 2017:

In January 2014, with California facing one of the most severe droughts on record, Governor Brown proclaimed a State of Emergency due to drought conditions beginning in 2012 through 2016. An interagency Drought Task Force was convened to monitor drought impacts and advise on actions to be taken if drought conditions worsened. The Drought Task Force also developed a plan for the provision of emergency food supplies, financial assistance and unemployment services in communities that suffer high levels of unemployment due to drought conditions.

In September 2014, Governor Brown issued an Executive Order authorizing Cal OES to provide California Disaster Assistance Act (CDAA) funding for local government assistance to provide emergency water supplies to households without water for drinking and/or sanitation purposes.

In April 2017, Governor Brown lifted the Executive Order Proclaiming a drought, however, he retained prohibition on wasteful practices.

The Drought Contingency Plan (DCP) contains strategies and actions that state agencies have taken or may take to prepare for, respond to, and recover from droughts. Its purpose is to minimize drought impacts by improving agency coordination and enhancing monitoring and early warning capabilities, water shortage impact assessments, and preparedness, response, and recovery programs. The DCP identifies an integrated, regional approach to addressing drought, drought action levels, and appropriate agency responses as drought conditions change. It calls for coordination and clearly defined roles and responsibilities of federal, state, and local agencies, and timely dissemination of information to decision-makers.

Five levels of drought response are identified. These range from Level 1, representing an: Abnormally Dry period (calling for raising awareness), to Level 3, a Severe Drought (requiring mandatory conservation in some communities and emergency actions), to Level 5, an Exceptional Drought (water supplies may be cut off and maximum response). A Governor's emergency drought proclamation may be initiated at Level 3.

Drought can be defined according to meteorological, hydrological, or agricultural criteria.

Meteorological drought is usually based on long-term precipitation departures from normal, but there is no consensus regarding the threshold of the deficit or the minimum duration of the lack of precipitation that makes a dry spell an official drought.

Hydrological drought refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow, as well as lake, reservoir, and ground water levels.

Agricultural drought occurs when there is insufficient soil moisture to meet the needs of a particular crop at a particular time. A deficit of rainfall over cropped areas during critical periods of the growth cycle can result in destroyed or underdeveloped crops with greatly depleted yields. Agricultural drought is typically evident after meteorological drought but before a hydrological drought.

Socioeconomic drought associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather- related supply shortfall. This may also be called a water management drought.

History

Riverside County chronically experiences drought cycles. Drought causes stress on the County's ability to provide water to the community. In addition, drought conditions can cause extensive weakening of trees in forested areas causing them to become highly vulnerable to disease and insect infestation. Many trees have weakened and died, creating a severe fire hazard. Furthermore, wildland brush areas were dry, presenting wildfire risk.

Figure 35: California's drought level first week of March 2011-2015

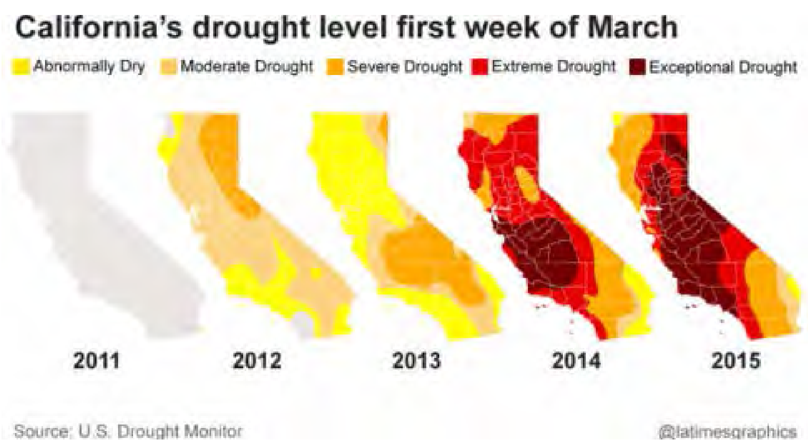
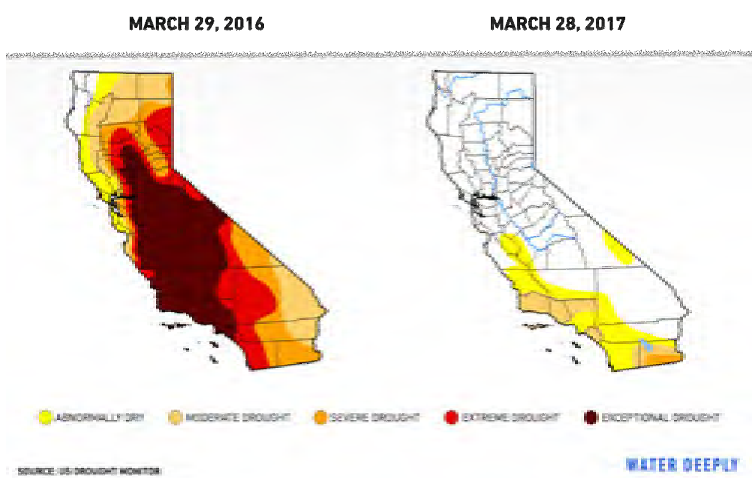


Figure 36: California's drought level March 2016-2017



Drought Risk Assessment

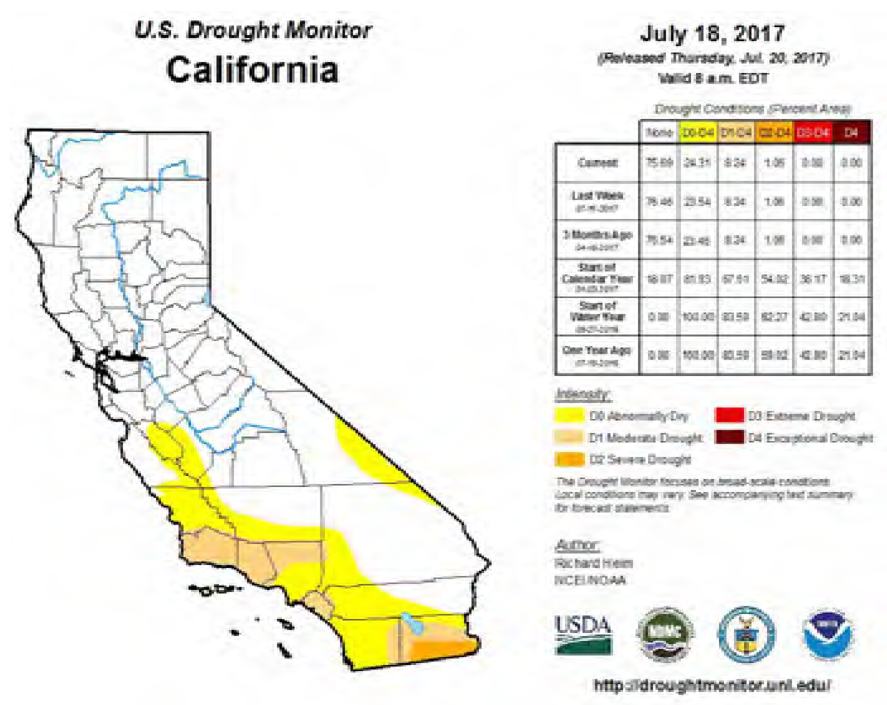
The Department of Water Resources produces a California Water Plan every five years that not only includes a statewide water budget but also regional watershed water budgets. These water budgets are based on California Department of Finance population projections and indicate clearly that demand for water will exceed supply in 2020 whether or not a drought condition exists at that time. The largest average-year shortages are forecasted for the South Coast Region, which heavily relies on imported water. Future average-year shortages in the South Coast Region reflect forecasted population growth plus lower Colorado River supplies as California reduces its use of Colorado River water to the State's basic apportionment.

Although a drought in and of itself is not a direct threat to property and life, the impact on the County's agricultural industry and home development can be monumental. The costs to the County for the current drought in terms of fire damage and forest management have been in the millions. This is a chronic problem for Riverside County and accounts for significant indirect costs, loss of property and threat to human life.

Relationship to Other Hazards – Cascading Effects

Drought can increase the severity of other hazards. For example, drought can lead to an increase in dead vegetation when can increase fire hazards. It can also lead to increased insect infestations.

Figure 37: U.S Drought Monitor – California



5.3.12 Nuclear/Radiological Incident

Severity: 4

Probability: 1

Risk Score: 1.00

<u>OA Jurisdictions Affected by Nuclear Incidents</u>

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

Radiological Accidents

Radioactive materials are routinely transported in California. These materials include the medical and industrial sources described below, as well as wastes that have radioactive components. Many of the radioactive waste shipments come from research and cleanup efforts at national laboratories.

Radiological accidents that result in the release of radioactive materials may result in long-term health risks and contamination of the state resources, including air, water supply, groundwater, and agricultural lands.

Profiling Radiological Accident Hazards

Due to strict regulation of nuclear power plants in the United States, significant nuclear power incidents that can cause harm to the public have a low probability of occurrence, and none have occurred in California. Even though the probability of a catastrophic event involving a nuclear power plant is extremely low and these plants are extremely well protected, the consequences of a severe accident or a successful terrorist attack on a nuclear power plant that results in a release of radioactive materials could be very significant.

State and local governments having jurisdiction within ten miles of an operating nuclear power plant must plan, train, and conduct emergency exercises annually in accordance with federal regulations. Detailed emergency plans are maintained by each affected agency. Four Emergency Classification Levels (ECLs) have been established in federal regulations to characterize the severity of the emergency and the response actions required. The ECLs must be used as the foundation for emergency response planning, training and exercises.

Planning Zones

A series of zones have been established around each nuclear power plant to clearly identify the required activities in the event of an accident. Although three specific zones are identified, efforts to protect public health and safety and the environment are made without regard to whether particular areas are inside or outside of these zones:

- The Emergency Planning Zone is an approximate 10-mile radius around the plants. Plans for this zone are in place to protect people, property, and the environment from the effects of exposure to a radioactively contaminated plume.
- The Ingestion Pathway Zone covers an approximate 50-mile radius around the plant. In this zone, plans are in place to mitigate the effects of radioactive contamination to agriculture, and food processing and distribution.

There are three general situations that could affect Riverside County, namely:

1. A situation involving nuclear weapons, which is discussed in the Terrorism section of this LHMP (Section 5.3.7);
2. A situation involving the transportation of nuclear materials; and
3. An incident involving the San Onofre Nuclear Generating Station (SONGS).

As will be discussed in the Terrorism section of this LHMP, the possibility exists that a terrorist organization might acquire the capability of creating a small nuclear detonation. A single nuclear detonation in the United States would likely produce fallout affecting an area many times greater than that of the blast itself. There is also the possibility that a terrorist will construct a “dirty bomb”, a bomb that is used to distribute nuclear-contaminated materials. It would have less of an effect than a “traditional” nuclear bomb, but the terror effect on the population would be great.

A nuclear incident could be initiated by a transportation emergency, either accidental or intentional. See the Transportation Emergencies section of this LHMP (Section 5.3.14).

SONGS is located on the Pacific Coast in northwestern San Diego County, approximately 4 miles southeast of the City of San Clemente. Surrounding San Onofre is a Basic Emergency Planning Zone, approximately 10 miles in radius within which certain precautionary actions must be taken and specific precautionary plans must be prepared.

This zone does not include any portion of Riverside County. Beyond this zone is an area that could be affected by radioactive fallout being deposited in such a manner as to detrimentally affect the human food chain, which includes all of Riverside County. This area is identified as the Ingestion Pathway Zone. Specifically, the primary threat is that of radioactive iodine 131 being deposited upon fodder consumed by dairy cows and subsequently appearing in milk in the public marketplace.

History of Events

Fortunately, Riverside County has not experienced a nuclear accident.

Risk Assessment

Transportation of nuclear and/or irradiated materials is of growing concern. A severe transportation incident could require the evacuation of a large number of people, major rerouting of traffic systems, and an expensive decontamination process for the area involved. Ancillary problems associated with such an incident are discussed in the sections of this LHMP dealing with Hazardous Materials and with Transportation Incidents.

Radiological Waste Transportation

Since 1989, the staff of the Energy Commission has represented California on two western state groups: the Western Governors' Association WIPP Transportation Advisory Group and the Western Interstate Energy Board's High-Level Radioactive Waste Committee. Both groups work with the U.S. Department of Energy and other state regional groups to develop accident prevention and emergency response plans for major federal non-classified shipments of radioactive waste. Staff also coordinates the California Nuclear Transport Working Group that develops and updates accident prevention and emergency response plans for federal shipments of transuranic waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico.

To mitigate disaster, federal regulations require that:

- radiological materials transported by train use special packaging based on the hazard of the shipment
- there are extensive worker training and documentation
- vehicle and packages of radioactive materials are inspected
- The waste travels via specific, controlled routes.

More information about radiological waste transportation can be found on Cal OES's radiological *transportation website.*

A detailed discussion of radiation hazards and their effects on humans along with a description of the operation of a nuclear power generating facility and the hazards posed thereby are contained in the State of California Nuclear Power Plant Emergency Response Plan and in other documents.

The State Nuclear Power Plant Emergency Response Plan assigns to the County of Riverside responsibility for certain actions to protect the public and the environment within Riverside County from the effects of an accident. The plan also lists the support and assistance available from various State and Federal organizations.

- **Effects on people and housing.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.
- **Effects on commercial and industrial structures.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.
- **Effects on infrastructure.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.
- **Effects on agriculture.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.

Risk Assessment Conclusion

The nearest plant to Riverside County is San Onofre, which is a three tower facility in San Diego County. In 1992 the site retired Tower 1. Towers 2 and 3 remained operational until 2012. In March of 2015 SoCal Edison was granted permission to decommission towers 2 and 3 and permanently close the site. The estimated date for full closure of the power plan is December 31, 2031.

The County is far enough away from nuclear power plants that cataclysmic exposure is not likely. There is the possibility of Riverside County being used as a major evacuation route from a nuclear plant accident. This would tax the County's response resources. The radiation from an accident would, of course, negatively affect the area.

Relationship to Other Hazards – Cascading Effects

Cascading effects of a nuclear incident could include contaminated water, air, and soil. It could also impact first responders and the 911 system.

5.3.13 Extreme Weather

Severity: 3

Probability: 2

Risk Score: 0.75

OA Jurisdictions Affected by Extreme Weather

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

Extreme weather hazards in Riverside County include:

- Extreme Heat
- Severe Cold
- Wind Event
- Fog Event
- Agricultural Event

Climate Change can impact weather patterns within the County. Climate changes can increase or change effects of weather. Some changes may include reduced water supply, increased temperatures, decreased precipitation and increased wildfire risks.

The National Climate Data Center (NCDC) receives Storm Data from the National Weather Service. The National Weather service receives their information from a variety of sources, which include but are not limited to: county, state and federal emergency management officials, local law enforcement officials, SKYWARN spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public.

Storm Data Disclaimer:

Storm Data is an official publication of the National Oceanic and Atmospheric Administration (NOAA) which documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. In addition, it is a partial record of other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occurs in connection with another event. Some information appearing in

Storm Data may be provided by or gathered from sources outside the National Weather Service (NWS), such as the media, law enforcement and/or other government agencies, private companies, individuals, etc. An effort is made to use the best available information but because of time and resource constraints, information from these sources may be unverified by the NWS. Therefore, when using information from Storm Data, customers should be cautious as the NWS does not guarantee the accuracy or validity of the information.

Table 32: Storm Data Table (4/30/1950 to 8/7/2017)

Type	# of Events	Property Loss	Crop Loss	Deaths	Injuries
Drought	26	N/A	N/A	N/A	N/A
Dust Storm	26	405 K	100 K	0	77
Flood	246	88.405 M	5.200 M	7	26
Fog	18	25K	0	0	21
Funnel Cloud	26	0	0	0	0
Hail	30	131.5 K	10 K	0	2
High Winds	227	65.579 M	36.705 M	8	71
Lightning	30	254.5 K	10.1K	1	6
Precipitation	25	40.400 M	0	0	26
Snow and Ice	57	1.386 M	0	4	102
Strong Winds	19	999 K	0	1	2
Temp Extremes	25	1.330 M	1.175 M	31	39
Thunderstorm Winds	119	4.980 M	10 K	0	0
Tornado	24	21.537 M	0	0	4

Type	# of Events	Property Loss	Crop Loss	Deaths	Injuries
Wild and Forest Fire	161	190.892 M	1.247 M	1	131
Totals	**1,329**	**2.229 B**	**174.429 M**	**53**	**507**

Note: Figures in the chart above were gathered from NOAA's Storm Event Database and may not be a complete listing of previous hazard occurrences.

Riverside County's weather has a history of extremes. There are basically three weather regions in the County, each with its own type of weather and each with a different impact on the County. In some cases, the high temperatures in the desert are harmful to the public, but beneficial to agriculture. In other cases, a steady rainfall that raises the water table can be good for the County, yet too much rain will cause flooding and a disruption in the production of agricultural goods.

Average Climates across the County

The Weather Tables portray the averages for several areas across the County of Riverside. The cities included are Riverside, Idyllwild and Blythe. These cover the Desert, Mountain and Valley Regions, and are clear examples of the weather extremes within the county.

Riverside Climate

Climate Riverside - California °C | °F

	Jan	Feb	Mar	Apr	May	Jun
Average high in °F:	68	68	71	76	80	87
Average low in °F:	43	44	46	49	54	57
Av. precipitation in inch:	2.32	2.4	1.69	0.67	0.2	0.08
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-

	Jul	Aug	Sep	Oct	Nov	Dec
Average high in °F:	94	95	91	83	74	67
Average low in °F:	62	62	59	53	46	42
Av. precipitation in inch:	0.04	0.08	0.16	0.47	0.83	1.38
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-

Source: http://www.usclimatedata.com/climate/riverside/california/united-states/usca1695

Idyllwild Climate

Climate Idyllwild - California °C | °F

	Jan	Feb	Mar	Apr	May	Jun
Average high in °F:	56	56	59	64	72	80
Average low in °F:	30	30	31	35	41	47
Av. precipitation in inch:	4.88	5.35	3.78	1.81	0.43	0.16
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-
Average snowfall in inch:	8	8	6	3	1	0

	Jul	Aug	Sep	Oct	Nov	Dec
Average high in °F:	86	86	81	71	62	55
Average low in °F:	54	54	49	41	34	29
Av. precipitation in inch:	0.67	0.79	0.83	1.22	2.52	3.7
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-
Average snowfall in inch:	0	0	0	0	2	4

Source: http://www.usclimatedata.com/climate/idyllwild/california/united-states/usca0506

Blythe Climate

Climate Blythe - California °C | °F

	Jan	Feb	Mar	Apr	May	Jun
Average high in °F:	68	73	80	88	97	105
Average low in °F:	40	44	49	55	63	69
Av. precipitation in inch:	0.55	0.59	0.39	0.08	0.04	0.04
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-

	Jul	Aug	Sep	Oct	Nov	Dec
Average high in °F:	109	108	102	90	76	66
Average low in °F:	78	77	69	57	46	39
Av. precipitation in inch:	0.24	0.43	0.43	0.2	0.24	0.59
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-

Source: http://www.usclimatedata.com/climate/idyllwild/california/united-states/usca0506

5.3.13.1 Extreme Heat

Overview

Extreme heat can be described as overly hot temperatures that are sustained to the extent that human and animal overexposure can cause heat illness and death. Heat illness is a major cause of preventable morbidity in regions characterized by high ambient temperatures.

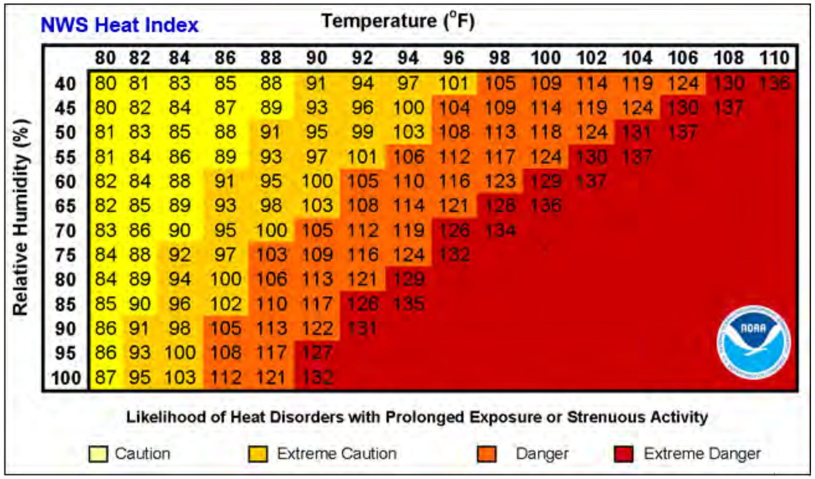
Riverside County has a wide range of temperatures, from freezing in some areas during the winter months to extremely hot temperatures for long periods of time during the summer in the deserts and other areas. In 2011 Riverside County and several other counties were impacted by a power outage during a period of high temperatures. The State Hazard Mitigation Plan addresses the issue of Extreme Heat Hazards, and this information has been included in this LHMP.

The figure on the next page illustrates the Heat Index (HI) as a function of heat and relative humidity. The Heat Index describes how hot the heat-humidity combination makes the air feel. As relative humidity increases, the air seems warmer than it actually is because the body is less able to cool itself via evaporation of perspiration. As the Heat Index rises, so do health risks.

Specifically:

- When the Heat Index is 90°F, heat exhaustion is possible with prolonged exposure and/or physical activity.
- When it is 90° to 105°F, heat exhaustion is probable with the possibility of sunstroke or heat cramps with prolonged exposure and/or physical activity.
- When it is 105° to 129°F, sunstroke, heat cramps or heat exhaustion is likely, and heatstroke is possible with prolonged exposure and/or physical activity.
- When it is 130°F and higher, heatstroke and sunstroke are extremely likely with continued exposure. Physical activity and prolonged exposure to the heat increase the risks.

Figure 38: The National Weather Service (NWS) Heat Index


NWS Heat Index

Relative Humidity (%) \ Temperature (°F)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Source: http://www.nws.noaa.gov/os/heat/heat_index.shtml

The National Weather Service (NWS) will initiate its Heat Index Program Alert procedures when the high temperature is expected to exceed 105° to 110° (depending on local climate) for at least two consecutive days.

Extreme Heat and infrastructure

Extreme heat can not only result in loss of life and injury but it can also cause damages to infrastructures. According to the 2017 update Draft of the Safeguarding California Plan, highway systems can be affected by extreme heat by roads buckling and rutting.

Profiling Extreme Heat Hazards (from the 2013 SHMP)

"Heat waves do not cause damage or elicit the immediate response that floods, fires, earthquakes, and other disasters do. They have, however, claimed many lives in comparison with other disasters. For example, the 1989 Loma Prieta Earthquake resulted in 63 deaths while the 1992 Northridge Earthquake was responsible for the loss of 55 lives. The catastrophic 2003 Southern California Firestorms resulted in 24

deaths. However, according to the 2013 SHMP, the worst single heat wave event in California occurred in Southern California in 1955, when an eight-day heat wave is said to have resulted in 946 deaths. The 2013 SHMP also states that the July 2006 heat wave in California caused the deaths of at least 136 people over a 13-day period (6 deaths were still under investigation in 2007). Another source, the Spatial Hazard Events and Loss Data for the United States (SHELDUS), estimates that approximately 47 heat events occurred in California between the years 1960 and 2008. Adjusted to 2008 dollars, SHELDUS reports that severe heat events in California caused roughly $1.8 million in property damage and $531.7 million in crop damage. From 2012 to 2014 there were 159 fatalities related to extreme Heat events within California.

The California Climate Adaptation Strategy (CAS), citing a California Energy Commission study, states that "over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined." Despite this history, however, not a single heat emergency was formally proclaimed at the state level or declared as a federal disaster between 1960 and 2008. Though no formal explanation exists for this seeming contradiction, scholars have written about the exclusion of heat events as declared disasters. For example, Eric Klinenberg, author of an account of a heat wave which killed 739 people in the City of Chicago in July 1995, suggests that the hidden nature of social vulnerability combined with the inconspicuous nature of heat events (unlike earthquakes, floods, wildfires, tornados, etc.) prevent them from being declared as legitimate disasters.61 Further, although heat events can have a devastating effect on agriculture, heat-caused property damage over the last 48 years has been relatively small.

Treating Heat as a "Legitimate Disaster" (from the 2013 SHMP)

These facts raise several issues. First, since the primary goal of the SHMP is to significantly reduce the loss of life and injuries in the state of California, heat is considered a legitimate disaster type. Though heat does not cause much economic damage or damage to the built environment, the number of people it has killed underscores the importance of mitigating its impacts. Second, heat events highlight the importance of thoughtful social vulnerability analyses. While changes to the built environment can greatly alter vulnerability to different hazards, social vulnerability and resiliency are especially important during heat events. For example, socially isolated elderly persons are especially vulnerable. Any mitigation efforts aimed at reducing heat losses will focus on ways to reduce social isolation as well as changes to the built environment. Third, heat events illustrate how seemingly unrelated phenomena combine to create a disaster. For example, the increased use of air conditioners during heat waves can lead to power outages, which makes the events even more deadly. Upgrading water and power infrastructure, then, is a form of heat disaster mitigation.

Situational and physical characteristics help to identify vulnerable populations that may not comfortably or safely access and use disaster resources. Specifically, when discussing heat related emergency preparedness, the following groups could be considered vulnerable or at greater risk in a heat emergency:

- Infants and small children under age three
- Women who are pregnant
- Elderly people (age 65 and older)
- Homeless
- The obese
- The bedridden
- Mentally ill
- Those with cognitive disorders
- Those with medical conditions (e.g., heart disease, diabetes, high blood pressure)
- Those requiring life-saving medications (e.g., for high blood pressure, depression, insomnia)
- Individuals with drug or alcohol addictions
- Those with mobility constraints
- People who are non-ambulatory
- Those under extreme working conditions
- The poor
- People who are socially isolated
- Non-English speakers who may not have access to information

Animals, including domestic pets, livestock, and poultry are also susceptible to extreme heat. For example, dogs and cats are in danger of heat stroke in temperatures of 110°F. The heat wave of 2006 resulted in 15 reported pet deaths and more than 25,000 cattle, and 700,000 fowl heat-related deaths.

Table 33: 1991 -2013 Heat Deaths in California

	< 1	1-4	5-9	10-14	15-19	20-24	25-44	45-64	65-84	85+	*Total*
1991	0	0	0	0	0	1	6	5	5	0	***17***
1992	0	0	0	1	2	0	8	3	2	1	***17***
1993	0	1	0	0	0	1	1	3	6	0	***12***
1994	0	0	0	0	0	0	7	7	9	0	***23***
1995	0	0	0	0	0	1	6	5	3	2	***17***
1996	0	1	0	0	0	0	5	8	7	0	***21***
1997	0	0	0	0	0	0	3	0	3	1	***7***
1998	0	0	0	0	0	2	3	2	2	0	***9***
1999	0	2	0	0	0	0	5	3	8	1	***19***
2000	2	0	1	0	0	2	10	9	8	3	***35***
2001	0	3	0	0	0	0	3	8	4	1	***19***
2002	2	1	0	0	0	1	12	4	3	1	***24***
2003	1	0	0	0	1	3	12	6	6	0	***29***
2004	1	2	0	0	0	1	9	8	6	1	***28***
2005	0	1	1	2	0	2	13	7	5	5	***36***
2006	1	0	0	0	0	3	22	48	38	10	***122***
2007	2	1	0	0	2	2	14	13	4	4	***42***
2008	0	0	0	0	1	1	5	15	3	4	***29***
2009	1	0	0	0	1	2	8	15	7	5	***39***
2010	1	0	0	0	1	1	5	9	4	1	***22***
2011	0	0	0	0	0	1	3	8	4	1	***17***
2012	0	0	0	0	1	2	17	13	7	4	***44***
2013	1	0	0	1	2	2	10	14	11	2	***43***
Total	***12***	***12***	***2***	***4***	***11***	***28***	***187***	***213***	***155***	***47***	***671***

*Current as of June 2017
Source: CDPH Vital Statistics Death Statistical Master Files
Prepared by: California Department of Public Health, Safe and Active Communities Branch
Report generated from http://epicenter.cdph.ca.gov on: August 07, 2017

5.3.13.2 Severe Cold

Overview

Riverside County generally experiences a Mediterranean or Desert climate. When temperatures suddenly drop it can potentially lead to loss of life in humans and livestock, as well as severely damage crops.

When temperatures drop below freezing that is the most dangerous time for crops. When water freezes it expands, this effect causes damage to a plants structure and may cause it to die.

Identifying Freeze Hazards (2013 SHMP)

Sustained temperatures below freezing in California's generally mild weather regions can cause life loss and health risks to vulnerable populations. Although infrequent, freezes can severely affect California agriculture. Freezing temperatures occurring during winter and spring growing seasons can cause extensive crop damage.

Secondary impacts of freeze disasters can include major economic impacts on farmers, farm workers, packers, and shippers of agricultural products. Freezes can also cause significant increases in food prices to the consumer due to shortages.

Freezing spells are likely to become less frequent in California as climate temperatures increase. If emissions follow higher pathways, freezing events could occur only once per decade in a sizable portion of the state by the second half of the 21st century. While fewer freezing spells would decrease cold-related health effects, too few freezes could lead to increased incidence of disease as vectors and pathogens do not die off (CNRA 2009).

5.3.13.3 Wind Event

Overview

Windstorms are a hazard for many of the participating.

Santa Ana Winds have caused large amounts of damage and increased the fire damage level dramatically. Santa Ana Winds are generally defined as warm, dry winds that blow from the east or northeast (offshore). These winds occur below the passes and canyons of the coastal ranges of Southern California and in the Los Angeles basin. Santa Ana winds often blow with exceptional speed in the Santa Ana Canyon (the canyon from which it derives its name). Forecasters at the NWS in Oxnard and San Diego usually place speed minimums on these winds and reserve the use of "Santa Ana" for winds greater than 25 knots.

The complex topography of Southern California combined with various atmospheric conditions creates numerous scenarios that may cause widespread or isolated Santa Ana events. Commonly, Santa Ana winds develop when a region of high pressure builds over the Great Basin (the high plateau east of the Sierra Mountains and west of the Rocky Mountains including most of Nevada and Utah). The clockwise circulation around the center of this high pressure area forces air downslope from the high plateau. The air warms as it descends toward the California coast at the rate of 5 degrees F per 1000 feet due to compressional heating. Thus, compressional heating provides the primary source of warming. The air is dry since it originated in the desert, and it dries out even more as it is heated.

Santa Ana winds commonly occur between October and February with December having the highest frequency of events. Summer events are rare. Wind speeds are typically north to east at 35 knots through and below passes and canyons with gusts to 50 knots. Stronger Santa Ana winds can have gusts greater than 60 knots over widespread areas and gusts greater than 100 knots in favored areas. Frequently, the strongest winds in the basin occur during the night and morning hours due to the absence of a sea breeze. The sea breeze which typically blows onshore daily can moderate the Santa Ana winds during the late morning and afternoon hours.

The following maps and photos show the direction of the Santa Ana winds as they travel from the stable, high-pressure weather system called the Great Basin High through the canyons and towards the low-pressure system off the Pacific. Riverside County is in the direct path of the ocean-bound Santa Ana winds.

Figure 39: Direction of Santa Ana Wind Patterns

Source: http://www.theweatherprediction.com/weatherpapers/049/

Risk Assessment

The Santa Ana Winds pose several different types of threats.

1. By themselves, the winds pose a threat to the health of the people and to structures in the County.

a. Health risks relate primarily to breathing problems caused by the blowing dust and plant pollen.

b. Structural issues relating to the winds range from roofs being blown off to trees falling onto buildings.

2. The winds increase the threat and/or severity of fires in the urban areas

a. Wind-blown flames will spread more rapidly when pushed by high Santa Ana Winds.

3. Santa Ana Winds dry out brush and forest areas and increase the speed of a fire.

4. Santa Ana Winds cause power lines to arc, resulting in fires
5. Santa Ana Winds can either cause trees to fall on power lines or power lines to break, causing power outages.

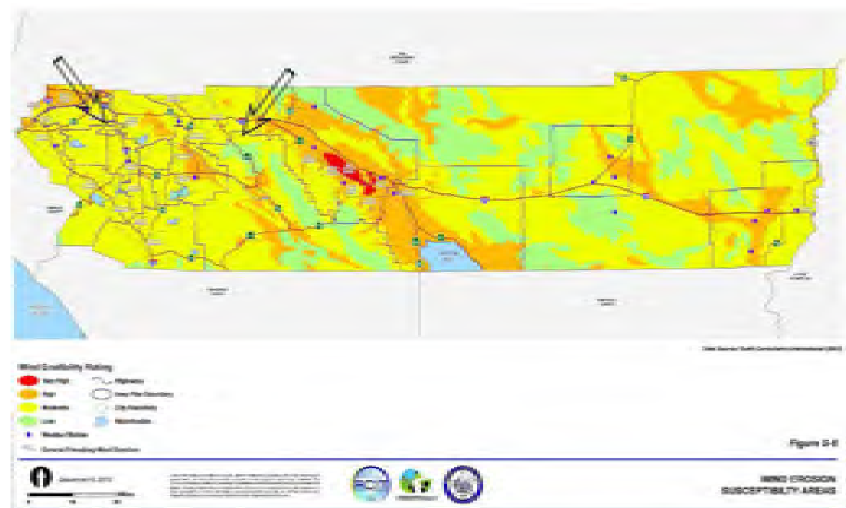
Wind Erosion

Soil erosion is also a natural on-going process that transports, erodes and displaces soil particles through a transport mechanism, such as flowing water or the wind. Loose texture and steep slopes primarily result in high wind erosion potential in soils. Wind erosion is most severe in arid regions, where sandy or loamy sediments are un-vegetated and exposed to severe wind conditions.

In addition to the problems caused by the Santa Ana Winds, wind erosion is a serious environmental problem attracting global attention. Soil movement is initiated as a result of wind forces exerted against the surface of the ground. Dust particles in the air create major health problems. Atmospheric dust causes respiratory discomfort, may carry pathogens that cause eye infections and skin disorders and reduces highway and air traffic visibility. Dust storms can cause additional problems. Buildings, fences, roads, crops, trees and shrubs can all be damaged by abrasive blowing soil.

The wind and wind-blown sand are an environmentally-limiting factor throughout much of Riverside County. Approximately 20 percent of the land area of Riverside County is vulnerable to "high" and "very high" wind erosion susceptibility. The Coachella Valley, the Santa Ana River Channel in northwestern Riverside County, and areas in and around the Cities of Hemet and San Jacinto are zones of high wind erosion susceptibility. Human intervention can accelerate the natural erosion process. For instance, typical consequences of development increase erosion potential from the removal of vegetative cover and reduction of overall permeable area. These activities can lead to increased water runoff rates and concentrated flows that have greater potential to erode exposed soils. The effects of excessive erosion range from nuisance problems that require additional maintenance, such as increased siltation in storm drains, to instances of more severe damage, where water courses are down-cut and gullies develop. These processes can eventually undermine adjacent structures or topography. Human activities that disturb soils in arid regions increase wind erosion potential. Many of the desert areas are also susceptible to blowing sand, a severe form of wind erosion that damages property and accumulates soil on roadways. The majority of the soils within the district exhibit moderate to high erosion potential, which can be compounded by development.

Map 17: Riverside County Wind Erosion Map



5.3.13.4 Fog Event

Overview

Fog forms from air being cooled to the point where it can no longer hold all of the water vapor it contains. For example, rain can cool and moisten the air near the surface until fog forms. A cloud-free, humid air mass at night can lead to fog formation, where land and water surfaces that have warmed up during the summer are still evaporating water into the atmosphere. This is called radiation fog. A warm moist air mass blowing over a cold surface also can cause fog to form, called advection fog.

Fog can have a devastating effect on transportation. Nighttime driving in the fog is dangerous and multi-car pileups have resulted from drivers using excessive speed for the conditions and visibility. Fog contributes to transportation accidents and is a life safety hazard. These accidents can cause multiple injuries and deaths and could have serious implications for human health and the environment if a hazardous or nuclear waste shipment were involved. Dense fog may also delay emergency response vehicles.

This hazard does not occur regularly but has had an impact on the highways.

5.3.13.5 Agricultural Event

Overview

Agriculture in Riverside County must be considered from two standpoints, namely, both as a product producer/exporter and a major economic provider to the County of Riverside. In 2014, Riverside County ranked in the top fourteen leading agricultural counties in California, with an agricultural production value of $1.36 billion. Major agricultural industries include milk, nursery products, citrus and avocado, grapes, vegetables and hay.

Riverside County is divided into two general agriculture regions (Desert and Western Riverside County), with the San Bernardino National Forest acting as a natural dividing line.

Desert - Coachella Valley & Palo Verde Valley

Agriculture is the second largest industry in the Desert Valleys and is primarily crop- related. Over 61% of Riverside County's crop production is grown in the Coachella and Palo Verde Valleys. In addition to crop production, many supporting industries, such as packing and distribution, are located in the desert

area. The Coachella Valley produces 95% of all dates grown in the United States and the annual fruit crop exceeds 40 million pounds. The Desert's list of agriculture-related products includes:

- Vegetable & Melon Crops (Bell Peppers, Lettuce, Corn, Watermelon, etc.)
- Nursery Stock
- Turf/Sod Producers
- Field Crops (Hay, Cotton, Wheat, etc.)
- Citrus
- Tree & Vine Crops (Table Grapes, Dates)

Western Riverside County (WR)

Agriculture in the Western Riverside County region is an ever-changing industry. With the large increase in housing in this area of the County over the past few years, there has been a reduction of several agriculture-related industries. This reduction is primarily in the poultry and dairy industries. The Western Riverside County list of agriculture-related products includes:

- Dairy Cattle
- Nursery Stock
- Beef Cattle
- Poultry and Eggs
- Citrus Crops
- Tree and Vine Crops (Avocado, Wine Grapes)
- Field Crops (Wheat, Hay, Green Chop)
- Vegetable Crops (Potatoes, etc.)
- Fish Hatcheries (for domestic and international distribution)

Statistics for Riverside County Agriculture

Table 11: USDA statistics for Riverside County Agriculture for 2012 show the following:

Payroll	$16 million
Farms	3,440
Farm Acreage	344,044
Crop Value Production	$1.03 billion +
Livestock, poultry value including production	$146 million +
Dairy cows	42,954
Sheep and Lambs	36,846
20 week old and older layers	4,127,452
Wheat for Grain Acreage	6,400

United States Department of Agriculture, National Agricultural Statistics Service reports listed the following as the Top 5 commodities in 2015.

Table 12: Top 5 Commodities

Milk Products	$165,124 million
Table Grapes	$143,988 million
Nursery Stock	$137,707 million
Lemons	$120,557 million
Hay	$81,760 million

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

History

Table 13: Agriculture-related disasters in Riverside County:

Riverside County Agriculture Disasters				
Year	**Disaster**	**Commodity**	**Damages**	**Region**
1979-80	Wind	Avocado and Citrus	$40,000.00	
1979-80	Rain/Floods (El Nino)	Olive Trees (4,200)	$319,494.00	WR.
1979-80	Rain/Floods	Sugar beets, Barley &	$182,711.00	WR.
1979-	Rain/Floods	Potato Crop	$2,000,000.00	WR.
1979-80	Rain/Floods	Dairy and Livestock	$211,900.00	WR.
1982-1983	Rain/Floods (El Nino)	All agriculture		Countywide
1990 *	Insect Infestation-Med- fly	Fruit		Countywide
1990-91	Freezing temperatures	Citrus, avocados,	$15,450,000.00	Countywide
1990-	Drought			WR
1991	Insect Infestation-white fly	Melons, squash, cucumbers,		WR, Desert
1992-	Rain/Flood			
1993-94	Insect Infestation-Med- Fly	Fruit		WR
1996	Plant disease-Karnel Blunt	Wheat		WR/Blythe
1997-98	Rain/Flood (El Nino)	Wheat	$167,000.00	WR
1997-98	Rain/Flood (El Nino)	Livestock & Dairy	$4,100,000.00	WR

1999	Freezing temperatures	Citrus	$1,630,000.00	Countywide
*1999-2002 **	*Insect spread disease - (Pierce's Disease)*	*Wine Grapes*	*$16,000,000.00*	*WR*
*2001-July **	*Rain/Floods-Desert Storm*	*Misc. land & irrigation damage*	*~ $1,000,000.00*	*CV*
2002-2003	Drought	Dairy farms, dry land crops, etc.		Countywide
2002	High Winds/Freeze	Avocado & Citrus Crops	$8,586,000.00	WR
2002-03	Animal Disease-END	Poultry - 300,000 birds in So. Calif.		WR
2003-04	Wildfire	Nursery, various		WR
2004-05	Severe Storms – Excessive Moisture	All Agricultural Commodities		Countywide
2005	Severe Storms – Excessive Moisture	All Agricultural Commodities		Countywide
2006	Excessive	Livestock		WR
2007	Winter Storms	All Agricultural		Countywide
2007	Wildfires	Avocados		WR
2007	Below Normal Temperatures, Winter Storms	All Agricultural Commodities		Countywide

2007	Hail	All Agricultural		Countywide
2007	Drought	Grain Crops, Livestock	$3.8 Million +	WR
2008	Wildfires	All Agricultural		WR
2009	Drought	Grain Crops, Livestock	$5.0 Million +	WR
2010	Earthquake	Agricultural Buildings		Coachella Valley
2010	Winter Storms – Flooding, Debris Flow,	All Agricultural Commodities		Countywide
2013-2016	Drought	Crops damaged due to		County Wide

*Denotes a locally declared disaster

Risk *Assessment*

When considering Agriculture the County factored in both crops and animals/livestock. Both groups have a three day window before serious damages occur (aside from physical damages that may happen due to earthquake or floods).

Animals

Most beef and dairy ranches, chicken ranches, swine farms, and other agricultural animal facilities usually only have a 2-to-3 day supply of feed on-site. Most of the large feed providers in the County do not have more than a 3-to-5 day supply. Restocking of feed supplies is done primarily by rail to the feed providers and then by truck to the local ranches.

In addition to providing feed for the animals, the impact on the dairy farms would be immense. The time factor for the dairy farms would be almost immediate. Not being able to move milk to the milk house was a major concern. Dairy cows have to be milked and without the ability to transport the milk off property, that milk has to be disposed of in some way so as not to contaminate the soil or create a positive host for insects.

Crops

Although many crops are time sensitive and there is a limited amount of storage space in local packing houses, transportation issues vary based on the time of year and crop season.

Water Related Hazards

Many crops are not as water-dependent as animals are, though some ground and vine crops have a very short lifespan without an adequate supply. Short-term water supplies can be provided to animals through the use of water trucks; however, water trucks cannot support large crop areas with an adequate level of water.

Water-related issues included:

1. Local water supply (wells, holding ponds, etc.) contamination occurring either naturally or from man-made causes
2. Loss of water supply due to pipeline or aqueduct damage from an earthquake.

Hazmat Incidents – On-Property and Off-Property

The definition for an On-Property Hazmat incident relates to the improper use of chemicals, crop-dusting accidents or errors, accidental chemical spills into the ground, and other similar incidents. Off-Property Hazmat events relate to the typical transportation Hazmat incident. Both groups (animal-related and crop-related) were very concerned about the impact of an On-Property event. There was a higher level of concern about the impact of an Off-Property event for animals than for crops. Both groups rated the probability of either type of event occurring as low.

Transportation Events

Transportation events were listed as either short-term (less than 3 days) or long-term (over 3 days) and included:

1. Railroad accidents interrupting the delivery of products into the County;
2. Railroad accidents interrupting the movement of products out of the County;
3. A railroad or trucking strike; and

4. A disruption in transportation lines due to an earthquake, flood, fire, or another event.

Both animals and crops viewed the 3-day point as critical from both an economic and operational standpoint, with the crop group indicating that the 3-day window could be reduced based on whether or not it was picking season.

Insect infestation and Disease to Crops and Vines

There is an ever-changing potential for damage to local crops and vines from disease and insect infestation. The County has been attacked by a wide variety of pests, insects, and diseases, and because of the diversity of the types of crops in the County, maintaining a pro-active approach has been difficult. Studies and history show that should there be a disease outbreak or contamination of crops/vines, the economic impact would be enormous. Recent events in other states have shown the potential for bans on importation of cattle/dairy products from affected states.

One of the primary concerns of the producers in the County is the illegal or uninspected importation of plants into this region. The majority of insect, pest, and disease issues in the County can be attributed to this problem.

Table 37: Primary Crop-related Insect Infestations for Riverside County

The table below shows the primary crop-related insect infestations in the County over the past twenty years:

NAME
AFRICANIZED HONEY BEE
BARK BEETLE
CITRUS LEAFMINER
GLASSY-WINGED SHARPSHOOTER
GYPSY MOTH
HONEY BEE TRACHEAL MITE
JAPANESE BEETLE
LESSER SNOW SCALE
MAGNOLIA WHITE SCALE
MEDITERRANEAN FRUIT FLY
ORIENTAL FRUIT FLY
PIERCE'S DISEASE
RED IMPORTED FIRE ANT
STING NEMATODE
TROPICAL PALM SCALE
VARROA MITE/HONEY BEE
ASIAN CITRUS PSYLLID
SILVERLEAF WHITEFLY
POLYPHAGOUS SHOT-HOLE BORER

Figure 40: 2015 Pest Interceptions Chart

PEST INTERCEPTIONS - 2015

Scientific Name	Common Name	Pest Rating	Interceptions
Solenopsis invicta	Red Imported Fire Ant	A	30
Maconellicoccus hirsutus	Pink Hibiscus Mealybug	A	8
Lopholeucaspis cockerelli	Cockerell Scale	A	3
Pseudaulacaspis cockerelli	Magnolia White Scale	A	1
Ceroplastes floridensis	Florida Wax Scale	A	1
Paropeas achatinaceum	Land Snail	A	1
Aspidiotus destructor	Coconut Scale	A	1
Homalodisca vitripennis	Glassy-Winged Sharpshooter	B	2
Aonidiella aurantii	California Red Scale	B	1
Pulvinaria urbicola	Urban Soft Scale	B	1
Bradybaena similaris	Asian Tramp Snail	B	1
Fatoua villosa	Crabweed	B	1
Nipaecoccus sp.	Mealybug	Q	2
Paracoccus sp.	Mealybug	Q	2
Aspidiella sacchari	Armored Scale	Q	1
Phenacoccus peruvianus	Mealybug	Q	1
Ferrisia sp.	Mealybug	Q	1
Milviscutulus sp.	Scale	Q	1
Ophelimus mastielli	Gall Wasp	Q	1
Bambusaspis miliaris	Bamboo Pit Scale	Q	1

Animal Diseases

There have not been recent incidents of catastrophic outbreaks of disease in the cattle/dairy industry. This is due in part to excellent precluding efforts on behalf of the cattle/dairy industry. Studies and history show that if there is an outbreak of cattle/dairy- related disease, the economic impact would be enormous. Recent events in other states have shown the potential for bans on importation of cattle/dairy products from affected states. In a short period of time, the inability to export products from the County would have wide-ranging economic effects.

The poultry industry is particularly vulnerable to the spread of disease because many fowl are kept in residential back yards and are therefore hard to monitor. Diseases can be spread by mosquitoes and/or ranch service operations that often serve more than one farm, increasing the odds of infection being spread. Outbreaks of the Exotic Newcastle Disease in the poultry industry in 2003 have resulted in the necessary depopulation of 3.16 million chickens in the County. This disease required the quarantine of a large area of Southern California, including all of Riverside County. The economic loss to the ranchers and County as a whole was estimated to be 161 million.

Diseases of primary concern to the area are:

- Avian Influenza
- Exotic Newcastle Disease
- Fowl Pox
- Hoof-and-Mouth Disease
- Transmissible Spongiform Encephalopathies

Loss of Electrical Power

The loss of electrical power is becoming more of a concern to all areas of agriculture. Depending on the season, the loss of electrical supply to a poultry ranch can be devastating within 2-to-4 hours because of the inability to keep the chickens cool. The loss of electrical power for over a 12 hour period can be devastating to a dairy farmer who cannot milk dairy cows.

5.3.14 Transportation Failure

Severity: 3

Probability: 2

Risk Score: 0.38

OA Jurisdictions Affected by Transportation Hazard Incidents

- Riverside Community College District
- San Gorgonio Memorial Hospital
- Banning
- Beaumont
- Blythe
- Calimesa
- Canyon Lake
- Cathedral City
- Coachella
- Corona
- Desert Hot Springs
- Eastvale
- Hemet Indian Wells
- Indio
- Jurupa Valley
- La Quinta
- Lake Elsinore
- Menifee
- Moreno Valley
- Murrieta
- Norco
- Palm Desert
- Palm Springs
- Perris
- Rancho Mirage
- Riverside
- San Jacinto
- Temecula
- Wildomar

Hazard Definition

Transportation hazards are incidents involving air, rail, or highway transport of goods or passenger travel resulting in property damage, death, or serious injury. The incidents can be caused by transportation of hazardous materials, earthquake, hazardous weather, or other hazardous conditions affecting the uninterrupted flow of transportation and/or public safety.

Five major transportation systems operate within Riverside County.

1. Highways
2. Railroads
3. Air traffic
4. High-pressure petroleum and gas lines
5. Aqueducts.

Pipelines and aqueducts are treated separately in following sections of this LHMP.

History

Highways. The traffic density on the freeway and highway systems in the western part of the County is of particular concern. The population and economic growth in this area have caused increased demand on these networks.

Although the seasons do not have a large impact on Riverside County, there is the threat of poor visibility due to winter fog. Adding to this problem is the fact that one out of every ten trucks on the freeway carries some sort of hazardous materials. (In addition, California Highway Patrol statistics show that 20 – 25 percent of them are usually driven in an unsafe mechanical condition.)

Rail Lines. Major rail transport lines through Riverside County include Union Pacific and the Burlington Northern Santa Fe (BNSF) Railway Companies. Rails, cars, supporting bridges, overpasses, and electrically-operated switching mechanisms are susceptible to damage.

Union Pacific and the BNSF Railway Companies lines enter the Coachella Valley from Imperial County along the eastern shore of the Salton Sea.

Major population centers affected by railroad transportation are vulnerable to the impact of a wide variety of hazardous materials transported by these carriers. Additionally, there are lines running east and west that carry significant tonnage daily. Some of these lines are in remote areas, but that does not lessen the overall seriousness of their impact.

Airlines / Airports.

The western part of Riverside County has some of the busiest air traffic areas in the United States. Commercial, as well as military traffic, is very heavy. The number of near misses reported by pilots underscores the increasing possibility of a mid-air collision over the County.

There are two major airports in Riverside County: March Air Reserve Base and Palm Springs International. There are also numerous smaller municipal and commercial airports and private air strips:

- Banning Airport
- Bermuda Dunes Airport
- Blythe Airport
- Chiriaco Summit Airport
- Corona Municipal Airport
- Desert Center Airport
- Flabob Airport
- French Valley Airport
- Hemet- Ryan Airport
- Lake Elsinore/Skylark Airport
- Perris Valley Airport
- Rancho California Airport
- Riverside Municipal Airport
- Jacqueline Cochran Regional Airport

In addition, there are five major out-of-county airports operating in the vicinity of Riverside County with significant flight-paths over the County:

1. John Wayne Airport (Orange County)
2. Long Beach Airport (Los Angeles County)
3. Los Angeles International (LAX) Airport
4. Ontario Airport (San Bernardino County)
5. Chino Airport (Airport Influence Area extends into Riverside County)
6. San Diego International Airport (SAN) San Diego County

Risk Assessment

The possibility for a transportation hazard to occur is ongoing. There have been railway incidents in the recent past, although they have not been numerous and have not caused extensive damage. Semi-trucking incidents are not uncommon and could result in a hazardous spill at any time, although notable events have not occurred in recent history. There has not been a serious airline accident in the area in the recent past.

- **Effects on people and housing.** As the historical events in Riverside County show, people may be evacuated when a transportation emergency occurs. Relative to some of the other natural hazards assessed earlier in this LHMP, the numbers of people affected by transportation emergencies are usually less. However, a transportation accident on Interstate 10 during a period of high heat can result in hundreds (or more) of commuters being stranded on the highway with little resources for an extended period of time.

- **Effects on commercial and industrial structures**. There may be economic consequences due to transportation emergencies, but the damage is generally limited to clean-up of facilities and grounds or simply interruption of business due to evacuation.

- **Effects on infrastructure.** Transportation emergencies may result in downed power lines. Also, Hazmat materials released in a transportation emergency may impact waterways and drainage systems, and incidents can lead to the evacuation of schools, business districts, and residential areas.

- **Effects on agriculture**. Transportation is essential to the agricultural industry.

For all elements of agriculture other than those that are dairy-related, any incident that affects transportation for more than three days is "major." For the dairy segment of the agricultural industry, any incident that affects the ability to transport product by more than 12 hours is considered "major."

Risk Assessment Conclusion.

In general, transportation hazards are not cataclysmic in terms of widespread property damage and loss of life. Existing emergency operations should be equipped to handle almost of any transportation hazard that may occur.

However, because Riverside County has an agricultural production value of over $1 billion, any transportation emergency that affects the ability of agriculture to conduct its routine business (importing supplies and exporting production) can have severe economic consequences for the County.

Relationship to Other Hazards – Cascading Effects

Depending on the location of the incident, the cascading effects of transportation emergencies are generally limited to those of Hazmat incidents, Fires or Extreme Weather (if the incident occurs in the desert when the temperatures are very high, citizens in vehicles stopped for several hours can suffer from the heat and lack of conveniences). In all cases, health and life may be threatened.

5.3.15 Dam Failure

Severity: 3

Probability: 1

Risk Score: 0.38

OA Jurisdictions Affected by Dam Failure

- Norco
- Eastvale
- Corona
- Lake Elsinore
- Wildomar
- Murrieta
- Temecula
- Perris
- Menifee
- Riverside
- Jurupa Valley
- Hemet
- Moreno Valley
- San Jacinto
- Various Portions of unincorporated areas in the West County

Hazard Definition

The term "dam failure" encompasses a wide variety of circumstances. Potential causes of a dam failure are numerous and can be attributed to deficiencies in the original design of the dam, the quality of construction, the maintenance of the dam and operation of the appurtenances while the dam is in operation, and acts of nature including precipitation in excess of the design, flood, and damage from earthquakes. Water over topping the dam crest is a common cause of failure in earth dams.

Overtopping will cause erosion of the dam crest and eventual dam breach. Piping of earth dams is another common form of failure. Piping is a form of erosion that occurs underground caused by rodent burrowing and the presence of extensive root systems from vegetation growing on and around the dam.

Flooding of the area below the dam may occur as the result of structural failure of the dam, overtopping, or a seiche. The primary danger associated with a dam failure is the swift, unpredictable flooding of those areas immediately downstream of the dam.

There are three general types of dams: earth and rock fill, concrete arch or hydraulic fill, and concrete gravity. Each of these types of dams has different failure characteristics. The earth/rock fill dam will fail gradually due to the erosion of the breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. A concrete arch or hydraulic fill dam will fail almost instantaneously; with a very rapid build-up to a peak and then a gradual decline. A concrete gravity dam will fail somewhere in between instantaneous and gradual, with the corresponding build-up of flood wave.

History

Historically, Riverside County has not experienced any significant dam failure incidents, although there are several major dams in the County of both the earthen and steel reinforced concrete type

Risk Assessment

The County of Riverside is subject to potential flooding from several local dams, reservoirs, streams, rivers, and washes. These include but are not limited to, Lake Elsinore, the Colorado River, and the San Jacinto River. Seasonal flooding with the failure of run-off storage reservoirs, canals, and levees could seriously compound the situation, particularly in or near urban population centers. From the time of complete failure to inundation could be as little as 5-to-10 minutes.

Portions of Riverside County along the Colorado River corridor could suffer from a catastrophic failure of dams that are located far outside the borders of Riverside County. These dams include Palo Verde Diversion Dam, Headgate Rock Dam, Parker Dam, Davis Dam, and Hoover Dam. If there were a catastrophic dam failure, it is estimated that it would take a minimum of 23 hours before the flood waters reach the City of Blythe.

With major disruptions in power and communications systems, a warning may not be received from dam or reservoir sites in time to initiate an organized evacuation or broadcast warnings via emergency radio stations. If a credible prediction is initiated, then preparation for a damaging earthquake could begin and residents and business owners within dam inundation areas could be directed to assembly areas to wait for official word regarding safe re-entry. This method of direction and control could substantially reduce potential loss of life, if enough warning were available.

- **Effects on Agriculture** can be catastrophic, both for crops and for animals. Loss of property is a real risk, as well.

Risk Assessment Conclusion.

Although dam failure incidents have not historically been a problem in Riverside County, the County's location with respect to earthquake fault lines presents the very real danger of dam failure due to quakes. If this were to occur, the effects could be catastrophic. Also, as noted above, seasonal flooding with the failure of run-off storage reservoirs, canals, and levees could seriously compound the risks of dam failure and additional flooding.

Relationship to Other Hazards – Cascading Effects

Dam failure obviously causes downstream flooding. It may also lead to power failures and downed power lines. The secondary effects of dam failure can include the disruption of the local and state economies by damage to buildings and roads, the severance of communications, the disruption of supply and delivery mechanisms, additional welfare, and emergency aid to the recovering economy.

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Table 38: Dams within the County of Riverside

Listed Alphabetically By County

Dam No.	National ID No.	Name	Owner	County	Stream	Year Built	Capacity (Ac-ft)	Res. Area (Acres)	Drainage Area (mi^2)	Crest Elev. (ft)
1003-003	CA00798	Alessandro	Riverside County Flood Control And Water Conservation	Riverside	Alessandro Cr	1956	370	17	4.63	1146
1003-007	CA00802	Boxsprings	Riverside County Flood Control And Water Conservation	Riverside	Box Springs Cr	1960	405	29	4	1139
35-021	CA01441	Cajalco Creek	Metropolitan Water Dist	Riverside	Cajalco Creek	2001	889	74.4	22.7	1512
87-008	CA01204	Declez Retention	San Bernardino County Flood Control District	Riverside	San Sevaine Cr	1984	331	21	10.7	849
35-018	CA01410	Diamond Valley Lake	Metropolitan Water District	Riverside	Domenigoni Valley Cr	2000	800000	4860	13	1769
35-019	CA01413	Diamond Valley Lake Forebay	Metropolitan Water District	Riverside	Domenigoni Val Can	1999	500	31	0.13	1497.5
1812-000	CA01302	Dunn Ranch	Agri-Empire,A Calif Corp	Riverside	Hamilton Cr	1987	90	7	0.2	142.5
1003.02	CA10503	Eagle Canyon Debris Basin	Riverside County Flood Control And Water Conservation	Riverside	Eagle Canyon	2015	222	7.1	-	405
822-000	CA00767	El Casco	Riverside Land Conservancy	Riverside	San Timoteo Creek	1879	143	15	0.09	116
81-000	CA00304	Fairmount Park	City Of Riverside	Riverside	Santa Ana River	1923	200	40	22	793
827-000	CA00769	Foster	Idyllwild Water District	Riverside	Lily Creek	1945	56	6	0.85	5812
35-020	CA01424	Goodhart Canyon Detention Basin	Metropolitan Water Dist	Riverside	Goodhart Canyon	1999	1026	98	3.8	1627.2

1003	CA00787	Harrison Street	Riverside County Flood Control And Water Conservation	Riverside	Harrison Creek	1954	208	14	2.03	1123.5
35-016	CA01349	Henry J Mills No 2	Metropolitan Water Dist	Riverside	Offstream	1996	92	5	0.1	1651.2
35-014	CA01085	Henry J Mills Reservoir	Metropolitan Water Dist	Riverside	Offstream	1979	83	6	0	1651
35-017	CA01374	Hj Mills Reclamation	Metropolitan Water District	Riverside	Offstream	1996	98	16	0.03	1593
1003-014	CA01212	Jurupa Basin	Riverside County Flood Control And Water Conservation	Riverside	Jurupa Wash	1983	167	17	1.69	855
817-000	CA00763	Lake Hemet	Lake Hemet Municipal Water District	Riverside	San Jacinto Riv	1895	14000	470	67	4341.5
1003-016	CA01392	Lakeview	Riverside County Flood Control And Water Conservation	Riverside	San Jacinto Riv	1994	530	39	7.6	1621
818-002	CA00766	Lee Lake	Elsinore Valley Mun Wd	Riverside	Temescal Creek	1919	1100	70	53	1153
1003-009	CA01103	Mabey Canyon	Riverside County Flood Control And Water Conservation	Riverside	Mabey Creek	1974	68	5	1.5	1146
1003-011	CA01211	Mary Street	Riverside County Flood Control And Water Conservation	Riverside	Alessandro Wash	1981	320	19	6.7	1009
35-000	CA00212	Mathews	Metropolitan Water District of Southern California	Riverside	Cajalco Creek	1938	182000	2750	40	1404
1003-015	CA01197	Metz Road Debris Basin	Riverside County Flood Control And Water Conservation	Riverside	San Jacinto Riv	1981	88	20	1	1470.5
81-003	CA00305	Mockingbird Canyon	City Of Riverside	Riverside	Mockingbird Can	1914	1250	64	13.13	1015

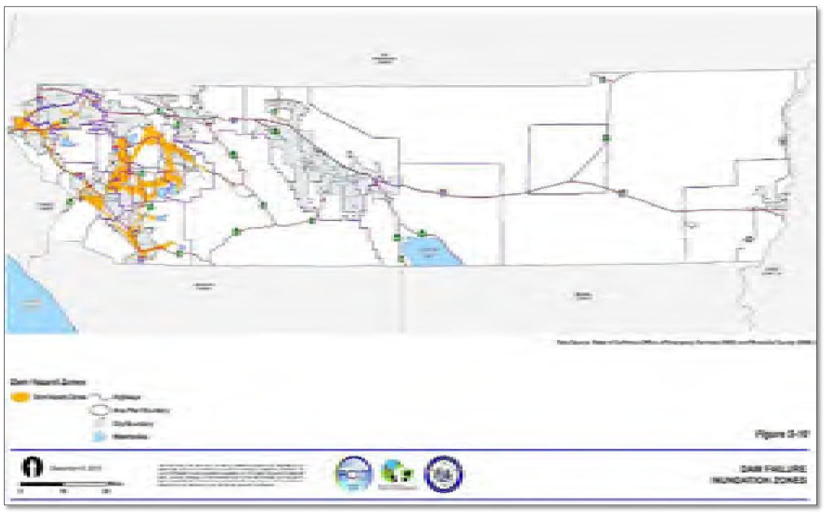
1003-010	CA01179	Oak Street	Riverside County Flood Control And Water Conservation	Riverside	Oak Street Cr	1979	138	36	6.02	1034
1-068	CA00054	Perris	California Department Of Water Resources	Riverside	Bernasconi Pass	1973	131452	2340	10	1600
1003-006	CA00801	Pigeon Pass	Riverside County Flood Control And Water Conservation	Riverside	Pigeon Pass	1958	900	86	8.71	1702.5
1003-004	CA00799	Prenda	Riverside County Flood Control And Water Conservation	Riverside	Prenda Creek	1954	192	15	1.93	1242
829-000	CA00771	Quail Valley	Forecast Homes	Riverside	San Jacinto Riv	1959	103	10	1.6	1490
818-000	CA00765	Railroad Canyon	Elsinore Valley Mun Wd	Riverside	San Jacinto River	1928	11586	525	664	1410
35-012	CA00223	Robert A Skinner	Metropolitan Water Dist	Riverside	Tucalota Creek	1973	43800	860	51.5	1493
35-015	CA01271	Skinner Clearwell	Metropolitan Water District	Riverside	Offstream	1991	356	14	0	1433
1811-000	CA01237	Sunnymead Ranch	Sunnymead Ranch Comm Assoc	Riverside	Reche Canyon	1985	400	35	2	1770
1003-005	CA00800	Sycamore	Riverside County Flood Control And Water Conservation	Riverside	Sycamore Canyon	1956	860	57	10.7	1013
1003-013	CA01170	Tahchevah	Riverside County Flood Control And Water Conservation	Riverside	Tachevah Creek	1964	650	60	3.2	582
1003-012	CA01242	Tahquitz Creek Debris	Riverside County Flood Control And Water Conservation	Riverside	Tahquitz Creek	1991	75	5	18	562
2028-000	CA00770	Vail	Rancho Calif Water District	Riverside	Temecula Creek	1949	51000	1078	306	1482.6
1003-008	CA00803	Wide Canyon	Riverside County Flood Control And Water Conservation	Riverside	West Wide Canyon	1968	1490	57	33.5	1560

1003-000	CA00796	Woodcrest	Riverside County Flood Control And Water Conservation	Riverside	Woodcrest Creek	1954	420	24	5.32	1122.5

The most recent damn built was Eagle Canyon Debris Basin in 2015

Descriptions of the dams, their inundation impact on the County, and a delineation of response efforts are outlined in the 2015 Draft version of the Flood and Dam Inundation Plan, maintained by Riverside County Transportation and Land Management Agency.

Map 18: Riverside County Dam Inundation Risks



5.3.16 Aqueduct

Severity: 3

Probability: 2

Risk Score: 0.38

OA Jurisdictions Affected by Aqueduct Failure

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

An Aqueducts is an artificial channel to transport water. There are two major Aqueducts that traverse Riverside County:

- California Aqueduct
- Colorado River Aqueduct.

The California Aqueduct is a 444-mile long, artificially river shaped facility that is a crucial component of the State Water Project. The California Department of Water Resources states that the Project includes 34 storage facilities, reservoirs and lakes; 20 pumping plants; 4 pumping-generating plants; 5 hydroelectric power plants; and about 701 miles of open canals and pipelines. It travels from Sacramento into San Bernardino County and finally ends in western Riverside County. The East Branch is the portion of the Aqueduct that transports water for storage into Lake Perris.

The Colorado River Aqueduct stretches 242 miles across Arizona and California. According to the American Society of Civil Engineers, it consists of more than 90 miles of tunnels, nearly 55 miles of cut-and-cover conduit, almost 30 miles of siphons, and five pumping stations. More than a billion gallons of water travel through it a day. It travels from Arizona into San Bernardino County, enters the eastern portion of Riverside County and travels the length of the County until it ends near the City of Riverside. It was built and is currently maintained by the Metropolitan Water District of Southern California.

Figure 41: California Aqueducts

Source: 2013 (SHMP)

History of Events

Riverside County has not experienced a large scale Aqueduct incident.

Risk Assessment

An earthquake or landslide could severely damage the two main aqueducts that travel through the county, possibly render them out of service. In this event the water supply to the County would be greatly affected.

Long periods of droughts have been known to damage aqueduct infrastructure. Wells have needed to work harder to pump low levels of water. This has resulted in many irrigation districts to raise the sides of canals to encourage gravitational water flow. However, this tactic can negatively affect bridges.

- **Effects on people and housing.** There is a low impact on housing unless the aqueduct was to flood a residential area. The impact to people can range from minor to disastrous. A failure could greatly impact the County's water supply leaving the County to source water elsewhere until the damages to the aqueduct can be remedied. It can also impact the economy in the event that crops are damaged and farmers lose valuable product.
- **Effects on commercial and industrial structures**. There is a low impact on commercial and industrial structures.
- **Effects on infrastructure.** There is a low impact on infrastructure.
- **Effects on agriculture.** In the event of an aqueduct failure crops could be devastatingly impacted.

Risk Assessment Conclusion

This hazard has a low probability but has the potential to have catastrophic impacts to the county.

Relationship to Other Hazards – Cascading Effects

An Aqueduct failure could lead to water supply contamination or disruption and flooding. It could also increase the effects of a drought.

5.3.17 Tornado

Severity: 2

Probability: 1

Risk Score: 0.25

OA Jurisdictions Affected by Tornados

- Hemet
- Perris
- Desert Center
- Coachella Valley
- Mecca
- Homeland

Hazard Definition

Tornados

Tornadoes are spawned when there is warm, moist air near the ground, cool air aloft, and winds that speed up and change direction. An obstruction, such as a house, in the path of the wind, causes it to change direction. This change increases pressure on parts of the house, and the combination of increased pressures and fluctuating wind speeds creates stresses that frequently cause structural failures.

In order to measure the intensity and wind strength of a tornado, Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale. This scale compares the estimated wind velocity with the corresponding amount of suspected damage. The scale measures six classifications of tornadoes with increasing magnitude from an "F0" tornado to an "F6+" tornado.

Tornados, like those that occur every year in the Midwest and Southeast parts of the United States, are a rare phenomenon in most of California, with most tornado-like activity coming from micro-bursts.

The chart below depicts the Fujita Tornado Damage Scale:

Table 39: Fujita Tornado Damage Scale

Scale	Wind Estimate (mph)	Typical Damage
F0	< 73	**Light damage.** Some damage to chimneys and TV antennas; breaks twigs off trees; pushes over shallow-rooted trees.
F1	73-112	**Moderate damage.** Peels surface off roofs; windows broken; light trailer houses pushed or overturned; some trees uprooted or snapped; moving automobiles pushed off the road. 74 mph is the beginning of hurricane wind speed.
F2	113-157	**Considerable damage.** Roofs torn off frame houses leaving strong upright walls; weak buildings in rural areas demolished; trailer houses destroyed; large trees snapped or uprooted; railroad boxcars pushed over; light object missiles generated; cars blown off highway.
F3	158-206	**Severe damage.** Roofs and some walls torn off frame houses; some rural buildings completely demolished; trains overturned; steel-framed hangar-warehouse-type structures torn; cars lifted off the ground; most trees in a forest uprooted snapped, or leveled.
F4	207-260	**Devastating damage.** Whole frame houses leveled, leaving piles of debris; steel structures badly damaged; trees debarked by small flying debris; cars and trains thrown some distances or rolled considerable distances; large missiles generated.
F5	261-318	**Incredible damage.** Whole frame houses tossed off foundations; steel-reinforced concrete structures badly damaged; automobile-sized missiles generated; trees debarked; incredible phenomena can occur.
F6-F12	319 to sonic	**Inconceivable damage.** Should a tornado with the maximum wind speed in excess of F5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.

Source: http://weather.latimes.com/tornadoFAQ.asp

Microbursts

Unlike tornados, microbursts are strong, damaging winds that strike the ground and often give the impression a tornado has struck. They frequently occur during intense thunderstorms. The origin of a microburst is downward moving air from a thunderstorm's core. But unlike a tornado, they affect only a rather small area.

University of Chicago storm researcher Dr. Ted Fujita first coined the term "downburst" to describe strong, downdraft winds flowing out of a thunderstorm cell that he believed were responsible for the crash of Eastern Airlines Flight 66 in June of 1975.

A downburst is a straight-direction surface wind in excess of 39 mph caused by a small-scale, strong downdraft from the base of convective thundershowers and thunderstorms. In later investigations into the phenomena, he defined two sub-categories of downbursts: the larger macro bursts and small microbursts.

Macro bursts are downbursts with winds up to 117 mph that spread across a path greater than 2.5 miles wide at the surface and which last from 5 to 30 minutes. The microburst, on the other hand, is confined to an even smaller area, less than 2.5 miles in diameter from the initial point of downdraft impact. An intense microburst can result in damaging winds near 270 km/hr (170 mph) and often last for less than five minutes.

"Downbursts of all sizes descend from the upper regions of severe thunderstorms when the air accelerates downward through either exceptionally strong evaporative cooling or by very heavy rain which drags dry air down with it. When the rapidly descending air strikes the ground, it spreads outward in all directions, like a fast-running faucet stream hitting the sink bottom.

When the microburst wind hits an object on the ground such as a house, garage or tree, it can flatten the buildings and strip limbs and branches from the tree. After striking the ground, the powerful outward running gust can wreak further havoc along its path. Damage associated with a microburst is often mistaken for the work of a tornado, particularly directly under the microburst. However, damage patterns away from the impact area are characteristic of straight-line winds rather than the twisted pattern of tornado damage."

History

The history table demonstrates the high number of tornados and microbursts that have occurred in the County.

Figure 42: Historical Tornados Statistics for Riverside

DATE ↑	FORCE	DEATH(S)	INJURED	DISTANCE
10/17/2015	0	0	0	22
09/09/2012	0	0	0	14
08/12/2012	0	0	0	16
05/22/2008	0	0	0	11
05/22/2008	2	0	1	8
05/22/2008	0	0	0	8
05/22/2008	0	0	0	10
07/23/2006	0	0	0	20
07/23/2005	0	0	0	27
03/04/2005	0	0	0	11
02/26/2005	0	0	0	17
01/09/2005	0	0	0	29
12/21/2001	0	0	0	28
02/24/2001	0	0	0	27
02/16/2000	0	0	0	30
05/13/1998	0	0	0	21
02/07/1994	0	0	0	28
02/08/1993	0	0	0	28
01/17/1993	0	0	1	28
03/20/1991	0	0	0	1
03/20/1991	0	0	0	16
02/28/1991	0	0	0	27
01/18/1988	0	0	0	27

Source:http://www.homefacts.com/tornadoes/California/Riverside-County/Riverside.html

Map 19: Past Riverside Count Tornadoes

Source: http://www.tornadohistoryproject.com/tornado/California/Riverside/map

Risk Assessment

- **Effects on people and housing.** Tornadoes are very dangerous and can destroy homes and injure or kill Riverside County residents. The county has been fortunate in the past because we have not experienced loss of life and very few injuries caused by tornadoes or airborne debris.
- **Effects on commercial and industrial structures.** Industrial structures could house Hazardous Materials that have to potential to be released if the facility is damaged. Workers could be trapped under debris if the tornado hits during business hours.
- **Effects on infrastructure.** Infrastructures could be damaged by high winds at building failure points such as rook joist or wall stud- bottom plate intersections. Flying debris can also cause damages.
- **Effects on agriculture.** Tornadoes have the power to destroy crops or tools/structures needed by the farmer to tend his crops. It can also lead to the death of livestock.

Risk Assessment Conclusion

Riverside County's "Tornado Alley" spans from the 15 Corridor to desert center and is highly susceptible to microburst and tornados that result is high dollar recovery costs.

Relationship to Other Hazards – Cascading Effects

Tornados can destroy powerlines causing disruption in power to residents and commercial properties. They can damage critical facilities and devastate homes.

5.3.18 Insect Infestation

Severity: 2

Probability: 3

Risk Score: 0.00

OA Jurisdictions Affected by Insect Infestation

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

(Bark Beetle)

- Idyllwild Fire Protection District

(Red Imported Fire Ant Quarantine)

- Alvord Unified School District
- Cathedral City
- City of Banning
- City of Blythe
- City of Calimesa
- City of Canyon Lake
- City of Coachella
- City of Corona
- City of Desert Hot Springs
- City of Hemet
- City of Indian Wells
- City of Indio -- only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of La Quinta
- City of Lake Elsinore
- City of Moreno Valley – only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of Murrieta
- City of Norco
- City of Palm Desert -- only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of Palm Springs -- only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of Perris
- City of Rancho Mirage -- only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of Riverside
- City of Temecula
- Home Gardens County Water District
- Idyllwild Water District
- Lake Elsinore Unified School District
- Menifee Unified School District
- Moreno Valley Unified School District
- Rancho California Water District
- Riverside Community Hospital
- Riverside County Office of Education, Children, and Family Services
- Riverside County Transportation

and Land Management Agency
- Riverside Unified School District
- San Gorgonio Pass Water Agency
- Valley Sanitation District
- Western Municipal Water District

Hazard Definition

Insect infestation occurs when an undesirable type of insect inhabits an area in a manner that causes serious harm to: cash crops, livestock, or poultry; wild land trees, plants, or animals; or humans. Countless insects live on, in, and around plants, animals, and humans in all environments. Many are harmless, while others can cause fatal damage. Under some conditions, insects that have been present and relatively harmless can become hazardous. For example, severe drought conditions can weaken trees and make them more susceptible to destruction from insect attacks.

The major forms of insects are:

- **Chewing insects** are defoliating insects. They generally strip plants of green matter such as leaves. Caterpillars and beetles make up the largest proportion of chewing insects. Under normal conditions, trees can usually bounce back from an attack of these defoliators, though repeat infestation will weaken a tree and can eventually kill it by starving it of energy.

- **Boring, or tunneling, insects** cause damage by boring into the stem, roots, or twigs of a tree. Some lay eggs that then hatch and the larvae burrow more deeply into the wood, blocking off the water-conducting tissues of the tree. Boring insects generally feed on the vascular tissues of the tree. If the infestation is serious, the upper leaves are starved of nutrients and moisture, and the tree can die. Signs of borer infestation include entry/exit holes in the bark, small mounds of sawdust at the base, and sections of the crown wilting and dying.

- **Sucking insects** do their damage by sucking out the liquid from leaves and twigs. Many sucking insects are relatively immobile, living on the outside of a plant and forming a hard protective outer coating while they feed on the plant's juices. Quite often they will excrete a sweet, sticky substance known as honeydew which contains unprocessed plant material. Honeydew can cause sooty mold to form on leaves and can become a nuisance. Signs of infestation include scaly formations on branches, dieback of leaves, and honeydew production.

Table 40: Example Insect Species

NAME
AFRICANIZED HONEY BEE
BARK BEETLE
CITRUS LEAFMINER
GLASSY-WINGED SHARPSHOOTER
GYPSY MOTH
HONEY BEE TRACHEAL MITE
JAPANESE BEETLE
LESSER SNOW SCALE
MAGNOLIA WHITE SCALE
MEDITERRANEAN FRUIT FLY
ORIENTAL FRUIT FLY
RED IMPORTED FIRE ANT
STING NEMATODE
TROPICAL PALM SCALE
VARROA MITE/HONEY BEE
ASIAN CITRUS PSYLLID
SILVERLEAF WHITEFLY
POLYPHAGOUS SHOT-HOLE BORER
ASIAN CITRUS PSYLLID
GOLDSPOT OAK BORE BEETLE, (GSOB)
PINE BARK BEETLE
SHOT HOLE BORER BEETLE
KUROSHIO SHOT HOLE BORERS

In conjunction with the above outlined problems, insects can carry and spread or vector disease to plants, animals, and people.

Definition of Vector Control

Vector Control Programs are responsible for providing services that reduce the risk of illness caused by any organism transporting a pathogen. Some examples of these organisms and some of the pathogens they can carry are:

- Mosquito - West Nile Virus, St. Louis Encephalitis, Western Equine Encephalitis
- Rodent Fleas - Plague

- Western Black Legged Tick - Lyme Disease
- Rodents - Hantavirus

Riverside County actually has three vector control agencies. There are two Vector Control Districts and the County Vector Control Program operating through the Department of Environmental Health. The Coachella Valley Mosquito and Vector Control District manages these services for a portion of the desert community around the Coachella Valley. The Northwest Mosquito and Vector Control District provides services in the northwest portion of the county. The County Vector Control program covers the unincorporated areas of the County and other areas such as contracted cities that may fall outside of the two other vector district boundaries.

History

Presently - Parts of Riverside County (Moreno Valley, Indio, Rancho Mirage, Palm Desert, Bermuda Dunes, and Palm Springs) are under quarantine by state and federal officials to stop the spread of Red Imported Fire Ants. The quarantine limits the movement of plants and soil and requires commercial nursery growers to take steps to ensure their products are free of Red Imported Fire Ants. It is believed that the infestations in Southern California may stem from the shipment of infested nursery stock from the southeastern states.

2012 - Polyphagous Shot-Hole Borer, an insect pest that attacks over 200 types of agricultural and landscape trees, became widespread in Southern California. By 2015, this insect pest was established in Western Riverside County. This insect pest is detrimental to the avocado industry and landscape ornamental trees in California.

2009 - A portion of Riverside County (Coachella Valley) was placed under quarantine for Asian Citrus Psyllid (ACP). In 2011, the quarantine area was expanded to include Western Riverside County. The quarantine limits the movement of nursery stock and citrus from the quarantine area. Growers must take steps to ensure their products are free from ACP prior to movement.

2003 -Governor Gray Davis proclaimed a State of Emergency in Riverside, San Bernardino, and San Diego Counties where hundreds of thousands of trees were dead and dying after being weakened by drought and attacked by an infestation of bark beetles. Trees on more than 150,000 acres died and an estimated 75,000 residents were threatened by catastrophic wildfire, injury, and property damage from falling trees.

1999-2000, an insect-spread disease (Pierce's Disease spread by Glassy-winged Sharpshooter) caused over $16 million damage to wine grapes in the west County area. Riverside County is under quarantine by state officials to stop the spread of

Glassy-winged Sharpshooter and Pierce's Disease. The quarantine limits the movement of nursery stock, bulk grapes, bulk citrus and requires inspection and certification of these commodities by the local Agricultural Commissioner prior to movement from the infested area.

1991-1994 - Africanized Honey Bees entered California near Blythe. Since 1994, they have spread to all counties in Southern California (Imperial, San Diego, Orange, Los Angeles, Riverside, San Bernardino, Ventura and Kern). In 1993-94 and 1990, Med-fly infestations damaged fruit Countywide. In 1991, a whitefly infestation damaged melons, squash, and cucumbers Countywide.

Risk Assessment

Riverside County has a demonstrated vulnerability to insect infestation. The climate makes it possible for insects to reproduce with little natural hindrance to their proliferation.

Programs for monitoring Encephalitis in Riverside County have been in effect for more than two decades in a cooperative effort with the California Department of Public Health (CDPH), the University of California, the Mosquito and Vector Control Association of California, and the Riverside County Public Health Department. Since its introduction to Southern California in 2003, West Nile Virus surveillance has been a primary focus. This type of surveillance is driven by live mosquito trapping and processing for virus detection. The dead bird surveillance program is also headed up by CDPH where the public can report dead birds via their website (www.westnile.ca.gov) or a telephone hotline (1-877-WNV-BIRD). If CDPH staff determines that a dead bird is deemed acceptable for testing, Vector Control offices are notified for collection and testing. Another aspect of this program consists of sentinel chicken flocks being placed in areas where high populations of Culex tarsalis, the western encephalitis mosquito, are known to exist and where such areas infringe on local communities. Blood samples are sent to the CDPH Viral & Rickettsial Disease Laboratory where they are analyzed for the antibodies to the viruses. All of these disease indicators allow programs to focus their vector control efforts. Since 2006, at least seventy three cases of West Nile virus human infections have been reported within Riverside County with ten fatalities. Horses have also been infected and succumbed to this disease.

In Riverside County, Plague is associated with animal disease outbreaks in populations of California Ground Squirrels. The vector is the Squirrel Flea. In 1979 during a disease outbreak among California ground squirrels in Silent Valley, located south of the City of Banning, a boy contracted Plague. It was properly diagnosed and he recovered. This incident provided impetus to start the Plague Surveillance Program and eventually establish the County's Vector Control Program. Over the course of the past several decades surveillance activities have isolated Plague endemic areas in the San Jacinto Mountain range.

- **Effects on people and housing.** In the case of the Bark Beetle, the fire hazard it creates can cause the loss of homes and life as demonstrated in the fall fires of 2003. In the case of certain mosquitoes, West Nile Virus has infected humans and horses.

- **Effects on agriculture, and commercial and industrial structures.** If a given insect is particularly hazardous to forests, crops, or property, it can cost the County millions of dollars in lost revenue and eradication and replacement.

Risk Assessment Conclusion.

Insect infestation is an ongoing threat to agriculture and public health in Riverside County. The effects on people and property can be disastrous and costly.

The County and independent vector control special districts have aggressive programs utilizing:

- Disease surveillance such as certified personnel, insect/rodent traps, lab testing capacities, and Sentinel chicken flocks.
- Vector control equipment and approved pesticides.
- Public outreach.

Relationship to Other Hazards – Cascading Effects

The Bark Beetle infestation is a classic example of cascading effects. The insect killed hundreds of thousands of trees, increasing the wildfire hazard, which resulted in the unfortunate devastation of the fall fires of 2003.

5.3.19 Jail/Prison Event

Severity: 2

Probability: 1

Risk Score: -0.13
OA Jurisdictions Affected by Jail or Prison Events

- Blythe
- Riverside
- Norco
- Banning
- Indio
- Murrieta

Hazard Definition

There are numerous State of California Correctional Institutions and County correctional facilities in Riverside County. Law enforcement is tasked with maintaining order in the facilities and preventing inmates from escaping into the community.

Chuckawalla Valley State Prison in Blythe provides long-term housing and services for male felons classified as medium and low-medium custody inmates.

Ironwood State Prison in Blythe provides services for minimum and medium custody inmates through academic education, vocational instruction, and support services. The prison also has the Institutional Hearing Program (IHP) which prepares inmates who are illegal immigrants for release to United States Immigration and Naturalization Service custody and the return to their native country.

The California Rehabilitation Center (CRC) in Norco is a medium Level II correctional facility and that only accommodates male inmates since April 2007. The CRC inmate population consists of felon commitments as well as Civil Addicts.

The California Institution for Woman (CIW) in Chino accommodates all custody levels of female inmates and functions as a reception/processing center for incoming female inmates. In addition to its large general population, CIW houses inmates with special needs such as pregnancy, psychiatric care, methadone, and medical problems such as HIV infection.

The California Institution for Men in Chino consists of four separate facilities under the administration of one warden. Located three miles south of the city of Chino, the facilities provide housing for minimum through medium custody inmates. The reception centers receive and process newly committed male felons from several southern California counties. The California Youth Authority operates a facility in Chino. While all of these facilities are in the County of San Bernardino, their close proximity to Riverside County and the City of Corona necessitate their inclusion here as facilities of concern to Riverside County.

In addition, there are five correctional facilities within the County, namely:

1. Robert Pressley Detention Center
2. Blythe Jail
3. Indio Jail
4. Southwest County Jail (Murrieta)
5. Larry D. Smith Correctional Facility

History

Historically, the threat to society has been low. Law enforcement has demonstrated an overall capability to maintain the incarcerated population in a manner that does not pose an immediate threat to the general population.

Risk Assessment

It is important that law enforcement remains in a state of readiness for any incidents that could precipitate a threatening situation.

The passing of Assembly Bill 109 (2011) has shifted state prison populations back into the county jail populations as a way to stop state prison overcrowding. The effects of this change are just now being seen. Time will tell what the overall impact to Riverside County and its citizens will actually be.

Riots within the facilities generally do not pose a direct threat to the public on the outside. Occasionally an inmate has escaped correctional facilities. The danger involved in their escape is predicated on the escapee's criminal characteristics.

Riverside County Regional Medical Center provides medical care to both state and local inmates in an area designated as a prison ward, which could have a severe impact on health care delivery at the facility during and immediately after a prison ward incident. The degree of disruption would, of course, depend on the extent of the incident.

- **Effects on people and housing.** Relatively speaking, the risks are minimal. However, violent offenders escaping custody in a disaster could lead to residents in the surrounding areas being at risk of harm.
- **Effects on commercial and industrial structures**. The risks are minimal.
- **Effects on infrastructure.** The risks are minimal.
- **Effects on agriculture.** The risks are minimal.

Risk Assessment Conclusion.

Relatively speaking, the risks of jail and prison incidents will remain a minimal threat to the County. It is important that law enforcement remains in a state of readiness for any incidents that could precipitate a threatening situation.

Relationship to Other Hazards – Cascading Effects

In the event that Interstate 10 becomes damaged, it could affect evaluation routes and essential supplies from getting into the prison or jail.

Risks are minimal but have the potential to decrease responder availability during disasters if a facility is damaged. Another possible drain on resources would be in the event of inmate relocation due to damaged facilities or the potential damage to a facility.

5.3.20 Pipeline Disruption

Severity: 3

Probability: 2

Risk Score: -0.38

<u>OA Jurisdictions Affected by Pipeline Incidents</u>

- Desert Water Agency
- Western Municipal Water District
- City of Banning
- City of Beaumont
- City of Corona
- City of Palm Springs
- City of Temecula
- Riverside Community College District
- San Gorgonio Memorial Hospital

Hazard Definition

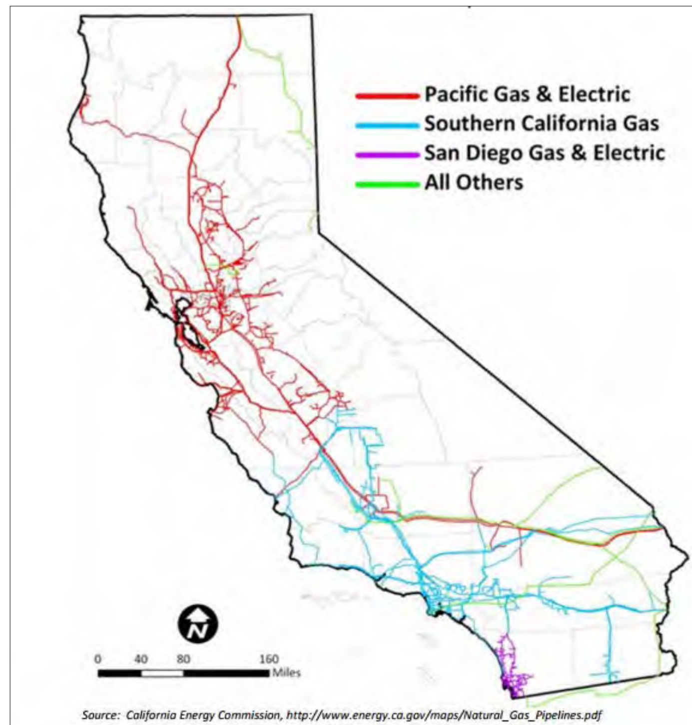
There are many pipeline distribution systems that transit Riverside County, including systems for water, natural gas, and petroleum products.

Identifying Natural Gas Pipeline Hazards (SHMP)

The United States is heavily dependent on transmission pipelines to distribute energy and fuel sources. Virtually all natural gas, which accounts for about 28 percent of the energy consumed annually, is transported by transmission pipelines. Energy demand in the United States continues to increase. Although California is a leader in exploring and implementing alternative energy sources such as the wind and solar, the expansion of traditional energy sources, such as natural gas, continues. Increased urbanization is resulting in more people living and working close to existing gas transmission pipelines that were placed prior to government agencies adopting and implementing land use and other pipeline safety regulations.

Compounding the potential risk is the age and gradual deteriorating of the gas transmission system due to natural causes. Significant failure, including pipe breaks and explosions, can result in loss of life, injury, property damage, and environmental impacts. Causes of and contributors to pipeline failures include construction errors, material defects, internal and external corrosion, operational errors, control system malfunctions, outside force damage, subsidence, and seismicity. Growth in population, urbanization, and land development near transmission pipelines, together with the addition of new facilities to meet new demands, may increase the likelihood of pipeline damage due to human activity and the exposure of people and property to pipeline failures.

Figure 43: California Gas Lines



Major water conveyance systems consist of the Colorado River Aqueduct operated by Metropolitan Water District (MWD) of Southern California, the California Aqueduct operated by the State Department of Water Resources (DWR), and water distribution lines operated by MWD.

A major pipeline carrying natural gas parallels Interstate 10 and Highway 60 throughout the County. This pipeline brings gas from the southwestern states into Southern California.

Petroleum products are stored and distributed at many major areas throughout the County. Of particular interest are the aviation fuel tanks and pipelines located at March Air Reserve Base. Although under the control of the U.S. Government, their potential for impact on the surrounding area is of interest to the County.

History

Fortunately, Riverside County has not experienced a large scale pipeline disruption. However, there are multiple small incidents on a yearly basis that are handled by the respective resource provider.

Risk Assessment

A rupture of the main line with a major release could have serious effects in terms of flooding and property damage. A gas line rupture could explode causing serious property damage and loss of life.

- **Effects on people and housing.** The consequences to people and housing from pipeline disruption can range from flooding to explosion, both could be quite severe.
- **Effects on commercial and industrial structures.** Similarly, the effects on commercial and industrial structures from flooding or explosion could be severe.
- **Effects on agriculture.** In the same way, the effects on agriculture from flooding or explosion could be severe.

Risk Assessment Conclusion.

Pipelines are vulnerable to especially with the possibility of an earthquake, causing significant breakage. The degree of damage county-wide for a given rupture would be minimal, even though there might be significant injuries, loss of life and property in the

immediate area of the incident, depending on what kind of pipe ruptures and where the rupture occurs.

Relationship to Other Hazards – Cascading Effects

Pipeline incidents may lead to flooding, fires and air, water and land contamination. Incidents with natural gas or petroleum product pipelines may lead to explosion and fire.

5.3.21 Landslide

Severity: 3

Probability: 3

Risk Score: -0.58

OA Jurisdictions Affected by Landslide Incidents

- Most mountain areas within the County

Hazard Definition

Like its earthquake-generating faults, California's mountainous terrain is also a consequence of dynamic geologic processes in operation as the North American Plate grinds past the Pacific Plate. More than one-third of California is mountainous terrain that generally trends parallel to the coast, forming a barrier that captures moisture from offshore storms originating in the Gulf of Alaska and Mexico. Steep topography, weak rocks, heavy winter rains, and occasional earthquakes all lead to slope failures more frequently than would otherwise occur under gravity alone.

A landslide is the breaking away and gravity-driven downward movement of hill slope materials, which can travel at speeds ranging from fractions of an inch per year to tens of miles per hour depending on the slope steepness and water content of the rock/soil mass.

Landslides range from the size of an automobile to a mile or more in length and width and, due to their sheer weight and speed, can cause serious damage and loss of life. Their secondary effects can be far reaching; for example, catastrophic flooding can result from the sudden release of river water impounded by landslide debris or slope failure of an earthen dam.

Although the area affected by a single landslide is less than that of earthquakes, landslides are pervasive in California's mountainous terrain and occur far more often, resulting in cumulative losses approaching $200 million in a given year. Average annual landslide losses in California are estimated at about $100 million. Because landslides occur as isolated events in both time and location, and there is presently no systematic means in place for documenting their losses, landslide hazard is often underestimated or goes unrecognized in the policy arena, even though landslides continue to cause millions of dollars in cumulative damage to California's homes, businesses, and infrastructure.

A landslide is a geologic hazard where the force of gravity combines with other factors to cause earth material to move or slide down an incline. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Slopes with the greatest potential for sliding

are between 34 degrees and 37 degrees. Although steep slopes are commonly present where landslides occur, it is not necessary for the slopes to be long.

Landslides, rock falls, and debris flows occur continuously on all slopes; some processes act very slowly, while others occur very suddenly, often with disastrous results. As human populations expand over more of the land surface, these processes become an increasing concern.

The most common types of landslides are (U.S. Department of the Interior, U.S. Geological Survey, Fact Sheet 2004-3072, July 2004):

Slides - Although many types of mass movements are included in the general term "landslide," the more restrictive use of the term refers only to mass movements, where there is a distinct zone of weakness that separates the slide material from the more stable underlying material.

Falls - Abrupt movements of masses of geologic materials, such as rocks and boulders that become detached from steep slopes or cliffs.

Topples - Toppling failures are distinguished by the forward rotation of a unit or units about some pivotal point, below or low in the unit, under the actions of gravity and forces exerted by adjacent units or by fluids in cracks.

Flows – There are five basic categories of flows that differ from one another in fundamental ways.

a. Debris flows: A debris flow is a form of rapid mass movement in which a combination of loose soil, rock, organic matter, air, and water mobilize as a slurry that flows downslope.
b. Debris avalanche: This is a variety of very rapid to extremely rapid debris flow.
c. Earthflow: The slope material liquefies and runs out, forming a bowl or depression at the head. The flow itself is elongate and usually occurs in fine-grained materials or clay-bearing rocks on moderate slopes and under saturated conditions. However, dry flows of granular material are also possible.
d. Mudflow: A mudflow is an earthflow consisting of material that is wet enough to flow rapidly and that contains at least 50 percent sand-, silt-, and clay-sized particles. In some instances, for example in many newspaper reports, mudflows and debris flows are commonly referred to as "mudslides."
e. Creep: Creep is the imperceptibly slow, steady, downward movement of slope-forming soil or rock.

Lateral Spreads - Lateral spreads are distinctive because they usually occur on very gentle slopes or flat terrain. The dominant mode of movement is lateral extension accompanied by shear or tensile fractures. The failure is caused by liquefaction, the process whereby saturated, loose, cohesionless sediments (usually sands and silts) are transformed from a solid into a liquefied state.

The geologic setting of southern California locally is conducive to slope failures and slope-failure deposits (landslides) that can be a hazard to human life and property. These hazards are created when geologic materials are displaced down a topographic slope under the influence of gravity. Factors that determine slope-failure occurrence include:

1. Slope angle
2. Geologic materials (substrate)
3. Climatic conditions
4. Earthquake shaking
5. Debris Flows

Sudden "mudslides" gushing down rain-sodden slopes and gullies are widely recognized by geologists as a hazard to human life and property. Most "mudslides" are localized in small gullies, threatening only those buildings and roadways in their direct path. They can burst out of the soil on almost any rain-saturated hill when rainfall is heavy enough. Often they occur without warning in localities where they have never been seen before.

There are predictable relationships between local geology and landslides, rockfalls and debris flows. Knowledge of these relationships can improve planning and reduce vulnerability. Slope stability is dependent on many factors and their interrelationships, including rock type, pore water pressure, slope steepness, and natural or man-made undercutting.

Riverside County has a history of landslides during seasons of high precipitation.

History

January, 2016 – Landslides near Banning resulted from a low 4.3 magnitude earthquake.

December, 2014 – Mud Flow in Gilman Springs, San Jacinto.

2002 – Landslide on Highway 60 in San Timoteo Badlands

Risk Assessment

There is a continuing risk of landslides during seasons of high precipitation. In addition, earthquakes could also cause significant landslides. The County has a great deal of hilly and mountainous terrain increasing the likelihood of a landslide incident.

- **Effects on people and structures**. Landslides constitute a threat to property, road safety, and life. Small landslides would not pose a serious risk. However, there is a possibility that a severe landslide in a populated area could cause significant damage and risk to life.
- **Effects on infrastructure**. Landslides can cause disruptions in power supply pipelines, power and telephone poles, and County roads and highways.
- **Effect on Critical Facilities**. An initial review of known landslide locations and the location of critical facilities indicates that there does not appear to be any of these facilities in close proximity to a Landslide Management Zone.
- **Effects on agriculture**. Similar to the threats to people and structures, small landslides would not pose a serious risk. However, there is the possibility that a severe landslide could cause significant damage and risk of life to elements of the agricultural industry.

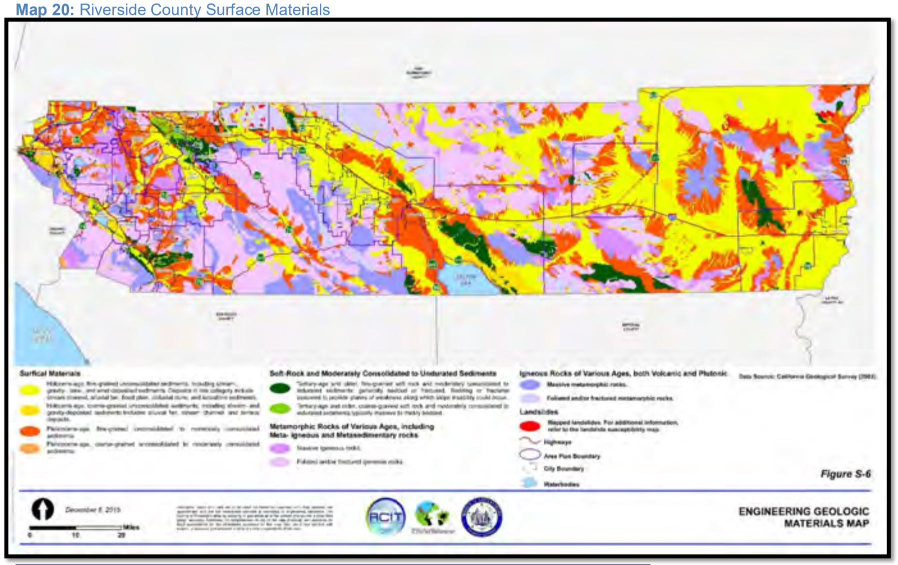
Risk Assessment Conclusion

Landslides are a continuing risk in Riverside County, especially during seasons of high precipitation. History has shown also that many landslides occur in areas where landslides have not been predicted.

Relationship to Other Hazards – Cascading Effects

As noted, landslides can be the result of an earthquake or severe weather. The starting mechanism for a landslide will determine some of the cascading events. The end result is if a landslide occurs in a populated area, or area used by people, earth materials can cover or impede the area as described above. If a landslide were to impact power lines or other utility systems a cascading effect could be power, utility or sewer loss.

Map 20: Riverside County Surface Materials



Map 21: Riverside County Slope Instability Map

5.3.22 Hazardous Materials Incident

Severity: 3

Probability: 4

Risk Score: -0.75

OA Jurisdictions Affected by Hazardous Materials Incidents

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

Hazardous materials (Hazmat), consist of substances that by their nature, lack of containment, and reactivity, have the capability for inflicting harm. Hazmat poses a threat to health and the environment when improperly managed. Hazmat can be toxic, corrosive, flammable, explosive, reactive, an irritant, or a strong sensitizer. Hazmat substances also include certain infectious agents, radiological materials, oxidizers, oil, used oil, petroleum products, and industrial solid waste substances.

Hazardous materials can pose a threat where they are manufactured, stored, transported or used. They are used in almost every manufacturing operation and by retailers, service industries, and homeowners.

Hazardous material incidents are one of the most common threats to public health and the environment. Incidents may occur as the result of natural disasters, human error, terrorism, and/or accident.

Hazmat incidents typically take five forms:

1. Fixed facility incidents
   - Laws require those facilities to notify state and local authorities about what is being used or produced there and incidents with the materials can be planned for.
2. Transportation incidents
   - Transportation incidents are more difficult to prepare for because it is impossible to know what material(s) could be involved until an accident actually happens.

3. Pipeline incidents
   - Pipelines carry natural gas and petroleum. Breakages in pipelines carry differing amounts of danger, depending on where and how the break occurs, and what is in the pipe.
4. Terrorism incidents (or suspected Terrorism)
   - Intentional acts involving violence and/ or the threat of violence. Similar to transportation incidents, these occurrences are more difficult to prepare for due to unknown locations and substances.
5. Illegal Disposal / Abandonment
   - Similar to transportation incidents, these occurrences are more difficult to prepare for due to unknown locations and substances.

History

Many forms of hazardous materials are present in both the rural and urban areas of Riverside County. They are present in permanent storage locations, roadway and railway transport mediums, long-distance pipelines, and at various industrial and agricultural application sites. The County's location, with its rail and highway transportation routes, and various industries, has a growing potential for serious hazardous materials incidents. Interstates 10, 15 and 215, and State Highways 60 and 91 are all heavily traveled by trucks. Those trucks carry a wide variety of hazardous materials including gasoline, corrosives, oxidizers, pesticides, and radioactive materials.

The railroad lines traveling throughout the County also carry some extremely hazardous cargoes. Fortunately, the railroads have a good safety record with regard to the transportation of hazardous materials.

Traffic on railroads is not as prevalent as on truck routes in Riverside County, but poses a much greater problem when an accident is involved due to the volumes of hazardous materials on board.

There is a great deal of air traffic along the airways above Riverside County with the March Air Reserve Base Palm Springs International Airport, French Valley Airport, Hemet-Ryan Airport, Riverside Municipal Airport, Jacqueline Cochran Regional Airport and Bermuda Dunes Airport all operating within the County. The potential for a hazardous materials incident exists, especially with respect to military operations.

There are many pipeline distribution systems that traverse the County. These are discussed in Section 5.3.20.

Table 41: History of Hazmat Incidents in 2016

Riverside County Department of Environmental Health Hazmat Incidents July 1, 2015 to June 30, 2016	
HAZARDOUS MATERIALS INCIDENT TYPE	TOTAL NUMBER
General Emergency Response (do not fit other categories)	28
Drug Labs	23
Drug Dumps	3
Facility Incidents	122
Roadway Incidents	119
Aircraft Incidents	3
Railroad Incidents	7
Mercury Incidents	5
Dielectric Fluid Incidents	40
Radiological Incidents	0
Pesticide Incidents	2
Medical Waste Incidents	9
Noxious Odor Incidents	39
Illegal Disposal of Substances	207
Transportation/Manifesting Violations	0
Suspected Terrorism	4
TOTAL Hazardous Materials Incidents:	**611**

The Riverside County Department of Environmental Health Hazardous Materials Emergency Response Program handled over 611 incidents in fiscal year (FY15/16) often in conjunction with Cal Fire countywide except for a few cities that handled Haz Mat incidents within their jurisdiction. The incidents cover all areas described in the definition section.

In 2016 The Riverside County Fire department responded to 613 Hazardous Materials Incidents.

The administering agencies within Riverside County are responsible for the control of fixed hazardous materials facilities, including the Participating Agencies of Riverside Fire Department and Corona Fire Department.

Risk Assessment

The amount of hazardous materials transported over rail and roadways on a daily basis is unknown, but estimated to be steadily increasing as our economy grows. There is the potential for a hazardous materials incident almost anywhere on the numerous highways and roads that crisscross Riverside County. The greatest concern focuses on the 10, 15, 60, 91, and 215 freeways. The most vulnerable areas along these routes are considered to be the on/off ramps and interchanges.

A major concern with the trucking industry is the safe operation of their trucks. With the deregulation of the trucking industry, spot checks of trucks in many states, including California, have shown that a large percentage of trucks currently in service are not in safe enough condition to be operated on public highways.

Many industries are moving into the County. Many facilities exist today, with more construction forecast. To support these industries, the County is likely to realize a large increase in the transportation of toxic, flammable, and corrosive materials into and out of the County. With the increased use of hazardous materials, there is an increased need for safe hazardous waste management and disposal. There will be the increased transportation of hazardous materials waste to proper disposal sites located outside of Riverside County.

Illegal dumping and clandestine drug labs are also a hazardous materials problem. Although not exclusive to Riverside County, the County is a target for these activities due to its accessibility in the outlying areas and the open living conditions in the mountain and desert areas.

No Class I landfills are operated in Riverside County. Seven Class III landfills are active in Riverside County. All accept only non-hazardous solid wastes and are located in unincorporated areas. Six of these landfills are operated by the Riverside County Waste Resources Department, while one (El Sobrante) is privately owned and operated. The El Sobrante, Badlands, Lamb Canyon, and Blythe landfills currently accept waste from outside of Riverside County. Blythe however, only takes small loads or may refuse to accept waste because it is a relatively small facility.

Hazardous waste generators include food and beverage processors as well as battery, semi- conductor, and metal container manufacturers, as well as automobile repair facilities, munition manufacturers, utility districts, and other industries. Although hazardous waste generators are scattered throughout Riverside County, most of the large generators of hazardous waste are located in the western portion of the County, including in the cities of Corona, Jurupa Valley, Riverside, and Temecula.

Nearly all of Riverside County residents have some type of hazardous materials in their homes. Examples include motor oil, paints, cleaners, aerosols, and pesticides. Household hazardous materials pose serious health issues for people who improperly use or dispose of these materials. Adverse environmental impacts can occur when household hazardous materials are disposed of in unlined sanitary landfills, where these materials may leach through the soil and contaminate groundwater.

Medical facilities, including clinics, hospitals, professional offices, blood and plasma centers, and medical research facilities generate a wide variety of hazardous substances. These substances may include contaminated medical equipment or supplies, infectious biological matter, prescription medicines, and radioactive materials used in medical procedures. The disposal of medical waste is achieved by on-site autoclaving of red-bagged waste (any medical waste that could possibly transmit a pathogen) and subsequently transported to a Class III landfill, or to a permitted incinerator. The Riverside County Department of Environmental Health has regulatory control over the disposal of medical and biological waste.

- **Effects on people and housing.** Historical events in Riverside County have necessitated evacuations when a Hazmat incident occurs. Relative to some of the other natural hazards assessed earlier in this LHMP, the numbers of people affected by Hazmat incidents are usually less.

- **Effects on commercial and industrial structures.** There may be economic consequences due to Hazmat incidents, but the damage is generally limited to clean-up of facilities and grounds, or simply an interruption of business due to evacuation.

- **Effects on infrastructure.** Hazmat incidents involving transportation may result in downed power lines. Also, Hazmat materials may impact waterways and drainage systems, and incidents can lead to the evacuation of schools, business districts, and residential areas.

- **Effects on agriculture.** As noted previously, there is a long history of agricultural production in Riverside County. Agricultural activities typically include the storage and periodic application of pesticides, herbicides, and fertilizers, as well as the storage and use of toxic fuels and solvents. The infiltration of these substances may leach into local groundwater supplies, presenting an elevated risk of groundwater contamination.

Risk Assessment Conclusion

Although Hazmat incidents can have serious property damage and even loss of life, Hazmat accidents do not generally affect extremely large areas. Hazmat incidents present a real danger and are highly unpredictable in terms of determining when or where they will occur, but generally do not pose a serious threat to the ability of Riverside County to respond. Reasonable preparation by law enforcement, fire department, and medical community enables the County to deal with the majority of likely events. Many emergency workers prepare for Hazmat events as part of their ongoing training. Agencies and facilities are also routinely equipped to deal with most events that might occur.

Relationship to Other Hazards – Cascading Effects

Besides the immediate effect of a hazardous materials incident at the scene of the emergency, there are ancillary effects as well. For instance, there may be impacts on waterways and drainage systems, and the evacuation of schools, business districts, and residential areas.

5.3.23 Water Supply Disruption/Contamination

Severity: 2

Probability: 3

Risk Score: -1.50

OA Jurisdictions Affected by Hazardous Materials Incidents

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

People exposed to water supply disruption or toxic pollutants caused by contaminations may be threatened by a number of health risks:

- Dehydration, hepatitis, and cancer
- Eating contaminated food products, such as fish from contaminated waters; meat, milk, or eggs from animals that fed on contaminated plants; and fruits and vegetables grown in contaminated soil
- Drinking water contaminated by toxic pollutants
- Ingesting contaminated soil. Young children are especially vulnerable because they often ingest soil from their hands or from objects they place in their mouths
- Touching (making skin contact with) contaminated soil, dust, or water (for example, during recreational use of contaminated water bodies)

Risk Assessment

According to the Environmental Protection Agency, there are four major types of drinking water contamination; physical, chemical, biological, and radiological.

Physical contaminants primarily impact the physical appearance or other physical properties of water. Examples of physical contaminants are sediment or organic material suspended in the water of lakes, rivers and streams from soil erosion.

Chemical contaminants are elements or compounds. These contaminants may be naturally occurring or man-made. Examples of chemical contaminants include nitrogen,

bleach, salts, pesticides, metals, toxins produced by bacteria, and human or animal drugs.

Biological contaminants are organisms in water. They are also referred to as microbes or microbiological contaminants. Examples of biological or microbial contaminants include bacteria, viruses, protozoan, and parasites.

Radiological contaminants are chemical elements with an unbalanced number of protons and neutrons resulting in unstable atoms that can emit ionizing radiation. Examples of radiological contaminants include cesium, plutonium and uranium.

Source: https://www.epa.gov/ccl/types-drinking-water-contaminants

Ground water contamination is also a major threat because of its use for drinking water and irrigation. Potential groundwater contaminants include; storage tanks, septic systems, hazardous waste, landfills, chemicals and road salts, and littering.

Source: waterboards.maps.arcgis.com

Map illustrated water systems in Riverside County. Blue stars represent in compliance water systems, red stars are systems out of compliance as of July 2017.

- **Effects on people and housing.** The effect on housing is relatively low, but the effect on people may be devastating. Though the County encourages residents to store at least 72 hours of water for their household, the reality is only a small percentage actual partake in that practice. This means that in the event of disruption or contamination that renders usable water sources limited, people may become dehydrated and suffer from other serious health issues such as cancer. In the event that contamination happens during the summer months when temperatures reach 90-105, the population is at an even higher risk.

- **Effects on commercial and industrial structures.** The effect to structures is relatively low.
- **Effects on infrastructure.** The effect to structures is relatively low.
- **Effects on agriculture.** Water contamination could devastate agriculture in Riverside County. The contaminant could be poisonous to crops and livestock. Depending on the level of exposure, entire field could be damaged to the point of total loss.

History

March 2, 2017 – 198 residents were exposed to water contaminated with uranium in the unincorporated area of Pinyon Pines.

Risk Assessment Conclusion

Due to high levels of monitoring and preparedness within water agencies, the threat of water contamination is fairly low. However, it could greatly impact the county if it is caused by a cascading event such as an earthquake.

Relationship to Other Hazards – Cascading Effects

The loss of water could drastically affect other man-made and natural hazards. In the event of an earthquake and pipelines are damaged, it could greatly reduce the amount of water available to fight fires. The amount of water available to residents would also be drastically reduced.

Section 6.0 – Community Rating System

The County of Riverside and all cities within the County participate in the National Flood Insurance Program (NFIP). Riverside County Ordinance NO. 458 Regulating Special Flood Hazard Areas and Implementing the National Flood Insurance Program was last updated on August 14, 2014.

Riverside County also participates in the Community Rating System (CRS). The rating system is a voluntary NFIP program that aims to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management. In addition to the county, four cities participate in CRS: Lake Elsinore, Moreno Valley, Murrieta, and Palm Springs.

The most active in the Community Rating System within the County is Palm Springs. Their high scores in the system allow the city to offer the highest discount off of flood insurance (20% for SFHA and 10% for Non-SFHA).

Community Number	Community Name	CRS Entry Date	Current Effective Date	Current Class	% Discount for SFHA	% Discount for Non-SFHA	Status
060245	Riverside County*	10/01/10	05/01/16	7	15	5	C
060636	Lake Elsinore	10/01/09	05/01/14	8	10	5	C
065074	Moreno Valley	10/01/91	10/01/96	8	10	5	C
060751	Murrieta	10/01/97	10/01/97	9	5	5	C
060257	Palm Springs	10/01/92	05/01/11	6	20	10	C

Note: SFHA, Special Flood Hazard Areas

6.1 Repetitive Loss Properties

Areas which have flooded in the past are highly likely to experience recurring flooding. The repetitive nature of flood damage is cause for concern. FEMA, in coordination with the state, identifies California's top Repetitive Loss (RL) Communities. Riverside County is not a top Repetitive Loss community. Riverside County unincorporated areas only have eleven identified repetitive loss properties. That is an increase of four properties since the 2012 plan. Two of the eleven repetitive loss properties have been mitigated and the Riverside County Flood Control District is investigating ways to mitigate the remaining five properties so as to avoid future flooding incidents. Options being considered are both structural and non-structural mitigation measures.

Table 42: Riverside County Repetitive Loss Properties

City	Mitigated?	Insured?	Date of Loss	Date of Loss	Total Paid
LAKE ELSINORE	YES	NO	02/14/1980	01/05/1979	$91,618.83
LAKE ELSINORE	NO	NO	12/04/1982	03/15/1980	$21,052.64
LAKE ELSINORE	NO	NO	04/15/1983	08/11/1980	$ 6,436.09
HEMET	YES	NO	03/02/1983	09/06/1981	$ 2,684.06
RIPLEY	NO	NO	09/23/1983	07/23/1983	$ 6,602.15
CORONA	NO	NO	01/04/1995	12/04/1987	$ 70,282.69
THOUSAND PALMS	NO	NO	12/22/2010	10/17/2005	$ 26,331.18
THOUSAND PALMS	NO	YES	09/08/2014	02/25/2005	$ 44,272.25
THOUSAND PALMS	NO	YES	09/08/2014	12/22/2010	$ 29,896.05
THOUSAND PALMS	NO	YES	09/08/2014	12/22/2010	$ 33,345.35
THOUSAND PALMS	NO	YES	09/08/2014	01/22/2010	$ 119,638.09

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
July 2018

6.2 National Flood Insurance Program

Public Law 90-448 of 1968, known as the National Flood Insurance Act, established the National Flood Insurance Program (NFIP) which provides for federal government underwriting of flood insurance policies sold by private companies. Supported by a national mapping system showing boundaries for 100- and 500-year floodplains, the NFIP encourages local governments to direct development away from floodplain areas or mitigate flood risks through local floodplain management regulations. Through the Community Rating Service (CRS), the NFIP provides for financial incentives in the form of lower insurance rates for local communities encouraging mitigation of flood hazards in a manner parallel to rate incentives related to private fire insurance and enforced by the mortgage industry. The National Flood Insurance Act was modified in 1994 to provide for flood hazard mitigation planning and project grants.

The unincorporated community of Riverside County joined the NFIP on April 15, 1980. Currently, unincorporated Riverside County is one of 30 local communities that participate in the NFIP. Please refer to the table on the following page for participating jurisdictions.

Table 43: Jurisdictions and authorities participating with National Flood Insurance Program

CID	COMMUNITY NAME	INIT FHBM	INIT FIRM IDENTIFIED	CURR EFF MAP DATE	REG-EMER DATE	IDENTIFIED TRIBAL
060763C	AGUA CALIENTE BAND OF CAHUILLA INDIANS TRIBE	06/21/74	03/02/83	04/19/17	06/21/96	Yes
060246#	BANNING	03/15/74	10/17/78	08/28/08	10/17/78	No
060247#	BEAUMONT	04/05/74	10/17/78	08/18/14	10/17/78	No
060248#	BLYTHE	05/10/74	06/30/76	(NSFHA)	06/30/76	No
060740#	CALIMESA	-	08/28/08	08/28/08	05/01/91	No
060753C	CANYON LAKE	-	11/20/96	04/19/17	09/15/98	No
060704#	CATHEDRAL CITY	-	05/01/85	08/28/08	11/12/82	No
060249#	COACHELLA	05/17/74	09/30/80	(NSFHA)	09/30/80	No
060250#	CORONA	05/24/74	05/15/78	08/28/08	05/15/78	No
060251#	DESERT HOT SPRINGS	05/24/74	04/02/79	08/28/08	04/02/79	No
060155#	EASTVALE	-	08/28/08	08/28/08	06/05/13	No
060253C	HEMET	05/24/74	09/29/78	04/19/17	09/29/78	No
060254C	INDIAN WELLS	06/28/74	09/14/79	04/19/17	09/14/79	No
060255#	INDIO	05/31/74	09/14/79	08/28/08	09/14/79	No
060286#	JURUPA VALLEY	-	08/18/14	08/18/14	09/23/13	No

060709C	LA QUINTA	-	06/19/85	04/19/17	07/01/85	No
060636C	LAKE ELSINORE	06/28/74	09/17/80	04/19/17	09/17/80	No
060176C	MENIFEE	-	08/28/08	04/19/17	05/03/12	No
065074#	MORENO VALLEY	-	06/18/87	08/18/14	06/18/87	No
060751#	MURRIETA	-	04/15/80	08/28/08	06/09/93	No
060256#	NORCO	05/17/74	02/15/79	08/28/08	02/15/79	No
060629C	PALM DESERT	06/14/77	04/15/80	04/19/17	04/15/80	No
060257C	PALM SPRINGS	06/21/74	03/02/83	04/19/17	03/02/83	No
060258#	PERRIS	09/06/74	04/16/79	08/18/14	04/16/79	No
060259C	RANCHO MIRAGE	-	09/14/79	04/19/17	09/14/79	No
060245C	RIVERSIDE COUNTY *	-	04/15/80	04/19/17	04/15/80	No
060260#	RIVERSIDE	07/19/74	01/06/83	08/28/08	01/06/83	No
065056C	SAN JACINTO	-	09/28/73	04/19/17	09/28/73	No
060742#	TEMECULA	-	09/02/93	08/28/08	08/28/91	No
060221#	WILDOMAR	-	08/28/08	08/28/08	01/20/11	No

Section 7.0 – Capabilities Assessment

7.1 Regulatory Mitigation Table

Table 44: Regulatory Tools

Regulatory Tool	Yes/No	Comments
General Plan	Yes	General Plan December 15, 2015
Zoning Ordinance	Yes	Adopted updates to General Plan on December 15, 2015, Ordinance No. 348: Providing For Land Use Planning And Zoning Regulations and Related Functions of the County of Riverside effective 1/05/17
Subdivision Ordinance	Yes	Adopted updates to General Plan on December 15, 2015, Riverside County Ordinance No. 460: Subdivision Regulations, Riverside County Code of Ordinances, Title 16
Site Plan Review Requirements	Yes	Adopted updates to General Plan on December 15, 2015, Building and Safety Department submission requirements
Growth Management Ordinance	Yes	Adopted updates to General Plan on December 15, 2015,
Floodplain Ordinance	Yes	Adopted updates to General Plan on December 15, 2015, Riverside County Ordinance No. 458: Regulating Flood Hazards and Implementing the National Flood Insurance Program, last amended 8/28/08
Other special purpose ordinance (storm water, water conservation, wildfire)	Yes	Adopted updates to General Plan on December 15, 2015, Riverside County Ordinance No. 754: Establishing Stormwater/Urban Runoff Management and Discharge Controls, Ordinance No. 859: The Water Efficient Landscaping Requirements, Ordinance No, 787: Adopting the 2016 California Fire Code as Amended 1/1/17.
Building Code	Yes	Riverside County Ordinance 457: Building Codes and Fees, California Building Code, 2016

Fire Department ISO rating	Yes	Rating: 4 (Under reevaluation, expected update in October 2017)
Erosion or sediment control program		Adopted updates to General Plan on December 15, 2015
Storm Water Management Program	Yes	Riverside County Ordinance No. 754: Establishing Stormwater/Urban Runoff Management and Discharge Controls, Riverside County Flood Control Storm Water Protection Program
Capital Improvements Plan	Yes	CIP Budget and proposals updated in November 2015
Economic Development Plan	Yes	Riverside County Economic Development Strategic Action Plan – 2013-2016, Riverside County Economic Development Strategy (CEDS) 2015/2016 Annual Update
Local Emergency Operations Plan	Yes	Riverside County Emergency Operations Plan updated in February 2006
Flood Insurance Study or other engineering study for streams	Yes	County of Riverside Environmental Impact Report No. 521, Section 4.11 March 2014, Riverside County Unincorporated Areas Flood Insurance Study, 2008
Master Drainage Plan	Yes	Last Report, Lakeland Village in March 2015

7.2 Administrative/Technical Mitigation Table

Table 45: Administrative/Technical Mitigation Tools

Department/Position	Yes/No	Personnel/Resources
Agricultural Commissioner's Office	Yes	Agricultural Biologist, EOC Responders
Assessor's Office	Yes	Parcels information, Loss Estimates, Planners
Environmental Health	Yes	Program Chief, Hazmat and Environmental Specialist, EOC Responder's
Public Health	Yes	Nurses, Program Managers, EOC Responder's, Behavioral Health programs that provide resources and information for community members and mentally ill individuals.
Emergency Management Department	Yes	Division Chiefs, Program Coordinators, Emergency Services Coordinators, Administrative Services Personnel
Emergency Medical	Yes	EMS Specialist, Agency Chief, EOC Responder's
Animal Services	Yes	Chief Operations, Executive Management, Animal Control Officers, Administrative Personnel, EOC Responder's, Riverside Emergency Animal Rescue System (R.E.A.R.S.)
Riverside County Fire	Yes	Firefighters I/II, Engineers, Captains, Battalion Chiefs, Division Chiefs, Deputy Chiefs, County Fire Chief, Prevention Specialists, Forester's , Emergency Services Coordinators, Emergency Services program Supervisor, Deputy Director, Incident Management Teams, Administrative Services Personnel

Flood Control	Yes	Flood Control Specialist and Managers, Engineers, GIS Specialists, EOC Responder's
Sheriff's Office	Yes	Sherriff's Emergency Response Team (SERT) members, EOC Responder's
Roads	Yes	Engineers, EOC Responder's, Highway Operations Superintendent
Building and Safety Planning Dept.	Yes	Planners, Principle Building Inspectors, Engineers, EOC Responder's
Geographic Information System	Yes	GIS Specialist, CIS Supervisors, GIS Analysts, EOC Responder's
Information Technology	Yes	Chief Information Officer, IT Officers, EOC Responder's, Communication, Field assets, IT Support
Air Quality Management District	Yes	Air Monitoring
Waste Management	Yes	Operations Supervisor, Hazardous Waste Supervisor, Specialist, Engineers
Disaster Corps	Yes	Trained Volunteers, Deployment Capabilities both in the Operational Area and Statewide.
Radio Amateur Civil Emergency Services (R.A.C.E.S.)	Yes	Radio Operators, EOC Responders

7.3 Fiscal Mitigation Capabilities

Table 46: Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	Must meet eligibility requirements
Capital improvements project funding	Yes	Funds set aside for fiscal year 11/12 per Board of Supervisor's district
Authority to levy taxes for specific purposes	Yes	With voter approval
Impact fees for new development	Yes	Planning, Fire, Building & Safety
Incur debt through general obligation bonds	Yes	With voter approval
Incur debt through special tax bonds	Yes	With voter approval
Pre-Hazard Mitigation Grants	Yes	
Post-Mitigation Grants	Yes	

7.4 Funding Opportunities

The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, United States Code (U.S.C.) 5170c. The key purpose of HMGP is to take critical mitigation measures to reduce the risk of loss of life and property from future disasters during the reconstruction process following a disaster. HMGP is available, when authorized under a Presidential major disaster declaration, in the areas requested by the California Governor. The amount of HMGP funding available to the Applicant is based upon the total Federal assistance to be provided by FEMA for disaster recovery under the Presidential major disaster declaration.

The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

The Pre-Disaster Mitigation (PDM) program is authorized by Section 203 of the Stafford Act, 42 U.S.C. 5133. The PDM program is designed to assist States, Territories, Tribal governments, and local communities in implementing a sustained pre-disaster hazard mitigation program to reduce the overall risk to the population and structures from future hazard events, while also reducing Federal disaster response expense.

Table 47: Grant Funding Opportunities for Mitigation

Grant Name	Agency	Purpose	Contact
Pre-Disaster Mitigation Program **(PDM)**	U.S. Department of Homeland Security, Federal Emergency Management Agency	To provide funding for States, and communities for cost-effective hazard mitigation activities which complement a comprehensive hazard mitigation program to reduce injuries, loss of life, property damage, and reconstruction of property.	FEMA 500 C. Street, SW Washington, DC 20472 Phone: (202) 646-4621 www.fema.gov
Hazard Mitigation Grant Program	U.S. Department of Homeland Security, Federal Emergency Management Agency	To prevent future losses of lives property due to disasters; to implement State of local hazard mitigation plans; to enable mitigation measures to be implemented during immediate recovery from a disaster; and to provide funding for previously identified mitigation measures to benefit the disaster area.	FEMA 500 C Street S.W. Washington, DC 20472 Phone (202) 646-4621 www.fema.gov
Flood Mitigation Assistance (FMA)	U.S. Department of Homeland Security, Federal Emergency Management Agency	To help States and communities plan and carry out activities designed to reduce the risk of flood damage to structures insurable under the NFIP.	FEMA 500 C Street S.W. Washington, DC 20472 Phone (202) 646-4621 www.fema.gov

Emergency Management Performance Grants (EMPG)	U. S. Department of Homeland Security; Federal Emergency Management Agency	To encourage the development of comprehensive emergency management at the State and local level and to improve emergency management planning, preparedness, mitigation, response and recovery capabilities.	FEMA 500 C Street S.W. Washington, DC 20472 Phone (202) 646-4621 www.fema.gov
Community Development Grant Program (CDBG)	U.S. Department of Housing and Urban Development	To develop viable urban communities by providing decent housing and a suitable living environment. Principally for low-to-moderate income individuals.	HUD 451 7th Street, S. W. Washington, DC 20410-7000 Phone: (202) 708-3587 www.hud.gov
Public Assistance Program (PA)	U.S. Department of Homeland Security, Federal Emergency Management Agency	To provide supplemental assistance to States, local governments, and certain private nonprofit organizations to alleviate suffering and hardship resulting from major disasters or emergencies declared by the President. Under Section 406, Public Assistance funds may be used to mitigate the impact of future disasters.	FEMA 500 C Street S.W. Washington, DC 20472 Phone (202) 646-4621 www.fema.gov

Emergency Watershed Protection	U.S. Department of Agriculture, Natural Resource Conservation Service	To provide emergency technical and financial assistance to install or repair structures that reduce runoff and prevent soil erosion to safeguard life and property.	NRCS PO BOX 2890 Washington, DC 20013 Phone: (202) 720-3527 www.nrcs.usda.gov
Land and Water Conservation Fund Grants	U. S. Department of the Interior, National Park Service	To acquire and develop outdoor recreation areas and facilities for the general public, to meet current and future needs.	NPS PO Box 37217 Washington, DC 20013-7127 Phone: (202) 565-1200 www.nps.gov
Disaster Mitigation and Technical Assistance Grants	U.S. Department of Commerce, Economic Development Administration	To help States and localities to develop and /or implement a variety of disaster mitigation strategies.	EDA Herbert C. Hoover Building Washington, DC 20230 Phone: (800) 345-1222 www.eda.gov
Watershed Surveys and Planning	U.S. Department of Agriculture, Natural Resource Conservation Service	To provide planning assistance to Federal, State, and local agencies for the development of coordination water and related land resources programs in watersheds and river basins	NRCS PO Box 2890 Washington, DC 20013 Phone: (202) 720-3527 www.nrcs.usda.gov

National Earthquake Hazards Reduction Program (NEHRP)	U.S. Department of Homeland Security, Federal Emergency Management Agency	To mitigate earthquake losses that can occur in many parts of the nation providing earth science data and assessments essential for warning of imminent damaging earthquakes, land-use planning, engineering design, and emergency preparedness decisions.	FEMA 500 C Street S.W. Washington, DC 20472 Phone (202) 646-4621 www.fema.gov
Assistance to Firefighters Grant	U. S. Department of Homeland Security, Federal Emergency Management Agency	Competitively awarded project grants to provide direct assistance, on a competitive basis, to fire departments for the purpose of protecting the health and safety of the public and firefighting personnel against fire and fire-related hazards	FEMA 500 C Street S.W. Washington, DC 20472 Phone (202) 646-4621 www.fema.gov
Fire Management Assistance Grants	U. S. Department of Homeland Security, Federal Emergency Management Agency	To provide project grants and the provision of specialized services for the mitigation, management, and control of fires that would constitute a major disaster.	FEMA 500 C Street S.W. Washington, DC 20472 Phone (202) 646-4621 www.fema.gov

Engineering for Natural Hazards	National Science Foundation	Supports fundamental research that advances knowledge for understanding and mitigating the impact of natural hazards on constructed civil infrastructure	National Science Foundation Phone: (703) 292-7024 https://www.nsf.gov

7.5 Mitigation Outreach and Partnerships

In addition to the capabilities and funding sources listed in sections 7.1 – 7.4, Riverside County provides training, exercises, workshops and volunteer management to non-profit organizations, faith-based organizations, businesses, and other local municipalities and programs to better accomplish mitigation.

Various communities as well as County of Riverside Emergency Management Department provides Community Emergency Response Team (CERT) training to the public and county employees. Following a major disaster, first responders who provide fire and medical assistance will not be able to immediately meet all of the demands for their services. The Community Emergency Response Team (CERT) Program provides for community and employee self-sufficiency in order to meet the general public's urgent life-saving and sustenance needs until emergency personnel arrive. The Community Emergency Response Team (CERT) Program educates people about disaster preparedness and trains them in basic response skills, such as fire safety, light search and rescue, and disaster medial operations. CERT members assist their fellow citizens/coworkers in their community or workplace following a disaster. CERT members take an active role in their community by preparing for a disaster, thus reducing their own impact risk.

There are currently Twenty (22) jurisdictions supporting CERT Programs within the County: Riverside County EMD, Beaumont, Corona, Indio, La Quinta, Lake Elsinore, Cathedral City, Moreno Valley, Murrieta, Palm Springs, Perris, Riverside, Temecula, San Jacinto, Menifee, Wildomar, Canyon Lake, Rancho Mirage, Desert Hot Springs, Palm Desert, Blythe and the town of Idyllwild.

In addition to the volunteer program, EMD coordinates the Radio Amateur Civil Emergency Service (RACES), a group of licensed radio amateurs who operate during declared emergencies. Once activated by local, county or State jurisdictions, RACES may assist any agency to provide emergency communications support as requested by the County of Riverside. RACES members trains volunteers how to operate amateur radios to mitigate communication failures. RACES members conduct radio tests to ensure critical facilities, including hospitals, maintain redundant communications in case of a failure. The County manages the Medical Reserve Corps (MRC) which coordinates the skills of practicing and retired physicians, nurses and other health professionals as well as other citizens interested in health issues. MRC focuses on these specific personnel who are eager to volunteer in order to address their community's ongoing public health needs and to help their community during large-scale emergency situations. MRC volunteers may also serve a vital role by assisting their communities with ongoing public

health needs through public awareness of disease outbreaks, immunizations, screenings, health and nutrition education and volunteering in community health centers and local hospitals.

EMD joins forces with the Riverside University Health System – Public Health (RUHS-PH) by providing a flu clinic for community members to receive their flu shot free of charge. This clinic provides a means for the County to mitigate pandemic flu as a hazard by vaccinating more people, reducing the impact or risk of a pandemic flu outbreak.

EMD coordinates with RUHS-PH, the Riverside Emergency Medical Services Agency (REMSA), hospitals, local health care facilities, and other disciplines to develop the annual Statewide Medical Health Exercise (SWMHE). Each year the state selects a scenario focusing on testing objectives designed to improve understanding of response procedures, building collaborative relationships, and identify areas of improvement. The SWMHE plays a critical role in the on-going support to Public Health and Medical preparedness and mitigation efforts by local, regional, and State agencies. Participation in the exercise allows hospitals, ambulance providers, law enforcement, and fire to test and validate policies, plans, procedures, training, equipment, and agreements. In addition, it helps clarify and train personnel in roles and responsibilities, improve interagency coordination, identify gaps in resources and response plans, strengthen relationships among all participating agencies, meet various requirements from regulatory and accreditation agencies.

EMD provides a Healthcare Operations Decontamination (HCO-D) course to train hospital staff and county first responders to improve their abilities, mitigating hazmat incidents. This course allows healthcare workers to improve their response capabilities, reducing the impact of the hazmat incident on patients, community members and their facilities.

Workshops and trainings on plan developing are offered by EMD staff to assist jurisdictions create plans that can address mitigation actions for affecting hazards. For example, Point of Dispensing (POD) trainings and workshops are provided to cities and other disciplines in Riverside County to allow them to be prepared and diminish the effect of a disease outbreak. With the help of EMD, the jurisdictions can create an approved plan that will list some of the actions they have or would like to have in place to prevent their community members from being affected by emergent diseases.

EMD administers the Hospital Preparedness Program (HPP) grant. The grant provides funds to purchase emergency equipment, ensuring hospitals, clinics, and long-term facilities throughout the county are equipped with the proper supplies to help prevent and mitigate the effects of disasters. The grant also funds training for healthcare workers to increase their skills and abilities in mitigating hazards.

Citizen Corps Councils have additionally been established in the Temecula, Lake Elsinore, Wildomar and Jurupa Valley. These provide a cadre of credentialed volunteers for the jurisdiction to utilize during a disaster response.

Riverside County has an established General Plan that was updated and adopted in December 2015. According to the County's Transportation & Land Management Agency (TLMA), the plan is designed to ensure that the County retains its core identity by guiding future growth. This growth should respect the diversity of the region and configure development in relation to the land it occupies and ensures that its various parts relate. It is the County's over-arching policy to document for land use matters. It also determines housing needs, need for roads, and locations for commercial and industrial use will be better suited throughout the County for the next 20 years and beyond. The overall implementation process of the LHMP can be supported by the General Plan through the incorporation of mitigation actions, goals, or polices.

The Zoning Ordinance for Riverside County administers the County's General Plan. TLMA states that while the General Plan identifies land use designations in the long-term, the Zoning Ordinance identifies specific and immediate uses for land. The General Plan's successful implementation can only occur if the County of Riverside Zoning Ordinance is updated and consistent with the plan as state law mandates General Plan-Zoning consistency and is able to implement the long-term intent of the Plan. Implementation of mitigation actions that include improving structures can be accomplished by adopting them into this Ordinance.

The Subdivision Ordinance for Riverside County is mandated by State law to conduct a local approval of land subdivision via the Subdivision Map Act. TLMA implies that local review of proposed subdivisions and parcel maps includes assessment of consistency with, and implementation of, the County's General Plan. This ordinance can have the ability to support the implementation of mitigation objectives and policies stated in the LHMP.

Section 8.0 – Goals and Strategies

8.1 Goals and Objectives

Goal 1: Reduce Loss of Life and Injuries

Objective 1.1: Provide timely notification and direction to the public in preparation for imminent and potential hazards.

Objective 1.2: Protect public health and safety through mitigation, preparing for, responding to, and recovering from the effects of natural, technological or man-made disasters.

Objective 1.3: Reduce hazard impacts and protect life, property and the environment from damages.

Objective 1.4: Improve understanding of the type, location and effects of hazards and vulnerabilities, as well as measures needed to protect life.

Goal 2: Reduce Hazard Related Property Losses

Objective 2.1: Encourage new development to occur in locations that avoid or minimize exposure to hazards. Continue to utilize County Ordinance 458, in concerns to NFIP and flood hazard areas and County Ordinance 460, in concerns to land use.

Objective 2.2: Reduce hazard related property losses by enforcing strong building codes.

Objective 2.3: Reduce repetitive losses for fire, flood, and earthquakes by encouraging protective measures and by anticipating future events.

Objective 2.4: Reduce hazard impacts to critical facilities, utilities and services through the implementation of low cost mitigation strategies.

Objective 2.5: Continue to strengthen land use regulations in high hazard areas.

Goal 3: Protect the Environment

Objective 3.1: Mitigate the impact of recurring drought conditions that impact both ground water supply and the agricultural industry.

Objective 3.2: Reduce hazards that adversely impact habitats, especially in regions with endangered species.

Goal 4: Maintain Coordination of Disaster Planning and Integrated Public Policy

Objective 4.1: Incorporate changes within Cal OES and FEMA that may affect public policy and planning.

Objective 4.2: Incorporate mitigation related activities into other disaster planning mechanisms, such as the Riverside County General Plan and Capital Improvement Plan.

Goal 5: Improve Community and Agency Awareness

Objective 5.1: Increase public threat awareness in concerns to the nature and extent of hazards they may be exposed to and where they can occur.

Objective 5.2: Improve mitigation and hazard related outreach to businesses, county departments, and stakeholders to increase their understanding of the threats within the county and actions they can take to reduce those hazard impacts.

8.2 Prioritizing Strategies

For the 2017 LHMP, the County assessed each strategy based on the goals and objectives in the LHMP and the General Plan. The process used by the County to prioritize goals and their respective objectives consisted of an evaluation of the hazards and their threat from the 2012 LHMP reviewing any events that occurred 2012 to 2017, and evaluating these against potential impacts. The participating Cities and Special Districts have identified their mitigation strategies in their stand-alone Annexes that are specific to their area of authority or jurisdiction.

8.3 Future and Current Mitigation Strategies

The Riverside County General Plan, adopted in December 2015, includes the following policies and recommendations for new construction and proposals in Safety Element 4:

Earthquake Hazards:

S 1.1 Mitigate hazard impacts through adoption and strict enforcement of current building codes, which will be amended as necessary when local deficiencies are identified.

S 1.2 Enforce state laws aimed at identification, inventory, and retrofit of existing vulnerable structures.

S 2.1 Minimize fault rupture hazards through enforcement of Alquist-Priolo Earthquake Fault Zoning Act provisions and the following policies: (AI 80, 91)

a. Require geologic studies or analyses for critical structures, lifeline, high-occupancy, schools, and high-risk structures within 0.5 miles of all Quaternary historic faults shown on the Earthquake Fault Studies Zones map.
b. Require geologic trenching studies within all designated Earthquake Fault Studies Zones, unless adequate evidence, as determined and accepted by the Riverside County Engineering Geologist, is presented. The County of Riverside may require geologic trenching of non-zoned faults for especially critical or vulnerable structures or lifelines.
c. Require that lifelines be designed to resist, without failure, their crossing of a fault, should fault rupture occur.
d. Support efforts by the California Department of Conservation, California Geological Survey to develop geologic and engineering solutions in areas of ground deformation due to faulting and seismic activity, in those areas where a through-going fault cannot be reliably located.

S 2.2 Require geological and geotechnical investigations in areas with potential for earthquake-induced liquefaction, landsliding or settlement, for any building proposed for human occupancy and any structure whose damage would cause harm, except for accessory buildings.

S 2.5 Require that engineered slopes be designed to resist seismically- induced failure. For lower-risk projects, slope design could be based on pseudo-static stability analyses using soil engineering parameters that are established on a site-specific basis. For higher-risk projects, the stability analyses should factor in the intensity of expected ground shaking, using a Newmark-type deformation analysis.

S 2.6 Require that cut and fill transition lots be over-excavated to mitigate the potential of seismically-induced differential settlement.

S 2.7 Require a 100% maximum variation of fill depths beneath structures to mitigate the potential of seismically-induced differential settlement.

Flood Hazards:

S 4.1 For new construction and proposals for substantial improvements to residential and nonresidential development within 100-year floodplains as mapped by FEMA or as determined by site specific hydrologic studies for areas not mapped by FEMA, Riverside County shall apply a minimum level of acceptable risk; and disapprove projects that cannot mitigate the hazard to the satisfaction of the Building Official or other responsible agency.

S 4.2 The County shall enforce provisions of the Building Code in conjunction with the following guidelines: (AI 25)

a. All residential, commercial and industrial structures shall be flood-proofed from the mapped 100-year storm flow. This may require that the finished floor elevation be constructed at such a height as to meet this requirement. Non-residential (commercial or industrial) structures may be allowed with a "flood-proofed" finished floor below the Base Flood Elevation (i.e., 100-year flood surface) to the extent permitted by state, federal and local regulations. New critical facilities shall be constructed above grade to the satisfaction of the Building Official, based on federal, state, or other reliable hydrologic studies. To the extent that residential, commercial, or industrial structures cannot meet these standards, they shall not be approved.
b. Critical facilities shall not be permitted in floodplains unless the project design ensures that there are two routes for emergency egress and regress, and minimizes the potential for debris or flooding to block emergency routes, either through the construction of dikes, bridges, or large-diameter storm drains under roads used for primary access.
c. Development using, storing, or otherwise involved with substantial quantities of onsite hazardous materials shall not be permitted within a 100-year floodplain or dam inundation zone, unless all standards for evaluation, anchoring, and flood-proofing have been satisfied; and hazardous materials are stored in watertight containers, not capable of floating, to the extent required by state and federal laws and regulations.
d. Specific flood-proofing measures may require: use of paints, membranes, or mortar to reduce water seepage through walls; installation of water tight doors, bulkheads, and shutters; installation of flood water pumps in structures; and proper modification and protection of all electrical equipment, circuits, and

appliances so that the risk of electrocution or fire is eliminated. However, fully enclosed areas that are below finished floors shall require openings to equalize the forces on both sides of the walls.

S 4.3 Prohibit construction of permanent structures for human housing or employment to the extent necessary to convey floodwaters without property damage or risk to public safety. Agricultural, recreational, or other low intensity uses are allowable if flood control and groundwater recharge functions are maintained.

S 4.4 Prohibit alteration of floodways and channelization unless alternative methods of flood control are not technically feasible or unless alternative methods are utilized to the maximum extent practicable. The intent is to balance the need for protection with prudent land use solutions, recreation needs, and habitat requirements, and as applicable to provide incentives for natural watercourse preservation, including density transfer programs as may be adopted. (AI 25, 60) a. Prohibit the construction, location, or substantial improvement of structures in areas designated as floodways, except upon approval of a plan which provides that the proposed development will not result in any significant increase in flood levels during the occurrence of a 100-year flood discharge. b. Prohibit the filling or grading of land for nonagricultural purposes and for non-authorized flood control purposes in areas designated as floodways, except upon approval of a plan which provides that the proposed development will not result in any significant increase in flood levels during the occurrence of a 100-year flood discharge.

S 4.5 Prohibit substantial modification to watercourses, unless modification does not increase erosion or adjacent sedimentation, or increase water velocities, so as to be detrimental to adjacent property, nor adversely affect adjacent wetlands or riparian habitat.

S 4.6 Direct flood control improvement measures toward the protection of existing and planned development.

S 4.7 Any substantial modification to a watercourse shall be done in the least environmentally damaging manner practicable in order to maintain adequate wildlife corridors and linkages and maximize groundwater recharge.

S 4.8 Allow development within the floodway fringe, if the proposed structures can be adequately flood-proofed and will not contribute to property damage or risks to public safety.

S 4.9 Within the floodway fringe of a floodplain as mapped by FEMA or as determined by site specific hydrologic studies for areas not mapped by FEMA, require development to be capable of withstanding flooding and to minimize use of fill. However, some development may be compatible within flood plains and floodways, as may some other land uses. In such cases, flood proofing would not be required. Compatible uses shall not, however, obstruct flows or adversely affect upstream or downstream properties with increased velocities, erosion backwater effects, or concentrations of flows.

S 4.10 Require all proposed projects anywhere in the county to address and mitigate any adverse impacts that it may have on the carrying capacity of local and regional storm drain systems.

S 4.11 Encourage neighboring jurisdictions to require development occurring adjacent to the County to consider the impact of flooding and flood control measures on properties within unincorporated Riverside County.

Fire Hazards:

S 5.1 Develop and enforce construction and design standards that ensure that proposed development incorporates fire prevention features through the following:

a. All proposed development and construction within Fire Hazard Severity Zones shall be reviewed by the Riverside County Fire and Building and Safety departments.
b. All proposed development and construction shall meet minimum standards for fire safety as defined in the Riverside County Building or County Fire Codes, or by County zoning, or as dictated by the Building Official or the Transportation Land Management Agency based on building type, design, occupancy, and use.
c. In addition to the standards and guidelines of the California Building Code and California Fire Code fire safety provisions, continue to implement additional standards for high-risk, high occupancy, dependent, and essential facilities where appropriate under the Riverside County Fire Code (Ordinance No. 787) Protection Ordinance. These shall include assurance that structural and nonstructural architectural elements of the building will not impede emergency egress for fire safety staffing/personnel, equipment, and apparatus; nor hinder evacuation from fire, including potential blockage of stairways or fire doors
d. Proposed development and construction in Fire Hazard Severity Zones shall provide secondary public access, in accordance with Riverside County Ordinances.

e. Proposed development and construction in Fire Hazard Severity Zones shall use single loaded roads to enhance fuel modification areas, unless otherwise determined by the Riverside County Fire Chief.
f. Proposed development and construction in Fire Hazard Severity Zones shall provide a defensible space or fuel modification zones to be located, designed, and constructed that provide adequate defensibility from wildfires.

S 5.2 Encourage continued operation of programs for fuel breaks, brush management, controlled burning, revegetation and fire roads.

S 5.3 Monitor fire-prevention measures (such as fuel reduction) through a site specific fire-prevention plan to reduce long-term fire risks in the Fire Hazard Severity Zones.

S 5.4 Limit or prohibit development or activities in areas lacking water and access roads.

S 5.5 Encourage proposed development in Fire Hazard Severity Zones to develop where fire and emergency services are available or planned.

S 5.6 Demonstrate that the proposed development can provide fire services that meet the minimum travel times identified in Riverside County Fire Department Fire Protection and EMS Strategic Master Plan.

S 5.7 Minimize pockets of flammable vegetation that increase likelihood of fire spread through conceptual landscaping plans to be reviewed by Planning and Fire Departments in the Fire Hazard Severity Zones. The conceptual landscaping plan of the proposed development shall at a minimum include:

a. Plant palette suitable for high fire hazard areas to reduce the risk of fire hazards.
b. Retention of existing natural vegetation to the maximum extent feasible.
c. Removal of onsite combustible plants.

S 5.8 Design to account for topography of a site and reduce the increased risk from fires in the Fire Hazard Severity Zones located near ridgelines, plateau escarpments, saddles, hillsides, peaks, or other areas where the terrain or topography affect its susceptibility to wildfires by:

a. Providing fuel modification zones with removal of combustible vegetation, but minimizing visual impacts and limiting soil erosion.
b. Replacing combustible vegetation with fire resistant vegetation to stabilize slopes.
c. Submitting topographic map with site specific slope analysis.

d. Submitting erosion and sedimentation control plans.
e. Providing a minimum 30 foot of setback from the edge of the fuel modification zones.
f. Minimizing disturbance of 25% or greater natural slopes.

S 5.9 Reduce fire threat and strengthen fire-fighting capability so that the County could successfully respond to multiple fires. (AI 88)

S 5.10 Require automatic natural gas shutoff earthquake sensors in high-occupancy industrial and commercial facilities, and encourage them for all residences.

S 5.11 Utilize ongoing brush clearance fire inspections to educate homeowners on fire prevention tips by implementing annual countywide weed abatement program

S 5.12 Conduct and implement long-range fire safety planning, including stringent building, fire, subdivision, and municipal code standards, improved infrastructure, and improved mutual aid agreements with the private and public sector.

S 5.13 Develop a program to utilize existing reservoirs, tanks, and water wells in the county for emergency fire suppression water sources.

S 5.14 Periodically review inter-jurisdictional fire response agreements, and improve firefighting resources as recommended in the Riverside County Fire Department Fire Protection Plan and EMS Strategic Master Plan to keep pace with development, including construction of additional high-rises, mid-rise business parks, increasing numbers of facilities housing immobile populations, and the risk posed by multiple ignitions, to ensure that (AI 4, AI 88):

- Fire reporting and response times do not exceed the goals listed in the Riverside County Fire Department Fire Protection Plan and EMS Strategic Master Plan identified for each of the development densities described.
- Fire flow requirements (water for fire protection) are consistent with Riverside County Ordinance 787.
- The planned deployment and height of aerial ladders and other specialized equipment and apparatus are sufficient for the intensity of development desired.

S 5.15 Continue to utilize the Riverside County Fire Department Fire Protection Plan and EMS Strategic Master Plan as the base document to implement the goals and objectives of the Safety Element.

S 5.16 Encourage property owners to utilize clustering and Transfer of Development Rights (TDR) program when developing lands within Fire Hazard Severity Zones by:

- Restricting the development of a property through placement of conservation easement.
- Acquiring the conservation easements similar to that of MSHCP Program.

S 5.17 Identify, map, and update on an as-needed continual basis, the Fire Hazard Severity Zone maps.

S 5.18 Ensure that the Fire Department has appropriate municipal staffing and fire protection planning staff that meet the needs of development pressure and adequately respond to long range fire safety planning.

S 5.19 Implement a coordination program with fire protection and emergency service providers to reassess fire hazards after wildfire events and to adjust fire prevention and suppression needs, as necessary.

S 5.20 Implement a regional coordination program to increase support for coordination among fire protection and emergency service providers.

S 5.21 Implement a long-term training and education program among government agencies and communities about fire protection.

Wind Hazards:

S 3.11 Require studies that address the potential of this hazard on proposed development within "High" and "Very High" wind erosion hazard zones as shown on Figure S-8, Wind Erosion Susceptibility Map.

S 3.12 Include a disclosure about wind erosion susceptibility on property title for those properties located within "High" and "Very High" wind erosion hazard zones as shown on Figure S-8, Wind Erosion Susceptibility Map.

S 3.13 Require buildings to be designed to resist wind loads.

S 3.14 Educate builders about the wind environment and encourage them to design projects accordingly

8.4 Ongoing Mitigation Strategies

8.4.1 Earthquake Strategies

Retrofitting Against Earthquake:

Earthquake retrofitting measures include removing masonry overhangs that will fall onto the street during shaking. Bracing the building provides structural stability, but can be very expensive. Less expensive approaches may be more cost effective for an area like that faces a relatively low earthquake threat. These include tying down appliances, water heaters, bookcases and fragile furniture so they won't fall over during a quake and installing flexible utility connections that will not break when shaken.

8.4.2 Flood Strategies

Generally, natural, man-made, and technological hazards impact people and improved property the most. Vacant space may incur damages as well, but the threat to life and property is greatly decreased. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. Flooding is the one of those hazards that can be kept away from a structure. There are five common methods to do this:

- Retrofit the building
- Create a barrier between the building and the source of flooding
- Move the building out of the flood-prone area
- Elevate the building above the flood level
- Demolish the building.

Retrofitting Against Flooding:

Flood retrofitting measures include dry flood proofing where all areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings (doors, windows, and vents) are closed, either permanently, with removable shields, or with sandbags. Dry flood proofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under State, FEMA and local regulations. Dry flood proofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry flood proofing techniques.

The alternative to dry flood proofing is wet flood proofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water

damage. This is the approach used for the first floor of the elevated homes. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater, and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Barriers:

An effective way of keeping flood water away from a structure is to construct a barrier. This barrier can be built of dirt or soil, berms, concrete, steel, a floodwall or through a simple sand-bagging operation. In areas subject to flash flooding, deep waters, or other high hazard, relocation and evacuation is often the only safe and responsible approach.

Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that falls inside the perimeter. This is usually done with a sump and/or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier.

Barriers can only be built so high. They can be overtopped by higher than expected flood waters. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and maintained. A berm can settle over time, lowering its protection level. A floodwall can crack, weaken, and lose its watertight seal. Therefore, barriers need careful design and maintenance (and insurance on the building, in case of failure).

Relocation:

Moving a structure to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost goes up for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. However, experienced building movers can handle most job.

In areas subject to flash flooding, deep waters, or other high hazard, relocation is often the only safe approach. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

Elevation:

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents.

Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

One concern with elevation is that it may expose the structure to greater impacts from other hazards. If not braced and anchored properly, an elevated building may have less resistance to the shaking of an earthquake and the pressures of high winds.

Demolition:

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damage. It is cheaper to demolish them and either replace them with new, flood protected structures ("pilot reconstruction"), or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move—such as larger, slab foundation, or masonry structures—and for dilapidated structures that are not worth protecting. Generally, demolition projects are undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to public open space use, such as a park.

One potential problem is sometimes an acquisition and demolition project is a "checkerboard" pattern in which nonadjacent properties are acquired. This can occur when some owners, especially those who have and prefer a waterfront location, prove reluctant to leave. Creating such an acquisition pattern in a community simply adds to the maintenance costs that taxpayers must support.

8.4.3 Fire Strategies

Wildfire:

One way to lessen the threat of a fire is by keeping fuel away from buildings. This is called the concept of "defensible space." Defensible space involves providing sufficient space between the structure and flammable vegetation.

Within this space, the fire service has room to battle the wildfire before it reaches the structure or to stop a structural fire before it ignites the wildland vegetation. With sufficient

defensible space, the structure even has a chance to survive on its own when fire service personnel and equipment are not available, as often happens during a significant wildfire.

The 2003 Fire Siege was perhaps the worst fire disaster in Southern California history. The firestorm that raged through the region consisted of 14 major fires that quickly exhausted resources and lasted for multiple weeks. The lessons from that fire season served as a warning for everyone living in areas prone to fire danger and resulted in stronger fire prevention and mitigation efforts.

In January 2005 a new state law became effective that extended the defensible space clearance around homes and structures from 30 feet to 100 feet. Proper clearance to 100 feet dramatically increases the chance of your house surviving a wildfire. This defensible space also provides for firefighter safety when protecting homes during a wildland fire. Riverside County Ordinance No. 859 Water Efficient Landscape Requirements mentions the use of defensible space and avoiding the use of fire-prone plant materials. Ordinance No. 695 Abatement of Hazardous Vegetation effective July 16, 2009 states "a one hundred (100) foot wide strip of land around structure(s) located on an adjacent improved parcel"

Riverside County has a Fire Protection contract with Cal Fire and utilizes many of their materials to educate individuals on why they should maintain a proper defensible space.

Public Fire Education:

Family Escape Plan:

In a County as fire prone as Riverside, you can never be too fire safe. Throughout Southern California, wildfire danger is a year-around threat. Our goal is to make each and every home more fire safe. We ask residents to make sure they have a fire escape plan, and that they practice what to do in an emergency.

Smoke Alarms:

Over ninety-three percent of all homes in the United States have at least one smoke alarm. The bad news is that one third of them are not working. The County encourages residents to make sure their smoke alarms are operating correctly by testing them regularly.

8.4.4 All Hazard Strategies

Facility Audits:

One of the first things we can do to reduce loss of structures within the County of Riverside is to evaluate all critical facilities' that are exposed to potential damage from the hazards. We should include a review of insurance coverage and identify where more information can be found on the property protection measure(s) recommended by the audit. Typically property protection measures are used to modify buildings or property that has a greater potential to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building
- Modify the building so it can withstand the impacts of the hazard
- Insure the property owner receives the opportunity for financial relief after the damage has occurred, This is usually received under the owners insurance policies or technical and financial assistance can be provided by a government agency

Other measures:

- Burying utility lines is a retrofitting measure that addresses earthquakes, winds from tornadoes, thunderstorms, and the ice that accompanies winter storms.
- Installing or incorporating backup power supplies minimizes the effects of power losses caused by downed lines.
- Roofs can be replaced with materials less susceptible to damage by hazards, such as modified asphalt or formed steel shingles and other fireproof materials
- Wildfire mitigation in residential properties can include installing spark arrestors on chimneys.
- Winter storm retrofitting measures include improving insulation on older buildings, relocating water lines from outside walls to interior spaces, and insulating water lines in crawlspaces and under elevated buildings.
- Windows can be sealed or covered with an extra layer of glass (storm windows) or plastic sheeting.

8.5 Mitigation Actions

County Hazard Mitigation Goals and Actions:

The Agency Inventory Document and Mitigation Strategies and Goals, were used by the county and each participating city and special district to review the possible mitigation

actions that would be appropriate for that agency to work on. This is based on how the Riverside County planning area can reduce the vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Only those actions where the County is the lead jurisdiction are detailed further in Section 4.3. Actions specific to other participating jurisdictions are detailed in the jurisdictional annexes.

It is important to note that Riverside County and the participating jurisdictions have numerous existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents, such as the General Plan, community wildfire protection plans and capital improvement budgets and reports. These actions are considered to be part of this plan, and the details, to avoid duplication, should be referenced in their original source document. The Riverside County planning area also realizes that new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to the overall goals of this plan.

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Section 9.0 Plan Implementation and Maintenance Process

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This section provides an overview of the overall strategy for plan implementation and maintenance. It also outlines the method and proposed schedule for monitoring, updating, and evaluating the plan. The chapter will discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

9.1 Implementation

The Riverside County Operational Area Multi-Jurisdiction Local Hazard Mitigation Plan is a partnership between the jurisdictions involved. Implementation prioritization is determined during the planning process and after taking funding into consideration. Economic constraints make low or no-cost actions most easily accomplished in plan implementation.

A highly effective and low cost implementation mechanism is the incorporation of our hazard mitigation plan recommendations into Operational Area and other planning efforts discussed in more detail below. Another strategy is for participating jurisdictions to assimilate mitigation strategies into their day-to-day functions and priorities. This effort will be achieved by monitoring agenda, attending stakeholder meetings, and review of programs and policies for coordination and opportunities to implement mitigation strategies. Riverside County Operational Area will also monitor funding opportunities to facilitate the implementation of more costly recommended actions. The County will assist in the identification of specialized pre- and post- disaster funds, state and federal earmarked funds, and other grant programs for opportunities to implement mitigation actions and identified projects.

The primary duty of the participating jurisdictions is to participate in reporting to their community governing boards and the public on the status of their plan implantation and mitigation opportunities and keep the County of Riverside EMD updated of changes to the status of their recommended actions or priorities. The primary duty of the County will be to promote mitigation action funding opportunities, organize Steering Committee meetings for plan evaluation and potential updates on a yearly basis and post any relevant information on the County website and others as appropriate.

9.2 Role of Hazard Mitigation Steering Committee

With the adoption of this plan, the participating jurisdictions will be responsible for the plan implementation and maintenance. The participating jurisdictions, led by County of Riverside Emergency Management Department will work to maintain a Hazard Mitigation Steering Committee to:

- Disseminate hazard mitigation activities and opportunities to all participants;
- Pursue the implementation of high-priority, low-cost mitigation actions;
- Monitor and identify cost-share and funding opportunities to support the community and recommended actions;
- Monitor and assist in implementation and evaluate updates of this plan;
- Support and assist ALL jurisdictions not included in the Multi-Jurisdictional Plan to develop their own stand-alone local hazard mitigation plans;
- Report on plan progress and changes to participating jurisdictions

9.3 Incorporation into Existing Planning Mechanisms

Incorporation of the hazard mitigation plan recommendations into other County and jurisdictional plans and policies is part of our implementation plan.

Plans include:

- County and City General Plans
- County and City Emergency Operations Plans
- County and City Ordinances
- Flood and Storm-water Management Master Plans
- Wildfire Protection Plans
- Capital Improvement Plans and Budgets

- Other plans and policies outlined in the capability assessments in the jurisdictional annexes
- Other plans, regulation, and practices with a mitigation focus.

9.4 Maintenance

Plan maintenance will be an annual process by both the County and participating jurisdictions to monitor and evaluate the plans' implementation and to update the plan as progress, changes in actions or priorities, or changing circumstances are recognized. The County will notify Cal OES and FEMA with plan updates to ensure they have the most current version of a participating jurisdiction's plan.

County of Riverside Emergency Management Department, Preparedness Division, is responsible for initiating plan reviews, consulting and organizing a Hazard Mitigation Steering Committee Meeting and facilitating coordination with participating jurisdictions. In order to evaluate progress and update mitigation strategies identified in the plan, the County of Riverside EMD and the participating jurisdictions will review the plan annually and following a large scale event. County of Riverside EMD and participating jurisdictions will submit a five-year written update to Cal OES and FEMA Region IX, unless disaster or other circumstance (e.g., changing regulations) require a change to this schedule.

Maintenance Evaluation Process

The yearly review of the plan will be presented and discussed at our annual Operational Area Planning Committee, Disaster Council Meeting held in January. The assessment will address whether:

- The goals and objectives address current and expected conditions.
- The nature, magnitude, and/or type of risks have changed.
- The current resources are appropriate for implementing the plan.
- There are implementation problems, such as technical, political, legal, or coordination issues with other agencies.
- The outcomes have occurred as expected (a demonstration of progress).
- The agencies and other partners participated as originally proposed.

Updates to this plan will:

- Consider changes in vulnerability due to action implementation;
- Document and highlight instances where mitigation efforts have proven effective;
- Document new hazards and identify any hazards that were previously overlooked;
- Incorporate any new data or studies on identified hazards and risks;
- Incorporate growth and development-related changes to infrastructure inventories; and
- Incorporate any new action recommendations or changes in action or risk prioritization.

County of Riverside Emergency Management Department, Preparedness Division, will conduct a plan update 18 months prior to plan expiration. In addition, Riverside County EMD will seek grant funding to support the coordination and development of the plan update. Upon notice of the HMPG funding opportunity, Riverside will apply for any available HMGP funding. After plan adoption, the LHMP Steering Committee in coordination with the EMD Planning team will conduct an annual review of the plan, flagging any sections in the plan that will require further updates. The sections flagged for revision will be included in the next LHMP update. Additional meetings will occur annually throughout the five-year cycle. Changes will be made to the plan to accommodate for actions that are no longer relevant due to shifting agendas, funding or no longer considered feasible.

10.0 Continued Public Involvement

The Riverside County Operational Area Multi-Jurisdiction Hazard Mitigation Plan update process has provided an opportunity to solicit participation from new and existing stakeholders, publicize successful mitigation strategies and actions, and seek public comments.

The County will continue its efforts to involve the public during the annual maintenance process and after any major events that lead to revisions in the plan.

The Riverside County Emergency Management Department and participating jurisdictions will be responsible for facilitating continued public and stakeholder involvement for their plan updates. They will do this through: input from the Hazard Mitigation Steering Committee, public outreach meetings, web and social media postings, press releases and public hearings for the plan's maintenance.

There are also opportunities for participating jurisdictions to obtain and share information with their stakeholders by participating in the Operational Area Planning Committee and the Disaster Council meetings.

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APPENDIX A – Resolution

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APPENDIX B – Participating Jurisdictions and Letters of Commitment

Continue to Next Page.

LHMP Participant Database

Agency Title	In, Out, or New	Agency Type	Agency Discipline
Agua Caliente Band of Cahuilla Indians	DROPPED	Tribe	Tribe
Beaumont Unified	IN	School District	Education
City of Banning	IN	City	N/A
City of Beaumont	IN	City	N/A
City of Blythe	IN	City	N/A
City of Calimesa	IN	City	N/A
City of Canyon Lake	IN	City	N/A
City of Cathedral	IN	City	N/A
City of Coachella	IN	City	N/A
City of Corona	IN	City	N/A
City of Desert Hot Springs	IN	City	N/A
City of Eastvale	IN	City	N/A
City of Hemet	IN	City	N/A
City of Indian Wells	IN	City	N/A
City of Indio	IN	City	N/A
City of Jurupa Valley	IN	City	N/A
City of La Quinta	IN	City	N/A
City of Lake Elsinore	IN	City	N/A

City of Murrieta	IN	City	N/A
City of Norco	IN	City	N/A
City of Palm Desert	IN	City	N/A
City of Palm Spring	IN	City	N/A
City of Perris	IN	City	N/A
City of Rancho Mirage	IN	City	N/A
City of Riverside	IN	City	N/A
City of San Jacinto	IN	City	N/A
City of Temecula	IN	City	N/A
City of Wildomar	IN	City	N/A
Desert Sands USD	NEW	School District	Education
Eastern Municipal Water	IN	Utilities	Water
Fern Valley Water	OUT	Utilities	Water
Hemet Unified School District	IN	School District	Education
High Valley Water	IN	Utilities	Water
Home Gardens County Water	OUT	Utilities	Water
Idyllwild Fire Protection	IN	Special District	Fire Protection
Idyllwild Water	OUT	Utilities	Water
Imperial Irrigation District	IN	Utilities	Water
Kaiser Hospital - Riverside	NEW	Hospital	Health Care

Lake Elsinore USD	IN	School District	Education
March Air Force Base	DROPPED	Military	Airforce
Menifee Union	OUT	School District	Education
Moreno Valley USD	NEW	School District	Education
Morongo Band of Mission Indians	NEW	Tribe	Tribe
Nuview Union	OUT	School District	Education
Palm Springs Unified	OUT	School District	Education
Perris Elementary	OUT	School District	Education
Perris Union HSD	IN	School District	Education
Pine Cove Water	OUT	Utilities	Water
Ramona Band of Indians	DROPPED	Tribe	Tribe
Rancho California Water	IN	Utilities	Water
Riverside Community Colleges	IN	School District	Education
Riverside County Office of Education	IN	County	Education
Riverside Unified School District	IN	School District	Education
San Gorgonio Memorial Healthcare	OUT	Special District	Healthcare
San Jacinto USD	IN	School District	Education
Santa Ana Watershed	IN	Utilities	Water
Val Verde Unified	OUT	School District	Education
Western Municipal Water	IN	Utilities	Water

Participant Contact Information

Local Hazard Mitigation Plan Contacts

Company	Last Name	First Name	Email Address	Job Title	Business Phone	Mobile Phone	Fax Number	Address	City	ZIP
Agua Caliente Band of Cahuilla Indians	Canales	Victoria	vcanales@aguacaliente.net	Emergency Services Coordinator	760.285.9271	760.699.6852		5401 Dinal Shore Dr.	Palm Springs	92264
Beaumont Unified	Evens	Mareesa	mevans@beaumontusd.k12.ca.us	Director of Risk Management	951.797.5366		951.797.6521			
City of Banning	Diaz	Alex	adiaz@ci.banning.ca.us	Chief of Police	951-849-1194	951-840-8563		125 E. Ramsey Street, P.O. Box 998	Banning	92220
City of Beaumont	Keyser	Mark	mkeyser@beaumontpd.org	Lieutenant	951-769-8500	951-529-7878	951.769.8506	660 Orange Avenue	Beaumont	92223
City of Blythe	Thomas	Kelly	KThomas@cityofblythe.ca.gov	Community Service Officer	760-922-6111.2241		760-922-3652	240 N Spring Street	Blythe	92225
City of Calimesa	Monson	Margaret	pworks@cityofcalimesa.net	Interim Public Works Director	(909) 795-9801 ext.235	(951) 538-4748		908 Park Avenue	Calimesa	92320
	Johnson	Bonnie	BJohnson@cityofcalimesa.net	City Manager	909.795.9801 ext.239		909.795.4399	908 Park Avenue	Calimesa	92320

City of Canyon Lake	A. Borja	Mark	mborja@cityofcanyonlake.com	Administrative Services Manager	(951)246-2024			31516 Railroad Canyon Road	Canyon Lake	92587
City of Cathedral	Hauser	Eric	ehauser@cathedralcity.gov	Chief	(760) 770-8200			32100 Desert Vista Rd.	Cathedral City	92234
	Wilson	Paul	pwilson@cathedralcity.gov	Fire Chief	760-770-8200			32100 Desert Vista Rd.	Cathedral	92234
City of Coachella	R. Torres	George	gtorres@coachella.org	Emergency Services Coordinator		(760) 501-8122	(760) 398-1630	53462 Enterprise Way	Coachella	92236
City of Corona	Moran-McGough	Gina	Gina.Moran-McGough@ci.corona.ca.us	Emergency Services Coordinator	(951) 736-2458	951-415-8071	(951) 270-2737	400 South Vicentia Avenue	Corona	92882
City of Desert Hot Springs	Brooks	Mark	mark.brooks@fire.ca.gov	Battalion Chief	760-343-3510	951-366-9295				
	Wilms	Doria	dwilms@cityofdhs.org	Deputy City Clerk	(760) 329-6411 ext. 260					
City of Eastvale	A. Rodriguez	Alia	Arodriguez@eastvaleca.gov	Senior Admin Analyst	951.703.4412		951703 4760	12363 Limonite Ave., Suite 910	Eastvale	91752
City of Hemet	Mills	Jennifer	Jmills@cityofhemet.org	Emergency Services Coordinator	9517652451		951765 2328	510 East Florida Avenue	Hemet	92543
City of Indian Wells and	Cadden	Eric	Eric.Cadden@rivco.org	Emergency Services Coordinator		760.578.2088	760.863 .8882	4210 Riverwalk	Riverside	92505

Palm Desert								Pkwy, Suite 300		
City of Indio	Kelly	Michelle	mkelly@indio.org	Emergency Services Coordinator						
			Michelle.Caldwell@rivco.org			760.766.5802				
City of Jurupa Valley	Rollings	Terri	trollings@jurupavalley.org	Assistant to the City Manager	951.332.6464	951.332.6995		8930 Limonite Ave.	Jurupa Valley	92509
City of La Quinta	Johnston	Zander	zjohnston@la-quinta.org	ESC	760.777.7044	7605016221		78495 Calle Tampico	La Quinta	92253
City of Lake Elsinore	DeSantiago	Rick	rdsantiago@lake-elsinore.org	Emergency Services Coordinator	951.674.3124		951.471 .1251	130 S. Main Street	lake Elsinore	92530
	George Eakins	Catherine	ceakins@lake-elsinore.org	Administrative Assistant	951.674.5170 ext.241		951.471 .1251	521 North Langstaff St.	Lake Elsinore	92530
City of Menifee	Glynn	Steven	sglynn@cityofmenifee.us	PW Manager	(951) 723-3719	(951) 775-6691	951.679 .3843	29714 Haun Road	Menifee	92586
City of Moreno Valley	Wilkinson	Steve	stevew@moval.org	Management Analyst	951.486.6788			22870 Calle San Juan De Los Lagos - PO Box 88005	Moreno Valley	92552
	Bricker	Zuzzette	zuzzetteb@moval.org	City OEM	951.413.3809	951.337.0485		22870 Calle San Juan De Los Lagos - PO Box 88005	Moreno Valley	92552

City of Murrieta	Shuck	Ken	kshuck@MurrietaCA.gov.	Fire Marshal	951.461.6158		951.677 .6799	41825 Juniper Street	Murrieta	92562
	Aylward	Terri	Taylward@MurrietaCA.gov	Fire Prevention Coordinator	951.461.6158		951.677 .6799	41825 Juniper Street	Murrieta	92562
City of Norco	Lane	Scott	scott.lane@fire.ca.gov	Battalion Chief	(951) 737-8097				Norco	
	Schuchard	Gina	gschuchard@ci.norco.ca.us	Finance Officer	951.270.5650				Norco	
	Okoro	Andy	aokoro@ci.norco.ca.us	City Manager	951.570.5611	951.545.2017		3902 Hillside Avenue	Norco	92860
City of Palm Spring	Lebsock	Anjila	Anjila.lebsock@palmspringsca.gov	Emergency Service Coordinator	760-323-8185		760-778-8430	300 N. El Cielo Road	Palm Springs	92262
City of Perris	Martinez	David	dmartinez@cityofperris.org	Interim Building Official/Fire Marshal	951.443.1029 ext.228		951.943 .3293	135 N. D Street	Perris	92570
City of Rancho Mirage	Kopp	Bud	budk@ranchomirageca.gov	Planning Manager	760.328.2266					
	Wilson	Britt	brittw@RanchoMirageCA.gov	Management Analyst	760.324.4511-230		(760) 324-9851	69825 Highway 111	Rancho Mirage	92270
City of Riverside	Annas	Mark	mannas@riversideca.gov	Emergency Operations Coordinator	951-320-8103	951-320-5321	951-320-8102	3085 St. Lawrence Street	Riverside	92504

City of Temecula	Cardenas	Roberto	roberto.cardenas@cityoftemecula.org	Fiscal Services Manager	951-693-3944		951-302-4159	41000 Main Street	Temecula	92590
City of Wildomar	Morales	Janet	jmorales@cityofwildomar.org	Senior Admin Analyst	951-677-7751.210		951.698 .1463	23873 Clinton Keith Rd Ste. 201	Wildomar	92595
	Chapman	Les	lchapman@cityofwildomar.org	Public Works Superintendent	9 51-677-7751.205		951.698 .1463	23873 Clinton Keith Rd Ste. 201	Wildomar	92595
Desert Sands USD	Nacua	Edward	edward.nacua@desertsands.us	Director of Security & Safety Services	760.771.8646	760.644.2269	760.771 -8713	47950 Dune Palms Dr.	La Quinta	92253
Eastern Munic. Water	Hefley	Doug	hefleyd@emwd.org	Director of Safety, Risk and Emergency Management	951.928.377.4 218	951.287.8627		P.O. Box 8300 2270 Trumble Road	Perris	92572
	Bray	Ryan	ryan.bray@rmpcorp.com	Technical Insulant, Risk and Emergency Management	949.282.0123 ext. 238			P.O. Box 8300 2270 Trumble Road	Perris	92572
Hemet Unified School District	Radford	Lyle	lradford@hemetusd.org	Safety and Security Technician	(951)765-5100 -2301			1791 West Acacia Ave	Hemet	92545
High Valley Water	Thornton	Nera	nthornton@highvalleyswater.com	Office Administrator	951.849.2612		951.922 .9667	47781 Twin Pines Rd.	Banning	92220

Idyllwild Fire Protection	Reitz	Patrick	chief@idyllwildfire.com	Chief	951-659-2153					
Imperial Irrigation District	Contreras	Jose	jscontreras@iid.com	Emergency Services Coordinator		760.604.5242		333 E Barioni Blvd	Imperial	92251
Kaiser Hospital - Riverside	Sankey	Corrie	Corrie.L.Sankey@KP.Org	Dir. Of EH&S	951.353.5513	951.595.3825	951.353.5159	10800 Magnolia Ave.	Riverside	92505
Lake Elsinore USD	Scranton	Julie	julie.scranton@leusd.k12.ca.us	Safety & Risk Services Supervisor	951.253.7181		951.245.6609	545 Chaney St.	Riverside	92530
March Air Force Base	Tucker	Marvin	marvin.tucker@us.af.mil	Chief, Emergency Management	951.655.4766			2991 Graeber St Bldg 1214	Riverside	92518
Moreno Valley USD	Evangelista	Tracy	tevangelista@mvusd.net		951.571.7500.17565					
Morongo Band of Mission Indians	Ellsworth	David	dellsworth@morongo-nsn.gov	EOC Deputy	951.755.5277	951.768.3311	951.572.6017	11581 Portrero Road	Banning	92220
	Velasquez Sr.	Floyd W.	fvelasquez@morongo-nsn.gov	Emergency Services Manager	951.572.6141	951.392.9828		12700 Pumarra Road	Banning	92220
	Johnson	Jesse	jjohnson@morongo-nsn.gov	Emergency Service Analyst	951-572-6071	951-392-4129				
Perris Union HSD	Miller	Judy	judy.miller@puhsd.org	Director of Risk Management	951.529.4691		951.943.5356	155 E. 4th St.	Perris	92570

	Smiderly	Christine	christine.smiderly@puhsd.org	Risk Management Secretary	(951) 943-6369 ext. 80282			155 E. 4th St.	Perris	92570
Ramona	Gomez	John	jgomez@ramona-nsn.gov	Project Manager	951.763.4105	951.941.4943		5610 Hwy 371, Ste. B P.O. Box 391670	Anza	92539
Rancho California Water	Morrison	Dave	morrisond@ranchowater.com	Safety Officer	951.296.6949	951.538.4398				
Riverside Community Colleges	W. Simmons	Michael	michael.simmons@rccd.edu	Director, Risk Management, Safety & Police	(951) 222-8128	(951) 206-8605	(951) 328-3502	3801 Market Street, 3rd Floor	Riverside	92501
Riverside County Office of Education	D'Amico	Michael	MDAMICO@rcoe.us	Safety, Emergency Preparedness Coordinator	951-826-6530	951-609-5537		3939 Thirteenth Street	Riverside	92501
Riverside Unified School District	Mueller	Ken	kmueller@rusd.k12.ca.us	Director of Maintenance and Operations	(951)788-7496 ext. 84001			3070 Washington Street	Riverside	92504
San Jacinto USD	Lawrence	Dawn	dlawrence@SanJacinto.k12.ca.us	Prep Coordinator	951.929.7700.4411	253.249.6282		2045 S. San Jacinto Ave.	San Jacinto	92583
Santa Ana Watershed	Quintero	Carlos	cquintero@sawpa.org	Senior Project Manager	951.354.4234	951.941.7611		11615 Sterling Avenue	Riverside	92503
Western Municipal	McMillien	Tom	tmcmillen@wmwd.com	Safety Officer	951.571.7252			14205 Meridian Parkway	Riverside	92518

Water District										

LETTERS OF COMMITMENT

Cities

City of Banning
City of Beaumont
City of Blythe
City of Calimesa
City of Canyon Lake
City of Cathedral
City of Coachella
City of Corona
City of Desert Hot Springs
City of Eastvale
City of Hemet
City of Indian Wells
City of Indio
City of Jurupa Valley
City of La Quinta
City of Lake Elsinore
City of Murrieta
City of Norco
City of Palm Desert
City of Palm Spring
City of Perris
City of Rancho Mirage
City of Riverside
City of San Jacinto
City of Temecula
City of Wildomar

Tribes

Agua Caliente Band of Cahuilla Indians – DROPPED
Morongo Band of Mission Indians
Ramona Band of Indians

Special Districts

Beaumont Unified
Desert Sands USD
Eastern Municipal Water
Hemet Unified School District
High Valley Water
Idyllwild Fire Protection
Imperial Irrigation District
Kaiser Hospital - Riverside
Lake Elsinore USD
March Air Force Base – DROPPED OUT
Moreno Valley USD
Perris Union HSD
Rancho California Water
Riverside Community Colleges
Riverside County Office of Education
Riverside Unified School District
San Jacinto USD
Santa Ana Watershed
Western Municipal Water

STAGECOACH TOWN USA
ESTABLISHED 1913

City of Banning
Office of the City Manager

September 27, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Banning is submitting this letter of commitment to confirm that the City of Banning has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Banning agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Banning understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

99 E. Ramsey St. • P.O. Box 998 • Banning, CA 92220-0998 • (951) 922-3101 • Fax (951) 922-3128

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

Letter of Commitment
September 27, 2016
Page 2 of 2

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Michael Rock, City Manager, commit the City of Banning to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 27th day of September, 2016

Michael Rock, City Manager

CITY OF BEAUMONT

August 2, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Beaumont is submitting this letter of commitment to confirm that the City of Beaumont has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Beaumont agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Beaumont understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

550 E. 6th Street • Beaumont • CA • 92223 • Phone: (951) 769-8520 • Fax: (951) 769-8526
www.ci.beaumont.ca.us

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Richard Warne, commit the City of Beaumont to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 2nd day of August

Interim City Manager

CITY OF BLYTHE

235 North Broadway • Blythe, California 92225
Phone (760) 922-6161 • Fax (760) 922-4938

October 19, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Blythe is submitting this letter of commitment to confirm that The City of Blythe has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning: The City of Blythe agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Blythe understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,

- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Peter Cosentini, City Manager, commit the City of Blythe to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 19th Day of October, 2016 10

Peter Cosentini, City Manager

CITY OF CALIMESA

908 Park Avenue, Calimesa, California 92320
Telephone 909.795.9801 Facsimile 909.795.4399
www.cityofcalimesa.net

May 1, 2017

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Calimesa is submitting this letter of commitment to confirm that the City of Calimesa has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Calimesa agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Calimesa understands that it must engage in the following planning process, as described in FEMA's _Local Multi-Hazard Mitigation Planning Guidance_ dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement

908 Park Avenue • Calimesa, California 92320 • (909) 795-9801

in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I _**Bonnie Johnson, City Manager**_ commit the City of Calimesa to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 1st day of May, 2017

Bonnie Johnson, City Manager
City of Calimesa

908 Park Avenue • Calimesa, California 92320 • (909) 795-9801

CITY OF CANYON LAKE

June 24, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Canyon Lake is submitting this letter of commitment to confirm that the City of Canyon Lake has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Canyon Lake agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Canyon Lake understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process,

31516 Railroad Canyon Road, Canyon Lake, CA 92587 · 951/244-2955 · FAX 951/246-2022
admin@cityofcanyonlake.com · www.cityofcanyonlake.com

CITY OF CANYON LAKE

attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Aaron Palmer, City Manager, commit the City of Canyon Lake to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 24 day of June, 2016

Aaron D Palmer

31516 Railroad Canyon Road, Canyon Lake, CA 92587 · 951/244-2955 · FAX 951/246-2022
admin@cityofcanyonlake.com · www.cityofcanyonlake.com

Cathedral City
Office of the City Manager

June 1, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Cathedral City is submitting this letter of commitment to confirm that the City of Cathedral City has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Cathedral City agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Cathedral City understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan; and

68-700 Avenida Lalo Guerrero • Cathedral City • California • 92234
www.cathedralcity.gov

- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process and as a participant in a multi-jurisdictional plan; I, Charles P. McClendon, City Manager commit the City of Cathedral City to the County of Riverside's Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 1st day of June, 2016

Charles P. McClendon
Charles P. McClendon, City Manager

68-700 Avenida Lalo Guerrero • Cathedral City • California • 92234
www.cathedralcity.gov

CITY OF COACHELLA
1515 Sixth Street, Coachella, California 92236
Phone (760) 398-3502 • Fax (760) 398-8117 • www.coachella.org

June 13, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, City of Coachella is submitting this letter of commitment to confirm that City of Coachella has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning, City of Coachella agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

City of Coachella understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,

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Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

CITY OF COACHELLA
1515 Sixth Street, Coachella, California 92236
Phone (760) 398-3502 • Fax (760) 398-8117 • www.coachella.org

- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I George R. Torres Emergency Services Coordinator, commit City of Coachella to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 13th day of June 2016

An Affirmative Action/Equal Opportunity Employer

CITY OF CORONA FIRE DEPARTMENT

735 PUBLIC SAFETY WAY • CORONA, CA 92880 • (951) 736-2220 • FAX (951) 736-2497
WWW.DISCOVERCORONA.COM

June 13, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Corona is submitting this letter of commitment to confirm that the City of Corona has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Corona agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Corona understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;

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Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I David Duffy, Fire Chief commit the City of Corona to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 13th day of June 2016.

David Duffy, Fire Chief

"SERVING OUR CITY WITH PRIDE"

City of Desert Hot Springs

65-950 Pierson Blvd.• Desert Hot Springs • CA • 92240
(760) 329-6411
www.cityofdhs.org

June 8, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Desert Hot Springs is submitting this letter of commitment to confirm that Desert Hot Springs has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning: Desert Hot Springs agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Desert Hot Springs understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Martin Magaña, City Manager, commit the City of Desert Hot Springs to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 8th day of June, 2016.

City of Eastvale
12363 Limonite Avenue, Suite #910 • Eastvale, CA 91752
(951) 361-0900 • Fax: (951) 361-0888 • www.EastvaleCA.gov

May 31, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Eastvale is submitting this letter of commitment to confirm that the City of Eastvale has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning, the City of Eastvale agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Eastvale understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

City of Eastvale
12363 Limonite Avenue, Suite #910 • Eastvale, CA 91752
(951) 361-0900 • Fax: (951) 361-0888 • www.EastvaleCA.gov

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, *Michele Nissen*, commit the *City of Eastvale* to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 31st day of May, 2016

Michele Nissen
City Manager

City of Hemet

445 E. FLORIDA AVE • HEMET, CALIFORNIA 92543 • (951) 765-2301

From the Office of the
CITY MANAGER
Alexander P. Meyerhoff

June 13, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Hemet is submitting this letter of commitment to confirm that City of Hemet has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Hemet agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Hemet understands that it must engage in the following planning process, as described in FEMA's _Local Multi-Hazard Mitigation Planning Guidance_ dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

Riverside County Emergency Management Department
Kim Saruwatari, Director
Page 2
June 13, 2016

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Alexander P. Meyerhoff, commit the City of Hemet to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 13th day of June, 2016.

Alexander P. Meyerhoff
City Manager

INDIAN WELLS
CALIFORNIA

April 1, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, Indian Wells submitting this letter of commitment to confirm that Indian Wells has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Indian Wells agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Indian Wells understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Eric W. Cadden commit Indian Wells the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this June day of 3rd, 2016.

Eric W Cadden

44-950 Eldorado Drive – Indian Wells, California 92210-7497- (V) 760.2489 (F) 346.0407
www.IndianWells.com

June 1, 2016

Attn: Kim Saruwatari, Director
Riverside County Emergency Management Department
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment of Participating Jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Director Saruwatari:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Indio is submitting this letter of commitment to confirm that the City of Indio has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Indio agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department to complete the plan in conformance with FEMA requirements.

The City of Indio understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.

p: 760.391.4000 f: 760.391.4008 100 Civic Center Mall Indio, CA 92201 www.INDIO.org

- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I *Dan Martinez*, commit the City of Indio to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Sincerely,

Dan Martinez

DAN MARTINEZ
City Manager, City of Indio

Executed this 1st day of June, 2016

p: 760.391.4000 f: 760.391.4008 100 Civic Center Mall Indio, CA 92201 www.INDIO.org

City of Jurupa Valley

Laura Roughton, Mayor . Verne Lauritzen, Mayor Pro Tem .
Brian Berkson, Council Member . Frank Johnston, Council Member . Brad Hancock, Council Member

June 8, 2016

City of Jurupa Valley

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Jurupa Valley is submitting this letter of commitment to confirm that Jurupa Valley has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning, the City of Jurupa Valley agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Jurupa Valley understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

8930 Limonite Ave., Jurupa Valley, CA 92509-5183, (951) 332-6464
www.jurupavalley.org

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Gary Thompson, City Manager, commit the City of Jurupa Valley to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 8th day of June, 2016

Gary S. Thompson, City Manager

8304 Limonite Avenue, Suite M, Jurupa Valley, CA 92509-5183, (951) 332-6464
www.jurupavalley.org

City of La Quinta

June 9, 2016

Ms. Kim Saruwatari, Director
Riverside County Emergency Management Department
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Ms. Saruwatari:

Per the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements for multi-jurisdictional mitigation plans, the City of La Quinta is submitting this letter of commitment to confirm that the City has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning, the City agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County to complete the plan in conformance with FEMA requirements.

The City understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identify hazards unique to the jurisdiction and not addressed in the master planning document;
- Conduct a vulnerability analysis and identify of risks, where they differ from the general planning area;
- Formulate mitigation goals responsive to public input and develop mitigation actions complementary to those goals. A range of actions will be identified specific for each jurisdiction;
- Demonstrate that there has been proactive participation in the planning process by all community stakeholders.
- Document an effective process to maintain and implement the plan;
- Adopt the Multi-Jurisdictional Hazard Mitigation Plan.

Please do not hesitate to contact me with questions or concerns.

Sincerely,

Frank J. Spevacek
City Manager

78-495 Calle Tampico | La Quinta | California 92253 | 760.777.7000 | www.La-Quinta.org

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

City of Lake Elsinore
Dream Extreme

June 8, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Lake Elsinore is submitting this letter of commitment to confirm that City of Lake Elsinore has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; City of Lake Elsinore agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

City of Lake Elsinore understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.

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June 8, 2016

- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan: I Grant Yates, City Manager, commit City of Lake Elsinore to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 8th day of June, 2016

Grant Yates, City Manager

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
July 2018

CITY OF MURRIETA

June 16, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy. Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Murrieta Fire Department is submitting this letter of commitment to confirm that Murrieta Fire Department has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Murrieta Fire Department agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Murrieta Fire Department understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

FIRE DEPARTMENT • 41825 Juniper Street • Murrieta, California 92562
phone: 951.304.FIRE (3473) • fax: 951.677.6709 • web: murrieta.org

- Documentation of an effective process to maintain and implement the plan; and.
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Jason Briley commit the Murrieta Fire Department to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed June 16, 2016

Jason Briley, Fire Marshal
City of Murrieta Fire Department

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
July 2018

CITY of NORCO

CITY HALL • 2870 CLARK AVENUE • NORCO CA 92860 • (951) 735-3900 • www.norco.ca.us

June 13, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Director Saruwatari,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Norco is submitting this letter of commitment to confirm that the city has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Norco understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document.
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area.
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.).
- Documentation of an effective process to maintain and implement the plan.
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

CITY COUNCIL

KEVIN BASH, Mayor · GREG NEWTON, Mayor Pro Tem · ROBIN GRUNDMEYER, Council Member · BERWIN HANNA, Council Member · TED HOFFMAN, Council Member

Riverside County Operational Area Multi-Jurisdictional
Hazard Mitigation Planning
Page 2
June 13, 2016

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Andy Okoro commit the City of Norco to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 13th day of June 2016

Andy Okoro, City Manager
City of Norco

Attest:

Cheryl L. Link, City Clerk
City of Norco

City of Palm Springs

David H. Ready, Esq., Ph.D.
City Manager
3200 E. Tahquitz Canyon Way, Palm Springs, CA 92262
Tel 760.322.8350 • Fax 760.323.8207 • TDD 760.864.9527
David.Ready@palmspringsca.gov • www.palmspingsca.gov

June 1, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Palm Springs is submitting this letter of commitment to confirm that the City of Palm Springs has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning, the City of Palm Springs agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department to complete the plan in conformance with FEMA requirements.

The City of Palm Springs understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan; and,

PO Box 2743, Palm Springs, California 92263

Page Two
June 1, 2016
Riverside County Emergency Management

- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan, I, David H. Ready, Esq., Ph.D., commit the City of Palm Springs to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 13 day of June 2016

David H. Ready, Esq., Ph.D.

CITY OF PERRIS

DEPARTMENT OF DEVELOPMENT SERVICES
Building and Safety Division
135 N. 'D' STREET, PERRIS, CA 92570-2200
TEL.: (951) 943-1029 FAX: (951) 657-9085

June 13, 2016

RE: City of Perris letter of commitment

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Perris is submitting this letter of commitment to confirm that the City of Perris has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Perris agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Perris understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any

planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Clara Miramontes, commit the City of Perris to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 13th day of June 2016

Sincerely

Clara Miramontes
Development Services Director
City of Perris

CITY OF RANCHO MIRAGE

July 14, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Rancho Mirage is submitting this letter of commitment to confirm that the City of Rancho Mirage has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Rancho Mirage agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Rancho Mirage understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Britt W. Wilson commit the City of Rancho Mirage to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 14th day of July 2016

Britt W. Wilson
Emergency Services Coordinator, City of Rancho Mirage
Brittw@ranchomirageca.gov
760-324-4511

c. Bud Kopp, City of Rancho Mirage Planning Manager

Fire Department

City of Arts & Innovation

June 15, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Riverside Fire Department – Office of Emergency Management is submitting this letter of commitment to confirm that the Riverside Fire Department – Office of Emergency Management has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the Riverside Fire Department – Office of Emergency Management agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

City of Riverside understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,

Office of Emergency Management
3085 St Lawrence Street, Riverside, CA 92504 | Phone: (951) 320-8100 | RiversideCA.gov/Fire

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Mark Annas, Emergency Operations Coordinator, commit Riverside Fire Department – Office of Emergency Management to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 15 day of June, 2016

Mark D. Annas
Emergency Operations Coordinator
Riverside Fire Department
Office of Emergency Management

SAN JACINTO

Scott Miller
Mayor

Alonso Ledezma
Mayor Pro Tem

Crystal Ruiz
Councilmember

Andrew Kotyuk
Councilmember

Russ Utz
Councilmember

May 16, 2017

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of San Jacinto is submitting this letter of commitment to confirm that the City of San Jacinto has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; The City of San Jacinto agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of San Jacinto understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Robert Johnson, commit the City of San Jacinto to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 5/16 day of 2017

Robert A. Johnson
City Manager

595 S. San Jacinto Ave. | San Jacinto, CA 92583 | Ph 951-487-7330 | Fax 951-654-3728 | www.ci.san-jacinto.ca.us

City of Temecula

City Manager's Office
41000 Main Street • Temecula, CA 92590
Phone (951) 506-5100 • Fax (951) 694-6499 • www.cityoftemecula.org

June 9, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the City of Temecula is submitting this letter of commitment to confirm that the City of Temecula has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the City of Temecula agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The City of Temecula understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I *Aaron Adams*, commit the City of Temecula to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 9 day of June 2016.

X

Aaron Adams, City Manager

Bridgette Moore, Mayor
Timothy Walker, Mayor Pro Tem
Ben Benoit, Council Member
Bob Cashman, Council Member
Marsha Swanson, Council Member

23873 Clinton Keith Rd, Ste 201
Wildomar, CA 92595
951/677-7751 Phone
951/698-1463 Fax
www.CityofWildomar.org

June 13, 2016

CITY OF WILDOMAR

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level. The City of Wildomar is submitting this letter of commitment to confirm that City of Wildomar has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; City of Wildomar agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

City of Wildomar understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Page 1 of 2

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Dan York, Assist City Manager, commits City of Wildomar to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 13th day of June 2016

Dan York
Assistant City Manager
City of Wildomar

Page 2 of 2

DROPPED OUT

AGUA CALIENTE BAND OF CAHUILLA INDIANS

EMERGENCY SERVICES & RISK MANAGEMENT

June 13, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Agua Caliente Band of Cahuilla Indians is submitting this letter of commitment to confirm that the Agua Caliente Band of Cahuilla Indians has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning, the Agua Caliente Band of Cahuilla Indians agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The Agua Caliente Band of Cahuilla Indians understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

5401 DINAH SHORE DRIVE, PALM SPRINGS, CA 92264
WWW.AGUACALIENTE-NSN.GOV

AGUA CALIENTE BAND OF CAHUILLA INDIANS

EMERGENCY SERVICES & RISK MANAGEMENT

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I *John Lavallee* commit *Agua Caliente Band of Cahuilla Indians* to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 11 day of June

5401 Dinah Shore Drive, Palm Springs, CA 92264
WWW.AGUACALIENTE-NSN.GOV

MORONGO BAND OF MISSION INDIANS

A SOVEREIGN NATION

Morongo Band of Mission Indians

June 2, 2016
Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Morongo Band of Mission Indians is submitting this letter of commitment to confirm that Morongo Band Of Mission Indians has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; [Morongo Band Of Mission Indians agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

[Morongo Band of Mission Indians] understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (Examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I G. Michael Milhiser, commit Morongo Band of Mission Indians to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 3 day of 2016.

DROPPED OUT

RAMONA BAND OF CAHUILLA

56310 Highway 371, Suite B
Post Office Box 391670
Anza, California 92539

Tel: (951) 763-4105
Fax: (951) 763-4325
Website: www.ramona-nsn.gov
Email: admin@ramona-nsn.gov

"A SOVEREIGN NATION"

August 23, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

The Ramona Band of Cahuilla ("Band"), a federally recognized tribe, is submitting this letter of commitment to confirm that the Band has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

The Federal Emergency Management Agency's ("FEMA") Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans, and the Band's participation will allow for a more comprehensive evaluation of hazards and proposed mitigation measures through the coordination at the county, regional, or watershed level.

The Band agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The Band understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Band's Multi-Jurisdictional Hazard Mitigation Plan by the Band's governing body.

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Joseph D. Hamilton, Chairman, commit the Ramona Band of Cahuilla to participation in the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Please feel free to contact the Band's administrative offices at (951)763-4105 if you have any questions or wish to discuss this matter further.

Respectfully,

Joseph D. Hamilton
Chairman, Ramona Band of Cahuilla

QUALITY EDUCATION
A Shared Commitment

BEAUMONT UNIFIED SCHOOL DISTRICT

June 15, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, Beaumont Unified School District is submitting this letter of commitment to confirm that Beaumont Unified School District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Beaumont Unified School District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Beaumont Unified School District understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

350 W. Brookside Avenue • PO Box 187 • Beaumont • California • 92223-0187 • Tel: (951) 845-1631

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I *Terrence Davis*, commit *Beaumont Unified School District* to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 13th day of July, 2016

(Jurisdiction official's signature)

350 W. Brookside Avenue • PO Box 187 • Beaumont • California • 92223-0187 • Tele: (951) 845-1631

Desert Sands Unified School District
47-950 Dune Palms Road • La Quinta, California 92253 • (760) 777-8567 • FAX (760) 771-8574
BOARD OF EDUCATION: Michael Duran, Donald H. Griffith, Wendy Jonathan, Matt Monica, D. Gary Tomak
SUPERINTENDENT: Dr. Gary Rutherford
Security Services • (760) 771-8646 • FAX: (760) 771-8713
Jeff Kaye, Director of Security & Safety Services

June 14, 2016

Desert Sands Unified School District

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Desert Sands Unified School District is submitting this letter of commitment to confirm that The Desert Sands Unified School District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; The Desert Sands Unified School District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The Desert Sands Unified School District understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction

- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan, I Jeff Kaye, Director of Security and Safety, commit the Desert Sands Unified School District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 14 day of June 2016

Jeff Kaye

Director of Security and Safety Services
Desert Sands Unified School District

June 13, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Subject: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Eastern Municipal Water District is submitting this letter of commitment to confirm that Eastern Municipal Water District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Eastern Municipal Water District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Eastern Municipal Water District understands that it must engage in the following planning process, as described in FEMA's Local Multi-Hazard Mitigation Planning Guidance dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;

2270 Trumble Road • P.O. Box 8300 • Perris, CA 92572-8300
T 951.928.3777 • F 951.928.6177 emwd.org

Kim Saruwatari
June 13, 2016
Page 2

- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and.
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Douglas Hefley, commit Eastern Municipal Water District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 13th day of June, 2016.

Sincerely,

Douglas Hefley
Director of Safety, Risk and Emergency Management

DH:sr

EASTERN MUNICIPAL WATER DISTRICT

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

HEMET UNIFIED SCHOOL DISTRICT

Dr. Barry L. Kayrell
Superintendent

Dr. LaFaye Platter
Deputy Superintendent
Dr. David Horton
Assistant Superintendent
Vince Christakos
Assistant Superintendent

Professional Development Service Center
1791 W. Acacia Avenue
Hemet, CA 92545
(951) 765 5100
Fax: (951) 765-5115

Professional Development Academy
2085 W. Acacia Avenue
Hemet, CA 92545
(951) 765-5100
Fax: (951) 765-6421

www.hemetusd.org

Governing Board
Marilyn Forst
Megan Haley
Vic Scavarda
Patrick Searl
James Smith
Ross Valenzuela
Joe Wojcik

Hemet Unified School District
Lucy M. Dressel, Director of Safety/Risk Management/Benefits
1791 West Acacia Avenue
Hemet, CA 92545

May 26th, 2016

Hemet Unified School District

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level. Hemet Unified School District is submitting this letter of commitment to confirm that Hemet Unified School District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Hemet Unified School District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Hemet Unified School District understands that it must engage in the following planning process, as described in FEMA's Local Multi-Hazard Mitigation Planning Guidance dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant

HEMET UNIFIED SCHOOL DISTRICT

Dr. Barry L. Kayrell
Superintendent

Dr. LaFaye Platter
Deputy Superintendent
Dr. David Horton
Assistant Superintendent
Vince Christakos
Assistant Superintendent

Professional Development
Service Center
1791 W. Acacia Avenue
Hemet, CA 92545
(951) 765 5100
Fax (951) 765 5115

Professional Development
Academy
2085 W. Acacia Avenue
Hemet, CA 92545
(951) 765 5100
Fax (951) 765 6421

www.hemetusd.org

involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Lucy M. Dressel, commit Hemet Unified School District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 26th day of May 2016

Lucy M. Dressel

Lucy M. Dressel, Director of Safety/Risk Management/Benefits

High Valleys Water District

June 8, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the High Valleys Water District is submitting this letter of commitment to confirm that the High Valleys Water District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the High Valleys Water District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The High Valleys Water District understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Ernest B. Wright, commit the High Valleys Water District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 8th day of June, 2016

Ernest B Wright

Ernest B. Wright

Idyllwild Fire Protection District
PO Box 656
Idyllwild, CA 92549
(951) 659-2153

Thursday, June 09, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Idyllwild Fire Protection District (IFPD) is submitting this letter of commitment to confirm that the IFPD has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; the IFPD agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The IFPD understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings,

Page 1 of 2

contributing research, data, or other information, commenting on drafts of the plan, etc.); and

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Patrick Reitz, Fire Chief, commit the Idyllwild Fire Protection District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 9th day of June, 2016.

Patrick Reitz
Fire Chief

Page 2 of 2

IID

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June 8, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Imperial Irrigation District is submitting this letter of commitment to confirm that Imperial Irrigation District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Imperial Irrigation District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Imperial Irrigation District understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,

- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I <u>Gary D. Hatfield, Jr</u> , commit <u>Imperial Irrigation District</u> to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 8th day of June

KAISER PERMANENTE
Riverside Service Area
10800 Magnolia Ave.
Riverside, CA, 92505

August 3, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, Kaiser Permanente Riverside Service Area is submitting this letter of commitment to confirm that Kaiser Permanente Riverside Service Area has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Kaiser Permanente Riverside Service Area agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Kaiser Permanente Riverside Service Area understands that it must engage in the following planning process, as described in FEMA's *<u>Local Multi-Hazard Mitigation Planning Guidance</u>* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

KAISER PERMANENTE®
Riverside Service Area
10800 Magnolia Ave.
Riverside, CA. 92505

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Corrie Sankey, commit Kaiser Permanente Riverside Service Area to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 2 day of August

Corrie Sankey
Director, Environmental Health and Safety
Emergency Management

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

July 2018

Lake Elsinore Unified School District

(951) 253-7000

545 Chaney Street
Lake Elsinore, CA 92530

www.leusd.k12.ca.us

June 8, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Lake Elsinore Unified School District (LEUSD) is submitting this letter of commitment to confirm that LEUSD has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; LEUSD agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

LEUSD understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Dr. Gregory J. Bowers, commit Lake Elsinore Unified School District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 8th day of June 2016

Gregory J. Bowers

Dr, Gregory J. Bowers, Assistant Superintendent
Facilities & Operations Division

DROPPED OUT

DEPARTMENT OF THE AIR FORCE

AIR FORCE RESERVE COMMAND

13 June 2016

Riverside County Emergency Management Department

Kim Saruwatari, Director

4210 Riverwalk Pkwy, Ste. 300

Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, March ARB is submitting this letter of commitment to confirm that March ARB has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; March ARB agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

March ARB understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;

- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Marvin J. Tucker, commit March ARB to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

MARVIN J. TUCKER, GS-11, DAF

Chief, Emergency Management

Board of Education
Jesús M. Holguín, President
Denise Fleming, Ed.D., Vice President
Cleveland Johnson, Clerk
Gary E. Baugh, Ed.S.
Patrick W. Kelleher

Superintendent of Schools
Judy D. White, Ed.D.

Moreno Valley Unified School District

25634 Alessandro Boulevard
Moreno Valley, California 92553
951-571-7500
www.mvusd.net

The mission of Moreno Valley Unified School District is to ensure all students graduate high school prepared to successfully enter into higher education and/or pursue a viable career path.

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Moreno Valley Unified School District is submitting this letter of commitment to confirm that Moreno Valley Unified School District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Moreno Valley Unified School District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Moreno Valley Unified School District understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I *Darryl Scott*, commit *Moreno Valley Unified School District* to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

"Executed this 14 day of June

Signature of Director of Safety and Security, Darryl Scott

PERRIS UNION
HIGH SCHOOL DISTRICT
155 E. Fourth Street, Perris, CA 92570
951-943-6369

puhsd.org · @puhsd · PerrisUnionHSD

Superintendent: Jonathan L. Greenberg, Ed.D.

Grant Bennett
Assistant Superintendent
Educational Services

Candace Reines
Assistant Superintendent
Business Services

Tonya Davis
Chief Human
Resources Officer

Joseph Williams
Executive Director
Technology

April 1, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, Perris Union High School District is submitting this letter of commitment to confirm that Perris Union High School District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Perris Union High School District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Perris Union High School District understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.

- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I *Judy Miller, Director of Risk Management and Environmental Safety*, commit Perris Union High School District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 31st day of May

Rancho Water

June 30, 2016

RIVERSIDE COUNTY EMERGENCY MANAGEMENT DEPARTMENT
Ms. Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

SUBJECT: LETTER OF COMMITMENT AS PARTICIPATING JURISDICTION IN RIVERSIDE COUNTY OPERATIONAL AREA MULTI-JURISDICTIONAL HAZARD MITIGATION PLANNING

Dear Ms. Saruwatari:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Rancho California Water District (RCWD/District) is submitting this letter of commitment to confirm that RCWD has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; RCWD agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The District understands that it must engage in the following planning process, as described in FEMA's _Local Multi-Hazard Mitigation Planning Guidance_ dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I _Dave Morrison Safety Officer_, commit _Rancho California Water District_ to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 30th day of June

Should you have any questions regarding this matter, please contact me at the District office at (951) 296-6900.

Sincerely,

RANCHO CALIFORNIA WATER DISTRICT

Dave Morrison
Safety Officer

090IDT

RCCD | RIVERSIDE COMMUNITY COLLEGE DISTRICT
OFFICE OF THE CHANCELLOR
MORENO VALLEY COLLEGE | NORCO COLLEGE | RIVERSIDE CITY COLLEGE

June 1, 2016

PARTICIPATING JURISDICTION

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Riverside Community College District is submitting this letter of commitment to confirm that Riverside Community College District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; The Riverside Community College District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The Riverside Community College District understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.

3801 Market Street
Riverside, CA 92501
(951) 222-8800
Fax (951) 682-5339
www.rccd.edu

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
July 2018

Riverside County Emergency Management Department
June 1, 2016
Page 2

- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I *Michael L Burke, Ph.D.,* commit *Riverside Community College District* to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 1st day of June

Michael L. Burke
Michael L. Burke, Ph.D.

RIVERSIDE COUNTY OFFICE OF EDUCATION
KENNETH M. YOUNG
Riverside County Superintendent of Schools

3939 Thirteenth Street
P.O. Box 868
Riverside, California
92502-0868
(951) 826-6530

47-110 Calhoun Street
Indio, California
92201-4779
(760) 863-3000

24980 Las Brisas Road
Murrieta, California
92562-4008
(951) 600-5651

May 26, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy., Ste. 300
Riverside, CA 92505

Re: **Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning**

Dear Riverside County Emergency Management Department:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level. The Riverside County Office of Education is submitting this letter of commitment to confirm that Riverside County Office of Education has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Riverside County Office of Education agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Riverside County Office of Education understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;

- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and,
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Teresa Hyden, Chief Business Official, commit Riverside County Office of Education to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 1st day of June, 2016

Teresa Hyden
Chief Business Official
Division of Administration and Business Services
(951) 826-6790 / FAX [951] 826-6974

MD:amn
c: Michael D'Amico, Coordinator, Safety and Emergency Preparedness

Riverside Unified School District

ADMINISTRATION BUILDING
3380 14TH STREET - P. O. BOX 2800
RIVERSIDE, CALIFORNIA 92516

OFFICE OF THE ASSISTANT SUPERINTENDENT
OPERATIONS DIVISION
951-788-7135, Extension 80413
FAX: 951-778-5668

David C. Hansen
District Superintendent

RUSD Innovation in Education

Riverside County Emergency Management Department
Kim Saruwatari
Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Ms. Saruwatari,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Riverside Unified School District is submitting this letter of commitment to confirm that the Riverside Unified School District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning, the Riverside Unified School District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

The Riverside Unified School District understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;

Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning
June 8, 2016
Page 2

- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and,
- Documentation of an effective process to maintain and implement the plan; and.
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Kirk R. Lewis, commit the Riverside Unified School District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 8th day of June, 2016.

Kirk R. Lewis
Assistant Superintendent, Operations

August 10, 2016

Riverside County Emergency Management Department

Kim Saruwatari, Director

4210 Riverwalk Pkwy, Ste. 300

Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the San Jacinto Unified School District (SJUSD) is submitting this letter of commitment to confirm that SJUSD has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; SJUSD agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department to complete the plan in conformance with FEMA requirements.

SJUSD understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area

- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.)
- Documentation of an effective process to maintain and implement the plan
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan and by adoption of resolution from the Board of Trustees (attached), I commit San Jacinto Unified School District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Sincerely,

Diane Perez

Superintendent

Santa Ana Watershed Project Authority

OVER 45 YEARS OF INNOVATION, VISION, AND WATERSHED LEADERSHIP

One Water One Watershed
AWRA INTEGRATED WATER RESOURCES MANAGEMENT AWARD
HARVARD KENNEDY SCHOOL'S TOP 25 INNOVATIONS IN AMERICAN GOVERNMENT

Thomas P. Evans, Commission Chair
Celeste Cantú, General Manager
Orange County Water District
Western Municipal Water District
Eastern Municipal Water District
San Bernardino Valley Municipal Water District
Inland Empire Utilities Agency

June 14, 2016

Kim Saruwatari, Director
Riverside County Emergency Management Department
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as Participating Jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Ms. Saruwatari:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Santa Ana Watershed Project Authority (SAWPA) is submitting this letter of commitment to confirm that SAWPA has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; SAWPA agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

SAWPA understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan; and
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

11615 Sterling Avenue, Riverside, CA 92503 • 951.354.4220
www.sawpa.org • www.sawpa.org/OWOW

Kim Saruwatari, Director
Riverside County Emergency Management Department
Page 2
June 14, 2016

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I, Celeste Cantú, General Manager, commit SAWPA to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

You may contact Richard Haller at 951.354.4240 or rhaller@sawpa.org with any questions.

Sincerely,

For Celeste Cantú
General Manager

John V. Rossi, General Manager

Robert Stockton, Division 1 · Thomas P. Evans, Division 2 · Brenda Dennstedt, Division 3 · Donald D. Galleano, Division 4 · S.R. "Al" Lopez, Division 5

WESTERN MUNICIPAL WATER DISTRICT
Securing Your Water Supply

May 31, 2016

Riverside County Emergency Management Department
Kim Saruwatari, Director
4210 Riverwalk Pkwy, Ste. 300
Riverside, CA 92505

Re: Letter of Commitment as participating jurisdiction in Riverside County Operational Area Multi-Jurisdictional Hazard Mitigation Planning

Dear Riverside County Emergency Management Department,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, Western Municipal Water District is submitting this letter of commitment to confirm that Western Municipal Water District has agreed to participate in the County of Riverside Emergency Management Department's Multi-Jurisdictional Hazard Mitigation Planning.

Further, as a condition to participating in the mitigation planning; Western Municipal Water District agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as necessary and in a timely manner to the County of Riverside Emergency Management Department's to complete the plan in conformance with FEMA requirements.

Western Municipal Water District understands that it must engage in the following planning process, as described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction.
- Demonstration that there has been proactive participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any

14205 Meridian Parkway, Riverside, CA 92518 • 951.571.7100 • wmwd.com

planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-Jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I John V. Rossi, commit Western Municipal Water District to the County of Riverside Emergency Management Department Multi-Jurisdictional Hazard Mitigation Planning effort.

Executed this 4th day of June 2016,

John V. Rossi, General Manager

JVR:tm

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APPENDIX C – Mitigation Action Table

2012 Plan Strategies Updated Status

Mitigation Actions Table

Type of Hazard	Mitigation Actions	Departments/ Jurisdictions	Status Update
ALL	Incorporate Updated Local Hazard Mitigation Plan into Riverside County General Plan	Transportation, Land Management Agency and Riverside Office of Emergency Services	Recently updated and approved on December 2015 by Board of Supervisors. Adopted 2015, which includes a new reference to implement the Local Hazard Mitigation Plan within the Safety Element.
DROUGHT	Construct reservoirs and water tanks to increase water storage	Water Conservation, Agriculture and County Fire	On-going, no update has been made
EARTHQUAKE	CREWS Earthquake Mitigation Project	County-wide	Ongoing process of recruiting non-participating cities in the Coachella Valley area into the early earthquake warning program.
FIRE	Purchase Masticator to remove vegetation and brush in heavily populated areas prone to fires.	Riverside County Fire	No change. Project still on hold due to lack of funding during budget cuts. Potential future purchase
FIRE	Shake Shingle Roof Replacement Project	Idyllwild	In 2013 Mountain Communities Fire Safe Council was awarded a FEMA grant to replace hazardous shake/wood shingle roofs in the San Jacinto WUI (Wildland Urban Interface) One hundred homes were reroofed with Class A roofing material. The grant was completed in October 2016.

FIRE	Single Tree Removal – removed dying and dead trees.	Idyllwild	Ongoing - Nearing Closeout: dead and dying trees are continuously monitored and removed as needed.
FIRE	Hazard Abatement- Fuel treatment program to remove 1120 acres of natural fuel	Mountain Communities Fire Safe Council Program - Idyllwild	Reducing fuels on private property in the San Jacinto WUI is an on-going activity of Mountain Fire Safe Council. To date, more than 1,600 acres have been treated with the financial help of grant funds awarded to MCFSC
FLOOD	Norco Storm Drain This project is an underground storm drain which will address flooding along Pedley Avenue/Sixth Street.	Riverside County Flood Control	Project completed on 04/05/2011.
FLOOD	Santa Ana River, Norco Bluffs [Corps Project] – Stabilization Project is a Corps of Engineers project that consists of a soil cement to protection structure constructed to the 100-year flood level at the base of the bluff.	Riverside County Flood, Transportation Land Management Agency and Riverside County Fire	The bluff stabilization work was completed in 2004. The District is continuing to work with the Corps on wrapping up the project, including completion of a Project Operation and Maintenance Manual. Once the Corps approves the O&M Manual, the project can be transferred to the District for ownership, operation and maintenance.
FLOOD	Temescal Creek-Foster Road Storm Drain (2-8-00493-01) - This project is an underground storm drain in Foster Road extending from Interstate 15 to Temescal Creek.	Riverside-Corona Resource Conservation District Riverside County Flood Control	Project completed on 09/01/2015
FLOOD	Dillon Road – State Hwy 62 Road Project to clear debris. Road has 25 dips that cause flooding during storms.	Transportation, Land, Management Agency Riverside County Fire	Ongoing; The current action plan is to barricade the low dip sections when they are flooded and remove the storm debris when the water recedes.
FLOOD	Underground storm drain which will extend	Flood Control and City of Norco	Finished approximately in Spring 2011

	approximately 1,300 feet south in Pedley Avenue from Norco MDP Line NA in Sixth Street. This project will address localized flooding along Pedley Avenue.		
FLOOD	Restore 100 yr level flood protection to the three million residents within the floodplain downstream, the Corps proposes to increase both the storage capacity of Prado Dam, and its outlet discharge capacity. The embankment will be raised 30 feet, while the spillway sill will be raised 20 feet and the gated discharge capacity will be tripled.	Flood Control	**Part 1** of this project involving Riverside County Flood Control and TLMA was completed **Part 2** of this project involving only Riverside County Flood Control is still pending approval
FLOOD	Ultimate channel improvements for the existing interim channel from 6th Street to the terminus near Rose Court.	City of Norco	Project has not started. No estimation on start date. The District is currently working on 60% design plans and anticipates 90% design plans will be completed by next year (2017). FEMA processing will be necessary to revise the currently mapped floodplain once the construction is completed.
FLOOD	Ultimate improvements to the existing channel between Parkridge Avenue and River Road. The channel is planned as a concrete lined open channel	City of Norco and Riverside County Transportation Land Management Agency	Project began Circa 7/2013 and was finished Circa 2/2014. Lead Agency was RCFC & WCD
FLOOD	Underground storm drain extending from the existing Stage 1 near Pedley Avenue, east in 7th Street to California Avenue then south in California approximately 800 feet to a sump.	Transportation, Land, & Management Agency and Flood Control	Project completed on 04/05/2011

FLOOD	Collection of "mitigation" charges from builders in Mockingbird Canyon with the intention of providing relief to flood prone properties in the lower canyon	Mockingbird Canyon	In process of collecting funds. Charging investors $500 per lot. Talks about whether to keep this project or abandon it. Considered a "mini" ADP (Area Drainage Project)
FLOOD	Storm Drain Last portion will be constructed as part of the same contract as the Ontario Avenue Storm Drain project	City of Corona	Project completed on 04/24/2012, Project revised on 04/25/2012.
FLOOD	A 1,050-foot drain to de-water a sump in Frank Avenue in the south Mira Loma area	Riverside County Flood Control and City of Eastvale	Project completed on 01/31/2012
FLOOD	The original project consisted of a 54 acre-foot debris basin at the southerly end of Smith Road and a concrete rectangular channel extending northerly to Cajalco Road. Mitigation required for the basin project includes removal of non-native vegetation, debris and remnants of abandoned structures as well as re-grading and establishment of native vegetation.	Riverside County Flood Control	Project completed on 01/10/2006
FLOOD	Underground storm drain in the City of Corona extending from East Grand Boulevard north in Joy Street to Temescal Creek Channel. Design began on this project in 2003 at which time it was discovered during a field check of the preliminary drawings that a recently installed Edison conduit in Joy Street overlapped the only viable alignment for the storm drain. The street is so heavily laden with utilities here is no longer room to install a drain.	City of Corona	Designed Phase Schedule for advertisement in March 2017

FLOOD	Underground storm drain in Ontario Avenue extending upstream from the District's existing El Cerrito Channel at El Cerrito Road about 3,000 feet to State Street just west of Interstate 15.	Riverside County Flood Control and Transportation Land & Management Agency	Project revised on 04/25/2012
FLOOD	Underground storm drain in Foster Road extending from Interstate 15 to Temescal Creek	Temescal Creek-Foster Road Storm Drain	Construction began in January 2015 and was completed in September 2015.
FLOOD	Multi-year plan to construct the ultimate levee system (approximately 1,200 feet river bottom width) between the existing Corps of Engineers' levee 9,500 feet upstream of State Street, and a point about 8,200 feet downstream of Sanderson Avenue, a distance of about 5 miles. Floodwalls on piles are required to be constructed over the Metropolitan Water District facilities just east of State Street.	San Jacinto and Transportation and Land Management	Funding was received in November 2015 - the levee was included in a suite of projects that received Proposition 84 grant funding from the California Department of Water Resources. The Prop 84 contribution is anticipated to be about $3.5 million.
FLOOD	Project to build MDP extending from South W. Esplanade to east Midway Street to South San Jacinto Street to collect flows from the larger Park Hill basin watershed	City of San Jacinto	Construction for the project began on April 25, 2014 and was completed on July 2, 2015.
FLOOD	Construction of an underground storm drain that extends from a proposed detention basin at the intersection of Potter Road and De Anza Drive then southwest in De Anza to Young Street. The City of San Jacinto is administering the project.	City of San Jacinto and Transportation and Land Management	Project still pending

FLOOD	Underground storm drain from an outlet north of Holland Road southerly in Hawthorne Avenue to a collection system south of Craig Avenue	City of Menifee and Transportation and Land Management	Project Completed 3/01/2011
FLOOD	Project is an underground storm drain that extends from near Yale Street east on Stetson Avenue approximately 1 mile to Dartmouth Street	City of Hemet	Project completed on 09/04/2007
FLOOD	Project is an underground storm drain on Whittier Boulevard extending from the existing storm drain at Palm Avenue east to San Jacinto Street	Riverside County Flood Control and City of Hemet	Project completed on 08/23/2016
FLOOD	Underground storm drain extending from an existing storm drain in Meridian Street near Berkeley venue south in Meridian Street to Whittier Avenue.	Riverside County Flood Control and City of Hemet	Stage 1 completed on 06/21/2016. Stage 2 still pending approval.
FLOOD	Project is for major flood control project to extend from the San Jacinto River near Goetz Road east approximately 6 miles to Juniper Flats Road and incorporates both lined and unlined open channel, underground storm drains and two major detention basins.	City of Menifee and Transportation, Land and Management Agency	Project built in 4 stages. Some stages have been completed, but others still not finished.
FLOOD	Open channel along Nuevo Road from Dunlap Drive to Perris Valley Channel	City of Perris, Riverside County Transportation and Flood Control	Under new contract: Starting Jan. 2017 and will range about 2.5 yrs. for this entire project to be completed; first part will take about 180 days to complete, but time frame will be extended.

FLOOD	East Ironwood Avenue to Petit Street. Part of the work the City of Moreno Valley is doing in association with improvements to the Moreno Beach Drive & 60 freeway interchange.	City of Moreno Valley and Transportation and Land Management	Storm Drain Line K-1 – City completed design in 2014. Currently seeing construction funding of approximately $2.5m.
FLOOD	Project is an open channel extending from Nason Basin northeasterly approximately 2,500 feet to Ironwood Avenue	City of Moreno Valley and Transportation and Land Management Agency	Storm Drain Line K from Ironwood to the Nason Basin – RCFC&WCD secured an easement in 2014 to receive flows from Line K-1 noted above. Action completed in 2014.
FLOOD **EARTHQUAKE**	Norco Streambank Stabilization. Project consists of a soil cement toe protection structure constructed to the 100-year flood level at the base of the bluff, and a stable earthen buttress fill constructed to the top of the bluff from I-15 Bridge to Center Avenue	Riverside County Flood Control and Transportation Land & Management Agency	Project Completed
FLOOD **EARTHQUAKE**	Stabilization of Interstate 15 near Alhambra Street, as a part of the Prado Dam enlargement feature of the Santa Ana River Mainstream Project at no cost to the District. The project involves the construction of a toe-protection-only structure from Hamner Avenue downstream to approximately 5th Street	Transportation Land Management Agency	Project still pending
LANDSLIDE **EARTHQUAKE** **FLOOD**	Proposed improvements include installation of slope protection along the Green River Mobile Home Park, as well as the exposed slopes adjacent to the Green River Homeowners Association and Highway 91 just downstream of Highway 71.	Transportation and Land Management Agency	**Phase 2A-The** District has completed its acquisition of the necessary easements and fee interests from Riverside County and private lands. Acquisition of the necessary easements and fee interests from Caltrans is ongoing. Construction of Phase 2A was completed in Fiscal Year

			2015/2016.**Phase 2B-Construction** of this segment was completed in Fiscal Year 2014/2015.

2017 New Mitigation Strategies

2017 Mitigation Actions Table

Type of Hazard	Mitigation Actions	Departments/ Jurisdictions	Status Update/Timeframe	Potential Funding Source
All Hazards	CERT Training and retention	Riverside County Emergency Management Department	July 2018 – Ongoing On-going for the life of the current plan (yrs. 2018-2023). There will be one training in each of the county districts per year to ensure community members throughout the county get the opportunity to refresh and reinforce their CERT skills. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Homeland Security Program (SHSP)
All Hazards	Continue to utilize the Safety Element of the Riverside County General Plan and the Riverside County FD Master Plan as base documents to implement goals, objectives, and mitigation actions	All Riverside County Departments	On-going for the life of the current plan (yrs. 2018-2023). The Safety Element in the General Plan is continuously updated as new information and changes arise. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Earthquake	Working with CalOES & FEMA to revise the Southern California Catastrophic Earthquake Response Plan	All Cities in Riverside County	On-going for the life of the current plan (yrs. 2018-2023). Riverside County will continue to collaborate with Cal OES/ FEMA to improve and update this plan as needed. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

Earthquake	Reviewed Office of Statewide Health Planning and Development (OSHPD), Structural Performance Categories and Nonstructural Performance Categories (SPC/NPC) Ratings of Acute Care Hospital Buildings and reported the findings at EM Healthcare Coalition	Riverside County Emergency Management Department & Riverside County Hospitals	On-going for the life of the current plan (yrs. 2018-2023).These reports will continuously be reviewed to make sure they are up to date and consistent with any changes. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	Hospital Preparedness Program (HPP) Grant
Earthquake	Worked with local City Emergency Manager (EM) to address '08 Golden Guardian Riverside County Shake Out Scenario/Assumptions	Riverside County Emergency Management Department	On-going for the life of the current plan (yrs. 2018-2023). County will continuously work with City EM to update and inform of changes or thoughts to improve the annual Shake Out Scenario and help the community increase their preparedness skills. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Earthquake	Mitigate potential seismic hazards through adoption and strict enforcement of current building codes	Riverside County Transportation, Land, Management Agency	On-going for the life of the current plan (yrs. 2018-2023). The codes will be revised and updated to be consistent with emergency measures that can help prevent earthquake impacts in county buildings. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Pandemic Flu	Provide training on immunization techniques	Riverside University Health System-Public Health	On-going for the life of the current plan (yrs. 2018-2023). Continue training to teach any new techniques, strategies, and to ensure all staff are proficient. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	Public Health Emergency Preparedness Grant (PHEP)

Pandemic Flu	Participated and conducted a Non-Medical Intervention Tabletop Exercise	Riverside County Emergency Management Department & Riverside University Health System-Public Health	Completed on 09/28/2015	Pan Flu Grant PHEP Grant
Pandemic Flu	Participated and conducted a Flu vaccination exercise	Riverside County Emergency Management Department & Riverside University Health System-Public Health	Completed on 11/10/2016	Pan Flu Grant PHEP Grant
Pandemic Flu	Generate a draft Crisis Care Plan	Riverside County Emergency Management Department & Riverside University Health System-Public Health	Completed 08/30/2016	Pan Flu Grant PHEP Grant HPP Grant
Pandemic Flu	Training Medical Reserve Corp (MRC) in hospital surge exercises	Riverside County Emergency Management Department	Started in 2011 and is on-going for the life of the current plan (yrs. 2018-2023). Continue training to keep updating and informing volunteers to increase their skills. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	HPP Grant State Homeland Security Program (SHSP)
Pandemic Flu	Training Medical Reserve Corp. (MRC) volunteers in Alternate Care Site	Riverside County Emergency Management Department	Completed in 2014	HPP Grant State Homeland Security Program (SHSP)Pan Flu Grant
Wildland Fire	Create wildfire protection zones that reduce the risks to citizens and firefighters from fire dangers	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously update and develop protection zones that can help decrease wildfire risks in the community. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Strengthen defensible space inspections in fire prone areas	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continue inspections in locations that are susceptible to fires. This action will be reassessed during	State Mission and/or Grant funding

			the monitoring and update phase of the County's 2017 LHMP.	
Wildland Fire	Continue maintenance of existing fire roads throughout the county to provide fire department access	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continue keeping the roads well paved and easy to have fire trucks be able to drive on. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Fuel reduction projects throughout the county to reduce fire potential	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously improve and develop projects to lower the impact of fires in the county. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Develop and enforce construction and design standards that ensure the development incorporates fire prevention features	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously enforce and update measures to prevent fire hazards. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Conduct and implement long range fire safe planning through code adoption/policies consistent with the Safety Element of the General Plan	Riverside County Fire Department & CAL Fire & Riverside County Transportation, Land, Management Agency (Planning Division)	On-going for the life of the current plan (yrs. 2018-2023). Continuously implement code policies to integrate them into the Safety Element as they are developed/updated and approved. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Ben Clark Training Center to provide wildland fire protection related classes to fire personnel	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously make sure that this center is available to provide wildland fire protection classes to fire staff to improve their skills on fire mitigation and preparedness. This action will be reassessed during the monitoring	State Mission and/or Grant funding

			and update phase of the County's 2017 LHMP.	
Wildland Fire	Continue wildland fire suppression/preparedness to maintain a state of readiness throughout the year	Riverside County Fire Department & CAL Fire	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide skills training to the community to be prepared for disasters. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Rapid intervention, identification and mitigation of Goldspot Oak Bore Beetle (GSOB) trees at various infestation levels on State Responsibility Area (SRA) lands throughout the county. Herbicide or tree removal if necessary	CAL Fire Unit Forester	On-going for the life of the current plan (yrs. 2018-2023).Continuously monitor infestation levels of GSOB trees to continue removing infested trees if necessary. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Rapid intervention, identification and mitigation of Pine Bark Beetle infestation, epidemic during times of drought. Removal of trees that are symptomatic or the use of pesticide when applicable	CAL Fire Unit Forester	On-Going for the life of the current plan (yrs. 2018-2023).Continuously monitor infestation levels of Pine Bark Beetle to continue removing infested trees or to continue using pesticides if necessary. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Wildland Fire	Continue Truck Trail and road maintenance to provide access for fire suppression vehicles and personnel.	CAL Fire Unit Forester	On-Going for the life of the current plan (yrs. 2018-2023). Continuously preserve and improve Truck Trail and roads, if needed, for rapid available access to fire suppression vehicles. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding

Wildland Fire	Continue Fire Road maintenance of culverts and road prisms in open space areas on SRA land to allow for adequate drainage.	CAL Fire Unit Forester	On-Going for the life of the current plan (yrs. 2018-2023). Continuously preserve and improve culverts and road prisms, if needed, for sufficient drainage. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Mission and/or Grant funding
Electrical Failure	Coordinated with Southern California Edison to be included in their power outage notifications	Riverside County Emergency Management Department	On-going for the life of the current plan (yrs. 2018-2023). EMD joined SoCal Edison's recipient list as of Dec. 2016 to continuously be informed of any emergency notifications to help prevent electrical failure impacts. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Emergent Disease/ Contamination	Drafted a Region VI Highly Contagious Disease Transportation Plan	Riverside County Emergency Management Department	Completed on 12/08/2016	HPP Grant Ebola Grant
Emergent Disease/ Contamination	Facilitated a Region VI Highly Contagious Disease Transportation Tabletop Exercise	Riverside County Emergency Management Department	Completed on 09/29/2016 The situation manual for this was completed on 11/14/2016	HPP Grant Ebola Grant
Emergent Disease/ Contamination	Drafted a Riverside County Viral Hemorrhagic Fever Preparedness and Response Plan (VHF Plan)	Riverside County Emergency Management Department & Riverside University Health System-Public Health	Completed on 11/2016	HPP Grant Ebola Grant
Cyber Attack	**Enterprise Intrusion Prevention System (IPS)** Protects the county network from Internet-based threats and attacks (~140,000 attacks/day on average)	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continue to update and maintain the IPS network to protect the county from any form of cyber-attacks or threats. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

Cyber Attack	**Enterprise Breach Detection System** Inspects all internal/lateral county network traffic for indicators of compromise (IOCs) enabling the ISO to rapidly detect, respond to, contain, and prevent cyber-attacks, malware outbreaks, network reconnaissance, data exfiltration, and C2 (command & control) and botnet activities	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously inspect the county network to detect forms of threats or attacks. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Cyber Attack	**Albert Sensor** Monitors and reports to the Center for Internet Security (CIS) Multi-State Information Sharing and Analysis Center (MS-ISAC) all Domain Name System (DNS) and NetFlow traffic for correlation with the Department of Homeland Security's threat intelligence database for real-time alerting of malicious network connections to blacklisted IP address on the Internet	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously maintain the Albert Sensor in order keep having the association with the Department of Homeland Security's database on alerting network threats for the county. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

Cyber Attack	**Countywide Security Awareness Training** SANS Securing The Human information security and privacy training modules deployed on county learning management system (LMS) Educates our workforce on how to be extra vigilant and things to look out for to avoid falling victim to a targeted attack	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to the county's workforce on signs of cyber-attacks and prevent them from being a victim of these attacks. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Cyber Attack	**Enterprise Security Information Event Management (SIEM)** Serves as the county's centralized security event log management repository and correlation engine	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continue to maintain the SIEM to monitor and prevent security threats. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Cyber Attack	**Enterprise Internet Proxy (Web Filter)** Prevents county employees and malware from accessing compromised/malicious websites and C2 (command & control) servers, in addition to non-county authorized websites based on category/content filtration policies/rules	Riverside County Technology Information	May 2017 – December 2018 Product (Blue Coat Proxy Advance Secure Gateway (ASG)) has been procured and is in the process of being deployed.	County General Fund

Cyber Attack	**Governance, Risk, & Compliance (GRC) Software Suite** Platform on which our security operations (active network monitoring, breach detection, incident response, business impact analysis, threat containment/eradication, alerting/reporting, process workflow automation, security audits, risk assessments/register, regulatory compliance checks) will be carried out	Riverside County Technology Information	Implementation estimated to begin in June 2017 – July 2018. Product (RSA Archer GRC) has been procured and is in the process of being deployed.	County General Fund
Cyber Attack	**Security Operations Center (SOC)** Planning phase completed, construction estimated to begin in September 2017	Riverside County Information Technology	September 2017 – September 2018. The County's Cyber Security Operations Center (SOC) is under construction.	County General Fund
Cyber Attack	**Information Security Forum (ISF)** Convene on a quarterly basis with department information security officers/liaisons to discuss key security topics, risk trends, and other related matters, including: Formation of a Critical Security Incident Response Team (CSIRT)	Riverside County Information Technology	October 2018 – ongoing This forum will be on-going for the life of the current plan (yrs. 2018-2023). Will continue to conduct constant security incident/breach simulations and tabletop exercises that can help prevent cyber-attacks in the future. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP. The ISO is in the process of identifying members to serve on the Critical Security Incident	County General Fund

	Conducting security incident/breach simulations and tabletop exercises		Response Team (CSIRT). Estimated timeline for formation and initial kickoff meeting is October 2018.	
Terrorist Event	SWAT team trained to respond to terrorism events	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to reflect personnel attrition and train on new tactics. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Terrorist Event	Hazard Device Team trained to respond to terrorism events	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to reflect personnel attrition and train on new tactics and trends. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Terrorist Event	Sheriff Emergency Response Team trained to respond to terrorism events	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to reflect personnel attrition and train on new trends. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Terrorist Event	Sheriff personnel are assigned to the Joint Terrorism Task Force	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously integrate new sheriff personnel to improve this group's structure and capabilities. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Terrorist Event	Ben Clark Training Center provides terrorism related classes for Law	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Classes are funded each year through the State Homeland Security Program (SHSP) to	County General Fund

	Enforcement and First Responders.		continuously educate and train personnel on new skills and improve their abilities. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	
Terrorist Event	Tactical response training	Riverside County Sheriff & Riverside County Fire Department	On-going for the life of the current plan (yrs. 2018-2023). Continuously train and improve on tactical response. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Communications Failure	**County of Riverside Network (CORNET)** Redundant Internet connections Backbone links are configured with a mesh topology to provide full redundancy	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously configure links to prevent the termination of internet connections. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Communications Failure	**Enterprise Voice Network (VoIP)** Centralized SIP trunking for ingress/egress PSTN access via 8 geographically separated locations Carrier failover protection for inbound voice traffic Enterprise call processing for VoIP Endpoints are logically and physically separated into 3 datacenters ensuring a High-	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide accessibility to phone carrier connection and call processing. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

	Availability solution Remote site routers configured for SRST; in times of WAN outages, local IP Phones will re-register to local equipment, providing inter-site calling and access to the PSAP via carrier provided analog circuits			
Communications Failure	**Enterprise Best Practices** Internal escalation contact list for all essential personal readily available 24x7 On-Call staffing availability for both Voice and Data Networks Vendor support available at 24x7x4 for all critical Network and Voice equipment Regular professional staff training on emerging technologies Frequent equipment configuration backups to SAN Critical Enterprise level equipment is located at facilities with full battery and generator backup power	Riverside County Technology Information	On-going for the life of the current plan (yrs. 2018-2023). Continue to update contact list when staff support is needed in case of emergencies. Continue to train staff on technologies that arise and equip facilities with power backup supplies. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

Communications Failure	**Enterprise Emergency Notification System** InformaCast Advanced on-premise notification solution for immediate reach to the County's 20,000+ VoIP endpoints InformaCast Mobile cloud-based notification solution to extend the County's reach off-network to mobile devices such as cellular phones and tablets	Riverside County Technology Information	On-Premise solution has been rolled out to all County VoIP endpoints. Mobile Solution has been rolled out to EMD. Mobile solution is ready to be rolled out to other departments as requested. On-going for the life of the current plan (yrs. 2018-2023). Continue to have a notification system to be able to have the ability to connect with off-network devices in case of a communications failure, including Wi-Fi. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund Department Funds; departments who wish to take advantage of this service will be billed back to the departments based on how many users
Communications Failure	**Network Connectivity** Use of Cellular based redundant WAN links for critical county locations. Introduction of MPLS technologies to provide alternate network paths for County locations	Riverside County Technology Information	Several locations have purchased a Cellular based redundant WAN link . Solution can be purchased by other departments. Installation can take up to 6 weeks to install, based on equipment availability. On-going for the life of the current plan (yrs. 2018-2023). Continue to provide alternate network paths for County locations in the case of a communication failure. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund Department Funds; billable by the cellular carrier to requesting departments

Flood	**University Wash Channel, Stage 3 Project No. 221-1-8-00120-03-12** This project will increase public safety and improve local economics by retrofitting an older, built-out commercial/industrial area with drainage infrastructure to alleviate repeated flood damage to existing businesses. The project will also address street and intersection flooding	Riverside County Flood Control and Water Conservation District	Notice To Proceed 2/21/17 Completed 11/14/17	Riverside County Flood Control funds Cost: $3,044,500
Flood	**Monroe MDP – Monroe Channel Project No. 1-8-00071 Stage 4** At request of the City of Riverside, replacement of City's existing open channel with underground reinforced concrete box with 10-year storm capacity. Project limits are from California Avenue upstream to Magnolia Avenue	Riverside County Flood Control and Water Conservation District	Expected to be advertise in 4th Quarter 2016 Notice to Proceed 8/30/17 Completed 5/01/18	Riverside County Flood Control funds Cost:$2,489,067
Flood	**Jurupa – Pyrite MDP Line A-2 Project No. 1-8-00234 Stage 1** Master planned lateral stormdrain to Jurupa Channel. Project is east-west drain crossing	Riverside County Flood Control and Water Conservation District	30% Plans & R/W Acquisition as of 1/10/17 Projected Start: 9/2018 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $338,332

	Agate Street about 1,000 feet south of Jurupa Road. Outlet point at Jurupa Channel is unimproved and likely to remain so			
Flood	**University MDP Line 3 Project No. 1-8-09020 Stage 1** The MDP proposes Line 3 as approximately 2,900 feet of 30" RCP east in Blaine Street then northeast to Blaine Street Retention Basin. The Blaine Street Retention Basin is located 600 feet north of Blaine Street between Valencia Hill Drive and Mt. Vernon Avenue. Budgeted for scoping study and evaluation of FEMA map floodplain limits only	Riverside County Flood Control and Water Conservation District	Pending approval Projected Start: 12/2020 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $2,926,028
Flood	**Santa Ana River Stabilization Project No. 1-8-00010 Stg. 90** The USACE is expected to initiate restoration of the federally constructed reach of the Santa Ana River Levee system downstream of San Bernardino County line to Tequesquite. Exact form of	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $10,685,000

	project not set. Work will likely include repair of groins and toe protection			
Flood	**Box Springs Dam – Outlet Modification Project No. 1-8-00041** Reconstruct outlet structure to prevent blockage from sediment accumulation	Riverside County Flood Control and Water Conservation District	Pending until Woodcrest Dam is complete 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $981,842
Flood	**Sycamore Dam – Outlet Structure Modifications Project No. 1-8-00042** This project will upgrade the level of safety and serviceability. Initial project components include the repair/reinforcement of the existing outlet channel; construction of a new debris rack structure; erosion controls on the embankment of the dam; construction of a safer access road into the facility; design for a safer routing of flood waters from the emergency spillway to Central Avenue; and the installation of a control section to measure outflow from the outlet pipe	Riverside County Flood Control and Water Conservation District	Pending until Woodcrest Dam is complete 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $1,854,991

	of the dam. Completion of this project is planned to follow the Woodcrest Dam Outlet Modification project.			
Flood	**Alessandro Dam Outlet Modification Project No. 1-8-00043** Reconstruct outlet structure to prevent blockage from sediment accumulation	Riverside County Flood Control and Water Conservation District	Pending until Woodcrest Dam is complete 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $907,682
Flood	**Prenda Dam Outlet Modification Project No. 1-8-00044** Reconstruct outlet structure to prevent blockage from sediment accumulation	Riverside County Flood Control and Water Conservation District	Pending until Woodcrest Dam is complete 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $1,238,312
Flood	**Woodcrest Dam Outlet Modification Project No. 1-8-00045** This project will upgrade the level of safety and serviceability. The approved Project Charter identifies the primary scope of work for the project as follows: design and construction of a new inlet structure to reduce potential for clogging of the outlet works;	Riverside County Flood Control and Water Conservation District	Development of design plans and specifications on hold until latest Geotechnical investigation is complete Projected Start: March 2019 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $2,216,529

	rehabilitation of the existing outlet gate assembly and control stem; implementation of an automated gate control system; rehabilitation of the outlet pipe; restoration of the outlet channel; and installation of surficial erosion controls on the surface of the dam embankment. Once completed, this project will serve as an example for performing similar upgrades to the remaining Riverside Reservoirs			
Flood	**North Norco Channel Stage 10 Project No. 222-2-8-00140-10-12** The project is located just upstream of River Road within the city of Norco in Riverside County, California. This project consists of approximately 550 lineal feet of triple cell reinforced concrete box and 125 lineal feet of open concrete channel transition, will replace the existing interim dirt channel. The project remedies ongoing flooding	Riverside County Flood Control and Water Conservation District	Completed 9/9/14	Riverside County Flood Control funds

	problems in the area thus resulting in positive impacts to residents and businesses			
Flood	**Corona MDP Line 5 Stage 1 Project No. 2-8-00280** This project includes the construction of an underground storm drain beginning in Sherman Avenue south of Railroad Street and extending down Railroad Street westerly to Smith Street. The City is willing to undertake the design and construction of this project using District funding.	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $1,397,201
Flood	**Corona MDP Line 52 Stage 1 Project No. 2-8-00350** An underground storm drain extending north from Third Street along E. Grand Boulevard then under the 91 Freeway to Temescal Creek Channel	City Of Corona	Notice to Proceed 7/29/17 Expected Completion: Summer 2018	Riverside County Flood Control funds City of Corona Funds Cost: $4,522,000
Flood	**Coldwater Canyon Structural Improvements Project 2-8-00505** Proposed conceptual improvements include 1) reducing	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $6,005,806

	flood risk and nuisance to traveling public on Temescal Canyon Road at the intersection of Glen Ivy Road; and 2) an armored berm along the east bank of Coldwater Wash downstream of the intersection of Temescal Canyon Road and Glen Ivy Road. The armored berm would prevent the migration of the active Coldwater Wash Channel, thereby protecting the west side of the Mountain Cove Development. Conceptual improvements are pending friendly acquisition of the underlying parcels needed for the project			
Flood	**Coldwater Canyon Floodplain Acquisition Project No. 2-8-00505** Funded portion of project includes a hydrologic and geomorphologic assessment of Coldwater Canyon Wash from Glen Ivy Road to Temescal Wash. Study will evaluate the stability of Coldwater Canyon	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: included in the $6,005,806 amount for Coldwater Canyon Structural Improvement project listed above

	Wash and recommend potential minimalist interventions, if necessary, to protect Squaw Mountain Bridge and prevent erosion of Painted Hills development canyon slopes along Coldwater Canyon Wash. Balance of funds would support potential interventions recommended by the report including floodplain buyout			
Flood	**Southeast Compton Wash At Corona Sanitary landfill Project No. 2-8-09054** Riverside County Waste Management District has requested assistance solving ongoing flooding and erosion problems along the southeast side of the landfill	Riverside County Waste Management District**	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $500,000

Flood	**Lake Mathews Estates Water Quality Pond Project No. 2-8-09058** Proposed in the “Drainage Water Quality Management Plan for the Lake Matthews Watershed”, this roughly 10-acre project is to be located on the south side of Cajalco Road about ¾-mile west of Wood Road. The project will capture first flush runoff from Cajalco Creek and carry it to an off-channel pond to be treated and/or infiltrated	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $2,794,983
Flood	**Temescal Wash Floodplain Project No. 2-8-00052** Acquisition of floodplain area for flood protection, water conservation and habitat mitigation banking	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $23,534,000
Flood	**Arroyo Del Toro Channel Stage 1 Project No. 223-3-8-00170-01-12** This project collects flows that pass under Interstate 15, flow through the cemetery and flood the intersection of Riverside Drive	Riverside County Flood Control and Water Conservation District	Completed 6/16/15	Riverside County Flood Control funds

	and Collier Avenue. The flows will now be collected in a channel and conveyed via an underground storm drain system to the Collier Marsh area			
Flood	**Ortega Channel Retrofit Project No. 3-8-00070** Project will replace a portion of the clog-prone storm drain with a more easily accessible and maintainable open channel	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $1,628,761
Flood	**LITTLE LAKE MDP LINE B, STG 1 STETSON AVENUE CHANNEL, STG 7 aka HEMET MDP LINE D Project Nos. 224-4-8-00265-01-12 224-4-8-00211-07-12** The District constructed a segment of the District’s Little Lake MOP Line B. This infrastructure will diminish neighborhood flooding and damage to private property and businesses and improve the safety of the traveling public during storm events. This new drain will also permanently reduce	Riverside County Flood Control and Water Conservation District	Stage 1 Completed 06/21/16 Stage 2 Pending approval Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $6,398,777

	flood-related street maintenance and repair costs for the City of Hemet. Little Lake MDP Line B Stage 1 is located primarily within the City of Hemet, with small portions extending into the City of San Jacinto and unincorporated Riverside County beginning approximate 300 feet north of Berkley Ave and terminating approximately 200 feet south of Florida			
Flood	**Homeland MDP Line 2, Stage 2 Project No. 224-4-8-00337-02-12** The District constructed a segment of drainage infrastructure described in the District's Romoland Master Drainage Plan as Romoland MOP Line A, Stages 4, 5 and 6, Romoland MOP Lines A-2 and A-3, Stage 1, and Briggs Basin. In conjunction with the District's Homeland MDP Line 1, Stage 1, completion of this drainage infrastructure will reduce the	Riverside County Flood Control and Water Conservation District	Completed 6/5/12	Riverside County Flood Control funds

	floodplain by approximately 1, 762 acres and enable revisions to the FEMA Flood Insurance Rate Maps that result in a significant reduction in flood insurance premiums. The District's Homeland MDP Line 1, Stage 1 project is currently ongoing with an anticipated completion in February 2017			
Flood	**Sunnymead MDP Line P-6 Stage 2 Project No. 224-4-8-00716-02-12** The District constructed a segment of drainage infrastructure described in the District's Sunnymead Master Drainage Plan which remedies ongoing flooding problems in the area thus resulting in positive impacts toresidents and businesses.	Riverside County Flood Control and Water Conservation District	Completed 3/25/2014	Riverside County Flood Control funds
Flood	**San Jacinto MDP Line C, Stage 2, Lines C-4, C-5 & B Project No. 224-4-8-00124-02-12** The District constructed a segment of drainage	Riverside County Flood Control and Water Conservation District	Completed 6/30/15	Riverside County Flood Control funds

	infrastructure described in the District's San Jacinto Master Drainage Plan, which remedies the ongoing flooding problems at the intersections of San Jacinto Avenue and Menlo Avenue, San Jacinto Avenue and Midway Street, and Santa Fe Street and Midway Street. Consequently, the removal of ponding water at these intersections during storm events improves traffic and pedestrian safety and public access to the businesses along San Jacinto and Menlo Avenues. The District partnered with the City of San Jacinto to further improve normal residential traffic safety by replacing and reconstructing Midway Street between San Jacinto Avenue and Santa Fe Street			
Flood	**West End Moreno MDP Line LL Project No. 224-4-8-00783-01-12** The District constructed a segment of drainage infrastructure described in the	Riverside County Flood Control and Water Conservation District	Completed 5/12/15	Riverside County Flood Control funds

	District's West End Moreno MDP which remedies ongoing flooding problems in the area, thus resulting in positive impacts to residents and businesses			
Flood	**Romoland MDP Line A, STGS 4,5,6, Homeland MDP Line 1 Briggs Basin, Romoland MDP Lines A-2 and A-3 Project No. 224-4-8-00310-04-12** The District constructed a segment of drainage infrastructure described in the District's Romoland Master Drainage Plan as Romoland MOP Line A, Stages 4, 5 and 6, Romoland MOP Lines A-2 and A-3, Stage 1, and Briggs Basin. In conjunction with the District's Homeland MDP Line 1, Stage 1, completion of this drainage infrastructure will reduce the floodplain by approximately 1, 762 acres and enable revisions to the FEMA Flood Insurance Rate Maps that result in a significant	Riverside County Flood Control and Water Conservation District	Completed 8/23/16	Riverside County Flood Control funds

	reduction in flood insurance premiums. The District's Homeland MDP Line 1, Stage 1 project is currently ongoing with an anticipated completion in February 2017			
Flood	**Little Lake MDP Line B Stage 2 Project No. 4-8-00265** An underground storm drain from just south of Florida Avenue, southerly in Meridian Street to Whittier Avenue.	Riverside County Flood Control and Water Conservation District	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $6,804,257
Flood	**San Jacinto River Stage 3 Project No. 4-8-00020** "Stage 3" covers the nearly 10-mile river reach beginning at the entrance to Railroad Canyon and ending upstream at the Ramona Expressway crossing near the Bernasconi Hills. This environmentally and fiscally challenged project has been through several evolutions and has been essentially dormant for nearly a decade. Funding shown is for intensive planning/engineerin	Riverside County Flood Control and Water Conservation District	Pending approval Projected Start: 11/2019 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds ADP (Area Drainage Plan) Funds Cost: $70,000,000

	g study of options for managing future development. Goal is to develop a viable project for the San Jacinto River from Ramona Expressway to Railroad Canyon considering flood management, transportation, environmental and other opportunities and constraints			
Flood	**Gilman Home Channel Lateral A Stage 3 Gilman Home Channel Stage 90 Project No. 225-5-8-00171-03-12** The District constructed a segment of drainage infrastructure described in the District's Banning Master Drainage Plan which remedies ongoing flooding problems in the area, thus resulting in positive impacts to residents and businesses. Moreover, this project will enable revision of the FEMA Flood Insurance Rate Maps in the impacted area resulting in a significant reduction in flood insurance premiums. Many	Riverside County Flood Control and Water Conservation District	Completed 9/22/15	Riverside County Flood Control funds

	owners with federally insured home loans will realize savings of several thousands of dollars per year			
Flood	**Beaumont MDP Line 16 Stage 1 Project No. 5-8-00201** Project would build MDP Line 16 in Grand Avenue from Beaumont Cherry Valley Water District (BCVWD) infiltration ponds easterly to Bellflower Avenue as an element of a cooperative project with the BCVWD to provide both flood control and storm water capture to recharge groundwater	Riverside County Flood Control and Water Conservation District	Pending approval Projected Start: 12/2020 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $5,353,074
Flood	**Eagle Canyon Dam Stage 1 Project No. 6-8-00190** The District constructed a segment of drainage infrastructure described in the District's Palm Springs Master Drainage Plan. Construction of this project also includes remediation of potentially hazardous and nonhazardous illegally dumped	Riverside County Flood Control and Water Conservation District	Completed 11/17/15	Riverside County Flood Control funds

	materials and remedies ongoing flooding problems in the area, thus resulting in positive impacts to residents and businesses. Additionally, Palm Springs MDP Line 43 and Lateral 43A, the underground dam outlet, is currently under construction and completion is anticipated for February 2016. Completion of the underground infrastructure will enable revisions to the FEMA Flood Insurance Rate Maps in the impacted area immediately downstream of Eagle Canyon and will result in a significant reduction in flood insurance premiums			
Flood	**Palm Springs MDP Line 43 and Lateral 43A Project No. 226-6-8-00163-01-12** The District constructed a segment of drainage infrastructure described in the District's Palm Springs Master Drainage Plan as Palm Springs MOP Line 43 and Lateral	Riverside County Flood Control and Water Conservation District	Completed 3/15/16	Riverside County Flood Control funds

	43A. Construction of this project serves as the underground outlet to the District's Eagle Canyon Dam facility that was completed on September 21, 2015 with the Notice of Completion accepted by the Board as Agenda Item Number 11-1 on November 17, 2015. Completion of both District facilities will enable revisions to the FEMA Flood Insurance Rate Maps in the impacted area immediately downstream of Eagle Canyon Dam and will result in a significant reduction in flood insurance premiums			
Flood	**Murrieta Creek Channel (Phase II & III) Project No. 7-8-00021** Murrieta Creek Flood Control Project from Old Town Temecula to Elm Street in Murrieta	Riverside County Flood Control and Water Conservation District/United States Army Corps of Engineers*	Pending approval 5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $82,000,000
Flood	**Whitewater River Levee Restoration Project No. 6-8-00250** Restoration work to increase freeboard and bring levee	Riverside County Flood Control and Water Conservation District	Pending – Full scope of restoration work not yet established but funding figure shown is based on preliminary engineer's estimate	Riverside County Flood Control funds Cost:1,260,000

	adjacent to Cimarron Golf Resort into compliance with FEMA certification guidelines		5 year CIP (Capital Improvement Plan) Projected start and end: during the life of the plan (2018-2023)	
Flood	**Palm Canyon Wash – Cherley Creek Levee Restoration Stage 90 Project No. 6-8-00040** Major construction to bring levee serving small tributary upstream of South Palm Canyon Wash into compliance with FEMA certification guidelines. Project will be combination of RSP and soil-cement lined channel and levee	Riverside County Flood Control and Water Conservation District	Expected Advertise Date: 2nd Quarter 2018 Projected Start: 08/2019 Projected End: during the life of the plan (2018-2023)	Riverside County Flood Control funds Cost: $6,187,021
Flood	**Banning MDP Line D-2 Stage 1 Project No. 5-8-00169** This project is over one mile of underground storm drain that connects to the existing Ramsey Street Storm Drain at the intersection of Hargrave Street and Ramsey Street. It includes Line D-2, Stage 1 which will continue northerly along Hargrave Street for approximately 5,250 feet before terminating at Indian School	RCFC/City of Banning	Notice to Proceed: 5/15/17 Completed: 2/27/18	Riverside County Flood Control funds

	Lane. Line D-2A, Stage 1 will tie into Line D-2 at the intersection of Hargrave Street and Theodore Street. Line D-2A will continue westerly along Theodore Street for approximately 600 feet before terminating at Florida Street.			
Civil Disorder	Trained and equipped Mobile Field Force Teams throughout the county	Riverside County Sheriff	On-going for the life of the current plan (yrs. 2018-2023). Continuously provide training to reflect personnel attrition; Less-lethal equipment acquired. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
July 2018

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APPENDIX D – Public Outreach Presentations and Meetings

Please see Attachment D: Agendas and Sign-ins for supporting documentation.

Continue to Next Page.

Public Outreach Presentations and Updates

Date	Name of Meeting, Location	Type of Presentation	Number Attending	Hours
6/22/2016	Western Riverside Emergency Council (WREC) Meeting, Riverside	Informed Council of upcoming Plan update and encouraged participation	19	20 mins.
7/14/2016	Operational Area Planning Committee (OAPC) Meeting, Beaumont	Informed OA on upcoming Plan to update	163	15 mins
9/19/2016	Palo Verde COMM. Meeting, Blythe, CA.	LHMP discussion, Local Hazard Mitigation Plan update process, encouraged East County participation and Public Outreach	16	1
9/29/2016	Email Distribution #1	Email blast, Distributed contact verification emails for partnering jurisdictions and agencies. Provided LHMP informational guides and resources.	–	–
10/6/2016	Local Hazard Mitigation Plan Steering Committee Kick-Off for County Departments	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide Update Process County Inventory Checklist County Risk Assessment Participants, New, Returning, and Not Participating	19	2
10/11/2016	Emergency Management Project Committee	Project Overview, LHMP introduction, planning process	34	10 mins.
10/13/2016	Operational Area Planning Committee (OAPC) Meeting, Beaumont	Updated OA on progress of update, offered participants opportunity to reach out to county for technical support, offered public opportunity to ask questions and provide comment (no comments made)	64	2

10/19/2016	Steering Committee Email Distribution #1	Informed the members of the google drive that contains LHMP documentation for additional support Informed about the next steps and what about the next meeting date Provided contact information for EMD LHMP staff	–	–
12/1/2016	Email Distribution #2	Invitation to LHMP Template workshop, update on county hazard identification/ranking, and general information on where they should be in the update process	–	–
12/6/2016	Tribal Workshop, Riverside	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide County Update Process and Progress Mitigation Websites and Resources Technical Support	7	1
12/8/2016	City Workshop, Riverside	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide County Update Process and Progress Mitigation Websites and Resources Technical Support	15	2
12/8/2016	Mountain Emergency Communications COMM. Meeting, Idyllwild, CA	LHMP discussion, Local Hazard Mitigation Plan update process	7	2
12/13/2016	Special District Workshop, Riverside	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide County Update Process and Progress Mitigation Websites and Resources Technical Support	8	1
12/15/2016	School District Workshop, Riverside	Overview of Hazard Mitigation FEMA 2011 LHMP Review Guide County Update Process and Progress Mitigation Websites and Resources Technical Support	7	2.5
12/15/2016	Northwest COMM. Meeting, Jurupa Valley, CA	LHMP discussion, Local Hazard Mitigation Plan update process	12	2

12/20/2016	Southwest COMM. Meeting, Murrieta, CA	LHMP discussion, Local Hazard Mitigation Plan update process	6	2
12/29/2016	Steering Committee Email Distribution #2	Sent each member questions about specific hazards that pertained to the department they work for	–	–
1/4/2017	Email Distribution #3	Informed LHMP participants of additional LHMP workshops that will be hosted to provide further assistance	–	–
1/11/2017	Local Hazard Mitigation Plan Steering Committee, Riverside	Group Discussion, Hazard Identification/Ranking Final Review, Mitigation Actions and Strategies Brainstorm	16	2
1/12/2017	Operational Area Planning Committee (OAPC) Meeting, Beaumont	Updated OA on progress of update, offered participants opportunity to reach out to county for technical support, offered public opportunity to ask questions and provide comment (no comments made)	74	2
1/19/2016	Steering Committee Email Distribution #3	Thanked all members for participating in the previous meeting Provided the risk scores of the hazards that were discussed at the previous meeting Provided the most current updates for the mitigation actions from 2012 & asked for each of them to provide new actions for current county hazards Informed about the next meeting date	–	–
2/7/2017	City Workshop, Riverside	Answered LHMP questions & concerns Provided additional assistance if needed Reviewed LHMP drafts if needed	10	1
2/8/2017	School District Workshop, Riverside	Answered LHMP questions & concerns Provided additional assistance if needed Reviewed LHMP drafts if needed	2	1
2/9/2017	Special District Workshop, Riverside	Answered LHMP questions & concerns Provided additional assistance if needed Reviewed LHMP drafts if needed	4	1

2/14/2017	Email Distribution #4	Informed LHMP participants about the final 2017 LHMP County Hazard Ranking. Talked about a possible LHMP Training that EMD is deciding on hosting. Informed about the Senate Bills 1000 & 379. Provided a link to help participants obtain maps for their jurisdiction if they are having trouble with Hazus	–	–
2/23/2017	Email Distribution #5	Informed LHMP participants about the cancellation of the April workshops due to the substation of having the LHMP FEMA Training Informed about the confirmation of the FEMA G-318 Training that will be hosted April 3-4 and provided the sign-up link Informed that the June workshops are still going to be held to provide any additional assistance on the plan	–	–
3/1/2017	Steering Committee Reminder Email	Reminded members that the date for submitting new mitigation actions for the current top 10 county hazards was approaching	–	–
3/15/2017	Palo Verde COMM. Meeting, Blythe, CA	LHMP discussion, Local Hazard Mitigation Plan update process	18	1.5
4/21/2017	Steering Committee Email Blast #4	Provided minutes from previous meeting, informed about reviewing LHMP mitigation actions and goals/objectives, sent calendar invite for next meeting	–	–
4/24/2017	Steering Committee Email	Sent selected committee members to provide input on LHMP hazard profiles depending on the hazard that corresponds to the department they represent	–	–
6/5/2017	Tribal Workshop, Riverside	Answered LHMP questions & concerns Provided additional assistance if needed Reviewed LHMP drafts if needed	4	1

6/6/2017	City Workshop, Riverside	Answered LHMP questions & concerns Provided additional assistance if needed Reviewed LHMP drafts if needed	8	1
6/7/2017	School District Workshop, Riverside	Answered LHMP questions & concerns Provided additional assistance if needed Reviewed LHMP drafts if needed	6	1
6/8/2017	Special District Workshop, Riverside	Answered LHMP questions & concerns Provided additional assistance if needed Reviewed LHMP drafts if needed	6	1
7/13/2017	Operational Area Planning Committee (OAPC) Meeting, Beaumont	Updated OA on progress of update, offered participants opportunity to reach out to county for technical support, offered public opportunity to ask questions and provide comment (no comments made)		2
8/17/2017	Local Hazard Mitigation Plan Steering Committee, Riverside	Review completed sections for finalization	10	1
9/2/2017	Indio Preparedness Month Booth, Home Depot, at 42100 Jackson Street from 9 a.m. - 12 p.m.	Personal preparedness and mitigation information		3
9/5/2017	Twitter Post	LHMP and NFIP information		
9/9/2017	Riverside Preparedness Month Booth, Galleria at Tyler, 1299 Galleria at Tyler from 11 a.m. - 3 p.m.	Personal preparedness and mitigation information		4
9/9/2017	Farm Barn, Wildomar Preparedness and Mitigation Presentation	Personal preparedness and mitigation information		1
9/12/2017	County Preparedness Month Booth, County of Riverside Administration Center, 4080 Lemon	Personal preparedness and mitigation information		5

	Street, from 10:30 a.m. - 1:30 p.m.			
9/16/2017	Lake Elsinore Preparedness Month Booth, 710 W. Graham Ave., Lake Elsinore, CA	Personal preparedness and mitigation information		4
9/16/2017	Perris Preparedness Month Booth, Walmart, 1800 N. Perris Blvd from 8 a.m. - 12 p.m.	Personal preparedness and mitigation information		4
9/23/2017	Jurupa Valley Preparedness Month Booth, K-Mart, 7840 Limonite Avenue from 8 a.m. - 12 p.m.	Personal preparedness and mitigation information		4
9/30/2017	Hemet Preparedness Month Booth, Hemet Valley Mall, 2200 W. Florida Ave. from 8 a.m. - 12 p.m.	Personal preparedness and mitigation information		4

LHMP Private Meetings Attended

Date	Location	Type of Meeting	Number Attending	Hours
8/24/2016	City Emergency Operations Center, Riverside	One to One Assistance LHMP Process Familiarity and HAZUS/GIS information	3	1
11/10/2016	Hemet Fire Administration Building, Hemet	Plan review, update process and clarification assistance	3	2.5
11/15/2016	Riverside EMD	Plan review, update process and clarification assistance	2	1
12/13/2016	Conference call to Mather	CA SHMPT Quarterly Meeting	N/A	4.5
12/14/2016	Hemet	Plan review, update process and clarification assistance	3	2
12/15/2016	Moreno Valley	Plan review, update process and clarification assistance	6	1
2/7/2017	Riverside EMD	Plan review, update process and clarification assistance	2	1
3/14/2017	Perris	Participation with Eastern Municipal Water Districts Planning Committee	10	2.5
3/15/2017	Riverside EMD	Plan review, update process and clarification assistance	3	5
3/28/2017	Riverside EMD	Plan review, update process and clarification assistance	3	2
3/29/2017	Beaumont Police Department	Plan review, update process and clarification assistance	4	2
4/11/2017	Mather	CA SHMPT Quarterly Meeting	N/A	4.5
4/11/2017	Murrieta Fire Administration	Plan review, update process and clarification assistance	4	1.15
4/13/2017	Cathedral City Fire Station	Plan review, update process and clarification assistance	2	2
4/20/2017	Banning City Hall	Plan review, update process and clarification assistance	3	1.5
4/20/2017	Desert Sands USD	Plan review, update process and clarification assistance	4	2
4/25/2017	Calimesa City Hall	Plan review, update process and clarification assistance		

4/25/2017	Temecula City Hall	Plan review, update process and clarification assistance	4	1.15
4/26/2017	Perris	Participation with Eastern Municipal Water Districts Planning Committee	6	2
4/27/2017	San Jacinto City Hall	Meeting with City Manager and staff to discuss joining the County LHMP	5	
5/1/2017	Moreno Valley USD	Plan review, update process and clarification assistance	3	1.5
5/1/2017	Lake Elsinore USD	Plan review, update process and clarification assistance	2	1.15
5/2/2017	Banning - High Valley Water District	Plan review, update process and clarification assistance	3	2
5/3/2017	Indian Wells & Palm Desert	Plan review, update process and clarification assistance	2	7
5/9/2017	La Quinta City Hall	Plan review, update process and clarification assistance	2	1.5
5/17/2017	Beaumont Police Department	Plan review, update process and clarification assistance	5	1.5
5/18/2017	Desert Hot Springs	Plan review, update process and clarification assistance	3	3
5/24/2017	Riverside EOC	Participation in Riversides LHMP planning meeting	6	1
5/25/2017	Wildomar City Hall	Plan review, update process and clarification assistance	3	2
5/25/2017	San Jacinto City Hall	Plan review, update process and clarification assistance	2	2.5
5/31/2017	Murrieta Fire Administration	Plan review, update process and clarification assistance	3	3
6/19/2017	Riverside EMD	LHMP and HMGP assistance for La Quinta	2	1
9/18/2017	Riverside Flood Control	LHMP and HMGP information presentation/meeting with Riverside County Flood Control Staff for potential Mitigation Action Project	5	2

APPENDIX E – Inventory Template

RIVERSIDE COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION AGENCY 2016 INVENTORY WORKSHEETS

Insert Jurisdiction/Agency Name
Insert Date

TABLE OF CONTENTS

Introduction: These documents are meant to be discussed, used and reviewed by a multi-disciplinary team. The Participation by a wide range of stakeholders who play a role in identifying and implementing mitigation actions is required.

SPECIAL CONCERNS:

1. *Has the completed Letter of Commitment been returned to EMD? EMD must forward this completed Letter of Commitment to CAL OES.*
2. *Has the completed Letter of Participation been returned to EMD?*

Appendix A the Plan Review Tool for your reference. This is the document Cal OES and FEMA will utilize to verify that all of the required information is in the submitted documents. Please refer to the document for information.

1. LOCAL JURISDICTION CONTACT INFORMATION

The information on this page identifies:

- Jurisdiction and the contact person
- Jurisdiction's service area size and population
- EOP Plan and a Safety Element of their General Plan

PLEASE PROVIDE THE FOLLOWING INFORMATION:

Agency/Jurisdiction:

Type Agency/Jurisdiction:

Contact Person: Title:

First Name: Last Name:

Agency Address: Street:
City:
State:
Zip:

Contact Phone FAX
E-mail

Population Served Square Miles Served

Does your organization have a general plan?
Does your organization have a safety component to the general plan?
What year was your plan last updated?

Does your organization have a disaster/emergency operations plan?
What year was your plan last updated?
Do you have a recovery annex or section in your plan?
Do you have a terrorism/WMD annex or section in your plan?

2. Hazard Identification Questionnaire

The purpose of the questionnaire is to help identify the hazards within your service area. The list was developed from the first round of meetings with the various working groups in the 2012 plan creation, and from the hazards listed in the County's General Plan. Each hazard is discussed in detail in the 2012 LHMP. The information will be used as the basis for each jurisdiction to evaluate its capabilities, determine its needs, and to assist in developing goals and strategies. The information identifies:

a) What hazards can be identified within or adjacent to the service area of the jurisdiction.
b) Which of those hazards have had reoccurring events
c) What specific hazards and risks are considered by the jurisdiction to be a threat specifically to the jurisdiction? (These locations should be identified by name and location for inclusion in the Specific Hazard Summary Table).
    a. Specific types of facilities owned and operated by the jurisdiction.
    b. Locations damaged from prior disasters or hazard causing events.
d) Information about the jurisdiction's EOC

With your Multi-Disciplinary Planning Team:

a. Instructions for Updating Jurisdictions, with your planning team: Review your old Questionnaire for accuracy and relevance, mark changes.

b. Instructions for New Jurisdictions and Special Districts, with your planning team, meet and go over the questionnaire. Fill in YES, NO or NA on the Questionnaire.

HAZARD IDENTIFICATION QUESTIONNAIRE

DOES YOUR ORGANIZATION HAVE:	
AIRPORT IN JURISDICTION	
AIRPORT NEXT TO JURISDICTION	
DAIRY INDUSTRY	
POULTRY INDUSTRY	
CROPS/ORCHARDS	
DAMS IN JURISDICTION	
DAMS NEXT TO JURISDICTION	
LAKE/RESERVOIR IN JURISDICTION	
LAKE/RESERVOIR NEAR JURISDICTION	
JURISDICTION IN FLOOD PLAIN	
CONTROLLED FLOOD CONTROL CHANNEL	
UNCONTROLLED FLOOD CONTROL CHANNEL	
EARTHQUAKE FAULTS IN JURISDICTION	
EARTHQUAKE FAULTS NEXT TO JURISDICTION	
MOBILE HOME PARKS	
NON-REINFORCED FREEWAY BRIDGES	
NON-REINFORCED BRIDGES	
BRIDGES IN FLOOD PLAIN	
BRIDGES OVER OR ACROSS RIVER/STREAM	
ROADWAY CROSSING RIVER/STREAM	
NON REINFORCED BUILDINGS	
FREEWAY/MAJOR HIGHWAY IN JURISDICTION	
FREEWAY/MAJOR HIGHWAY NEXT TO JURISDICTION	
FOREST AREA IN JURISDICTION	
FOREST AREA NEXT TO JURISDICTION	
WITHIN THE 50 MILES SAN ONOFRE EVACUATION ZONE	
MAJOR GAS/OIL PIPELINES IN JURISDICTION	
MAJOR GAS/OIL PIPELINES NEXT TO JURISDICTION	
RAILROAD TRACKS IN JURISDICTION	
RAILROAD TRACKS NEXT TO JURISDICTION	
HAZARDOUS WASTE FACILITIES IN JURISDICTION	
HAZARDOUS WASTE FACILITIES NEXT TO JURISDICTION	
HAZARDOUS STORAGE FACILITIES IN JURISDICTION	
HAZARDOUS STORAGE FACILITIES NEXT TO JURISDICTION	
DOES YOUR ORGANIZATION OWN OR OPERATE A FACILITY	
IN A FLOOD PLAIN	
NEAR FLOOD PLAIN	
NEAR RAILROAD TRACKS	
NEAR A DAM	
UPSTREAM FROM A DAM	
DOWNSTREAM FROM A DAM	
DOWNSTREAM OF A LAKE	
DOWNSTREAM FROM A RESERVOIR	
NEAR A CONTROLLED FLOOD CONTROL CHANNEL	
NEAR UNCONTROLLED FLOOD CONTROL CHANNEL	
ON AN EARTHQUAKE FAULT	
NEAR AN EARTHQUAKE FAULT	
WITHIN THE 50 MILE SAN ONOFRE EVACUATION ZONE	
IN A FOREST AREA	
NEAR A FOREST AREA	
NEAR A MAJOR HIGHWAY	

A HAZARDOUS WASTE FACILITY	
NEAR A HAZARDOUS WASTE FACILITY	
A HAZARDOUS STORAGE FACILITY	
NEAR A HAZARDOUS STORAGE FACILITY	
NON REINFORCED BUILDINGS	
A MAJOR GAS/OIL PIPELINE	
NEAR A MAJOR GAS/OIL PIPELINE	
DOES YOUR ORGANIZATION HAVE ANY LOCATIONS THAT:	
HAVE BEEN DAMAGED BY EARTHQUAKE AND NOT REPAIRED	
HAVE BEEN DAMAGED BY FLOOD	
HAVE BEEN DAMAGED BY FLOOD MORE THAN ONCE	
HAVE BEEN DAMAGED BY FOREST FIRE	
HAVE BEEN DAMAGED BY FOREST FIRE MORE THAN ONCE	
HAVE BEEN IMPACTED BY A TRANSPORTATION ACCIDENT	
HAVE BEEN IMPACTED BY A PIPELINE EVENT	
EMERGENCY OPERATIONS INFORMATION	
DOES YOUR ORGANIZATION HAVE AN EOC	
IS YOUR EOC LOCATED IN A FLOOD PLAIN	
NEAR FLOOD PLAIN	
NEAR RAILROAD TRACKS	
NEAR A DAM	
UPSTREAM FROM A DAM	
DOWNSTREAM FROM A DAM	
DOWNSTREAM OF A LAKE	
DOWNSTREAM FROM A RESERVOIR	
NEAR A CONTROLLED FLOOD CONTROL CHANNEL	
NEAR UNCONTROLLED FLOOD CONTROL CHANNEL	
ON AN EARTHQUAKE FAULT	
NEAR AN EARTHQUAKE FAULT	
WITHIN THE 50 MILE SAN ONOFRE EVACUATION ZONE	
IN A FOREST AREA	
NEAR A FOREST AREA	
NEAR A MAJOR HIGHWAY	
A HAZARDOUS WASTE FACILITY	
NEAR A HAZARDOUS WASTE FACILITY	
A HAZARDOUS STORAGE FACILITY	
NEAR A HAZARDOUS STORAGE FACILITY	
NON REINFORCED BUILDINGS	
A MAJOR GAS/OIL PIPELINE	
NEAR A MAJOR GAS/OIL PIPELINE	
OTHER FACILITY INFORMATION ARE THERE LOCATIONS WITHIN YOUR JURISDICTION THAT:	
COULD BE CONSIDERED A TERRORIST TARGET	
COULD BE CONSIDERED A BIO-HAZARD RISK	

With your planning team, list the “Yes” answers and discuss. Use the information as a group to summarize your jurisdiction’s hazards and vulnerabilities.

3. SPECIFIC HAZARDS SUMMARY

This table helps to identify the information (name, owner, location, etc.) about the specific hazards identified in the Hazard Questionnaire.

In the Summary Table, list the basic information of the hazards identified by the jurisdiction in the Hazard Identification Questionnaire as a potential threat. These specific hazards were used in the development of response plans, maps, and other analysis data.

a. Instructions for Updating Jurisdictions and Special Districts: With your planning team, review the "Yes" answers and see if there were any changes, if so summarize why there is a difference from the 2012.

b. Instructions for New Jurisdictions and Special Districts: With your planning team, review the "Yes" answers and discuss. Use the information as a group to summarize your jurisdiction's hazards and vulnerabilities.

SPECIFIC HAZARDS SUMMARY

Jurisdiction	Hazard Type	Hazard Name	In Jurisdiction?	Adjacent to Jurisdiction?

4. JURISDICTION VULNERABILITY WORKSHEET

This table is a listing of the primary hazards identified by the 2012 LHMP working groups. Each jurisdiction was asked to evaluate the potential for an event to occur in their jurisdiction by hazard. They were also asked to evaluate the potential impact of that event by hazard on their jurisdiction. The impact potential was determined based on:

1. Economic loss and recovery
2. Physical loss to structures (residential, commercial, and critical facilities)
3. The loss or damage to the jurisdictions infrastructure
4. Their ability to continue with normal daily governmental activities
5. Their ability to quickly recover from the event and return to normal daily activities
6. The loss of life and potential injuries from the event.

The jurisdictions were asked to rate the potential and severity using a scale of between 0 and 4 (4 being the most severe). The jurisdictions were also asked to rank the listed hazards as they relate to their jurisdiction from 1 to 20 (1 being the highest overall threat to their jurisdiction).

With the assistance of the RCIP Plan and County Departments, Riverside County OES conducted an extensive evaluation of the severity and probability potential for the county as a whole. The hazards were also ranked for the County. These numbers and rankings were provided to the jurisdictions as a comparison guide.

A separate table was created to address the hazards relating to agriculture and was assessed by the agriculture working group.

a. Instructions for Updating Jurisdictions and Special Districts: Please review the table, determine if your ranking from the 2012 LHMP remains the same.
b. Instructions for New Jurisdictions and Special Districts: Please evaluate the potential for an event to occur in your jurisdiction by hazard. Then, evaluate the potential impact of that event by hazard on your jurisdiction according to #1-6 from the potential impact list above.

NOTE: Under Medical, Pandemic was added. This was a result of the H1N1 and other incidents.

NAME:	AGENCY:	DATE :

	COUNTY		LOCAL JURISDICTION		
HAZARD	**SEVERITY 0 - 4**	**PROBABILITY 0 - 4**	**SEVERITY 0 - 4**	**PROBABILITY 0 - 4**	**RANKING 1 - 20**
1. EARTHQUAKE					
2. WILDLAND FIRE					
3. FLOOD					
OTHER NATURAL HAZARDS					
4. DROUGHT					
5. LANDSLIDES					
6. INSECT INFESTATION					
7. EXTREME SUMMER/WINTER WEATHER					
8. SEVERE WIND EVENT					
AGRICULTURAL					
9. DISEASE/CONTAMINATION					
10. TERRORISM					
OTHER MAN-MADE					
11. PIPELINE					
12. AQUEDUCT					
13. TRANSPORTATION					
14. POWER OUTAGE					
15. HAZMAT ACCIDENTS					
16. NUCLEAR ACCIDENT					
17. TERRORISM					
18. CIVIL UNREST					
19. JAIL/PRISON EVENT					
MEDICAL					
20. PANDEMIC					

5. JURISDICTION MITIGATION STRATEGIES AND GOALS

This comprehensive table is a listing of the various mitigation strategies, goals, and objectives developed by the 2012 LHMP working groups. The jurisdictions were also given the opportunity to list additional strategies, goals, and objectives specific to either their jurisdiction or their workgroup (i.e. the hospitals, agriculture, etc.).

LOCAL JURISDICTION MITIGATION STRATEGIES AND GOALS
With your Planning Team

a. Instructions for Updating Jurisdictions and Special Districts: please review the table; determine if your ranking from the 2012 LHMP remains the same.

b. Instructions for New Jurisdictions and Special Districts: please follow below:

Please evaluate the priority level for each listed mitigation goal identified below as it relates to your jurisdiction or facility. If you have any additional mitigation goals or recommendations, please list them at the end of this document.

Place an H (High), M (Medium), L (Low), or N/A (Not Applicable) for your priority level for each mitigation goal in the box next to the activity.

	EARTHQUAKE
	Aggressive public education campaign in light of predictions
	Generate new literature for dissemination to:
	◊ Government employees
	◊ Businesses
	◊ Hotel/motel literature
	◊ Local radio stations for education
	◊ Public education via utilities
	◊ Identify/create television documentary content
	Improve the Emergency Alert System (EAS)
	◊ Consider integration with radio notification systems
	◊ Upgrade alerting and warning systems for hearing impaired
	◊ Training and maintenance
	Procure earthquake-warning devices for critical facilities
	Reinforce emergency response facilities
	Provide training to hospital staffs
	Require earthquake gas shutoffs on remodels/new construction
	Evaluate re-enforcing reservoir concrete bases
	Evaluate EOCs for seismic stability
	Install earthquake cutoffs at reservoirs
	Install earthquake-warning devices at critical facilities
	Develop a dam inundation plan for new Diamond Valley Reservoir
	Earthquake retrofitting
	◊ Bridges/dams/pipelines
	◊ Government buildings/schools
	◊ Mobile home parks
	Develop educational materials on structural reinforcement and home inspections **(ALREADY DEVELOPED)**
	Ensure Uniform Building Code compliance
	◊ Update to current compliance when retrofitting
	Insurance coverage on public facilities
	Funding for non-structural abatement (Earthquake kits, etc.)
	Pre - identify empty commercial space for seismic re-location
	Electrical co-generation facilities need retrofitting/reinforcement (Palm Springs, others?)
	Mapping of liquefaction zones
	Incorporate County geologist data into planning
	Backup water supplies for hospitals
	Evaluate pipeline seismic resiliency
	Pre-positioning of temporary response structures
	Fire sprinkler ordinance for all structures

	Evaluate adequacy of reservoir capacity for sprinkler systems
	Training/standardization for contractors performing retrofitting
	Website with mitigation/contractor/retrofitting information
	◊ Links to jurisdictions
	◊ Alerting information
	◊ Volunteer information
	Evaluate depths of aquifers/wells for adequacy during quakes
	Evaluate hazmat storage regulations near faults
COMMUNICATIONS IN DISASTER ISSUES	
	Communications Interoperability
	Harden repeater sites
	Continue existing interoperability project
	Strengthen/harden
	Relocate
	Redundancy
	Mobile repeaters
FLOODS	
	Update development policies for flood plains
	Public education on locations of flood plains
	Develop multi-jurisdictional working group on floodplain management
	Develop greenbelt requirements in new developments
	Update weather pattern/flood plain maps
	Conduct countywide study of flood barriers/channels/gates/water dispersal systems
	Required water flow/runoff plans for new development
	Perform GIS mapping of flood channels, etc.
	Install vehicular crossing gates/physical barriers for road closure
	Maintenance of storm sewers/flood channels
	Create map of flood channels/diversions/water systems etc.
	Require digital floor plans on new non-residential construction
	Upgrade dirt embankments to concrete
	Conduct countywide needs study on drainage capabilities
	Increase number of pumping stations
	Increase sandbag distribution capacities
	Develop pre-planned response plan for floods
	◊ Evacuation documentation
	◊ Re-examine historical flooding data for potential street re-design
	Training for city/county PIOs about flood issues
	Warning systems - ensure accurate information provided
	◊ Publicize flood plain information (website?)
	◊ Install warning/water level signage

	◊ Enhanced public information
	◊ Road closure compliance
	◊ Shelter locations
	◊ Pre-event communications
	Look at County requirements for neighborhood access
	◊ Secondary means of ingress/egress
	Vegetation restoration programs
	Ensure critical facilities are hardened/backed up
	Hardening water towers
	Terrorism Surveillance - cameras at reservoirs/dams
	Riverbed maintenance
	Evaluate existing lift stations for adequacy
	Acquisition of property for on-site retention
	Evaluate regulations on roof drainage mechanism
	Erosion-resistant plants
	Traffic light protection
	Upkeep of diversionary devices
	Install more turn-off valves on pipelines
	Backup generation facilities
	Identify swift water rescue capabilities across County
WILDFIRES	
	Aggressive weed abatement program
	◊ Networking of agencies for weed abatement
	Develop strategic plan for forest management
	Public education on wildfire defense
	Encourage citizen surveillance and reporting
	Identify hydrants with equipment ownership information
	Enhanced firefighting equipment
	Fire spotter program/red flag program
	◊ Expand to other utilities
	Research on insect/pest mitigation technologies
	Volunteer home inspection program
	Public education program
	◊ Weather reporting/alerting
	◊ Building protection
	◊ Respiration
	Pre-identify shelters/recovery centers/other resources
	Roofing materials/defensive spacing regulations
	Community task forces for planning and education
	Fuel/dead tree removal

	Strategic pre-placement of firefighting equipment
	Establish FEMA coordination processes based on ICS
	Brush clearings around repeaters
	Research new technologies for identifying/tracking fires
	Procure/deploy backup communications equipment
	"Red Tag" homes in advance of event
	Provide fire-resistant gel to homeowners
	Involve insurance agencies in mitigation programs
	Clear out abandoned vehicles from oases
	Code enforcement
	Codes prohibiting fireworks
	Fuel modification/removal
	Evaluate building codes
	Maintaining catch basins
OTHER HAZARDS	
	Improve pipeline maintenance
	Wetlands mosquito mitigation (West Nile Virus)
	Insect control study
	Increase County Vector Control capacities
	General public drought awareness
	◊ Lawn watering rotation
	Develop County drought plan
	Mitigation of landslide-prone areas
	Develop winter storm sheltering plan
	Ease permitting process for building transmission lines
	Evaluate restrictions on dust/dirt/generating activities during wind seasons
	Rotational crop planning/soil stabilization
	Enhance agricultural checkpoint enforcement
	Agriculture - funding of detection programs
	Communications of pipeline maps (based on need to know)
	Improved notification plan on runaway trains
	Improve/maintain blackout notification plan.
	Support business continuity planning for utility outages
	Terrorism training/equipment for first responders
	◊ Terrorism planning/coordination
	◊ Staffing for terrorism mitigation
	Create a SONGS regional planning group
	◊ Include dirty bomb planning
	Cooling stations - MOUs in place
	Fire Ant eradication program

	White Fly infestation abatement/eradication program
	Develop plan for supplemental water sources
	Public education on low water landscaping
	Salton Sea desalinization
	Establish agriculture security standards (focus on water supply)
	ID mutual aid agreements
	Vulnerability assessment on fiber-optic cable
	Upgrade valves on California aqueduct
	Public education
	◊ Bi-lingual signs
	◊ Power Outage information
	Notification system for rail traffic - container contents
	Control and release of terrorism intelligence
	Develop prison evacuation plan (shelter in place?)

Use the list and rankings to narrow down or identify "your" strategies. The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy includes the development of goals, objectives, and prioritized mitigation actions.

Goals are general guidelines that explain what you want to achieve. They are broad policy statements and are usually long-term and represent global visions, such as "Protect Existing Property."

Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific, measurable, and may have a defined completion date. Objectives are more specific, such as "Increase the number of buildings protected from flooding."
The development of effective goals and objectives enables the planning team to evaluate the merits of alternative mitigation actions and the local conditions in which these activities would be pursued. A potential mitigation action that would support the goal and objective goal example above is "Acquire repetitive flood loss properties in the Acadia Woods Subdivision."

In the 2012 LHMP, each jurisdiction was required to develop a Mitigation Strategy Proposal based on one of the following:

1. The strategy, goal, or objective rating "High Priority" on the Local Jurisdiction Mitigation Strategies and Goals (WORKSHEET ABOVE)
2. A specifically identified strategy, goal, or objective that was developed as part of one of the working groups planning sessions such as the hospitals or agriculture
3. A specifically identified strategy, goal, or objective that was developed as part of one of the jurisdiction's internal working group planning sessions

6. LOCAL JURISDICTION PROPOSED MITIGATION ACTION AND STRATEGY PROPOSAL

a. Instructions for Updating Jurisdictions and Special Districts: With your planning team, please review the table from # 5, and determine if your ranking from the 2012 LHMP remains the same.

Review the chosen Mitigation Strategy that your jurisdiction submitted. The updated plan **must** identify the completed, deleted, or deferred actions or activities from the previously approved plan as a benchmark for progress.

If the mitigation actions or activities remain unchanged from the previously approved plan, the updated plan **must** indicate why changes are not necessary. Further, the updated plan **shall** include in its prioritization any new mitigation actions identified since the previous plan was approved or through the plan update process.

b. Instructions for New Jurisdictions and Special Districts: With your planning team, Use the “High Priority” rated strategy, goal or objective as a starting point to determine your Mitigation Strategy Proposal.

LOCAL JURISDICTION PROPOSED MITIGATION ACTION AND STRATEGY PROPOSAL

Jurisdiction:
Contact:
Phone:

MITIGATION STRATEGY INFORMATION

Proposal Name:

Proposal Location:

Proposal Type

Place an "X" by the type of mitigation strategy (one or more may apply)

- [ ] Flood and mud flow mitigation
- [ ] Fire mitigation
- [ ] Elevation or acquisition of repetitively damaged structures or structures in high hazard areas
- [ ] Mitigation Planning (i.e. update building codes, planning develop guidelines, etc.)
- [ ] Development and implementation of mitigation education programs
- [ ] Development or improvement of warning systems
- [ ] Additional Hazard identification and analysis in support of the local hazard mitigation plan
- [ ] Drinking and/or irrigation water mitigation
- [ ] Earthquake mitigation
- [ ] Agriculture - crop related mitigation
- [ ] Agriculture - animal related mitigation
- [ ] Flood inundation/Dam failure
- [ ] Weather/Temperature event mitigation

DESCRIPTION OF THE PROPOSED MITIGATION STRATEGY

Proposal/Event History — List any previous disaster related events (dates, costs, etc.)

Description of Mitigation Goal Narrative: — Give a detailed description of the need for the proposal, any history related to the proposal. List the activities necessary for its completion in the narrative section below, including estimated timeline. (how long will it take)

Does your jurisdiction have primary responsibility for the proposal? If not, what agency does?

Yes	X	No		Responsible Agency:

FUNDING INFORMATION

Place an "X" by the proposed source of funding for this proposal

- [ ] Unfunded proposal - funds are not available for the proposal at this time
- [ ] Local jurisdiction General Fund
- [ ] Local jurisdiction Special Fund (road tax, assessment fees, etc.)
- [ ] Non-FEMA Hazard Mitigation Funds
- [ ] Local Hazard Mitigation Grant Funds - Future Request
- [ ] Hazard Mitigation Funds

- [ ] Has your jurisdiction evaluated this mitigation strategy to determine its cost benefits? (i.e. has the cost of the mitigation proposal been determined to be beneficial in relationship to the potential damage or loss using the attached Cost/Benefit Analysis Sheet or another internal method)

As part of this process, each Submitting Jurisdiction is required to perform a cost-benefit analysis. They were required to answer the question at the bottom of the Proposal page that asks if they had conducted a Cost-Benefit Analysis of some type. This analysis was conducted either by completing a Cost Benefit form or by some other approved method. Many of the jurisdictions used the cost-effective analysis approach outlined in the FEMA publication, *Cost and Benefits of Natural Hazards Mitigation.* This cost-benefit analysis was not restricted to natural hazards.

In some cases, the jurisdiction or working group identified a proposal that highlighted a life- safety issue over a standard hazard proposal. This was done when there was either historical data or other sources of information indicating that the life-safety issue needed to be emphasized or brought to the public's attention.

7. LOCAL JURISDICTION DEVELOPMENT TRENDS QUESTIONNAIRE

LAND USE ISSUES - COMPLETE THE INFORMATION BELOW

This questionnaire identifies a comparison of specific land use issues between 2012, 2017 and 2022. The questionnaire also identifies the specific threat potential to the jurisdiction in relationship to residential and commercial structures along with critical facilities. This threat potential is focused on structural loss rather than dollar-value loss as it relates to the three main natural hazards – earthquakes, floods, and wildland fires. The determination of dollar-value loss relating to commercial and critical facilities was found to be very limited and a difficult task to establish. This issue will be addressed in future updates of the Plan.

The questionnaire also requires the jurisdiction to identify the process it will use to maintain their portion of the Plan.

LOCAL JURISDICTION DEVELOPMENT TRENDS QUESTIONNAIRE 2011

LAND USE ISSUES - COMPLETE THE INFORMATION BELOW

JURISDICTION:	DOES YOUR AGENCY HAVE RESPONSIBILITY FOR LAND USE AND/OR DEVELOPMENT ISSUES WITHIN YOUR JURISDICTIONAL BOUNDARIES? YES NO			
	2012 DATA	2017 DATA		2022
Current Population in Jurisdiction or Served			Projected Population in Jurisdiction or Served - in 2022	
Current Sq Miles in Jurisdiction or Served			Projected Sq Miles in Jurisdiction or Served - in 2022	
Does Your Jurisdiction have any ordinances or regulations dealing with disaster mitigation, disaster preparation, or disaster response?			If yes, please list ordinance or regulation number.	
What is the number one land issue your agency will face in the next five years				
Approximate Number of Homes/Apts/etc.			Projected Number of Homes/Apts/etc.- in 2022	
Approximate Total Residential Value			Projected Residential Total Value - in 2022	
Approximate Number of Commercial Businesses			Projected Number of Commercial Businesses - in 2022	
Approximate Percentage of Homes/Apts/etc in flood hazard zones			Approximate Percentage of Homes/Apts/etc in flood hazard zones - in 2022	
Approximate Percentage of Homes/Apts/etc in earthquake hazard zones			Approximate Percentage of Homes/Apts/etc in earthquake hazard zones - in 2022	
Approximate Percentage of Homes/Apts/etc in wildland fire hazard zones			Approximate Percentage of Homes/Apts/etc in wildland fire hazard zones - in 2022	
Approximate Percentage of Commercial Businesses in flood hazard zones			Approximate Percentage of Commercial Businesses in flood hazard zones - in 2022	
Approximate Percentage of Commercial Businesses in earthquake hazard zones			Approximate Percentage of Commercial Businesses in earthquake hazard zones - in 2022	
Approximate Percentage of Commercial Businesses in wildland fire hazard zones			Approximate Percentage of Commercial Businesses in wildland fire hazard zones - in 2022	
Number of Critical Facilities in your Jurisdiction that are in flood hazard zones			Projected Number of Critical Facilities in your Jurisdiction that are in flood hazard zones - in 2022	
Number of Critical Facilities in your Jurisdiction that are in earthquake hazard zones			Number of Critical Facilities in your Jurisdiction that are in earthquake hazard zones - in 2022	
Number of Critical Facilities in your Jurisdiction that are in wildland fire hazard zones.			Number of Critical Facilities in your Jurisdiction that are in wildland fire hazard zones - in 2022	
Does your jurisdiction plan on participating in the County's on-going plan maintenance program every two years as described in Part I of the plan?			If not, how will your jurisdiction do plan maintenance?	
Will a copy of this plan be available for the various planning groups within your jurisdiction for use in future planning and budgeting purposes?				Yes or No

APPENDIX A:
LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction:	**Title of Plan: Local Hazard Mitigation Plan**	**Date of Plan:**
Local Point of Contact:	**Address:**	
Title:		
Agency:		
Phone Number:	**E-Mail:**	

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region *(insert #)*		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1: REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))			
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))			
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))			
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))			
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))			

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
July 2018

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))			
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))			
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))			
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))			
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))			
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))			
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))			
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))			
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))			
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))			
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))			
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))			
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))			
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Plan Adoption/ Resolution Page 4 all plans		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Plan Adoption/ Resolution Page 4 all plans		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2: PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to: • *Key problems identified in, and linkages to, the vulnerability assessment;* • *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;* • *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;* • *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);* • *Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;* • *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and* • *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to: • *Status of previously recommended mitigation actions;* • *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;* • *Documentation of annual reviews and committee involvement;* • *Identification of a lead person to take ownership of, and champion the Plan;* • *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;* • *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);* • *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and* • *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

Riverside Operational Area
Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)

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B. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following: • *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?* • *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?* • *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?* • *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?* • *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

SECTION 3: MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to

ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
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MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
20												

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APPENDIX F – Historical Landmarks

Continue to next page.

Name (Landmark Plaque Number)	National Register	California State Historical Landmar	California Register of	Point of Interest	Date Listed	City (County)
ADMINISTRATION BUILDING, SHERMAN INSTITUTE (N851)	Yes				1/9/1980	Riverside (Riverside)
AGENTS HOME (P231)				Yes	10/5/1971	Thermal (Riverside)
ALL SOULS UNIVERSALIST CHURCH (N666)	Yes				9/18/1978	Riverside (Riverside)
ANDREAS CANYON (N201)	Yes				1/8/1973	Palm Springs (Riverside)
ARCHEOLOGICAL SITES CA-RIV-504 AND CA-RIV 773 (N2195)	Yes				3/12/2003	Blythe (Riverside)
ARLINGTON BRANCH LIBRARY AND FIRE HALL (N1839)	Yes				7/22/1993	Riverside (Riverside)
ARMORY HALL (N1748)	Yes				1/29/1992	Lake Elsinore (Riverside)
ARMORY HALL, GRAND ARMY OF THE REPUBLIC BUILDING (P822)				Yes	5/15/1996	Lake Elsinore (Riverside)
ATCHISON, TOPEKA, AND SANTA FE RAILWAY DEPOT AT BLYTHE (P735)				Yes	2/11/1991	Blythe (Riverside)
BANDINI ADOBE SITE (P120)				Yes	6/6/1969	Norco (Riverside)
BANDINI-COTA ADOBE SITE (P122)				Yes	6/6/1969	Corona (Riverside)
BANNING WOMEN'S CLUB (P725)				Yes	11/20/1989	Banning (Riverside)
BARKER DAM (N394)	Yes				10/29/1975	Twentynine Palms (Riverside)
BEAUMONT CARNEGIE LIBRARY (P807)				Yes	12/4/1994	Beaumont (Riverside)
BLYTHE FERRY CROSSING (P195)				Yes	5/19/1971	Blythe (Riverside)
BLYTHE INTAGLIOS (N384)	Yes				8/22/1975	Blythe (Riverside)
BOGART HOUSE (P808)				Yes	12/4/1994	Beaumont (Riverside)
BUTTERCUP FARMS PICTOGRAPH (N411)	Yes				5/3/1976	Perris (Riverside)
BUTTERFIELD STAGE STATION (188)		Yes			6/20/1935	Corona (Riverside)
CAMP EMERSON (P147)				Yes	11/3/1969	Idyllwild (Riverside)
CAMP YOUNG--DESERT TRAINING CENTER, CAMA (P87)				Yes	6/2/1968	Desert Center (Riverside)
CANTU RANCH/GALLEANO WINERY (P773)				Yes	8/21/1992	Mira Loma (Riverside)
CARNEGIE, ANDREW, LIBRARY (N502)	Yes				6/29/1977	Corona (Riverside)
CARVED ROCK (187)		Yes			6/20/1935	Corona (Riverside)
CHILDS, WILLIAM, HOUSE (N2063)	Yes				7/28/1999	Riverside (Riverside)
CHINATOWN (P74)	Yes			Yes	1/24/1968	Riverside (Riverside)
CITRUS EXPERIMENT STATION (P121)				Yes	6/6/1969	Riverside (Riverside)
CITRUS MACHINERY PIONEERING (P123)				Yes	6/6/1969	Riverside (Riverside)
COACHELLA VALLEY COUNTY WATER DISTRICT (P141)				Yes	8/29/1969	Coachella (Riverside)
COACHELLA VALLEY FISH TRAPS (N175)	Yes				6/13/1972	Valerie (Riverside)
COPLIN HOUSE SPOKANE HOTEL PLUEGER REALTY (P759)				Yes	11/8/1991	Banning (Riverside)
CORN SPRINGS (N2038)	Yes				10/30/1998	Desert Center (Riverside)
CORN SPRINGS (P80)				Yes	1/24/1968	Desert Center (Riverside)
CORNELIUS AND MERCEDES JENSON RANCH (943)		Yes			6/12/1981	Rubidoux (Riverside)
CORONA FOUNDERS MONUMENT (738)		Yes			6/6/1960	Corona (Riverside)
CORONA HIGH SCHOOL (N2297)	Yes				8/3/2005	Corona (Riverside)
COTTONWOOD SCHOOL (P520)				Yes	2/1/1978	Sage (Riverside)
CRESCENT BATHHOUSE (N380)	Yes				7/30/1975	Lake Elsinore (Riverside)
DE ANZA CROSSING OF THE SANTA ANA RIVER, 1775 AND 1776 (787)		Yes			9/18/1963	Riverside (Riverside)
DESERT INN (P307)				Yes	7/13/1973	Palm Springs (Riverside)
DESERT QUEEN MINE (N402)	Yes				1/17/1976	Twentynine Palms (Riverside)
DOS PALMAS (P78)				Yes	1/24/1968	Mecca (Riverside)
EAGLE MOUNTAIN IRON (P229)				Yes	10/5/1971	Desert Center (Riverside)
EL MIRADOR HOTEL AND TOWER (P570)				Yes	6/12/1981	Palm Springs (Riverside)
ELSINORE WOMEN'S CLUB (P832)				Yes	2/5/1998	Lake Elsinore (Riverside)
ELSINORE'S HOTTEST SULPHUR SPRINGS (P97)				Yes	6/7/1968	Lake Elsinore (Riverside)
ESTUDILLO MANSION (N2146)	Yes				10/25/2001	San Jacinto (Riverside)
FEDERAL POST OFFICE (N705)	Yes				11/20/1978	Riverside (Riverside)
FIRST CHURCH OF CHRIST, SCIENTIST (N1794)	Yes				9/22/1992	Riverside (Riverside)
FIRST CONGREGATIONAL CHURCH OF RIVERSIDE (N1975)	Yes				4/3/1997	Riverside (Riverside)
FIRST POST OFFICE (P174)				Yes	3/19/1970	Temecula (Riverside)
FRINK RANCH (P94)				Yes	6/7/1968	Beaumont (Riverside)
GALLEANO WINERY (N2207)	Yes				6/22/2003	Mira Loma (Riverside)
GARBANI, ROCCO, HOMESTEAD (N2079)	Yes				12/22/1999	Winchester (Riverside)

GIANT DESERT FIGURES (101)		Yes			3/29/1933	Blythe (Riverside)
GILMAN RANCH (P41)	Yes			Yes	6/2/1967	Banning (Riverside)
HALL CITY AND HALL'S GRADE (P124)				Yes	6/6/1969	Cabazon (Riverside)
HAMILTON SCHOOL (#1), LITTLE RED SCHOOL HOUSE (P746)				Yes	8/2/1991	Anza (Riverside)
HARADA HOUSE (N517)	Yes				9/15/1977	Riverside (Riverside)
HEMET DAM AND LAKE HEMET (P95)				Yes	6/7/1968	Hemet (Riverside)
HEMET MAZE STONE (557)		Yes			8/24/1956	Hemet (Riverside)
HENDERSON/REID BUILDING (P774)				Yes	8/21/1992	Banning (Riverside)
HERITAGE HOUSE (N205)	Yes				2/28/1973	Riverside (Riverside)
HIGHGROVE HYDROELECTRIC PLANT (P108)				Yes	12/11/1968	Riverside (Riverside)
HIGHLAND SPRINGS (P38)				Yes	6/2/1967	Banning (Riverside)
IDYLLWILD (P335)				Yes	7/12/1974	Idyllwild (Riverside)
INDIAN SCHOOL AGENCY OFFICE, INDIAN SCHOOL AGENCY (P233)				Yes	10/5/1971	Thermal (Riverside)
INDIAN WELLS (P83)				Yes	1/24/1968	Palm Desert (Riverside)
JENSEN, CORNELIUS, RANCH (N815)	Yes				9/6/1979	Rubidoux (Riverside)
JOHN W. NORTH PARK / SEVENTH STREET HISTORIC DISTRICT (P308)				Yes	7/13/1973	Riverside (Riverside)
LAKE NORCONIAN CLUB (N2083)	Yes				2/4/2000	Norco (Riverside)
LEDERER, GUS, SITE (N2196)	Yes				3/12/2003	Desert Center (Riverside)
LORING OPERA HOUSE, GOLDEN STATE THEATER (P64)				Yes	9/22/1967	Riverside (Riverside)
MARCH FIELD HISTORIC DISTRICT (P93)				Yes	6/7/1968	Moreno Valley (Riverside)
MARCH FIELD HISTORIC DISTRICT (N1893)	Yes				12/6/1994	Riverside (Riverside)
MARTINEZ CANYON ROCKHOUSE (N2074)	Yes				12/14/1999	North Palm Springs (Riverside)
MARTINEZ HISTORICAL DISTRICT (N236)	Yes				5/17/1973	Torres-Martinez Indian Reservation (Riverside)
MARTINEZ HISTORICAL DISTRICT/MARTINEZ INDIAN AGENCY (P232)				Yes	10/5/1971	Thermal (Riverside)
MASONIC TEMPLE (N872)	Yes				6/6/1980	Riverside (Riverside)
MCCOY SPRING ARCHEOLOGICAL SITE (N1103)	Yes				5/10/1982	Blythe (Riverside)
MISSION COURT BUNGALOWS (N1835)	Yes				7/8/1993	Riverside (Riverside)

MISSION INN (761)	Yes	Yes			4/28/1961	Riverside (Riverside)
MOROVIAN CHURCH AND INDIAN SCHOOL, INDIAN SCHOOL (P230)				Yes	10/5/1971	Thermal (Riverside)
MOUNT RUBIDOUX (P65)				Yes	9/22/1967	Riverside (Riverside)
MURRIETA CREEK ARCHEOLOGICAL AREA (N229)	Yes				4/24/1973	Temecula (Riverside)
NOBLE'S RANCH (P82)				Yes	1/24/1968	Beaumont (Riverside)
NORTH CHUCKWALLA MOUNTAIN QUARRY DISTRICT (N966)	Yes				8/24/1981	Desert Center (Riverside)
NORTH CHUCKWALLA MOUNTAINS PETROGLYPH DISTRICT CA-RIV 1383 (N969)	Yes				9/3/1981	Desert Center (Riverside)
OLD MORENO SCHOOL (P702)				Yes	8/23/1988	Moreno Valley (Riverside)
OLD TEMESCAL ROAD (638)		Yes			3/31/1958	Corona (Riverside)
OLD YWCA BUILDING (N1009)	Yes				1/28/1982	Riverside (Riverside)
ORIGINAL PALM SPRINGS, THE (P118)				Yes	6/6/1969	Palm Springs (Riverside)
PAINTED ROCK (190)		Yes			6/20/1935	Corona (Riverside)
PALM CANYON THEATER / STEVENS, FRANCES S., SCHOOL (C21)			Yes		11/7/2003	Palm Springs (Riverside)
PALMDALE RAILROAD SITE / RAILROAD THAT FAILED (P146)				Yes	11/3/1969	Palm Springs (Riverside)
PARENT WASHINGTON NAVEL ORANGE TREE (20)		Yes			6/1/1932	Riverside (Riverside)
PEDLEY-TYPE DAM (P337)				Yes	7/12/1974	Banning (Riverside)
PERRIS DEPOT (N1871)	Yes				8/5/1994	Perris (Riverside)
PINACATE MINING DISTRICT (P553)				Yes	6/6/1980	Good Hope (Riverside)
PINACATE, PINACATE MINING DISTRICT (P554)				Yes	6/6/1980	Perris (Riverside)
RAMONA BOWL, SITE OF THE RAMONA PAGEANT (1009)		Yes			2/16/1993	Hemet (Riverside)
RANCHO SANTA ROSA (P719)				Yes	11/3/1989	Murrieta (Riverside)
RIVERSIDE CEMENT COMPANY (P336)				Yes	7/12/1974	Riverside (Riverside)
RIVERSIDE COUNTY COURTHOUSE (P96)				Yes	6/7/1968	Riverside (Riverside)
RIVERSIDE FIRST CONGREGATIONAL CHURCH (P76)				Yes	1/24/1968	Riverside (Riverside)

RIVERSIDE MUNICIPAL AUDITORIUM AND SOLDIER'S MEMORIAL BUILDING (N576)	Yes				3/31/1978	Riverside (Riverside)
RIVERSIDE-ARLINGTON HEIGHTS FRUIT EXCHANGE (N877)	Yes				6/9/1980	Riverside (Riverside)
RUINS OF THIRD SERRANO ADOBE (224)		Yes			6/20/1935	Corona (Riverside)
RYAN HOUSE AND LOST HORSE WELL (N368)	Yes				6/5/1975	Twentynine Palms (Riverside)
SAAHATPA (749)		Yes			8/17/1960	(Riverside)
SAN PEDRO, LOS ANGELES, & SALT LAKE RR DEPOT (N491)	Yes				4/18/1977	Riverside (Riverside)
SAN TIMOTEO CANYON SCHOOLHOUSE (P125)	Yes			Yes	6/6/1969	Calimesa (Riverside)
SANTA FE RAILWAY DEPOT (P711)				Yes	11/22/1988	Hemet (Riverside)
SANTA ROSA RANCHO (1005)		Yes			2/18/1992	Murrieta (Riverside)
SERRANO BOULDER (185)		Yes			6/20/1935	Corona (Riverside)
SERRANO TANNING VATS (186)		Yes			6/20/1935	Corona (Riverside)
SHAVER'S WELL (P148)				Yes	11/3/1969	Mecca (Riverside)
SIMON'S, M. H., UNDERTAKING CHAPEL (N878)	Yes				6/9/1980	Riverside (Riverside)
SITE OF BLYTHE INTAKE (948)		Yes			3/1/1982	Blythe (Riverside)
SITE OF BLYTHE INTAKE (P63)				Yes	9/22/1967	Blythe (Riverside)
SITE OF CONTRACTOR'S GENERAL HOSPITAL (992)		Yes			8/17/1990	(Riverside)
SITE OF DE ANZA CAMP, MARCH 1774 (103)		Yes			3/29/1933	Anza (Riverside)
SITE OF INDIAN VILLAGE OF POCHEA (104)		Yes			3/29/1933	Hemet, (Riverside)
SITE OF LOUIS RUBIDOUX HOUSE (102)		Yes			3/29/1933	Rubidoux (Riverside)
SITE OF OLD RUBIDOUX GRIST MILL (303)		Yes			7/12/1939	Rubidoux (Riverside)
SMILEY PLACE (P760)				Yes	11/8/1991	Indio (Riverside)
SOUTHERN HOTEL (N1803)	Yes				10/15/1992	Perris (Riverside)
SPEED OF LIGHT EXPERIMENT SITE (P119)				Yes	6/6/1969	Idyllwild (Riverside)
ST. BONIFACE SCHOOL (P415)				Yes	8/7/1975	Beaumont (Riverside)
SUTHERLAND FRUIT COMPANY (N1439)	Yes				4/11/1986	Riverside (Riverside)
TAHQUITZ CANYON (N189)	Yes				10/31/1972	Palm Springs (Riverside)
TEMECULA QUARRIES (P175)				Yes	3/19/1970	Temecula (Riverside)
TEMESCAL TIN MINES (P79)				Yes	1/24/1968	Corona (Riverside)
THOMAS-GARNER RANCH (P176)				Yes	3/19/1970	Idyllwild (Riverside)
TORO VILLAGE (P81)				Yes	1/24/1968	Indio (Riverside)

TRUJILLO ADOBE (P75)				Yes	1/24/1968	Riverside (Riverside)
U.S. EXPERIMENTAL DATE STATION, DATE INDUSTRY BIRTHPLACE (P306)				Yes	7/13/1973	Mecca (Riverside)
UNIVERSITY HEIGHTS JUNIOR HIGH SCHOOL (N1832)	Yes				6/24/1993	Riverside (Riverside)
VALERIE JEAN'S DATE SHOP,RUSSELL NICOLL HOME/OL KING SOLO (P736)				Yes	2/11/1991	Thermal (Riverside)
VICTORIA AVENUE (N2108)	Yes				10/26/2000	Riverside (Riverside)
WEAVER ADOBE (P39)				Yes	6/2/1967	Banning (Riverside)
WHITEWATER (P40)				Yes	6/2/1967	Banning (Riverside)
WILEY'S WELL (P77)				Yes	1/24/1968	Blythe (Riverside)
WOMAN'S IMPROVEMENT CLUB CLUBHOUSE (N1579)	Yes				11/3/1988	Corona (Riverside)
YERXA'S DISCOVERY (P560)				Yes	12/19/1980	Desert Hot Springs (Riverside)

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APPENDIX G – Trends Questionnaire

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JURISDICTION:	DOES YOUR AGENCY HAVE RESPONSIBILITY FOR LAND USE AND/OR DEVELOPMENT ISSUES WITHIN YOUR JURISDICTIONAL BOUNDARIES? YES			
	2012 DATA	2017 DATA		2022
Current Population in Jurisdiction or Served	2,196,137	2,329,256	Projected Population in Jurisdiction or Served - in 2022	2,506,739
Current Sq Miles in Jurisdiction or Served	6,375	7,295.6	Projected Sq Miles in Jurisdiction or Served - in 2022	7,295.6
Does Your Jurisdiction have any ordinances or regulations dealing with disaster mitigation, disaster preparation, or disaster response?	Yes	Yes	If yes, please list ordinance or regulation number.	
What is the number one land issue your agency will face in the next five years	N/A			
Approximate Number of Homes/Apts/etc.	696,290	700,413	Projected Number of Homes/Apts/etc.- in 2022	955,853
Approximate Total Residential Value	N/A	362,066	Projected Residential Total Value - in 2022	
Approximate Number of Commercial Businesses	N/A	N/A	Projected Number of Commercial Businesses - in 2022	N/A
Approximate Percentage of Homes/Apts/etc. in flood hazard zones	12%		Approximate Percentage of Homes/Apts/etc. in flood hazard zones - in 2022	N/A
Approximate Percentage of Homes/Apts/etc. in earthquake hazard zones	5%		Approximate Percentage of Homes/Apts/etc. in earthquake hazard zones - in 2022	N/A
Approximate Percentage of Homes/Apts/etc. in wildland fire hazard zones	34%		Approximate Percentage of Homes/Apts/etc. in wildland fire hazard zones - in 2022	N/A
Approximate Percentage of Commercial Businesses in flood hazard zones	N/A	N/A	Approximate Percentage of Commercial Businesses in flood hazard zones - in 2022	N/A
Approximate Percentage of Commercial Businesses in earthquake hazard zones	N/A	N/A	Approximate Percentage of Commercial Businesses in earthquake hazard zones - in 2022	N/A
Approximate Percentage of Commercial Businesses in wildland fire hazard zones	N/A	N/A	Approximate Percentage of Commercial Businesses in wildland fire hazard zones - in 2022	N/A
Number of Critical Facilities in your Jurisdiction that are in flood hazard zones	41	1,298	Projected Number of Critical Facilities in your Jurisdiction that are in flood hazard zones - in 2022	N/A
Number of Critical Facilities in your Jurisdiction that are in earthquake hazard zones	21		Number of Critical Facilities in your Jurisdiction that are in earthquake hazard zones - in 2022	N/A
Number of Critical Facilities in your Jurisdiction that are in wildland fire hazard zones.	69		Number of Critical Facilities in your Jurisdiction that are in wildland fire hazard zones - in 2022	N/A
Does your jurisdiction plan on participating in the County's on-going plan maintenance program every year as described in Part I of the plan?	N/A	N/A	If not, how will your jurisdiction do plan maintenance.	
Will a copy of this plan be available for the various planning groups within your jurisdiction for use in future planning and budgeting purposes?				Yes

APPENDIX H – Mitigation Cost Analysis Guidelines

Continue to next page.

COUNTY OF RIVERSIDE
OFFICE OF THE
AUDITOR-CONTROLLER

County Administrative Center
4080 Lemon Street, 11th Floor
P.O. Box 1326
Riverside, CA 92502-1326
(951) 955-3800
Fax (951) 955-3802

ACO AUDITOR CONTROLLER
COUNTY OF RIVERSIDE
Paul Angulo, CPA
Auditor-Controller

Auditor-Controller Review of Rates/Fees

Pursuant to Board of Supervisors Policy B-4 and B-28, County departments wishing to establish a rate/fee, or revise an existing rate/fee for service provided to other County departments, other public agencies, organizations, or individuals, are required to obtain approval by the County Executive Office and be reviewed by the (ACO) Auditor-Controller's Office prior to submitting their rate/fee request to the Board of Supervisors.

Federal (OMB) Office of Management and Budget Circular A-87 provides guidance for determining costs that may be recovered in rates/fees.

Rate/Fee packages submitted for review to the ACO must include the following:

1. A narrative fully explaining the methodology used (i.e., the purpose of the rate/fee, how it was developed, how each rate/fee was calculated, and who will be charged the rate/fee).
2. Electronic copies of spreadsheets created to calculate the rate/fee. Please provide notes to explain where the information was derived and clearly identify if changes have been made to the original data. Ensure multiple tabs are correctly linked and pertinent data is highlighted.
3. Supporting documentation validating all expenditure and revenue amounts used, full disclosure of all calculations, and clear identification of overhead calculations and application of the overhead to all the department's divisions/functions.

ACO Documentation Requirements

1. Direct salary/benefits costs by classification; including hourly rate of pay & benefits rate;
2. Direct costs by line item included in the rate/fee (non-salary/benefit);
3. Departmental administrative overhead costs included in rate/fee, as well as the total administrative cost applied to all divisions/functions;
4. Departmental indirect costs by line item included in rate;
5. Countywide overhead costs;
6. Schedule of fixed asset amortization;
7. Copy of (ICRP) Indirect Cost Rate Proposal, if applicable;
8. Copy of last year's budget for the function;

9. Time studies, if applicable;
10. Methodology for Productive hourly rate computations, if applicable;
11. Government Code reference for statutorily set rates/fees;
12. Related off-setting revenues;
13. County Ordinance reference, if applicable;
14. ISF retained earnings information;
15. Summary showing current rates/fees and revised rates/fees;
16. Completed Form 11; and
17. Copy of the annual productivity and efficiency report.

The above list is not all inclusive and additional documentation may be required in support of submitted rates/fees.

If you have any questions in regards to the rate/fee review process or the required documentation, please contact Principal Accountant, Russell Dominski at 955-8136.

Thank you in advance for your cooperation.

Cc: Jay Orr, County Executive Officer
Ivan Chand, Deputy County Executive Officer
Karen Johnson, Senior Management Analyst

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APPENDIX I – Acronyms

This list contains acronyms commonly used in Emergency Management and those specific to Riverside County.

AC	Area Command
ADA	Americans with Disabilities Act
ALS	Advanced Life Support
ARC	American Red Cross
ARES	Amateur Radio Emergency Services
CALDAP	California Disaster Assistance Program
CAL FIRE	California Department of Forestry and Fire Protection
CAL-TRANS	California Department of Transportation
CALWAS	California Warning System
CAR	Corrective Action Report
CBO	Community Based Organization
CBRNE	Chemical, Biological, Radiological, Nuclear or High-Yield Explosive
CCC	California Conservation Corps
CDC	Centers for Disease Control, U.S. Public Health Service
CDF	California Department of Forestry
CEPEC	California Earthquake Prediction Evaluation Council
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERT	Community Emergency Response Team
CESFRS	California Emergency Service Fire Radio System
CESRS	California Emergency Services Radio System
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CLEMARS	California Law Enforcement Mutual Aid Radio System
CLERS	California Law Enforcement Radio System

CLETS	California Law Enforcement Telecommunications System
COG	Continuity of Government
DA	Damage Assessment
DAP	Disaster Assistance Programs
DCS	Disaster Communications Service
DFCO	Deputy Federal Coordinating Officer
DFO	Disaster Field Office
DHA	Disaster Housing Assistance
DHS	Department of Homeland Security
DMAT	Disaster Medical Assistance Team
DMORT	Disaster Mortuary Operational Response Team
DOC	Department Operations Center
DOD	Department of Defense
DOI	Department of Interior
DOJ	Department of Justice
DOL	Department of Labor
DOS	Department of State
DOT	Department of Transportation
DRC	Disaster Recovery Center
DRC	Disaster Resource Center
DSA	Division of the State Architect (California)
DWR	California Department of Water Resources
EAS	Emergency Alert System
EDD	Employment Development Department
EDIS	Emergency Digital Information System
EMAC	Emergency Management Assistance Compact
EMD	Emergency Management Department
EMI	Emergency Management Institute
EMIS	Emergency Management Information System (Los Angeles County)

EMMA	Emergency Managers Mutual Aid
EMP	Electromagnetic Pulse
EMPG	Emergency Management Performance Grant
EMS	Emergency Medical Services
EMSA	Emergency Medical Services Authority
EMT	Emergency Medical Technician
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EPI	Emergency Public Information
EPIC	Emergency Public Information Center
ERT	Emergency Response Team
ESA	California Emergency Services Act
ESC	Emergency Services Coordinator
ESF	Emergency Support Functions
EST	Emergency Support Team
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FCC	Federal Communications Commission
FCO	Federal Coordinating Officer
FEMA	Federal Emergency Management Agency
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
FIA	Federal Insurance Administration
FIRESCOPE	Firefighting Resources of Calif. Organized for Potential Emergencies
FOG	Field Operations Guide
FTS	Field Treatment Sites
GAR	Governor's Authorized Representative
GSA	General Services Administration

HAZMAT	Hazardous Materials
HEW	U.S. Department of Health, Education and Welfare
HHS	Department of Health and Human Services
HMC	Hazard Mitigation Coordinator
HMDA	Hazard Mitigation and Disaster Assistance
HMGP	Hazard Mitigation Grant Program
HMO	Hazard Mitigation Officer
HMT	Hazard Mitigation Team
HSAS	Homeland Security Advisory System
HSC	Homeland Security Council
HSEEP	Homeland Security Exercise Evaluation Program
HSOC	Homeland Security Operations Center
HSPD	Homeland Security Presidential Directive
HSPD-5	Homeland Security Presidential Directive-5
HUD	Housing and Urban Development Program
IA	Individual Assistance
IAC	Incident Advisory Council
IAP	Incident Action Plan
IC	Incident Commander
IC	Incident Command
ICP	Incident Command Post
ICS	Incident Command System
IDE	Initial Damage Estimate
IID	Imperial Irrigation District
IMT	Incident Management Team
IRS	U.S. Internal Revenue Service
JDIC	Justice Data Interface Controller
JFO	Joint Field Office
JIC	Joint Information Center

JIS	Joint Information System
JOC	Joint Operations Center
JPA	Joint Powers Agreement
JTTF	Joint Terrorism Task Force
LNO	Liaison Officer
MACS	Multi-Agency Coordination System
MARAC	Mutual Aid Regional Advisory Committee
MMRS	Metropolitan Medical Response Team
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MTA	Metropolitan Transit Authority
NAWAS	National Warning System
NDAA	California Natural Disaster Assistance Act
NDMS	National Disaster Medical System
NEP	National Exercise Program
NFA	National Fire Academy
NFIP	National Flood Insurance Program
NGO	Nongovernmental Organization (See PNP, NVOAD, VOAD)
NHC	National Hurricane Center
NHPA	National Historic Preservation Act
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NOC	National Operations Center
NOI	Notice of Interest
NRC	Nuclear Regulatory Commission
NRF	National Response Framework
NSC	National Security Council
NVOAD	National Voluntary Organizations Active in Disaster (See NGO, PNP, VOAD)
NWS	National Weather Service

OA	Operational Area
OASIS	Operational Area Satellite Information System
OEM	Office of Emergency Management
OES	Office of Emergency Services
OSA	California Office of the State Architect
OSHA	Occupational Safety and Health Administration
PA	Public Assistance
PA/O	Public Assistance Officer
PDD	Presidential Decision Directive
PFO	Principal Federal Officer
PFO	Principal Federal Official
PIO	Public Information Officer
PIS	Public Information System
PNP	Private Nonprofit Organization (see NGO, NVOAD, VOAD)
POC	Point of Contact
POLREP	Pollution Report
PUC	California Public Utilities Commission
PVO	Private Voluntary Organizations
PW	Project Worksheet
R&D	Research and Development
RACES	Radio Amateur Civil Emergency Services
RCOE	Riverside County Office of Education
RCSD	Riverside County Sheriff's Department
REOC	Regional Emergency Operations Center (State OES Region)
RESTAT	Resources Status
RIMS	Response Information Management System (State OES)
RIMS	Resources Inventory Management System (federal)
ROSS	Resource Ordering and Status System
RRCC	Regional Response Coordination Center

RRCC	Regional Response Coordinating Center
SAP	State Assistance Program
SAR	Search and Rescue
SARA	Superfund Amendment Reauthorization Act (Title III)
SBA	Small Business Administration
SCAQMD	South Coast Air Quality Management District
SCC	Sheriff's Communications Center (Los Angeles County)
SCO	State Coordinating Officer
SDO	Standards Development Organizations
SEMS	Standardized Emergency Management System
SFLEO	Senior Federal Law Enforcement Official
SFO	Senior Federal Official
SHMO	State Hazard Mitigation Officer
SIOC	Strategic Information and Operations Center
SITREP	Situation Report
SO	Safety Officer
SOC	State Operations Center
SOP	Standard Operating Procedure
STO	State Training Officer
TEW	Terrorism Early Warning group
TLMA	Transportation and Land Management Agency
UC	Unified Command
USACE	United States Army Corps of Engineers
USAR	Urban Search and Rescue
USDA	U.S. Department of Agriculture
USFA	United States Fire Administration
USGS	United States Geological Survey
VOAD	Volunteer Organizations Active in Disaster (See NGO, PNP, NVOAD)
WMD	Weapons of Mass Destruction

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APPENDIX J – References

References for the Updated LHMP included information from many websites, FEMA and Cal EMA guidance documents and resources from the County of Riverside Departments.

Guidance and other Documents:
2012 Riverside County Operational Area Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP)
FEMA Local Mitigation Plan Review Guide
2010 State of California Hazard Mitigation Plan (SHMP)
Disaster Mitigation Act of 2000
County of Riverside General Plan, multiple Elements
Riverside County Operational Area Emergency Operations Plan
FEMA Hazard Mitigation Planning
FEMA How To Guide #1, Getting Started: Building Support for Mitigation Planning
FEMA How To Guide #2, Understanding Your Risks: Identifying Hazards and Estimating Losses
FEMA How To Guide #3, Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies
FEMA How To Guide #4, Bringing the Plan to Life: Implementing the Hazard Mitigation Plan
FEMA How To Guide #5, Using Benefit-Cost Review in Mitigation Planning
FEMA How To Guide #6, Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning
FEMA How To Guide #7, Integrating Manmade Hazards into Mitigation Planning
FEMA How To Guide #8, Multi-Jurisdictional Mitigation Planning
FEMA How To Guide #9, Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects
Freeway Closure Plan
Joint Information System (JIS) Plan
Mass Care & Shelter Guidance and Standard Operating Procedures
Natural Hazard Mapping, Analysis, and Mitigation: a Technical Background Report in Support of the Safety Element of the New Riverside County 2000 General Plan
Riverside County Essential Facilities Risk Assessment (RCEFRA) Project Report June 2009
2015 Riverside County SCAG Repot – Profile of Riverside County
Southern California Catastrophic Earthquake Response Plan

Website Links:	
Cal OES Hazard Mitigation Portal	http://hazardmitigation.calema.ca.gov/
Cal OES Local Mitigation Planning	http://www.caloes.ca.gov/for-individuals-families/hazard-mitigation-planning/local-hazard-mitigation-program
My Hazards Mapping Website	http://myhazards.calema.ca.gov/
My Plan Mapping Site	http://myplan.calema.ca.gov/
Distressed and Abandoned Properties	http://www.foreclosureregistration.org/
Query for fires, used to find details on 63 large fires for Riverside County	http://cdfdata.fire.ca.gov/incidents/incidents_search_results?search=riverside
Data query to find heat data, health related stats	http://epicenter.cdph.ca.gov/ReportMenus/InjuryDataByTopic.aspx
Seismic landslide zones	http://gmw.consrv.ca.gov/shmp/html/pdf_maps_so.html
Landslide Alerts	http://www.usgs.gov/hazard_alert/alerts/landslides.rss
Kinder Morgan Public Information	http://www.kindermorgan.com/public_awareness/
	http://www.kindermorgan.com/public_awareness/AdditionalInformation/KMSafetyBrochures.cfm
Riverside County Ordinances Link	http://www.rctlma.org/admin/content/ordinance_
Riverside County Building and Safety Link	http://www.rctlma.org/building/default.aspx
Riverside County Auditor Controller	http://www.auditorcontroller.org/ReportsPublications.aspx
Riverside Flood Control	http://www.floodcontrol.co.riverside.ca.us/AnnualReports.aspx
Riverside County Transportation & Land Management Agency	http://planning.rctlma.org/Portals/0/genplan/general_Plan_2017/elements/OCT17/Ch01_Intro_120815.pdf?ver=2017-10-11-102103-380
	http://planning.rctlma.org/ZoningInformation/GeneralPlan/RiversideCountyGeneralPlan2015.aspx
	http://planning.rctlma.org/
Ready.Gov Website	http://www.ready.gov/pandemic
	http://www.ready.gov/terrorism
Disability Planning Data for Planners From Pooled 2005-2007 ACS PUMS Data.	www.DisabilityPlanningData.com
The Spatial Hazard Events and Losses Database for the United States. Version 7.0 Database.	http://www.sheldus.org.

Columbia, SC: University of South Carolina. 2009.	
Water Plan information	http://www.water.ca.gov/publications/forms/
Flood Risk Maps	http://www.water.ca.gov/myfloodrisk/
Dam Safety Website	www.water.ca.gov/damsafety/index.cfm
Source: California Energy Commission, Natural Gas Pipelines	http://www.energy.ca.gov/maps/Natural_Gas_Pipelines.pdf
75 Gas Transmission Pipeline Long Range Planning	http://www.pge.com/myhome/customerservice/response/pipelineplanning/
Source: U.S. Department of Transportation's Office of Pipeline Safety	http://osfm.fire.ca.gov/pipelineregulation.html
Recent Earthquakes in California and Nevada	http://scedc.caltech.edu/recent/Quakes/quakes0.html
Data: Explore 15 Years of Power Outages	http://insideenergy.org/2014/08/18/data-explore-15-years-of-power-outages/
Thousands without power in unincorporated Riverside County	http://abc7.com/news/thousands-without-power-in-unincorporated-riverside-county/1315149/
Power and phone outages reported across Riverside/San Bernardino counties	http://www.kesq.com/news/power-and-phone-outages-reported-across-riverside_san-bernardino-counties/62501575
Arizona-Southern California Outages on September 8, 2011	cascading outages and leaving approximately 2.7 million customers without power
A Study of Active Shooter Incidents in the United States Between 2000 and 2013	file:///C:/Users/sbruns/Downloads/(U)_ActiveShooter021317_17B_WEB%20(1).PDF
Active Shooter Incidents in the United States in 2014 and 2015	file:///C:/Users/sbruns/Downloads/ActiveShooterIncidentsUS_2014-2015.pdf
U.S. Drought Monitor – California	http://droughtmonitor.unl.edu/data/jpg/20170718/20170718_CA_trd.jpg
Riverside County Flood Control and Water Conservation District ANNUAL REPORT FY 2015/2016	http://www.floodcontrol.co.riverside.ca.us/Downloads/AnnualReports/DistrictAnnualReport15-16.pdf
San Onofre - Units 2 and 3	https://www.nrc.gov/info-finder/decommissioning/power-reactor/san-onofre-units-2-3.html
Cal OES - San Onofre Nuclear Generating Station	http://www.caloes.ca.gov/cal-oes-divisions/planning-preparedness/nuclear-power-plant-program
Colorado River Aqueduct	http://www.asce.org/project/colorado-river-aqueduct/
California State Water Project Overview	http://www.water.ca.gov/swp/

Addressing Emerging Infectious Disease Threats: A Prevention Strategy for the United States Executive Summary	https://www.cdc.gov/mmwr/preview/mmwrhtml/00031393.htm
National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)	https://www.cdc.gov/ncezid/who-we-are/index.html
Botulism from Drinking Pruno	https://wwwnc.cdc.gov/eid/article/15/1/08-1024_article
West Nile Virus in California	https://wwwnc.cdc.gov/eid/article/10/8/04-0077_article
Risk of Local Zika Virus Transmission by County	https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/LocalZikaRiskMap.pdf
Ebola (Ebola Virus Disease)	https://www.cdc.gov/vhf/ebola/transmission/index.html
Mapping Site Links:	
Cal OES Hazard Mapping	http://www.caloes.ca.gov/cal-oes-divisions/geographic-information-systems
Cal OES My Plan	http://myplan.calema.ca.gov/
Faults Mapping	http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html
California Department of Water Resources	http://gis.bam.water.ca.gov/bam/
Handouts and Documents Distributed to Participants:	
FEMA Local Mitigation Planning Handbook	
FEMA How To Guide #1, Getting Started: Building Support for Mitigation Planning	
FEMA How To Guide #2, Understanding Your Risks: Identifying Hazards and Estimating Losses	
FEMA How To Guide #3, Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies	
FEMA How To Guide #4, Bringing the Plan to Life: Implementing the Hazard Mitigation Plan	
FEMA How To Guide #5, Using Benefit-Cost Review in Mitigation Planning	
FEMA How To Guide #6, Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning	
FEMA How To Guide #7, Integrating Manmade Hazards into Mitigation Planning	
FEMA How To Guide #8, Multi-Jurisdictional Mitigation Planning	

FEMA How To Guide #9, Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects
FEMA Mitigation Ideas
2016 Riverside County SCAG Repot – Profile of Riverside County
Community Rating System
FEMA Local Mitigation Plan Review Guide
2016 Inventory Worksheet
2017 LHMP Template
Senate Bill 1000
Senate Bill 379
FEMA Mitigation Grant Information

APPENDIX G

RESOLUTION ADOPTING 2020 UWMP AND WSCP

RESOLUTION NO. 2021-04

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE CHINO BASIN DESALTER AUTHORITY ADOPTING THE CHINO BASIN DESALTER AUTHORITY URBAN WATER MANAGEMENT PLAN 2020

WHEREAS, the Chino Basin Desalter Authority ("CDA") prepared that certain draft Chino Basin Desalter Authority Urban Water Management Plan 2020, dated June 2021 ("2020 UWMP"), in accordance with the requirements of the Urban Water Management Planning Act, California Water Code Section 10610, *et seq.*; and

WHEREAS, in accordance with California Water Code Section 10642, CDA encouraged public participation with respect to the preparation of the 2020 UWMP by making the 2020 UWMP available for review by the public online, at *www.chinodesalter.org*, on May 20, 2021; and

WHEREAS, on June 3, 2021, the CDA Board of Directors held a public hearing to receive public testimony and comments regarding the 2020 UWMP; and

WHEREAS, notice of the time and place of the June 3, 2021 public hearing was published on May 11, 2021 and May 18, 2021 in the Inland Valley Daily Bulletin and May 12, 2021 and May 19, 2021 in the Riverside Press Enterprise, in accordance with California Government Code Section 6066; and

WHEREAS, the CDA Board of Directors considered all public comments and testimony presented at the public hearing relating to the 2020 UWMP; and

WHEREAS, the CDA Board of Directors now desires to adopt the 2020 UWMP.

NOW, THEREFORE, BE IT RESOLVED, the Board of Directors of the Chino Basin Desalter Authority hereby declares, finds, and determines as follows:

1. The recitals set forth above are true and correct.

2. The 2020 UWMP is hereby approved and adopted.

3. The Chairperson or the Chairperson's designee, the General Manager or the General Manager's designee, and any other proper officer of CDA, are each hereby authorized and directed to execute and deliver any and all documents and instruments and to do and cause to be done any and all acts and things necessary or proper to implement the 2020 UWMP.

4. The 2020 UWMP shall be placed on file with the General Manager or another officer of CDA, as directed from time to time by the General Manager. The General Manager is hereby directed to transmit copies of the 2020 UWMP to the California Department of Water Resources, the California State Library, and each city and county within which CDA provides water supplies, all within thirty (30) days following the date of adoption of this Resolution.

5. The CDA Board of Directors hereby finds and determines that, pursuant to California Water Code Section 10652, the adoption of the 2020 UWMP does not constitute a "project" within the meaning of the California Environmental Quality Act, Public Resources Code Section 21000, *et seq.*

6. This Resolution shall take effect immediately upon adoption.

PASSED AND ADOPTED this 3rd day of June, 2021.

Kenneth McLaughlin
Chairperson

ATTEST:

Casey Costa
Secretary

STATE OF CALIFORNIA)
) ss
COUNTY OF SAN BERNARDINO)

I, Casey Costa, Secretary of the Chino Basin Desalter Authority, do hereby certify that the foregoing Resolution, being No. 2021-04, was duly adopted by the Board of Directors of the Chino Basin Desalter Authority on the 3rd day of June, 2021, by the following vote:

AYES: Ken McLaughlin, Jurupa Community Services District
Jim Bowman, City of Ontario
Eunice Ulloa, City of Chino
Peter Rogers, City of Chino Hills
Greg Newton, City of Norco
Vicki Rupe, Santa Ana River Water Company
Gracie Torres, Western Municipal Water District

NOES: None

ABSENT: None

ABSTAIN: None

By:

Casey Costa
Secretary

RESOLUTION NO. 2021-05

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE CHINO BASIN DESALTER AUTHORITY ADOPTING THE CHINO BASIN DESALTER AUTHORITY WATER SHORTAGE CONTINGENCY PLAN 2020

WHEREAS, the Chino Basin Desalter Authority ("CDA") is an urban water supplier that is required to adopt an Urban Water Management Plan pursuant to Water Code Sections 10620 et seq.; and

WHEREAS, CDA adopted the Chino Basin Desalter Authority Urban Water Management Plan 2020 ("2020 UWMP") on June 3, 2021 in accordance with the requirements of the Urban Water Management Planning Act, California Water Code Section 10610, *et seq.*; and

WHEREAS, CDA is also required to prepare and adopt a Water Shortage Contingency Plan (2020 WSCP) that consists of certain elements prescribed by Water Code Section 10632, and to make the Plan available to the California State Library, the California Department of Water Resources, and to any city or county within which CDA supplies water no later than 30 days after adoption of the Plan and no later than July 1, 2021, as a required component of the Urban Water Management Plan; and

NOW, THEREFORE, BE IT RESOLVED, the Board of Directors of the Chino Basin Desalter Authority hereby declares, finds, and determines as follows:

1. The recitals set forth above are true and correct.

2. The 2020 Water Shortage Contingency Plan for the Chino Basin Desalter Authority is hereby approved and adopted.

3. This Resolution shall take effect immediately upon adoption.

PASSED AND ADOPTED this 1st day of July 2021.

Kenneth McLaughlin
Chairperson

ATTEST:

Casey Costa
Secretary

STATE OF CALIFORNIA)
) ss
COUNTY OF SAN BERNARDINO)

I, Casey Costa, Secretary of the Chino Basin Desalter Authority, do hereby certify that the foregoing Resolution, being No. 2021-05, was duly adopted by the Board of Directors of the Chino Basin Desalter Authority on the 1st day of July 2021, by the following vote:

AYES: Ken McLaughlin, Jurupa Community Services District
Jim Bowman, City of Ontario
Eunice Ulloa, City of Chino
Peter Rogers, City of Chino Hills
Greg Newton, City of Norco,
Vicki Rupe, Santa Ana River Water Company
Gracie Torres, Western Municpal Water District

NOES: None

ABSENT: None

ABSTAIN: None

By:

Casey Costa
Secretary

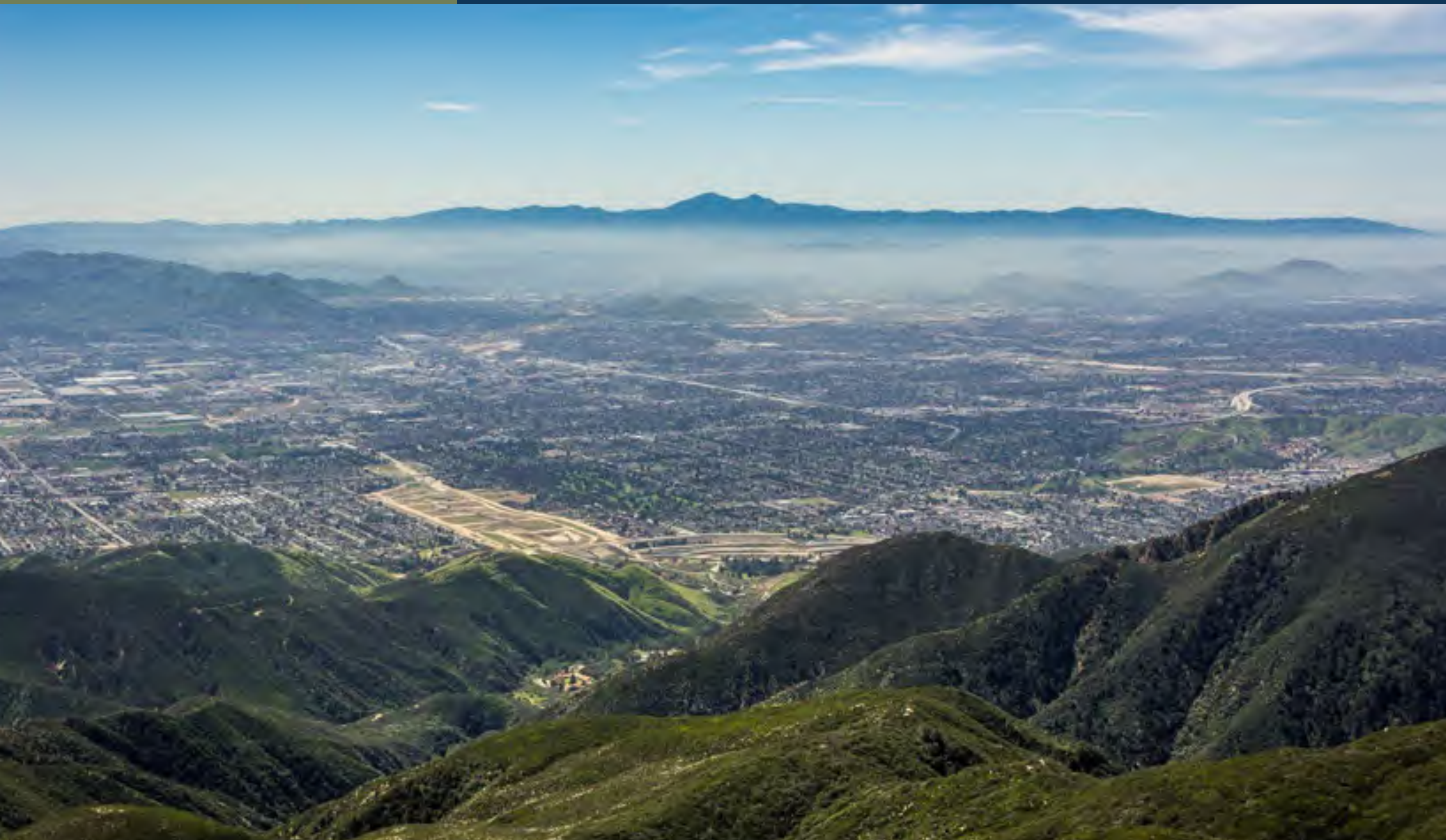
APPENDIX H

San Antonio Water Company 2020 UWMP

Urban Water Management Plan

SEPTEMBER 2021

SAN ANTONIO WATER COMPANY



SAN ANTONIO WATER COMPANY

Urban Water Management Plan

SEPTEMBER 2021

Prepared by Water Systems Consulting, Inc.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS & ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
AB	Assembly Bill
AF	Acre Foot
AFY	Acre Feet per Year
AHHG	Area of Historic High Groundwater
AMR	Automatic Meter Reader
APA	Administrative Procedures Act
AWWA	American Water Works Association
BMP	Best Management Practice
CALWARN	California Water/Wastewater Agency Response Network
CAT	Climate Action Team
CCF	Hundred Cubic Feet
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFS	Cubic Feet per Second
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Irrigation System
CUWCC	California Urban Water Conservation Council
DCR	DWR SWP Delivery Capacity Report
DDW	SWRCB Division of Drinking Water
DFW	California Department of Fish and Wildlife
DIP	Ductile Iron Pipe
DMM	Demand Management Measure
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
ERNIE	Emergency Response Network of the Inland Empire
ESA	Endangered Species Act
ET	Evapotranspiration
ETo	Reference Evapotranspiration

GAC	Granulated Activated Carbon
GIS	Geographic Information System
GPCD	Gallons per Capita per Day
GPM	Gallons per Minute
HECW	High Efficiency Clothes Washer
HET	High Efficiency Toilet
IX	Ion Exchange
KAF	Thousand Acre Feet
KAFY	Thousand Acre Feet per Year
LAFCO	Local Agency Formation Commission
MAF	Million Acre-Feet
MCL	Maximum Contaminant Level
MF	Multi-family
MG	Million Gallons
MGD	Million Gallons per Day
MOU	Memorandum of Understanding
MSL	Mean Sea Level
MTBE	Methyl Tertiary Butyl Ether
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
PCE	Perchloroethylene
PVC	Polyvinyl Chloride
QWEZ	Qualified Water Efficient Landscaper
RIX	Rapid Infiltration and Extraction
RPA	Reasonable and Prudent Alternative
RUWMP	Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
SAWCo	San Antonio Water Company
SBX7-7	Senate Bill 7 of Special Extended Session 7
SF	Single Family
SOI	Sphere of Influence
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TCE	Trichloroethylene
ULFT	Ultra-Low Flush Toilet

UV	Ultraviolet
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act
VOC	Volatile Organic Compound
WBIC	Weather Based Irrigation Controller
WSCP	Water Shortage Contingency Plan
WFF	Water Filtration Facility
WSS	Water Sense Specification
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

1

2020 URBAN WATER MANAGEMENT PLAN

Introduction and Lay Description

This chapter provides a brief overview of the San Antonio Water Company (SAWCo) and the purpose of this Urban Water Management Plan (UWMP).

SAWCo is a private non-profit Mutual Water Company formed in 1882 under the General Corporation Laws of the United States with the purpose to furnish, lease, or sell water for irrigation, milling, manufacturing and other purposes to the newly established Ontario irrigation colony. Land for the irrigation colony was sold primarily for the booming citrus industry at the time, and a share in SAWCo was included with every acre of land purchased. Each shareholder was entitled to a portion of available local water, distributed equally by SAWCo amongst shareholders on a non-profit basis. Today SAWCo retains the same purpose of providing beneficial water service to all shareholders based on established monthly entitlements and a fixed number of shares.

IN THIS SECTION

- California Water Code
- UWMP Organization
- UWMP Relation to Other Efforts

1.1 The California Water Code

In 1983, the State of California Legislature (Legislature) enacted the Urban Water Management Planning Act (UWMP Act). The law required an urban water supplier, providing water for municipal purposes to more than 3,000 customers or serving more than 3,000 acre-feet (AF) annually, to adopt an UWMP every five years demonstrating water supply reliability under normal as well as drought conditions.

Since the original UWMP Act was passed, it has undergone significant expansion, particularly since the completion of the 2015 UWMP. Prolonged droughts, groundwater overdraft, regulatory revisions, and changing climatic conditions affect the reliability of water suppliers as well as the statewide water reliability overseen by California Department of Water Resources (DWR), the State Water Resources Control Board (State Water Board), and the Legislature. Accordingly, the UWMP Act has grown to address changing conditions and the current requirements are found in Sections 10610-10656 and 10608 of the California Water Code.

DWR provides guidance for urban water suppliers by preparing an Urban Water Management Plan Guidebook 2020 (Guidebook) (California Department of Water Resources, 2021), conducting workshops, developing tools, and providing program staff to help water suppliers prepare comprehensive and useful UWMPs, implement water conservation programs, and understand the requirements in the California Water Code. Suppliers prepare their own UWMPs in accordance with the requirements and submit them to DWR. DWR then reviews the plans to make sure they have addressed the requirements identified in the California Water Code and submits a report to the Legislature summarizing the status of the plans for each five-year cycle.

The purpose of the UWMP is for water suppliers to evaluate their long-term resource planning and establish management measures to ensure adequate water supplies are available to meet existing and future demands. The UWMP provides a framework to help water suppliers maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during drought conditions or other water supply interruptions.

The UWMP is a valuable planning tool used for multiple purposes including:

- Provides a standardized methodology for water utilities to assess their water resource needs and availability.
- Serves as a resource to the community and other interested parties regarding water supply and demand, conservation and other water related information.
- Provides a key source of information for cities and counties when considering approval of proposed new developments and preparing regional long-range planning documents such as city and county General Plans.
- Informs other regional water planning efforts.

This plan, which was prepared in compliance with the California Water Code, and as set forth in the Guidebook and format established by the DWR, constitutes the 2020 UWMP for SAWCo.

1.2 UWMP Organization and Lay Description

This UWMP is organized as follows:

Chapter 1 – Introduction

The introduction provides a description of SAWCo and background on the UWMP and California Water Code. Water suppliers that serve more than 3,000 customers or 3,000 acre-feet-per-year (AFY) are required to prepare a UWMP. The UWMP is an important tool that details SAWCo's system and service area, estimates supply and demand over a twenty-five-year period, and analyzes reliability in terms of drought.

Chapter 2 – Plan Preparation

The UWMP is prepared based on guidance from DWR. This UWMP provides information in terms of calendar year (January 1st – December 31st) and in units of AFY. While preparing this UWMP, SAWCo coordinated with other local agencies and sent notifications that the UWMP was being developed, available for review, and details pertaining to the public hearing and plan adoption meeting.

Chapter 3 – System Description

This chapter summarizes SAWCo's service area, climate, demographics, and land use. SAWCo provides domestic service to the San Antonio Heights community with an estimated population of 3,000 people. SAWCo provides water based on entitlement and the number of shares. There are 6,389 shares in SAWCo. In 2020, only 6,178 shares were active.

Chapter 4 – Water Use Characterization

This chapter summarizes historical and future water use. SAWCo provides water for domestic, municipal, and miscellaneous uses. In addition, SAWCo spreads water in the Chino, Cucamonga, and Six Basins groundwater basins for groundwater recharge. In 2020, the largest customer was the City of Upland's purchases for irrigation water, which accounted for 50% of the total water sales.

SAWCo's Basic Area is nearly built out. SAWCo's ongoing Master Plan effort identified seven parcels as possible future development and corresponding water demand factors. Using the information developed in the Master Plan, it is estimated that should these seven parcels develop, future demands on SAWCo will increase by approximately 30 AFY.

Chapter 5 – Water Supply Characterization

SAWCo uses local groundwater from several groundwater basins and surface water to meet customer demands. Local groundwater is extracted from the Chino Basin, Cucamonga Basin, and Six Basins. The three groundwater basins are each adjudicated, and SAWCo's has water rights as defined by the various legal Judgements in place to protect and manage each basin. SAWCo also participates in groundwater recharge operations that enhance groundwater supply. Surface water from San Antonio Creek are pre-1914 water rights, and annual water availability is influenced by rainfall. The San Antonio Tunnel is a deep rock tunnel 100 feet below ground surface that collects naturally percolated groundwater.

Chapter 6 – Water Service Reliability and Drought Risk Assessment

Future demand and supply were analyzed to evaluate supply reliability over the planning period. The UWMP analyzed conditions for normal, or average, single-dry, and five-year consecutive dry periods. SAWCo aims to provide shareholders full entitlement, but in periods of drought, allocations per share may be reduced, depending on supply availability. In all scenarios, SAWCo expects to meet customer demands based on shareholders full entitlement. In addition, a Drought Risk Assessment was performed to analyze anticipated supply and demand for the next five years (2021-2025). The Drought Risk Assessment analysis determines that SAWCo's supplies are able to reliably meet customer demands.

Chapter 7 – Water Shortage Contingency Plan

The Water Shortage Contingency Plan (WSCP) provides guidance on declaring a water shortage stage and how to mitigate supply deficits. The WSCP defines four stages of water shortage and outlines the actions that will be required of customers during each stage. The complete WSCP is available in Appendix H.

Chapter 8 – Demand Management Measures

This chapter summarizes the various demand management measures used to implement water conservation throughout SAWCo. To participate in any of the rebate programs, interested customers should contact SAWCo directly.

Chapter 9 – Plan Adoption, Submittal, and Implementation

This chapter summarizes the various requirements to adopt and submit a UWMP and WSCP. Details on public hearing dates, notification letters to local agencies, and how to submit or amend a plan are discussed.

1.3 UWMP Relation to Other Efforts

The UWMP characterizes water use, estimates future demands and supply sources, and evaluates supply reliability for normal, single-dry, and consecutive dry years. The UWMP Act also requires reevaluation of SAWCo's Water Shortage Contingency Plan (WSCP). Details on the WSCP are provided in Chapter 7.

Documents that were leveraged in preparation of this UWMP and how they overlap with the primary topics included in the UWMP are shown in Figure 1-1.

				PLAN TOPICS				
PLANNING DOCUMENT	PREPARED BY	DOCUMENT STATUS		SUPPLIES / RELIABILITY	DEMANDS / WATER USE EFFICIENCY	INFRASTRUCTURE	RISK & MITIGATION	EMERGENCY RESPONSE
Water Master Plan	WSC for SAWCo	■■■□□	Under development	✓	✓	✓		
AWIA Risk and Resilience Assessment and Emergency Response Plan	WSC for SAWCo	■■■■■	Complete	✓		✓	✓	✓
2017 Water Master Plan	Civiltec Engineering, Inc for SAWCo	■■■■■	Complete	✓	✓	✓		
2017 Water Rate and Fee Study	Carollo Engineers for SAWCo	■■■■■	Complete		✓			
2015 Urban Water Management Plan	Civiltec Engineering, Inc for SAWCo	■■■■■	Complete	✓	✓		✓	✓

Figure 1-1. UWMP Relation to Other Planning Efforts.

2

2020 URBAN WATER MANAGEMENT PLAN

Plan Preparation

This plan was prepared using guidance from the Department of Water Resources' (DWR) Urban Water Management Plan Guidebook 2020 (2020 UWMP Guidebook). This chapter provides details regarding SAWCo's UWMP preparation and the coordination and outreach efforts conducted.

A DWR review sheet checklist is provided in Appendix A.

IN THIS SECTION

2.1 Basis for Preparing a Plan

As mentioned in Chapter 1, the Water Code requires Suppliers with 3,000 or more service connections or water deliveries in excess of 3,000 AFY to prepare an UWMP every five years. Details pertaining to SAWCo's water system, such as public water system number, 2020 number of connections and volume of water supplied are provided in Table 2-1. In 2020, SAWCo delivered 16,345 AFY of water to nearly 1,210 service connections and in a wholesale capacity; therefore, SAWCo is required to prepare an UWMP. SAWCo included all 2020 data in the development of this UWMP.

Table 2-1. DWR 2-2 Plan Identification

TYPE OF PLAN	MEMBER OF RUWMP	MEMBER OF REGIONAL ALLIANCE	NAME OF RUWMP OR REGIONAL ALLIANCE
Individual UWMP	No	No	

Table 2-2. DWR 2-3 Agency Identification

TYPE OF SUPPLIER	YEAR TYPE	FIRST DAY OF YEAR		UNIT TYPE
Wholesaler	Calendar Years	DD	MM	Acre Feet (AF)
		01	01	

2.2 Coordination and Outreach

The UWMP Act requires a water purveyor to coordinate the preparation of its UWMP with other appropriate agencies in and around its service area. This includes other water suppliers that share a common source, water management agencies, and relevant public agencies. All relevant entities, including the County of San Bernardino, were sent 60-day notices of preparation and consideration for adoption at a public hearing prior to the adoption of the 2020 UWMP. Copies of the letters and other correspondence are provided in Appendix B. Public hearing notices are also provided in Appendix B.

2.2.1 Wholesale and Retail Coordination

SAWCo provides water based on a fixed number of shares. Several local water suppliers own shares in SAWCo and are listed in Table 2-3.

Table 2-3. DWR 2-4W Water Supplier Information Exchange

Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631. Complete the table below.

WHOLESALE WATER SUPPLIER NAME
Cucamonga Valley Water District
Monte Vista Water District
City of Ontario
City of Upland

2.2.2 Coordination with Other Agencies and the Community

CWC Section 10621 requires that suppliers notify cities and counties to which they serve water that the UWMP and WSCP are being updated. Notices should be provided at least 60 days prior to a public hearing. To fulfill this requirement, SAWCo notified local and regional agencies of preparation of its 2020 UWMP and WSCP, inviting these agencies to submit any comments. SAWCo provided notices to the agencies listed in Table 2-4.

Table 2-4. Agency Coordination.

AGENCY/ORGANIZATION	WAS NOTIFIED OF PLAN AVAILABILITY[1]	WAS SENT A NOTICE OF INTENTION TO ADOPT 60 DAYS PRIOR TO PUBLIC HEARING
Water Suppliers		
Cucamonga Valley Water District	X	X
Monte Vista Water District	X	X
Public Agencies		
City of Upland	X	X
City of Ontario	X	X
City of Pomona	X	X
County of San Bernardino	X	X
Others		
Chino Basin Watermaster	X	X

[1]Was notified of availability of Draft UWMP and directed to an electronic copy of the draft plan on SAWCo's website.

3

2020 URBAN WATER MANAGMENET PLAN

System Description

This section will describe SAWCo's service area, climate, population, demographics, and land uses.

IN THIS SECTION

- Service Area
- Climate
- Population and Demographics
- Land Uses

SAWCo is governed by a seven-person Board of Directors elected to four-year terms. Daily operations are overseen by the General Manager with support by the Assistant General Manager and Water Utility Superintendent. SAWCo employs approximately 10 staff members to manage operational and administrative services.

SAWCo is governed by bylaws. The purpose of SAWCo is to develop, distribute, supply, and deliver water to its shareholders for irrigation, domestic, and all other useful purposes, in proportion to the number of shares of stock held by them respectively, at actual cost, and is not organized for the private gain of any person (San Antonio Water Company).

SAWCo contains a fixed number of shares at 6,389 shares. In 2020, 6,178 shares were actively taking water. Water is provided based on entitlement and the number of shares a customer holds. Shares may be divided or sold. In 2020, the total yearly entitlement was 13,000 AF; the yearly entitlement per share was equal to 2.03 AF/share.

3.1 Service Area

SAWCo's bylaws specify the service area is made up of a Basic Area and an Extended Area. The Basic Area generally coincides with the incorporated community of San Antonio Heights located north of the City of Upland in San Bernardino County, as shown in Figure 3-1. The Basic Area is bounded to the south by the City of Upland, to the north by the San Bernardino Mountains, to the west by the Los Angeles County Line and to the east by Cucamonga Creek. SAWCo provides retail service to all end users who reside in the Basic Area.

The Extended Area is identified as all lands not included in the Basic Area. Customers within the Extended Area are considered wholesale shareholders. There are however a limited number of retail customers in the Extended Area including the Upland Hills Golf course, the Red Hill Golf Course, Holliday Rock Company, and several grove irrigators.

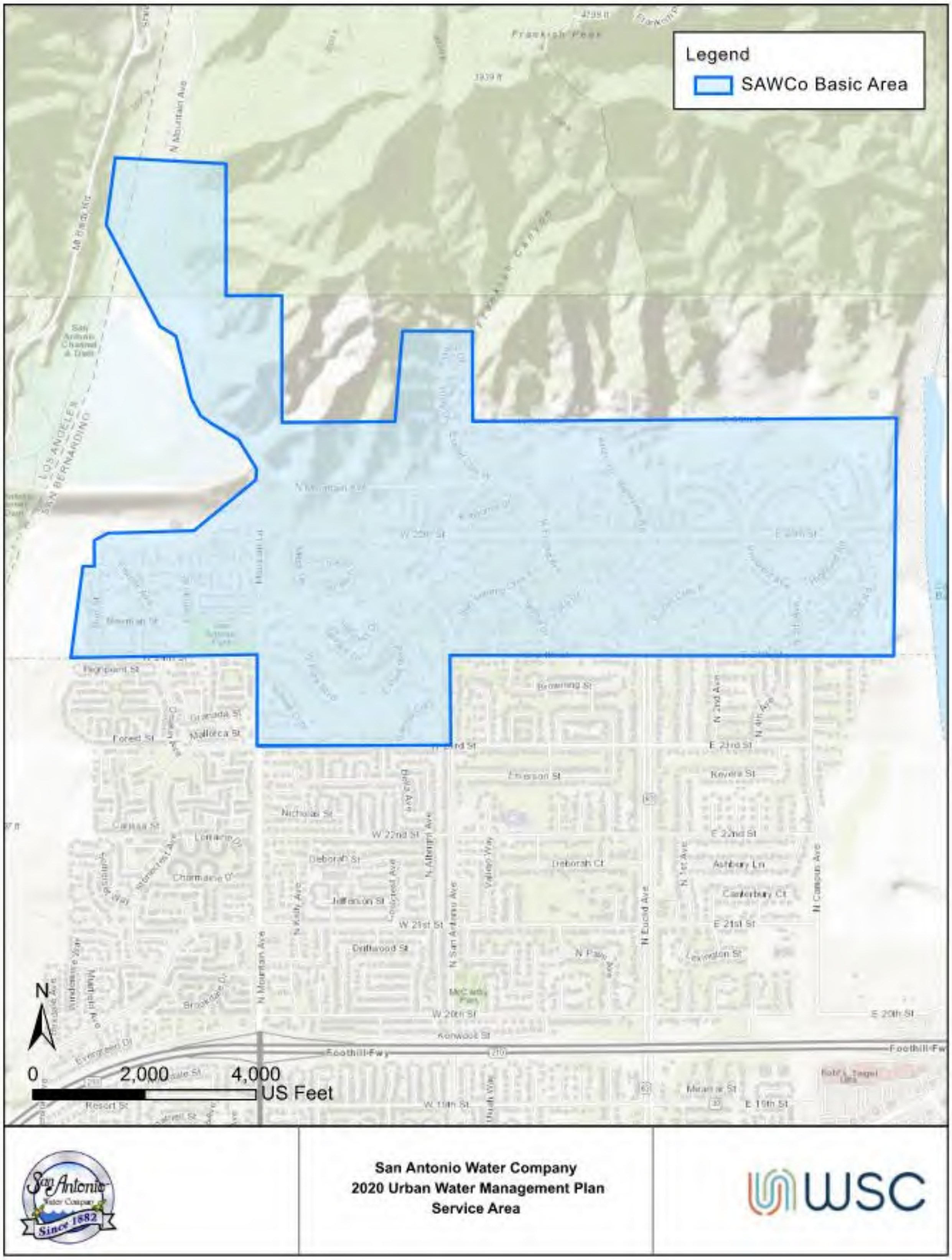


Figure 3-1. Service Area

3.2 Service Area Climate

Table 3-1 presents average climate data for the service area, including temperature, rainfall, and reference evapotranspiration (ETo) from the California Irrigation Management Information System (CIMIS). CIMIS data was used as it provided the most recent data pertaining to temperature, rainfall, and ETo. As shown in

Table 3-1, the warmest month of the year is typically August with an average temperature of 82.4 degrees Fahrenheit (°F), while the coldest month of the year is December with an average temperature of 58.5°F.

The annual average precipitation within SAWCo's service area is about 15.6 inches. As shown in

Table 3-1, the majority of rainfall occurs in the months of October through March. December is typically the wettest month with an average rainfall of approximately 3.9 inches.

Table 3-1. Average Climate [1]

MONTH	AVERAGE TEMPERATURE (°F)	AVERAGE RAINFALL (INCH)	AVERAGE STANDARD ETO (INCH)
January	59.9	2.8	2.2
February	60.5	2.1	2.8
March	63.8	1.9	4.3
April	67.0	0.9	5.4
May	69.8	0.4	5.8
June	75.8	0.1	6.6
July	81.2	0.2	7.5
August	82.4	0.0	7.3
September	80.1	0.5	5.6
October	73.5	1.3	4.0
November	65.0	1.6	2.7
December	58.5	3.9	2.0
ANNUAL AVERAGE	**69.8**	**15.6** [2]	**4.7**

[1] Data based on CIMIS weather station 78 Pomona; https://cimis.water.ca.gov/. Averages calculated from 2010-2020 data.

[2] Annual total rainfall.

3.3 Service Area Population and Demographics

3.3.1 Service Area Population

SAWCo's Basic Service Area closely follows the boundaries of the census designated place of San Antonio Heights, which had a population of 3,092 in 2017, down from 3,371 in 2010 per the US Census (Datausa.io, 2017). To identify the population for 2020, the DWR population tool was used. Using a persons per connection factor of 2.73, it was estimated that the population within the Basic Area is 3,303 people.

San Antonio Heights is primarily residential and nearly built out. SAWCo has identified seven parcels that could potentially be developed and require water service. For this UWMP, it was assumed development would occur between 2025 and 2030. Therefore, future population was determined to increase to 3,322 people and remain constant throughout the planning horizon.

$$Future\ population = 2020\ population + 2.73\frac{persons}{connection} * 7\ future\ connections = 3{,}322\ people$$

SAWCo also provides water for irrigation, industrial, agricultural, and wholesale in the Extended Area. Land use and planning in the extended area is under the jurisdiction of numerous cities and San Bernardino County and is addressed in their respective UWMPs.

Table 3-2. DWR 3-1W Current and Projected Population

POPULATION SERVED	2020	2025	2030	2035	2040	2045
Basic Area - San Antonio Heights	3,303	3,303	3,322	3,322	3,322	3,322

3.3.2 Other Social, Economic, and Demographic Factors

Based on 2015-2019 data, the United States Census Bureau (Census) estimates that households within the San Antonio Heights are composed of 2.69 people per household and approximately 64% of households are composed of married-couples with families. The median age of a resident within the San Antonio Heights is approximately 48 years old. Based on 2015-2019 Census data, 95% of people 25 years or older had at least graduated from high school and 42% obtained a bachelor's degree or higher. It was estimated that 5% of people did not complete high school.

Throughout the San Antonio Heights, approximately 58% of the working population (people ages 16 and over) were employed. Approximately 75% held a private wage or salary position, and 16% were employed by the federal, state, or local government. Educational services, health care and social assistance (30%) is the most common industry that San Antonio Heights residents work in, followed by a retail trade (14%). The median household income was $91,897, while the median earnings for a full-time, year-round worker was $78,071 (United States Census Bureau, n.d.).

It was estimated that 5.2% of people within the San Antonio Heights were in poverty. 1.8% of households participated in government programs, such as the Supplemental Nutrition Assistance Program (SNAP). Of the households that received SNAP, 100% had children under the age of 18 within the household (United States Census Bureau, n.d.).

Census data reported that of the people identifying as one race alone, 79.7% were White. Approximately 4.5% identified as two or more races. Of the total population, an estimated 60.3% identified as White non-Hispanic and 27.8% as Hispanic. It was estimated that 18.9% of people at least

5 years or older spoke a language other than English at home. In addition to English, Asian and Pacific Islander languages were the most common languages spoken by San Antonio Heights residents. 7.4% of people stated that they did not speak English “very well” (United States Census Bureau, n.d.).

3.4 Land Uses within Service Area

As mentioned, SAWCo provides potable water service to the Basic Area, which incorporates the community of San Antonio Heights. This area consists of residential users only. There are only seven parcels currently identified as undeveloped. If they are developed, single-family residences will be established. Therefore, both current and future land uses within SAWCo’s Basic Area is residential only.

4

2020 URBAN WATER MANAGEMENT PLAN

Water Use Characterization

SAWCo provides potable and non-potable water to customers within its service area.

SAWCo provides potable water to residents within the San Antonio Heights and on occasion, to the City of Upland. SAWCo provides non-potable water for irrigation to various local irrigators and other agencies, including the Cities of Upland and Ontario, Monte Vista Water District, and Cucamonga Valley Water District. Other large irrigation accounts include the Holiday Rock Company and Red Hill Golf Course and Homeowners Association.

SAWCo's bylaws outline the various water services provided, which include domestic, municipal, and miscellaneous uses, defined below (San Antonio Water Company):

Domestic: water treated by SAWCo and directly delivered to shareholders through SAWCo's distribution system.

Municipal: untreated water and delivered to shareholders who in turn treat the water for delivery of domestic, commercial, and other users through their delivery systems.

Miscellaneous: untreated water directly delivered to shareholders through SAWCo's distribution system for a variety of legal permissible uses, including farm irrigation, golf course watering, and rock company operations.

IN THIS SECTION

- Non-Potable vs. Potable Water Use
- Water Use by Sector

4.1 Non-Potable Versus Potable Water Use

As mentioned, SAWCo serves both potable and non-potable water. Potable water is provided to residents within the San Antonio Heights and to the City of Upland. Non-potable water used for irrigation is also provided to several local irrigators and other nearby agencies, as mentioned above. Based on data for 2016 through 2020, SAWCo's average non-potable deliveries account for 84% of the total water provided by SAWCo.

4.2 Past, Current, and Projected Water Use by Sector

SAWCo has provided potable and non-potable water to its customers and will continue to do so in the future. Past deliveries are shown in Figure 4-1.

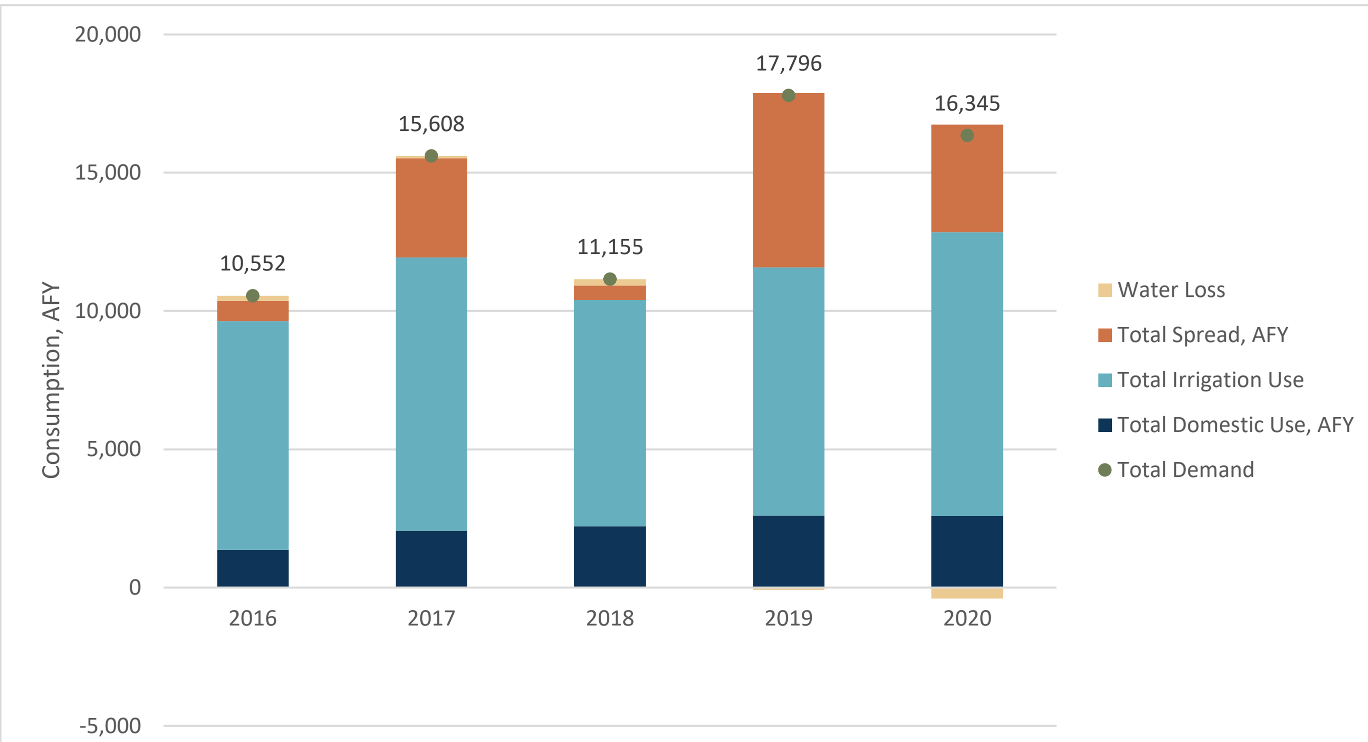


Figure 4-1. Water Demand for 2016-2020, AFY

4.2.1 Distribution System Water Losses

Over the last few years, SAWCo has focused on mitigating water losses. Based on historical data, it was clear that SAWCo experienced meter inaccuracies throughout the system. As shown above in Figure 4-1, SAWCo experienced negative water losses, meaning SAWCo sold more water than produced. As a result, the volume of 2020 actual water use shown in Table 4-1 differs from the total supply shown in Table 5-6.

Investigation helped SAWCo identify a substantial area of water losses, located at a flow meter at the Basin 6 settling ponds. In early 2021, SAWCo fixed this meter, and since then, water losses have remained consistent. Based on data for January through April 2021, water losses have been recorded as 0.9% within the domestic system and 1% within the irrigation system.

In addition, SAWCo has replaced customer meters with Automated Meter Reading (AMR) to improve data collection and response.

4.2.2 Current Water Use

In 2020, SAWCo provided 16,746 AF of water to its customers or spread into groundwater storage. The City of Upland's irrigation system consumed 50% of SAWCo's total water produced. The second largest water use was for spreading, accounting for 23% of the total water produced. Potable deliveries for SAWCo's domestic system within the San Antonio Heights accounted for 8%. A breakdown of water used in 2020 is provided in Figure 4-2.

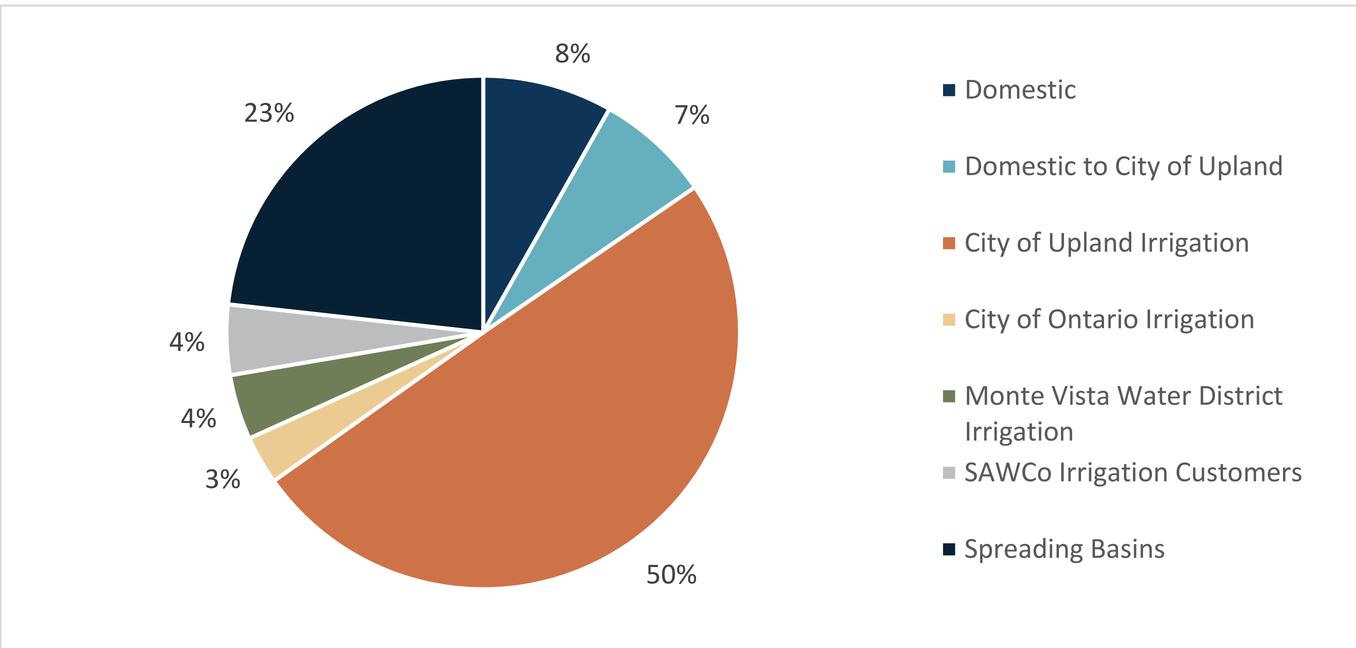


Figure 4-2. 2020 Water Use

Table 4-1. DWR 4-1W Actual Demands for Water, AFY

USE TYPE	ADDITIONAL DESCRIPTION	LEVEL OF TREATMENT WHEN DELIVERED	2020 VOLUME
Single Family	SAWCo Domestic Customers	Drinking Water	1,371
Sales/Transfers/Exchanges to Other Agencies	City of Upland	Drinking Water	1,213
Sales/Transfers/Exchanges to Other Agencies	City of Upland	Raw Water	8,332
Sales/Transfers/Exchanges to Other Agencies	Monte Vista Water District	Raw Water	687
Sales/Transfers/Exchanges to Other Agencies	City of Ontario	Raw Water	511
Landscape	Minor Irrigators	Raw Water	740
Groundwater Recharge	Spreading Basins	Raw Water	3,893
-		**TOTAL:**	**16,747**

4.2.3 Projected Water Use

SAWCo's system is very close to buildout and therefore, demands are expected to increase minimally. The majority of the San Antonio Heights area is already developed and any new development, should it occur, is expected along Holly Drive. These developments are anticipated to be single family residential and require potable service only.

Future demands were estimated as part of SAWCo's 2020 Master Plan, using a factor calculated from 2019 consumption and parcel acreage. This factor was applied to areas identified as possible development within the 2017 Water Master Plan and added to current demand to determine the total future demand for SAWCo's potable system. Areas for possible development are identified in Figure 4-3 below and corresponding demand for each parcel is summarized in Table 4-2.

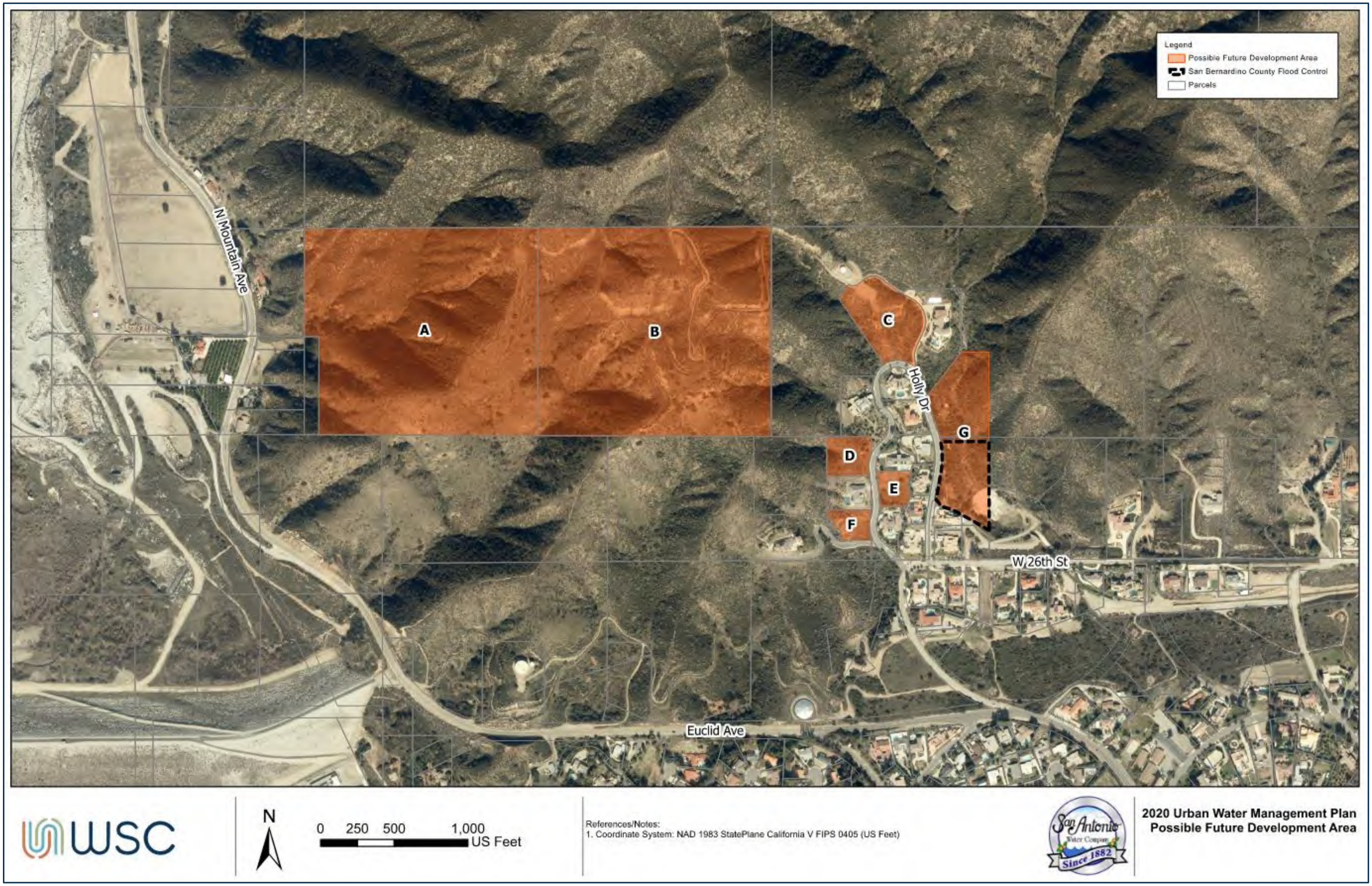


Figure 4-3. Areas Identified as Possible for Future Development

Table 4-2. Future Potable Demand from Future Development

AREA	ACRES	WATER DEMAND FACTOR (GPM/ACRE)	WATER DEMAND (GPM)	WATER DEMAND (AFY)
A[1]	33.8	1.036	17.53	10.9
B[1]	35.2	1.036	18.23	11.3
C	3.4	1.036	3.54	2.2
D	1.2	1.036	1.28	0.8
E	0.8	1.036	0.81	0.5
F	0.8	1.036	0.82	0.5
G[2]	5.9	1.036	6.09	3.8
			ADDITIONAL FUTURE DEMAND, AFY	**29.9**

Notes:

[1]If developed, parcel expected to be half developed. Half of total parcel acreage used to determine future demand.

[2]Half of area identified as future development is highly unlikely to be developed. Southern portion of Area G owned by San Bernardino County Flood Control. Dashed lines in Figure 4-3 delineate area owned by San Bernardino County Flood Control.

4.2.4 Characteristic Five-Year Water Use

As outlined in SAWCo's Bylaws, SAWCo provides water to its shareholders and expects its customers to maximize their shares. Therefore, SAWCo projects future water uses based on total shares and entitlement for each customer.

Table 4-3. DWR 4-2W Projected Demands for Water

	ADDITIONAL DESCRIPTION	PROJECTED WATER USE				
USE TYPE		2025	2030	2035	2040	2045
Single Family	SAWCo Domestic Customers	1,270	1,270	1,270	1,270	1,270
Sales/Transfers/Exchanges to Other Agencies	City of Upland	9,186	9,186	9,186	9,186	9,186
Sales/Transfers/Exchanges to Other Agencies	Monte Vista Water District	671	671	671	671	671
Sales/Transfers/Exchanges to Other Agencies	Cucamonga Valley Water District	8	8	8	8	8
Sales/Transfers/Exchanges to Other Agencies	City of Ontario	601	601	601	601	601
Industrial	Holiday Rock Company	269	269	269	269	269
Landscape	Red Hills Golf Course	444	444	444	444	444
Other	Red Hill HOA	20	20	20	20	20
Other	Minor Irrigators	102	102	102	102	102
Groundwater Recharge	Spreading Basins	2,000	2,000	2,000	2,000	2,000
-	**TOTAL:**	**14,571**	**14,571**	**14,571**	**14,571**	**14,571**

Table 4-4. DWR 4-3W Total Gross Water Use

	2020	2025	2030	2035	2040	2045
Potable and Raw Water From Table 4-1W and 4-2W	16,747	14,571	14,571	14,571	14,571	14,571
Recycled Water Demand* From Table 6-4W	-	-	-	-	-	-
Total Water Demand:	**16,747**	**14,571**	**14,571**	**14,571**	**14,571**	**14,571**

4.3 Climate Change Considerations

It is anticipated that SAWCo's shareholders will continue to use water based on their share's entitlement. Demands may decrease as the result of water supply shortage and drought messaging, as discussed in SAWCo's Water Shortage Contingency Plan.

5

2020 URBAN WATER MANAGEMENT PLAN

Water Supply Characterization

This section describes the existing and projected supplies for SAWCo. SAWCo currently receives all its water supply from local sources including the San Antonio Creek, groundwater from the San Antonio Tunnel, and three groundwater basins: Chino Basin, Cucamonga Basin, and Six Basins.

Surface water from San Antonio Creek are pre-1914 water rights, and annual water availability is influenced by rainfall. The San Antonio Tunnel is a deep rock tunnel 100 feet below ground surface that collects naturally percolated groundwater. The three groundwater basins are each adjudicated, and SAWCo's water rights are defined by the various legal Judgements in place to protect and manage each basin. SAWCo also participates in groundwater recharge operations that enhance groundwater supply.

SAWCo provides water from the San Antonio Tunnel (Tunnel), the Chino Basin, and the Cucamonga Basin to its domestic customers. During times of large flows from the Tunnel, potable water overflows into the irrigation system through the Forebay Pump Station. This provides SAWCo with the opportunity to avoid large water losses within the domestic system and decrease groundwater extraction for the irrigation system.

IN THIS SECTION

5.1 Water Supply Analysis Overview

SAWCo currently relies on local supply sources to meet its shareholder needs. Supplies include local surface water from the San Antonio Creek and groundwater from several basins. SAWCo expects to continue using these local sources throughout the future.

Surface Water: SAWCo may obtain up to 13,864 AFY of surface water from the San Antonio Creek. However, the actual volume received depends on minimum stream flowrates and can vary significantly based on rainfall. Water from the San Antonio Creek is used to meet irrigation demands and also conveyed to the City of Upland's water treatment plant for treatment and subsequent distribution by the City of Upland.

Tunnel Water: SAWCo may obtain all the volume of water in the San Antonio Tunnel (Tunnel). The Tunnel is supplied by naturally percolated groundwater, which can vary year to year based on rainfall and snowpack. SAWCo may also divert water from the San Antonio Creek spreading grounds north of the San Antonio Tunnel, where it is percolates into the tunnel and is conveyed to SAWCo's Forebay Tank and can be used in either the domestic or irrigation system.

Groundwater: SAWCo has groundwater rights in the Chino, Cucamonga, and Six Basins, as summarized in Table 5-1 below.

Table 5-1. SAWCo's Groundwater Rights

GROUNDWATER BASIN	SAWCO RIGHTS, AFY	NOTES
Chino Basin	1,234	
Cucamonga Basin	4,500 – 8,500	SAWCo may obtain up to 6,500 AFY of groundwater from the Cucamonga Basin, provided 2,000 AF is spread each year. If SAWCo spreads less than 2,000 AFY, SAWCo may only extract 4,500 AFY. If SAWCo spreads an excess of 2,000 AFY, SAWCo may extract up to 95% of the total spreading surplus amount, but not more than 8,500 AFY.
Six Basins	932	

5.2 UWMP Water Supply Characterization

Details on SAWCo's various supply sources are described in this section.

5.2.1 Purchased or Imported Water

SAWCo does not currently purchase or import water.

5.2.2 Groundwater

SAWCo obtains groundwater from the Chino, Cucamonga, and Six Basins groundwater basins. Groundwater extracted from the Chino Basin is used for potable demands only. Groundwater from the Cucamonga Basin and Six Basins is used within SAWCo's irrigation system. Figure 5-1 shows the various groundwater basins SAWCo utilizes and their boundaries.

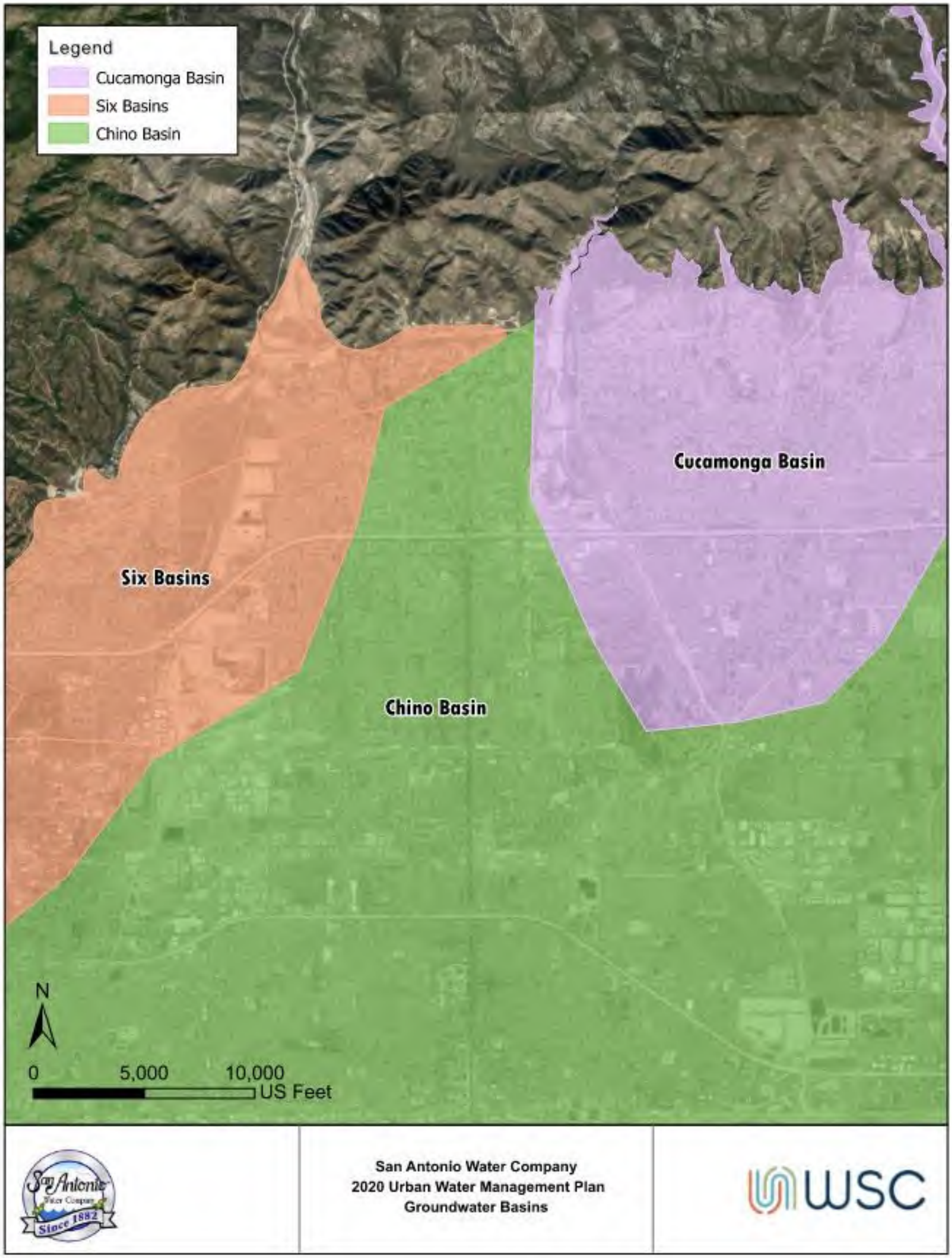


Figure 5-1. Groundwater Basins

5.2.2.1 Chino Basin

The Chino Basin is a subbasin to the Upper Santa Ana Valley Groundwater Basin and is designated by DWR as Basin 8-002.01. The Chino Basin underlies southeast Los Angeles County, northwest Riverside County, and southwest San Bernardino County. It is bound to the northwest by the San Jose fault, to the north by the Cucamonga fault and impermeable rocks that make up the San Gabriel Mountains. To the east, the Chino Basin is bounded by the Rialto-Colton fault, to the southeast by the Jurupa, Pedley, La Sierra Hills as well as the Santa Ana River. It is bounded to the southwest by the Chino and Puente Hills (California Department of Water Resources, 2016). The Chino Basin is considered a very-low-priority basin under the Sustainable Groundwater Management Act (SGMA).

The Chino Basin is governed by the Chino Basin Watermaster. The Chino Basin Watermaster serves to enforce the provisions of the 1978 Judgment in Chino Basin Municipal Water District vs. City of Chino et al (Judgment) and any other orders from the Court, as well as develops an Optimum Basin Management Program. Under the 1978 Judgment, the Chino Basin's safe yield was established as 140,000 AFY. The safe yield is defined in the Chino Basin Judgment as "the long-term average annual quantity of groundwater (excluding replenishment of stored water but including return flow to the Basin from use of replenishment or stored water) which can be produced from the Chino Basin under conditions of a particular year without causing an undesirable result" (Chino Basin Municipal Water District v. City of Chino, et al., 1978). The 1978 Chino Basin Judgment's allocation of the safe yield of the Chino Basin includes three separate Pools: The Overlying Agricultural Pool, Overlying Non-Agricultural Pool, and the Appropriative Pool. SAWCo is a member of the Appropriative Pool and has an appropriative right of 2.748 percent of the total appropriative rights in the Chino Basin. Under the 1978 Judgment, SAWCo was entitled to 1,506.888 AF. A copy of the 1978 Judgement is provided in Appendix D.

In 2020, the Safe Yield was recalculated to better manage the Basin and ensure sustainability. As established in the 2000 Optimum Basin Management Program (OBMP), the safe yield of the Chino Basin must be recalculated every 10 years, commencing in 2011. The Watermaster evaluated the safe yield recalculation using a groundwater flow model to redetermine the net recharge into the Chino Basin and identify any factors that could create undesirable results. The resulting Safe Yield was estimated at 135,000 AF (Chino Basin Watermaster, 2020). As a result, starting on June 30, 2020, SAWCo is entitled to 1,232.038 AF.

The Chino Basin Watermaster has also developed an updated 2020 OBMP that outlines how the Chino Basin should be managed over the next 20 years. The 2020 OBMP, provided as Appendix E, also includes the storage management plan that encompasses the recalculated safe yield.

The Chino Basin Watermaster also reallocates the unused portion of the Chino Basin safe yield from to the Overlying Agricultural Pool to the Appropriative Pool members as a supplement to the Appropriative Pool share of OSY rights in any year. These transfers are permanent if agricultural land has been converted to non-agricultural use, or temporary if agricultural pool extractions are less than their share of the safe yield. As agricultural production declines within the Chino Basin, the reallocation of water to the Appropriative Pool is expected to increase. Appropriators, like SAWCo, who are party to the Chino Basin Judgment are authorized to continue to produce groundwater while exceeding their water rights. Such extractions result in assessments by the Chino Basin Watermaster to pay for water to replenish the basin, through imported surface water recharge. Water to replenish the Chino Basin is purchased from Metropolitan Water District of Southern California (Metropolitan) by Chino Basin Watermaster in coordination with the Inland Empire Utilities Agency (IEUA) or from Appropriation Pool participants (Civiltec Engineering Inc. for San Antonio Water Company, June 2016).

5.2.2.2 Cucamonga Basin

The Cucamonga Basin is a subbasin to the Upper Santa Ana Valley Groundwater Basin and is designated by DWR as Basin 8-002.02. The Cucamonga Basin is bounded to the north by the San Gabriel Mountains and bounded by the Red Hill fault to the west, east and south (California Department of Water Resources, 2016). The Cucamonga Basin is considered a very-low-priority basin under the Sustainable Groundwater Management Act (SGMA).

In 1958, the Cucamonga Judgement was established and outlined water rights for individual groundwater producers, how much can be exported to non-overlaying areas, and specific requirements for spreading (San Antonio Water Company vs Others, 1958). The Cucamonga Judgment stipulates production for all stakeholders of 22,721 AFY, with SAWCo's water production right of 6,500 AFY, provided SAWCo spreads 2,000 AFY of water from the San Antonio Canyon. If the annual spreading is less than 2,000 AFY, SAWCo's water rights may be reduced to a minimum amount of 4,500 AFY. However, if the spreading exceeds 2,000 AFY, SAWCo can credit 95% of the excess up to a maximum of 8,500 AFY production. From 2010-2019, SAWCo spread an average of 1,500 AFY; however, spreading between 2012 through 2018 were less than 2,000 AFY. As a result, SAWCo's 2020 production right from the Cucamonga Basin was limited to approximately 6,000 AF (4,500 AF plus the 10-year average spread). A copy of the Cucamonga Judgement is provided in Appendix F.

5.2.2.3 Six Basins

The Six Basins are a part of the Main San Gabriel Basin, designated by DWR as Basin 4-013 and as a very low priority basin. The Six Basins area consists of six interconnected groundwater basins: Canyon, Upper Claremont Heights, Lower Claremont Heights, Live Oak, Ganesha, and the Pomona Basins. The Six Basins area is bounded by the San Jose Hills to the south, the Chino Basin to the east, the San Gabriel Mountains to the to the north, and the Main San Gabriel Basin to the west.

The Six Basins are further broken down into the Four Basins and Two Basins. The Four Basins include the Canyon, Upper Claremont Heights, Lower Claremont Heights and Pomona Basins. The Two Basins refer to the Live Oak and Ganesha Basins. Water within the Two Basins is used solely by the City of La Verne (Jericho Systems, Inc. and Tom Dodson & Associates for Three Valley Municipal Water District, May 2021). SAWCo is entitled up to 7.166 percent of the OSY of the Four Basins. For 2020, SAWCo was entitled to 932.10 AFY with 2,643.30 AFY available from storage.

The Six Basins is managed by the Six Basins Watermaster. The Six Basins were adjudicated in 1998 through the stipulated judgement "Southern California Water Company vs. City of La Verne et al." known as the Six Basins Judgement, provided in Appendix G. The Six Basins Judgement specified a safe yield of 19,300 AFY and the Six Basins Watermaster establishes operating safe yields (OSY) annually. In additions, water users within the Six Basins may obtain "carryover rights" for unused production (Southern California Water Company vs. Others, 1998).

The Six Basins Watermaster is currently developing a Six Basins Strategic Plan (Strategic Plan). The Strategic Plan's Draft Program Environmental Impact Report (PEIR) is currently in a public review period. This Strategic Plan will become the conjunctive water management program utilized by the Six Basins Watermaster to implement water supply and conservation projects in coordination with others and to optimize conjunctive water management activities within the Six Basins (Jericho Systems, Inc. and Tom Dodson & Associates for Three Valley Municipal Water District, May 2021). Specifically, the Strategic Plan aims to:

- Enhance water supplies
- Enhance basin management
- Protect and enhance water quality
- Equitably finance the Strategic Plan implementation

5.2.2.4 Past Five Years

Groundwater extractions by basin over the past five years are provided in Table 5-2.

Table 5-2. DWR 6-1W Groundwater Volume Pumped

All or part of the groundwater described below is desalinated.

GROUNDWATER TYPE	LOCATION OR BASIN NAME	2016	2017	2018	2019	2020
Alluvial Basin	Chino Basin	897	393	487	477	738
Alluvial Basin	Cucamonga Basin	6,281	5,761	6,407	5,340	4,945
Alluvial Basin	Six Basins	757	884	969	1,180	1,252
-	**TOTAL:**	**7,935**	**7,038**	**7,863**	**6,997**	**6,935**

Table 5-3. DWR 6-1W Groundwater Volume Pumped: Potable

All or part of the groundwater described below is desalinated.

GROUNDWATER TYPE	LOCATION OR BASIN NAME	2016	2017	2018	2019	2020
Alluvial Basin	Chino Basin	897	393	487	477	738
Alluvial Basin	Cucamonga Basin	116	42	1	-	13
-	**TOTAL:**	**1,013**	**435**	**488**	**477**	**751**

Table 5-4. DWR 6-1W Groundwater Volume Pumped: Non-Potable

All or part of the groundwater described below is desalinated.

GROUNDWATER TYPE	LOCATION OR BASIN NAME	2016	2017	2018	2019	2020
Alluvial Basin	Cucamonga Basin	6,165	5,720	6,406	5,340	4,933
Alluvial Basin	Six Basins	757	884	969	1,180	1,252
-	**TOTAL:**	**6,922**	**6,604**	**7,375**	**6,520**	**6,185**

5.2.2.5 San Antonio Tunnel

SAWCo is entitled to all water supplied through the San Antonio Tunnel (Tunnel). The Tunnel is a deep rock tunnel located 100 feet below ground surface and is supported by redwood beams and solid rock. Groundwater naturally percolates into the Tunnel and can vary year to year based on rainfall and snowpack. SAWCo may also divert water from the San Antonio Creek spreading grounds north of the Tunnel, where it is percolates into the tunnel and used primarily as a potable supply. The Tunnel deliveries this supply at SAWCo's Forebay station. In times of high Tunnel flows and low domestic demand, Tunnel water overflows into the irrigation system to avoid water losses. The average supply from the Tunnel since 1999 is 2,443 AFY and ranged from only 727 AF in 2015 to 3,682 AF in 1996.

5.2.3 Surface Water

SAWCo has rights for up to 13,864 AFY of surface water from the San Antonio Creek. However, the actual volume received depends on minimum stream flowrates and can vary significantly based on rainfall. SAWCo's supply from the San Antonio Creek since 1999 ranged from a low of 1,181 AF in

2018 to a high of 9,072 AF in 2005. The average volume from San Antonio Creek during years with average rainfall years is 4,042 AFY.

5.2.4 Stormwater

SAWCo's water sources are limited to groundwater from the basins that underlie SAWCo's service area and local surface water runoff.

5.2.5 Wastewater and Recycled Water

SAWCo does not own or operate wastewater or recycled water facilities and therefore does not have any current nor planned recycled water use. SAWCo encourages the use of recycled water as a regional resource through its affiliation with the Inland Empire Utilities Agency (IEUA). In the event that a SAWCo customer were to acquire recycled water as a supply, the customer may choose to lease, sell, or inactivate their shares within SAWCo.

5.2.5.1 Wastewater Collection, Treatment, and Disposal

SAWCo's domestic customers utilize septic tanks to dispose of their wastewater.

5.2.6 Desalinated Water Opportunities

SAWCo does not currently nor plan to use desalinated water as a supply source.

5.2.7 Water Exchanges and Transfers

SAWCo maintains interconnections with the City of Upland. Two of these connections have been identified for emergency use. However, SAWCo has not provided or purchased any emergency sales through the emergency interconnections over the last five years. In addition, several water suppliers own shares in SAWCo; therefore, they are considered SAWCo customers or shareholders and are discussed in Chapter 4.

5.2.8 Future Water Projects

SAWCo is currently updating its Water Master Plan. As part of the Water Master Plan, future projects that may increase SAWCo's supply and reliability may be identified. The Water Master Plan is anticipated to be complete by the end of 2021.

SAWCo is currently constructing several projects to increase storage and capture all raw water released through the Frankish Tunnel. Both projects are anticipated to be complete in early 2021.

Table 5-5. DWR 6-7W Expected Future Water Supply Projects or Programs

The supplier will complete the table.

NAME OF FUTURE PROJECTS OR PROGRAMS	JOINT PROJECT WITH OTHER SUPPLIERS	AGENCY NAME	DESCRIPTION	PLANNED IMPLEMENTATION YEAR	PLANNED FOR USE IN YEAR TYPE	EXPECTED INCREASE IN WATER SUPPLY TO SUPPLIER, AF
Frankish Tunnel Outfall Improvements	No	N/A	Improve the Frankish Tunnel outfall to capture all water released through the Frankish Tunnel for storage into various groundwater basins for future use.	2021	All Year Types	
Holly Drive Reservoir Upgrades	No	N/A	Installation of two 100,000-gallon tanks for additional fire and operations water storage.	2022	All Year Types	0.55
Well 19	No	N/A	Construction of new well for domestic use.	2022-2023	All Year Types	2,400

5.2.9 Summary of Existing and Planned Sources of Water

SAWCo currently utilizes local surface water and groundwater sources to meet its customers' demands. SAWCo will continue to efficiently utilize existing sources to meet future needs. Future supply projections reflect 20-year average supply from the San Antonio Creek and San Antonio Tunnel, while groundwater sources reflect SAWCo's total water right by basin.

Table 5-6. DWR 6-8W Actual Water Supplies

		2020	
WATER SUPPLY	ADDITIONAL DETAIL ON WATER SUPPLY	ACTUAL VOLUME	WATER QUALITY
Groundwater (not desalinated)	Chino Basin	738	Drinking Water
Groundwater (not desalinated)	Cucamonga Basin	13	Drinking Water
Groundwater (not desalinated)	Cucamonga Basin	4,933	Other Non-Potable Water
Groundwater (not desalinated)	Six Basins	1,252	Other Non-Potable Water
Surface water (not desalinated)	San Antonio Creek	6,901	Other Non-Potable Water
Groundwater (not desalinated)	San Antonio Tunnel	1,833	Drinking Water
Groundwater (not desalinated)	San Antonio Tunnel	676	Other Non-Potable Water
-	**TOTAL:**	**16,346**	

Table 5-7. DWR 6-9W Projected Water Supplies

		PROJECTED WATER SUPPLY				
		2025	2030	2035	2040	2045
WATER SUPPLY	ADDITIONAL DETAIL ON WATER SUPPLY	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME
Surface water (not desalinated)	San Antonio Creek	4,416	4,416	4,416	4,416	4,416
Groundwater (not desalinated)	San Antonio Tunnel	2,178	2,178	2,178	2,178	2,178
Groundwater (not desalinated)	Chino Basin	1,234	1,234	1,234	1,234	1,234
Groundwater (not desalinated)	Cucamonga Basin	6,500	6,500	6,500	6,500	6,500
Groundwater (not desalinated)	Six Basins	932	932	932	932	932
-	**TOTAL:**	**15,260**	**15,260**	**15,260**	**15,260**	**15,260**

Supply from the San Antonio Creek and San Antonio Tunnel reflect 20-year average supply from 2000 through 2020. Supply from various groundwater basins reflect SAWCo's total water rights from each basin.

5.2.10 Special Conditions

As mentioned previously, SAWCo is currently developing a Water Master Plan. The master planning effort also includes a supply risk and resilience analysis that addresses both the domestic and irrigation systems. Existing supply sources were analyzed, the top risks to their supplies evaluated, and the impacts these risks would have on SAWCo's ability to continue to provide a reliable and high-quality water to its shareholders quantified.

5.2.10.1 Climate Change Effects

Climate change is expected to result in more extreme droughts, shifting rainfall patterns, more intense rainfall and flooding, and higher variability from surface water supplies. Climate change is occurring and the best mitigation SAWCo can take is to plan and prepare for climate change related impacts. The Cal-Adapt Climate Projections for the Desert Region of San Bernardino County, of which SAWCo overlies, estimates a 2- to 4-inch decline in annual average rainfall by 2050 due to climate change. However, all models predict shifting rainfall patterns with wetter winters and drier summers (2021 California Energy Commission, 2021).

5.3 Energy Intensity

SAWCo monitors funds spent on energy at its facilities. In 2020, SAWCo spent approximately $629,000 on energy. It was assumed that energy is billed at $0.23 per kilo-Watt hour (kWh). Therefore, it was estimated that SAWCo consumed 2.7 million kWh to provide service to its customers, yielding an energy intensity of 167.3 kWh/AF.

Table 5-8. DWR O-1B Recommended Energy Reporting - Total Utility Approach

URBAN WATER SUPPLIER:	San Antonio Water Company		
Water Delivery Product (If delivering more than one type of product use Table O-1C): Multiple Products (unable to use table O-1C)			
ENTER START DATE FOR REPORTING PERIOD 1/1/2020	**URBAN WATER SUPPLIER OPERATIONAL CONTROL**		
END DATE 12/30/2020			
	SUM OF ALL WATER MANAGEMENT PROCESSES	**NON-CONSEQUENTIAL HYDROPOWER**	
Water Volume Units Used: AF	**TOTAL UTILITY**	**HYDROPOWER**	**NET UTILITY**
Volume of Water Entering Process (AF)	16,345	0	16,345
Energy Consumed (kWh)	2,734,416	0	2,734,416
ENERGY INTENSITY (KWH/AF)	**167.3**	**0.0**	**167.3**
Data Quality (Estimate, Metered Data, Combination of Estimates and Metered Data): Estimate			
Data Quality Narrative: Energy usage assumed based on a factor of $0.23/kWH and applied to the total amount SAWCo paid in 2020.			

6

2020 URBAN WATER MANAGEMENT PLAN

Water Service Reliability and Drought Risk Assessment

This section considers SAWCo's water supply reliability during normal, single dry, and multiple dry water years over the planning horizon. A Drought Risk Assessment of the next five years is also included.

The supply reliability assessment discusses factors (i.e. climatic, environmental, water quality, and legal) that could potentially limit the expected quantity of water available to SAWCo through 2045. Multiple drought scenarios are considered and the quantitative impacts of the aforementioned factors on water supply and demand are discussed, as well as possible methods for addressing these issues. The management tools that SAWCo has implemented to maximize current resources is also discussed.

IN THIS SECTION

- Water Service Reliability Assessment
- Drought Risk Assessment

6.1 Water Service Reliability Assessment

6.1.1 Constraints on Water Sources

As described in the previous section, SAWCo relies on surface water from the San Antonio Creek, naturally percolated water through the San Antonio Tunnel, and groundwater from several local basins.

Climatic Factors

Water available from the San Antonio Creek and Tunnel are highly susceptible to climate change and increased drought periods. The San Antonio Creek relies on rainfall and the snowpack in the local mountains. In periods of dry weather, the San Antonio Creek may cease to flow, resulting in decreased supply to SAWCo's irrigation system. The Tunnel also relies on naturally percolated groundwater from rainfall.

Groundwater within the Chino, Cucamonga, and Six Basins may be impacted by climate change. As other sources are negatively impacted, basin users may need to extract additional groundwater to meet their needs. Since the Chino, Cucamonga, and Six Basins are adjudicated, SAWCo obtains water rights within these basins. Should severe conditions occur, SAWCo's allocation may be reduced to avoid over-extraction and harm to the basins. In the event that SAWCo's water allocations are reduced, SAWCo's shareholders may also receive a reduction in allocation.

Environmental Factors

Local groundwater basins may be impacted by water quality. Groundwater management agencies, like the Chino Basin Watermaster, has and continues to focus on sustainable basin management to ensure local sources remain and that stakeholders can fully utilize their water rights. The Chino Basin Watermaster continues to monitor contaminants that may impact supply and publishes water quality data in the State of the Basin report every two years.

Similarly, the Six Basins Watermaster publishes an annual report that addresses the status of the Six Basins, including details on groundwater levels and the operating safe yield determination.

Other Factors

In times of severe drought, total entitlement to SAWCo and its shareholders has been adjusted to mitigate supply shortages. Entitlement has been reduced equally among all shareholders, based on a percentage. Should future severe dry periods occur, it is possible that entitlement may need to be reduced to align with supply available and in coordination with other supply management agencies and users, like Watermasters and other groundwater basin users.

6.1.1 Year Type Characterization

As required, the water service reliability assessment and Drought Risk Assessment (DRA) analyze supply over several water years: normal, single dry, and multiple dry years.

DWR defines these years as:

- **Normal Year:** this condition represents the water supplies a supplier considers available during normal conditions. This could be a single year or averaged range of years that most closely represents the average water supply available.
- **Single Dry Year:** the single dry year is recommended to be the year that represents the lowest water supply available.

- **Five-Consecutive Year Drought:** the driest five-year historical sequence for the supplier, which may be the lowest average water supply available for five years in a row.

6.1.1.1 Sources for Water Data

SAWCo provides water service based on the number of shares a customer holds. To determine the amount of supply available, the 20-year average volume was determined, as shown in Figure 6-1. SAWCo will only produce what is required to meet shareholder's demands; therefore, it assumed that the total supply available will equal the Company-wide shareholder entitlement of 14,571 AFY.

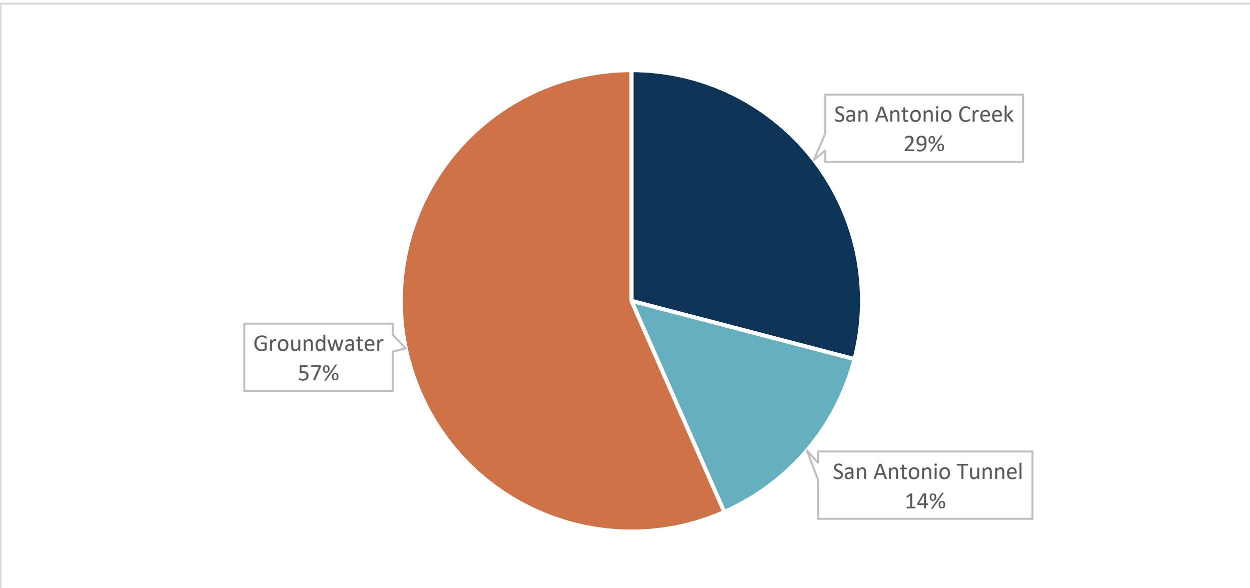


Figure 6-1. Average Supply

Table 6-1. DWR 7-1W Basis for Water Year Data

Quantification of available supplies is provided in this table as either volume only, percent only, or both.

-		AVAILABLE SUPPLY IF YEAR TYPE REPEATS	
YEAR TYPE	BASE YEAR	VOLUME AVAILABLE	PERCENT OF AVERAGE SUPPLY
Average Year		14,571	100%
Single-Dry Year		14,571	100%
Consecutive Dry Years 1st Year		14,571	100%
Consecutive Dry Years 2nd Year		14,571	100%
Consecutive Dry Years 3rd Year		14,571	100%
Consecutive Dry Years 4th Year		14,571	100%
Consecutive Dry Years 5th Year		14,571	100%

6.1.2 Water Service Reliability

Results of the water supply and demand analysis for normal, single dry, and five-year consecutive dry droughts are shown in the following tables. SAWCo expects to meet demands under all water year scenarios with existing supply sources.

Depending on rainfall and other local factors, the amount of water available from the San Antonio Creek and Tunnel may be reduced. The variability of water utilized from each source is illustrated in Figure 6-2. SAWCo plans to mitigate reductions from San Antonio Creek by increased groundwater pumping in drier years.

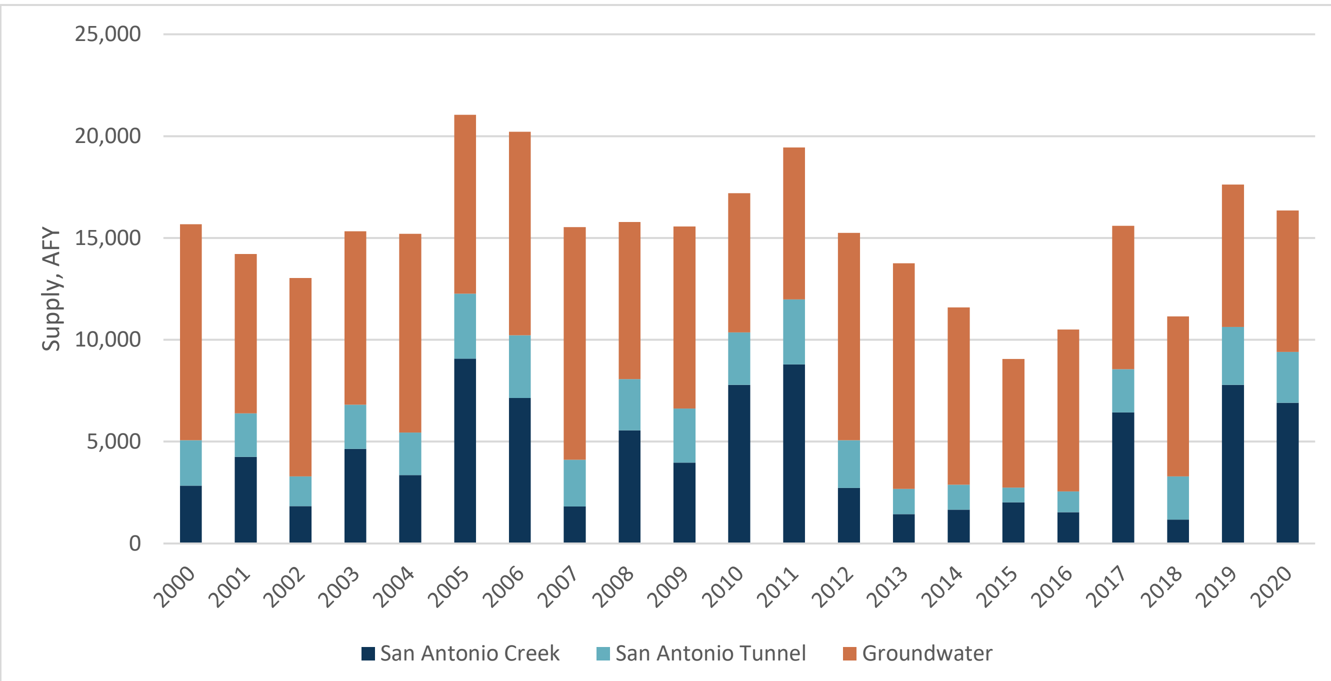


Figure 6-2. Historical Supply Variability

Table 6-2. DWR 7-2W Normal Year Supply and Demand Comparison

	2025	2030	2035	2040	2045
Supply Totals From Table 6-9W	15,260	15,260	15,260	15,260	15,260
Demand Totals From Table 4-3W	14,571	14,571	14,571	14,571	14,571
DIFFERENCE:	**689**	**689**	**689**	**689**	**689**

Supply totals reflect 20-year average supply from the San Antonio Creek and Tunnel, and total SAWCo allocation rights for groundwater.

Table 6-3. DWR 7-3W Single Dry Year Supply and Demand Comparison

	2025	2030	2035	2040	2045
Supply Totals	14,571	14,571	14,571	14,571	14,571
Demand Totals	14,571	14,571	14,571	14,571	14,571
DIFFERENCE:	**0**	**0**	**0**	**0**	**0**

Table 6-4. DWR 7-4W Multiple Dry Years Supply and Demand Comparison

		2025	2030	2035	2040	2045
First	Supply Totals	14,571	14,571	14,571	14,571	14,571
Year	Demand Totals	14,571	14,571	14,571	14,571	14,571
	DIFFERENCE:	**0**	**0**	**0**	**0**	**0**
Second	Supply Totals	14,571	14,571	14,571	14,571	14,571
Year	Demand Totals	14,571	14,571	14,571	14,571	14,571
	DIFFERENCE:	**0**	**0**	**0**	**0**	**0**
Third	Supply Totals	14,571	14,571	14,571	14,571	14,571
Year	Demand Totals	14,571	14,571	14,571	14,571	14,571
	DIFFERENCE:	**0**	**0**	**0**	**0**	**0**
Fourth	Supply Totals	14,571	14,571	14,571	14,571	14,571
Year	Demand Totals	14,571	14,571	14,571	14,571	14,571
	DIFFERENCE:	**0**	**0**	**0**	**0**	**0**
Fifth	Supply Totals	14,571	14,571	14,571	14,571	14,571
Year	Demand Totals	14,571	14,571	14,571	14,571	14,571
	DIFFERENCE:	**0**	**0**	**0**	**0**	**0**

6.1.3 Descriptions of Management Tools and Options

SAWCo relies on local sources to meet demands and intends to continue to utilize existing sources well into the future. SAWCo is proactive in ensuring these resources, such as the San Antonio Tunnel, is cared for and continues to evaluate its condition to ensure long-term reliability.

6.2 Drought Risk Assessment

The Drought Risk Assessment (DRA) is based on an analysis of historical drought data forecasted into the future under various drought conditions, with a focus on the five-year consecutive drought scenario. The DRA analyzes historical data to assess patterns and more reliably determine if there could be any water shortages in the next five years. If demands cannot be met by the expected supply available, shortage response actions from SAWCo's WSCP may be implemented. Details on SAWCo's WSCP are provided in Appendix H.

6.2.1 Data, Methods, and Basis for Water Shortage Condition

The data, methods, and basis for a water shortage condition were identified using typical normal year supply and total possible system demand (total entitlement based on all SAWCo shares). Since the total number of shares within SAWCo is fixed, the total demand is also fixed, and therefore constant over the next five years.

6.2.2 DRA Water Source Reliability

The DRA provides a snapshot of the anticipated surplus or deficit if a drought were to occur in the next five years. As described previously, SAWCo provides water based on total number of shares a stakeholder possesses. SAWCo will provide the water entitled to its shareholder, or only what is needed, to meet shareholder demands. SAWCo anticipates meeting all demands over the next five years.

Table 6-5. DWR 7-5 Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b)

2021	Gross Water Use	14,571
	Total Supplies	14,571
	Surplus/Shortfall without WSCP Action	0
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	
	WSCP (Use Reduction Savings Benefit)	
	Revised Surplus/Shortfall	0
	Resulting Percent Use Reduction from WSCP Action	0%
2022	Gross Water Use	14,571
	Total Supplies	14,571
	Surplus/Shortfall without WSCP Action	0
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	
	WSCP (Use Reduction Savings Benefit)	
	Revised Surplus/Shortfall	0
	Resulting Percent Use Reduction from WSCP Action	0%
2023	Gross Water Use	14,571
	Total Supplies	14,571
	Surplus/Shortfall without WSCP Action	0
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	
	WSCP (Use Reduction Savings Benefit)	
	Revised Surplus/Shortfall	0
	Resulting Percent Use Reduction from WSCP Action	0%
2024	Gross Water Use	14,571
	Total Supplies	14,571
	Surplus/Shortfall without WSCP Action	0
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	
	WSCP (Use Reduction Savings Benefit)	
	Revised Surplus/Shortfall	0
	Resulting Percent Use Reduction from WSCP Action	0%
2025	Gross Water Use	14,571
	Total Supplies	14,571
	Surplus/Shortfall without WSCP Action	0
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	
	WSCP (Use Reduction Savings Benefit)	
	Revised Surplus/Shortfall	0
	Resulting Percent Use Reduction from WSCP Action	0%

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2020 URBAN WATER MANAGEMENT PLAN

Water Shortage Contingency Plan Summary

The Water Shortage Contingency Plan (WSCP) is a strategic plan that SAWCo uses to prepare for and respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply available is not sufficient to meet the normally expected customer water use at a given time. A shortage may occur for many reasons, such as an extended drought, water pollution, power outage, or a catastrophic event.

The WSCP provides guidance to SAWCo's Board of Directors, staff, and the public by identifying anticipated water shortages and response actions to manage any water shortage with predictability and accountability in an efficient manner. This WSCP is intended to provide a working framework and options to guide SAWCo's response to water shortages.

IN THIS SECTION

7.1 WSCP Overview

The WSCP is composed of the following elements:

Water Supply Reliability Analysis

Summarizes SAWCo's water supply analysis and reliability and identifies any key issues that may trigger a shortage condition. Details on the water supply reliability analysis are provided in Chapter 7.

Annual Water Supply and Demand Assessment

Describes the key data inputs, evaluation criteria, and methodology for assessing the system's reliability for the coming year and the steps to formally declare a water shortage.

Shortage Stages

Establishes water shortage levels to clearly identify and respond to a water shortage emergency.

Shortage Response Actions

Describes the response actions that may be implemented or considered for each shortage stage to reduce gaps between available supply and demand.

Communication Protocols

Describes communication protocols SAWCo follows to ensure that its stakeholders are well-informed of shortage conditions and requirements.

Compliance and Enforcement

Defines compliance and enforcement actions available to implement the WSCP.

Legal Authority

Summarizes the legal documents that provide SAWCo with the authority to declare a water shortage emergency and implement and enforce response actions.

Financial Consequences of WSCP Implementation

Describes the anticipated financial impact of a water shortage and identifies mitigation strategies to offset financial burdens.

Monitoring and Reporting

Summarizes the monitoring and reporting techniques to evaluate the effectiveness of shortage response actions and overall WSCP implementation. Results will be used to determine whether additional shortage response actions should be implemented and if current actions are successful.

WSCP Refinement Procedures

Describes the factors that may trigger updates to the WSCP and outlines how to complete an update.

Special Water Features Distinctions

Defines considerations and definitions for water use for decorative features versus pools and spas. Decorative features include ornamental fountains, ponds, and other aesthetic features.

Plan Adoption, Submittal, and Availability

Describes the WSCP adoption process, submittal, and availability after revision.

The WSCP is a stand-alone document that can be modified as needed, and included as Appendix H.

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2020 URBAN WATER MANAGEMENT PLAN

Demand Management Measures

This section provides a comprehensive description of the water conservation programs that SAWCo has implemented for the past five years, is currently implementing, and plans to implement in the future.

8.1 Demand Management Measures for Wholesale Suppliers

8.1.1 Metering

In September 2020, SAWCo's Board approved a $740,000 project to replace all meters with new automated meters. The new meters will be Automated Meter Reading (AMR) cellular meters and will record water use daily. In addition, SAWCo is developing an online portal so that all shareholders can access their water consumption and receive alerts directly. All meters were replaced in early 2021. Previously, SAWCo staff visited meters once a month and manually read and logged meters.

IN THIS SECTION

- Demand Management Measures for Wholesalers
- Other Demand Management Measures
- Reporting Implementation

8.1.2 Public Education and Outreach

SAWCo provides updated information on its website, Facebook account, through quarterly newsletters, bill inserts, and other outreach materials. SAWCo may also participate in local events such as The Water Fair and Pancake Breakfast.

8.1.3 Water Conservation Program Coordination and Staffing

SAWCo does not have a dedicated water conservation coordinator, but employs administrative staff devoted to commit part time as SAWCo's water conservation representative.

8.1.4 Asset Management

SAWCo uses an "Asset Depreciation Schedule" that provides equipment service life for different types of water distributions facilities. A straight-line depreciation method is used to determine remaining service life estimates of existing equipment for the purposes of making replacement recommendations. SAWCo is currently developing an updated Water Master Plan that will identify replacement projects. SAWCo also maintains an annual maintenance budget to respond to needed repairs and perform routine preventive maintenance.

8.1.5 Wholesale Supplier Assistance Programs

SAWCo's wholesale agencies are provided toilets with installation for their customers. Agencies will provide name and contact information and contractor Bottomline Solutions will contact to set up appointment to remove old toilet and install new UHET toilets. Old toilets are also hauled away and disposed of.

8.2 Other Demand Management Measures - Rebates

SAWCo currently administers the following rebate programs through the Metropolitan Water District of Southern California. More information on each of these rebates can be found on SAWCo's website, https://www.sawaterco.com/rebates, or at https://socalwatersmart.com.

High-Efficiency Clothes Washers

Using high-efficiency washers can reduce water and energy usage in the home. The high-efficiency washers only use about 20-60% of water compared to traditional washers, which translate to energy savings as it uses as little as 20-50% of energy because there is less water to heat. SAWCo offers rebate starting at $85 for purchase of a high-efficiency washers. A listing of high-efficiency washers can be found at SoCal WaterSmart web site.

Weather-Based Irrigation Controllers

The Weather-Based Irrigation Controllers (WBICs) help reduce overwatering by applying water only when plants need it. It provides the appropriate watering schedule, adjusts for weather changes and irrigates based on the needs of the landscape and soil conditions. SAWCo offers rebates starting at $80 per controller for less than one acre of landscape and $35 per station for more than one acre of landscape.

Rotating Sprinkler Nozzles

Rotating sprinkler nozzles use less water than traditional sprinklers because it operates with lower precipitation rates, have greater uniform distribution and coverage. Rotating nozzles are a great water conservation tool as it applies water more slowly and uniformly than conventional sprays, especially when adjusted for specific site conditions. To help with wasteful water runoff, check out SoCal WaterSmart for recommended rotating nozzles. SAWCo offers $2 per nozzle rebates with a minimum quantity of 30 nozzles.

Turf Removal

SAWCo offers a turf removal rebate. Interested stakeholders can apply through SoCal Water$mart at https://socalwatersmart.com.

Rain Barrels and Cisterns

Rain barrels and cisterns can be installed to capture stormwater and runoff from rooftops and stored for later use. SAWCo offers a $35 rebate for the purchase of a rain barrel and a rebates for cisterns start at $250.

Single Family/Multi Family High Efficiency Toilet

SAWCo offers single family or multifamily premium high efficiency toilet rebates, starting at $40 for a 1.08 gallons per flush (GPF) toilet.

Soil Moisture Sensor Systems

Soil moisture sensor systems helps to save water by sensing the moister in the soil and regulate the irrigation system for watering in response to changes of the weather for large residential sites.

8.3 Reporting Implementation

SAWCo provided an update to its Board on April 20, 2021 summarizing the various conservation efforts implemented during 2020 and summarized below.

8.3.1 Local Assistance in meeting Best Management Practices

Table 8-1. Conservation Rebates

RESIDENTIAL REBATE PROGRAMS (FISCAL YEAR) THRU METROPOLITAN WATER DISTRICT	DEVICES/REBATES	EST. GALLONS SAVED/ DEVICE/YEAR	TOTAL EST. GALLONS SAVED PER YEAR
High Efficiency Clothes Washers	2	11,243	**22,486**
Rotating Nozzles	0		
Weather Based Irrigation Controllers	1	105,917	**105,917**
High Efficiency Toilets (premium)	1	13,851	13,851
Rain Barrels	0	619	
Turf Removal	0		
Landscape Audit	1	3,485	3,485
Total Savings for calendar year – thru 12/31/2020	5		**145,739**

8.3.2 SAWCo's efforts in meeting Best Management Practices as of 3/31/2021

Table 8-2. DMM Efforts

SAWCO PROGRAMS	TOTAL BUDGET	DEVICES/REBATES	ESTIMATED GALLONS SAVED PER DEVICE PER YEAR	TOTAL ESTIMATED GALLONS SAVED PER YEAR
Toilet Direct Installation for SAWCo Customers	$5,000 Cost to date: $1,035 4 toilets	4	15,600	62,400
SAWCo Wholesale Agencies Assistance-Toilet Direct Installation	$15,000 Cost to date: $3,860 14 toilets	14	15,600	218,400
TOTAL	**$20,000**	**18**		**280,800**

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2020 URBAN WATER MANAGEMENT PLAN

Plan Adoption, Submittal, and Implementation

This section describes steps taken to adopt and submit the and to make it publicly available.

IN THIS SECTION

- Public Hearing and Notices
- Public Hearing and Adoption
- Plan Submittal
- Public Availability

9.1 Notice of Public Hearing

Before the public hearing, SAWCo made a draft WSCP and draft UWMP available for public inspection at SAWCo's office and website. Pursuant to CWC Section 10642, general notice of the public hearing was provided through publication of the hearing date and time and posting of the hearing at SAWCo's office.

Table 9-1 provides a summary of the notifications that were issued as a part of SAWCo's development of the UWMP. SAWCo notified the public within its service area of the opportunity to provide input regarding the UWMP. A copy of the public outreach materials, including newspaper notices and invitation letters, are included in Appendix B.

Table 9-1. DWR 10-1W Notification to Cities and Counties

Supplier has not notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. Completion of the table is required.

CITY	60 DAY NOTICE	NOTICE OF PUBLIC HEARING	OTHER
City of Upland	Yes	Yes	
City of Ontario	Yes	Yes	
City of Pomona	Yes	Yes	
COUNTY	**60 DAY NOTICE**	**NOTICE OF PUBLIC HEARING**	**OTHER**
County of San Bernardino	Yes	Yes	
OTHER	**60 DAY NOTICE**	**NOTICE OF PUBLIC HEARING**	**OTHER**
Cucamonga Valley Water District	Yes	Yes	
Monte Vista Water District	Yes	Yes	
Chino Basin Watermaster	Yes	Yes	

9.2 Public Hearing and Adoption

Prior to adoption of the WSCP and 2020 UWMP, SAWCo held a public hearing regarding its WSCP and UWMP on September 21, 2021.

The WSCP and UWMP were publicly reviewed during the September 21, 2021 public hearing. This hearing provided the cities and counties and other members of the public a chance to review the staff report and attend the hearing to provide comment. The public hearing took place before the adoption allowing opportunity for the report to be modified in response to public input. Following the public hearing, the WSCP and UWMP were adopted by SAWCo on September 21, 2021.

A copy of the Resolution of Plan Adoption signed by the SAWCo Board is included as Appendix C of the UWMP. The UWMP includes all applicable information necessary to meet the requirements of CWC. The 2020 UWMP and WSCP were submitted to the DWR within 30 days of adoption.

9.3 Plan Submittal

A hard copy of the Final 2020 UWMP and WSCP were sent to the California State Library and electronical copies to DWR (electronically using the WUEdata reporting tool), and electronical copies to all cities and counties within SAWCo's service area within 30 days of adoption.

9.4 Public Availability

To fulfill the requirements of CWC Section 10642 of the UWMP Act, SAWCo made the 2020 UWMP and WSCP available online and at the main SAWCo office located at 139 N. Euclid Avenue, Upland, CA 91786-6036 between the hours of 8:00 am and 4:00 pm, Monday – Thursday, and on alternating Fridays between 8:00 am and 3 pm, for public review within 30 days of adoption.

9.5 Amending an Adopted UWMP or WSCP

Amendments to the SAWCo's 2020 UWMP and WSCP will be made on an as needed basis. Should SAWCo need to amend the adopted 2020 UWMP or WSCP in the future, SAWCo will hold a public hearing for review of the proposed amendments to the document and send a 60-day notification letter to all cities and counties within their service area and notify the public in same manner as set forth in this UWMP. Once the amended document is adopted, a copy of the finalized version will be distributed to the California State Library, DWR (electronically using the WUEdata reporting tool), and all cities and counties within SAWCo's service area within 30 days of adoption. The finalized version will also be made available to the public both online on SAWCo's website and in person at SAWCo's office during normal business hours.

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2020 URBAN WATER MANAGEMENT PLAN

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A

Appendix A. DWR Review Checklist

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Section 1 Introduction and Lay Description
Chapter 1	10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	1.2 UWMP Organization and Lay Description
Section 2.2	10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	1.1 The California Water Code
Section 2.6	10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	2.2 Coordination and Outreach
Section 2.6.2	10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	2.2.2 Coordination with Other Agencies and the Community, Table 2-4
Section 2.6, Section 6.1	10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	N/A
Section 2.6	10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	2.2.1 Wholesale and Retail Coordination, Table 2-3
Section 3.1	10631(a)	Describe the water supplier service area.	System Description	3.1 Service Area
Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	3.2 Service Area Climate
Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	3.3.1 Service Area Population
Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	3.3.2 Other Social, Economic, and Demographic Factors
Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	3.3.1 Service Area Population, Table 3-2
Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	3.4 Land Uses within Service Area
Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	4.2 Past, Current, and Projected Water Use by Sector
Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	4.2.1 Distribution System Water Losses
Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans and other policies or laws.	System Water Use	4.2.3 Projected Water Use
Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	4.2.3 Projected Water Use
Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	N/A
Section 4.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	N/A
Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	4.3 Climate Change Considerations
Chapter 5	10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	N/A
Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	N/A
Section 5.1	10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	N/A
Section 5.2	10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	N/A

Section 5.5	10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	N/A
Section 5.5 and Appendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	N/A
Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Section 5 Water Supply Characterization
Sections 6.1	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change.*	System Supplies	Section 5 Water Supply Characterization and Section 6 Water Service Reliability and Drought Risk Assessment
Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	5.2 UWMP Water Supply Characterization
Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	5.2.8 Future Water Projects and 5.2.9 Summary of Existing and Planned Sources of Water
Section 6.2.8	10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	5.2.9 Summary of Existing and Planned Sources of Water, Table 5-7
Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	5.2.2 Groundwater
Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	5.2.2 Groundwater, Appendix D, Appendix E
Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	5.2.2.1 Chino Basin, 5.2.2.2 Cucamonga Basin, 5.2.2.3 Six Basins
Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	5.2.2 Groundwater, Appendix D
Section 6.2.2.1	10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	5.2.2 Groundwater
Section 6.2.2.4	10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	5.2.2.4 Past Five Years
Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	5.2.9 Summary of Existing and Planned Sources of Water, Table 5-7
Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	5.2.7 Water Exchanges and Transfers
Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	5.2.5 Wastewater and Recycled Water
Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	5.2.5 Wastewater and Recycled Water
Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	5.2.5 Wastewater and Recycled Water
Section 6.2.5	10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	5.2.5 Wastewater and Recycled Water

Section 6.2.5	10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	5.2.5 Wastewater and Recycled Water
Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	5.2.5 Wastewater and Recycled Water
Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	5.2.6 Desalinated Water Opportunities
Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	5.2.5 Wastewater and Recycled Water
Section 6.2.8, Section 6.3.7	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	5.2.8 Future Water Projects
Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	5.3 Energy Intensity
Section 7.2	10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 6 Water Service Reliability and Drought Risk Assessment
Section 7.2.4	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	6.1.3 Descriptions of Management Tools and Options
Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	6.1.2 Water Service Reliability
Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	6.2 Drought Risk Assessment
Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	6.2.1 Data, Methods, and Basis for Water Shortage Condition
Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	6.2.2 DRA Water Source Reliability
Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	6.2.2 DRA Water Source Reliability, Table 6-5
Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 6 Water Service Reliability and Drought Risk Assessment
Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Appendix F Water Shortage Contingency Plan
Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Appendix F, 1.1 Water Supply Reliability Analysis
Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Appendix F, 1.9 Monitoring and Reporting
Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Appendix F, 1.2 Annual Water Supply and Demand Assessment
Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Appendix F, 1.2 Annual Water Supply and Demand Assessment
Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Appendix F, 1.3 Water Shortage Levels

Section 8.3	10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Appendix F, 1.3 Water Shortage Levels, Figure 1
Section 8.4	10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Appendix F, 1.4.2 Supply Augmentation
Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Appendix F, 1.4.1 Demand Reduction
Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Appendix F, 1.4.3 Operational Changes
Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Appendix F, 1.4.4 Additional Mandatory Restrictions
Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Appendix F, Table 3 and Table 4
Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Appendix F, 1.4.5 Seismic Risk Assessment, Mitigation Plan, and Emergency Response Plan
Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Appendix F, 1.5 Communication Protocols
Section 8.5 and 8.6	10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Appendix F, 1.5 Communication Protocols
Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Appendix F, 1.6 Compliance and Enforcement
Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Appendix F, 1.7 Legal Authorities
Section 8.7	10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Appendix F, 1.2 Annual Water Supply and Demand Assessment
Section 8.7	10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Appendix F, 1.2 Annual Water Supply and Demand Assessment
Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix F, 1.8 Financial Consequences of WSCP
Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix F, 1.8 Financial Consequences of WSCP
Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	N/A
Section 8.9	10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	N/A
Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Appendix F, 1.11 Special Water Feature Distinction
Sections 8.12 and 10.4	10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Appendix F, 1.12 Plan Adoption, Submittal, and Availability
Section 8.14	10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Appendix F, 1.12 Plan Adoption, Submittal, and Availability

Sections 9.1 and 9.3	10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	8.1 Demand Management Measures for Wholesale Suppliers
Sections 9.2 and 9.3	10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	N/A
Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	N/A
Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	9.1 Notice of Public Hearing, Table 9-1
Section 10.4	10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	9.3 Plan Submittal
Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	9.4 Public Availability
Section 10.2.2	10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	9.1 Notice of Public Hearing
Section 10.3.2	10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Appendix C, Adoption Resolutions
Section 10.4	10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	9.3 Plan Submittal
Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	9.4 Public Availability
Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	9.3 Plan Submittal
Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	9.4 Public Availability
Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	9.4 Public Availability
Section 10.6	10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	N/A
Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	9.5 Amending an Adopted UWMP or WSCP

B

Appendix B. Letters of Notification and Public Hearing Notices

San Antonio Water Company

Incorporated October 25, 1882
Serving the original Ontario Colony lands

April 28, 2021

Subject: San Antonio Water Company 2020 Urban Water Management Plan Update

Dear SAWCO Stakeholder,

The San Antonio Water Company is currently preparing an update to its Urban Water Management Plan (UWMP) in compliance with the California Urban Water Management Planning Act and the Water Conservation Act of 2009.

Pursuant to Water Code section 10620 SAWCO encourages your agency's coordination as we prepare our plan update. Additionally, pursuant to Water Code 10621 this letter shall serve as notice to cities and counties within our service area that we are preparing an update to our UWMP.

SAWCO anticipates holding an open comment period ending with a public hearing in June 2021.

If you would like to continue receiving notifications and/or participate in the update of our UWMP, please contact me by phone or email (blee@sawaterco.com).

Sincerely,

Brian C. Lee

Brian Lee, PE
General Manager

139 North Euclid Avenue ● Upland, California 91786 ● 909.982.4107 ● Fax 909.920.3047 ● Website: sawaterco.com

Legal Notice | Legal Notice | Legal Notice | Legal Notice

NOTICE INVITING BIDS

Project No. 801 0076

Heacock Street Pedestrian and Bicycle Enhancements / Gregory Lane to 680 Ft South

Bids shall be received electronically prior to **2:00 p.m., September 24, 2021** only in the City of Moreno Valley Bid Portal through PlanetBids. The link to register to become a prospective bidder and electronically bid on this project can be found at the following address:

http://www.planetbids.com/portal/portal.cfm?CompanyID=24660

The cost for downloading is $50.00. The bid results will be available on the above website immediately following the time of bid deadline.

The project consists of the roadway excavation and construction of missing curb, gutter, and sidewalk on the east side of Heacock Street from Gregory Lane to approximately 680 feet south. The project also includes the reconstruction of the curb return with a new ADA access ramp, the relocations of affected utility facilities, and new and reestablished traffic striping and signing within the project limits.

All work must be completed within Eighty (80) Working Days after the date of commencement specified in the Notice to Proceed to Fulfill Preconstruction Requirements.

All bidding documents shall be downloaded electronically on the City of Moreno Valley Bid Portal through PlanetBids at the address shown above.

For technical information relating to the details of this Project and bidding requirements, please submit all Requests for Information (RFI) via the "Questions and Answer" tab within the City of Moreno Valley Vendor Portal in PlanetBids. All RFI's shall be submitted no later than September 17, 2021, by 2:00 p.m. Any RFI received after the date and time specified herein will not be considered.

The bidder is solely responsible for on time submission of their electronic bid. The City will only consider bids that have been transmitted successfully and have been issued an ebid confirmation number with a time stamp from the Bid Management System indicating that the bid was submitted successfully. Transmission of bids by any other means will not be accepted. Bidder shall be solely responsible for informing itself with respect to the proper utilization of the bid management system, for ensuring the capability of their computer system to upload the required documents, and for the stability of their internet service. Failure of the bidder to successfully submit an electronic bid shall be at the bidder's sole risk and no relief will be given for late and/or improperly submitted bids. Bidders experiencing any technical difficulties with the bid submission process may contact PlanetBids at (818) 992-1771. Neither the City, nor PlanetBids, makes any guarantee as to the timely availability of assistance, or assurance that any given problem will be resolved by the bid submission deadline.

Dated: September 1, 2021 — Press-Enterprise: 9/07

CITY OF POMONA PLANNING DIVISION

NOTICE OF PUBLIC HEARING

PROPOSED PROJECT

The proposed project consist of two requests. The first request is for a Major Certificate of Appropriateness (MAJCOA 16333-2021) to demolish a Colonial Revival single family structure built in 1905. The second request is a Major Certificate of Appropriateness (MAJCOA 16336-2021) to demolish an English Tudor Revival single family structure built in 1924. These properties are located adjacent to one another and have been submitted by the same applicant. There will be two separate hearings and actions on these projects.

Applicant	Jennifer Tadeo
Location	1682 & 1694 N. Park Avenue (APNs: 8359-015-004, 8359-015-002)
Hearing Body	Historic Preservation Commission
Case Files	MAJCOA 16333-2021 & MAJCOA 16336-2021

Environmental Determination

The City of Pomona, as lead agency, has conducted an environmental review on the proposed project per the California Environmental Quality Act (CEQA). Pursuant to the provisions of CEQA (Public Resources Code, Section 21084 et. seq.), the guidelines include a list of classes of projects which have been determined not to have a significant effect on the environment and which shall, therefore, be exempt from the provisions of CEQA. The Planning Commission will consider adopting a Categorical Exemption in compliance with Article 19, Section 15301, (Class 1 — Existing Facilities). The proposed project described above hereby meets the guidelines for a Categorical Exemption. Therefore, no further environmental review is required.

PUBLIC HEARING INFORMATION

Time & Date:	Historic Preservation Commission Meeting, Wednesday, October 6, 2021, 6:30 p.m.
Location:	Available via Zoom Video Conferencing
Questions:	Geoffrey Starns, Historic Preservation Supervisor, (909) 620-2445, geoffrey_starns@ci.pomona.ca.us

On March 16, 2020, the City Council declared a local emergency in response to the global COVID-19 outbreak. Preserving the health and safety of our employees and the public is our top priority.

In accordance with California Governor's Executive Order N-25-20 regarding the Brown Act and guidance from the California Department of Public Health on gatherings, please note the following:

The Historic Preservation Commission meeting will occur via video conference only. **There will be no in-person public meeting location.**

To participate by video conference: Visit https://zoom.us/join (Webinar ID 839 4937 0458; Passcode 775848). Public comment may be made using the "Raise Hand" button for audio comments (limited to three minutes per speaker), or the "Q/A" button for written comments (limited to 375 words).

To participate by telephone: Dial (669) 900-9128 (Webinar ID 839 4937 0458 followed by #. For Participant ID, press #. Enter Passcode 775848 followed by #). You can indicate you would like to make a public comment by dialing *9.

Written Comments: May be submitted to DevServicesComments@ci.pomona.ca.us, by 5:30 p.m. the day of the hearing. Comments must be limited to 200 words. Please title your email "HPC Public Comment 10-6-2021". Comments received via email will be read into the record by staff.

Additional information regarding this Planning Commission meeting is available at:
https://www.ci.pomona.ca.us/index.php/government/city-departments/community-development/planning

The staff report on this matter will be available on or about October 1, 2021 on the City of Pomona website, which may be accessed at https://pomona.legistar.com/Calendar.aspx or by emailing the case planner, Lynda Lara.

PLEASE NOTE: If you challenge this matter in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the City of Pomona, Planning Division at, or prior to, the public hearing.

Published: September 7, 2021 Inland Valley Daily Bulletin
Ad#11485511

Legal Notice | Legal Notice | Legal Notice | Legal Notice

PUBLIC NOTICE OF INTRODUCTION OF ORDINANCE

VALLEY-WIDE RECREATION AND PARK DISTRICT

ORDINANCE NO. 2021-6_

NOTICE IS HEREBY GIVEN that on August 23, 2021, the Board of Directors of the Valley-Wide Recreation and Park District introduced Ordinance No. 2021-6, entitled:

AN ORDINANCE OF THE BOARD OF DIRECTORS OF VALLEY-WIDE RECREATION AND PARK DISTRICT, AUTHORIZING THE LEVY OF SPECIAL TAXES IN A COMMUNITY FACILITIES DISTRICT

If adopted, this ordinance will authorize the levy of a special tax within the French Valley Community Facilities District Zone 22 (Tierra Del Sol) (the "District"), at the rate and in accordance with the rate and method of apportionment of special tax set forth in the Resolution of Formation approved by the Board of Directors on August 23, 2021, by Resolution No. 1213-21. The special tax levy would commence in fiscal year 2022/23 and each fiscal year thereafter to pay for the costs of services and administering the District. The special tax shall be collected in the same manner as ordinary ad valorem taxes are collected and shall have the same lien priority, and be subject to the same penalties and the same procedure and sale in cases of delinquency as provided for ad valorem taxes. This ordinance will be considered for adoption at the Regular Meeting of the Board of Directors on Monday, September 20, 2021, at 5:30 p.m.

A certified copy of the full text of Ordinance No. 2021-6 is available for review in the Office of the Clerk of the Board, 901 W Esplanade, San Jacinto, California 92581.

Valerie Florez, Clerk of the Board
Valley-Wide Recreation and Park District

Press-Enterprise: 9/07

CITY OF TEMECULA BOARDS AND COMMISSIONS

POSITIONS AVAILABLE

The City of Temecula invites interested residents to apply for the following positions:

Old Town Local Review Board – 3 Positions
Community Services Commission – 2 Positions
Public/Traffic Safety Commission – 1 Position
Race, Equity, Diversity and Inclusion Commission – 2 Positions

The City Council will make appointments to these positions at a public meeting in November 2021. The term of each position will be January 1, 2022 through December 31, 2024.

The recruitment period for these positions is September 1, 2021 – October 31, 2021. Applicants may apply online through the City's website at TemeculaCA.gov. Supporting documents, if any, must be submitted together with the application. Qualified applicants must be a resident of the City of Temecula at the time the application is submitted.

Please contact the City Clerk's office at (951) 694-6444 for additional information.

Press-Enterprise: 9/07

Public Hearing Notice

**Urban Water Management Plan
And
Water Shortage Contingency Plan - 2020 Update**

The California Urban Water Management Planning Act requires the San Antonio Water Company (SAWCO) to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years.

The Company will hold a public hearing on September 21, 2021, at 5:00 p.m. to receive public comments and consider adoption of the 2020 UWMP and associated WSCP. The Public Hearing will be held at the City of Upland City Hall (460 N. Euclid Avenue Upland, CA 91786).

We invite your participation in the process. The draft UWMP and associated WSCP are available for public review on the Company's website (**www.sawaterco.com**). The meeting's agenda will also be posted to our website at least three days prior to the meeting.

If you have any questions about the 2020 UWMP or WSCP or the process for updating these documents, please contact Brian Lee at **blee@sawaterco.com** or at 909.982.4107.

Published: September 7 & 14, 2021 Inland Valley Daily Bulletin
Ad#11485973

CITY OF RANCHO CUCAMONGA - NOTICE INVITING SEALED BIDS

Notice is hereby given that the City of Rancho Cucamonga ("City") will receive sealed bids for the materials, supplies, equipment and - or services set forth herein, subject to all conditions outlined in the Bid Package, Plans and Specifications. 1. PROJECT NAME – **FY21-22 Local Overlay Pavement Rehabilitations** . The scope of work consists of, but not limited to, full width and variable pavement edge cold plane; weed killing and crack sealing; pavement overlay; grind and patch; subgrade preparation; installing and compacting aggregate base; adjusting existing manholes, water meter, and valves to new grade; constructing PCC curb and gutter, sidewalk, retaining curb, spandrel, and access curb ramps; and traffic striping, pavement markings and markers; and related items of work per plans. Engineer's Estimate is $2,090,000. A total of forty-five (45) working days to complete the project. 2. OBTAINING BID DOCUMENTS: In an effort to go green and paperless, digital copies of the plans, specifications, and bid proposal, including any future addenda or revisions to the bid documents, are available by going to www.ciplist.com and signing up, by going to Member Login or Member Signup (its free), then choose California, then scroll down to San Bernardino County and click on Browse Cities, then scroll down to Rancho Cucamonga and click on City Projects, then click on the Project of interest under the Title and follow directions for download. Note, copies of the plans, specifications, bid proposal, addendums and revisions will not be provided, digital copies must be downloaded from the above website then printed. Prospective bidders must register for an account on www.ciplist.com to be included on the prospective bidder's list(s) and to receive email updates of any addenda or revisions to the bid documents. Be advised that the information contained on this site may change over time and without notice to prospective bidders or registered users. While effort is made to keep information current and accurate and to notify registered prospective bidders of any changes to the bid documents, it is the responsibility of each prospective bidder to register with www.ciplist.com and to check this website on a daily basis through the close of bids for any applicable addenda or updates. No proposal will be considered from a Contractor to whom a proposal form has not been issued by the City of Rancho Cucamonga to registered prospective bidders from www.ciplist.com. 3. SEALED BIDS: will be received at all times during normal business hours prior to the Bid Opening, at the Office of the City Clerk, City Hall, 10500 Civic Center Drive, Rancho Cucamonga, CA 91730-3801. The outside of the Sealed Bid shall be clearly marked with the Project Name. It is the responsibility of the Bidder - Contractor to confirm receipt of the Bid Package in the City Clerk's Office prior to the date and time of the BID OPENING at 2:00 p.m. on Tuesday, September 21, 2021. 4. CONTRACTOR LICENSE: In accordance with provisions of Section 3300 of the California Public Contract Code, the City has determined that Contractor shall possess any and all contractors licenses, in form and class as required by any and all applicable laws with respect to any and all of the work to be performed under this contract including, a "Class-A" (General Engineering Contractor) or Class "C-12" License (Earthwork and Paving Contractor) in accordance with the provisions of the Contractor's License Law (California Business and Professions Code, Section 7000 et. seq.). 5. PREVAILING WAGES: In accordance with the provisions of Section 1770, et seq., of the Labor Code, the Director of the Industrial Relations of the State of California has determined the general prevailing rate of wages applicable to the work to be done. The Contractor will be required to pay to all persons employed on the project by the Contractor sums not less than the sums set forth in the documents entitled "General Prevailing Wage Determination made by the Director of Industrial Relations pursuant to California Labor Code, Part 7, Chapter 1, Article 2, Sections 1770, 1773, 1773.1. "These documents can be reviewed in the Engineering Department or may be obtained from the State (go to: www.dir.ca.gov, "Statistics and Research"). 6. BID SECURITY: Each bid shall be accompanied by bid security in the form and amount specified in Public Contract Code Sections 20170 and 20171. See Bid Package for details. 7. PAYMENT BOND AND COMPLETION BOND: A Payment Bond and a Completion Bond, each in the amount of 100% of the contract amount, will be required of the Contractor. 8. CONTACT - Questions regarding this Notice Inviting Sealed Bids shall be submitted five (5) calendar days prior to bid opening and shall be directed to Project Manager: Romeo M. David, Associate Engineer (909) 774-4070. The City of Rancho Cucamonga reserves the right to reject any bid or all bids and to waive any informality or irregularity in any bid. Any contract awarded will be let to the lowest responsive and responsible bidder. Attest: Janice C. Reynolds, City Clerk, City of Rancho Cucamonga; Publish: Thursday(s) September 9, 2021 and September 14, 2021.

Inland Valley Daily Bulletin **AD#11486616**

City of Wildomar
REQUEST FOR CONSTRUCTION BIDS

NOTICE IS HEREBY GIVEN that sealed bids will be received at the office of the City Clerk, located at 23873 Clinton Keith Road, Suite 201, Wildomar, California, 92595 until **3:00 pm** local time on **Wednesday, September 29, 2021**, for furnishing all labor, material, tax, transportation, equipment, and services necessary for the:

HOUSE DEMOLITION FOR THE BUNDY CANYON ROAD IMPROVEMENT PROJECT, SEGMENT 2
CIP 026-2A

Bids received after **3:00 pm** local time on **Wednesday, September 29, 2021**, shall be returned unopened. Bids will be opened and tabulated immediately after the time bids are due in the City Council Chambers located at 23873 Clinton Keith Rd., Suite 106, Wildomar, California, 92595. The bid opening will also be broadcasted live via the Zoom Meeting platform and recorded in its entirety. The public can observe the bid opening via the following weblink: **https://us02web.zoom.us/j/89825711110**, or by dialing over the phone to 1-669 900 6833 and entering in the Meeting ID: **898 2571 1110**. Bidders, their representatives and other interested parties are invited to watch the bid opening in-person or via Zoom, or call-in to the bid opening via Zoom.

Description of Work

Remove and dispose of existing structures (including lead and asbestos abatement), surface improvements, and certain vegetation; abandon utilities including septic systems and wells; install chain link fencing and gates at designated locations shown on the plans at 23302 Bundy Canyon Rd., 23400 Bundy Canyon Rd., and 23456 Bundy Canyon Rd., Wildomar, CA 92595; and all items not mentioned but indicated in the Plans, Specifications, and the Technical Specifications within the Contract Documents.

The proposed work shall be performed in accordance with the Project Description, Scope of Work, and other specifications listed in the Request for Proposal.

Obtaining Documents
Project documents may be downloaded from the City of Wildomar Website at
http://www.cityofwildomar.org/business/bid_opportunities/rfps_rfqs or purchased from the City for $50.00.

Construction License
The successful bidder must possess a current Class C-21 Contractor's License issued by the State of CA.

For more information, contact: **Jason Farag (951) 677-7751 x219**
Warren Repke (951) 677-7751
Press-Enterprise: 9/14/2021

Public Hearing Notice

Urban Water Management Plan
And
Water Shortage Contingency Plan - 2020 Update

The California Urban Water Management Planning Act requires the San Antonio Water Company (SAWCO) to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years.

The Company will hold a public hearing on September 21, 2021, at 5:00 p.m. to receive public comments and consider adoption of the 2020 UWMP and associated WSCP. The Public Hearing will be held at the City of Upland City Hall (460 N. Euclid Avenue Upland, CA 91786).

We invite your participation in the process. The draft UWMP and associated WSCP are available for public review on the Company's website (www.sawaterco.com).. The meeting's agenda will also be posted to our website at least three days prior to the meeting.

If you have any questions about the 2020 UWMP or WSCP or the process for updating these documents, please contact Brian Lee at blee@sawaterco.com or at 909.982..4107.

Published: September 7 & 14, 2021 **Inland Valley Daily Bulletin**
Ad#11485973

NOTICE OF PUBLIC SALE OF PERSONAL PROPERTY
Notice is hereby given that pursuant to Sections 21700-21716 of the Business and Professions Code, Extra Storage Riverside 2, 2680 E. La Cadena., Riverside ca 92505, County of Riverside, State of California, at the above address will sell, to satisfy lien of the owner, at Public Sale. Unit will be sold by competitive bidding at Public Auction with bids opening on or after September 15, 2021, At 12:00 AM. The personal goods stored therein by the following may include, but are not limited to general household items, furniture, boxes, clothes, and appliances.
NAME: Sahara L. Shepherd, Jordan Wazel, Patrick Obanion, Frank Martinez, DeJainee Armstrong, Estanislao Luvian
Purchases must be made with cash and paid at time of sale. All goods are sold as is and must be removed within 24 hours from the time of purchase. Extra Storage Riverside 2 reserves the right to retract bids. Sale is subject to adjournment and/or cancellation in the event of settlement between owner and obligated party.
Auction conducted by: West Coast Auctions, Bond # 0434194, 760-724-0423
To be published: Tuesday, September 7, 2021
Tuesday, September 14, 2021 Press-Enterprise

C

Appendix C. Adoption Resolutions

RESOLUTION No. 2021-09-01
A RESOLUTION OF THE BOARD OF DIRECTORS OF THE
SAN ANTONIO WATER COMPANY ADOPTING THE 2020 URBAN WATER
MANAGEMENT PLAN

WHEREAS, the California Legislature enacted Assembly bill 797 (Water Code Section 10610 et seq., known as the Urban Water Management Planning Act) during the 1983-1984 Regular Session, and as amended subsequently, which mandates that every supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare an Urban Water Management Plan, the primary objectives of which are to verify the adequacy and reliability of existing and planned sources of water supply and to plan for the conservation and efficient use of water; and

WHEREAS, the San Antonio Water Company (Water Company) supplies domestic and irrigation shareholders;

WHEREAS, the Water Company provides 10% of its supply to domestic shareholders in the San Antonio Heights; 7% to shareholders outside of San Antonio Heights for irrigation, agricultural and industrial purposes; and 80% to Municipal water districts at wholesale. Inactive shareholders represent approximately 3%;

WHEREAS, the 2020 Urban Water Management Plan (UWMP) identifies the Water Company as a wholesaler; and

WHEREAS, the Board recognizes that this document is a useful planning document that will be periodically reviewed at least once every five years in conjunction with the update of the Water Master Plan and shall make amendments or changes to its plan indicated by the review; and

WHEREAS, the plan must be adopted after public review and hearing, and filed with the California State Library and the California Department of Water Resources within thirty days of adoption; and

WHEREAS, the Water Company has therefore, prepared and circulated for public review a draft of the UWMP, and a properly noticed public hearing regarding said Plan was held by the Board of Directors of the Water Company on September 21, 2021.

WHEREAS, SAWCo did prepare and shall file said Plan with the California State Library and the California Department of Water Resources; and

NOW THEREFORE, BE IT RESOLVED by the Board of Directors of the San Antonio Water Company that the 2020 Urban Water management Plan is hereby adopted and the General Manager is hereby authorized and directed to file the 2020 Urban Water Management Plan with the California State Library and the California Department of Water Resources within 30 days of this date.

This Resolution was passed and adopted on the 21st day of September 2021.

Tom Thomas

Tom Thomas, President
San Antonio Water Company

Attest:

Martha Goss

Martha Goss, Secretary
San Antonio Water Company

RESOLUTION No. 2021-10-01
A RESOLUTION OF THE BOARD OF DIRECTORS OF THE
SAN ANTONIO WATER COMPANY ADOPTING THE 2020 WATER SHORTAGE
CONTINGENCY PLAN

WHEREAS, the California Legislature enacted Assembly bill 797 (Water Code Section 10610 et seq., known as the Urban Water Management Planning Act)during the 1983-1984 Regular Session, and as amended subsequently, which mandates that every supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare an Urban Water Management Plan including a Water Shortage Contingency Plan (WSCP); and

WHEREAS, the San Antonio Water Company (Water Company) supplies domestic and irrigation shareholders;

WHEREAS, the Water Company provides 10% of its supply to domestic shareholders in the San Antonio Heights; 7% to shareholders outside of San Antonio Heights for irrigation, agricultural and industrial purposes; and 80% to Municipal water districts at wholesale. Inactive shareholders represent approximately 3%;

WHEREAS, the Board recognizes that a Water Shortage Contingency Plan is a useful planning document that will be periodically reviewed at least once every five years in conjunction with the update of the Urban Water Management Plan and shall make amendments or changes to its plan indicated by the review; and

WHEREAS, the plan must be adopted after public review and hearing, and filed with the California State Library and the California Department of Water Resources within thirty days of adoption; and

WHEREAS, the Water Company has therefore, prepared and circulated for public review a draft of the Water Shortage Contingency Plan, and a properly noticed public hearing regarding said Plan was held by the Board of Directors of the Water Company on September 21, 2021.

WHEREAS, SAWCO did prepare and shall file said Plan with the California State Library and the California Department of Water Resources; and

NOW THEREFORE, BE IT RESOLVED by the Board of Directors of the San Antonio Water Company that the 2020 Water Shortage Contingency Plan is hereby adopted and the General Manager is hereby authorized and directed to file the 2020 Urban Water Management Plan, including the Water Shortage Contingency Plan with the California State Library and the California Department of Water Resources within 30 days of this date.

This Resolution was passed and adopted on the 19th day of October, 2021.

Tom Thomas

Tom Thomas, President
San Antonio Water Company

Attest:

Martha Goss

Martha Goss, Secretary
San Antonio Water Company

D

Appendix D. 1978 Chino Basin Judgment

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Attorneys for Plaintiff

Rec'd J. Stam Jan 27, 1978 tcl

FILED '78 JAN 30 AM 11 41

FILED - West District
San Bernardino County Clerk
OCT 12 1989

MICROFILMED

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

CHINO BASIN MUNICIPAL WATER DISTRICT, Plaintiff, v. CITY OF CHINO, et al. Defendants.	)	No. 164327 RCN 51010

JUDGMENT

JUDGMENT
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Attorneys for Plaintiff

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

CHINO BASIN MUNICIPAL WATER DISTRICT, Plaintiff, v. CITY OF CHINO, et al. Defendants.	No. 164327 JUDGMENT

I. INTRODUCTION

1. Pleadings, Parties and Jurisdiction. The complaint herein was filed on January 2, 1975, seeking an adjudication of water rights, injunctive relief and the imposition of a physical solution. A first amended complaint was filed on July 16, 1976. The defaults of certain defendants have been entered, and certain other defendants dismissed. Other than defendants who have been dismissed or whose defaults have been entered, all defendants have appeared herein. By answers and order of this Court, the issues have been made those of a full *inter se* adjudication between the

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parties. This Court has jurisdiction of the subject matter of this action and of the parties herein.

2. Stipulation For Judgment. Stipulation for entry of judgment has been filed by and on behalf of a majority of the parties, representing a majority of the quantitative rights herein adjudicated.

3. Trial; Findings and Conclusions. Trial was commenced on December 16, 1977, as to the non-stipulating parties, and findings of fact and conclusions of law have been entered disposing of the issues in the case.

4. Definitions. As used in this Judgment, the following terms shall have the meanings herein set forth:

(a) Active Parties. All parties other than those who have filed with Watermaster a written waiver of service of notices, pursuant to Paragraph 58.

(b) Annual or Year -- A fiscal year, July 1 through June 30, following, unless the context shall clearly indicate a contrary meaning.

(c) Appropriative Right -- The annual production right of a producer from the Chino Basin other than pursuant to an overlying right.

(d) Basin Water -- Ground water within Chino Basin which is part of the Safe Yield, Operating Safe Yield, or replenishment water in the Basin as a result of operations under the Physical Solution decreed herein. Said term does not include Stored Water.

(e) CBMWD -- Plaintiff Chino Basin Municipal Water District.

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(f) Chino Basin or Basin -- The ground water basin underlying the area shown as such on Exhibit "B" and within the boundaries described in Exhibit "K".

(g) Chino Basin Watershed -- The surface drainage area tributary to and overlying Chino Basin.

(h) Ground Water -- Water beneath the surface of the ground and within the zone of saturation, i.e., below the existing water table.

(i) Ground Water Basin -- An area underlain by one or more permeable formations capable of furnishing substantial water storage.

(j) Minimal Producer -- Any producer whose production does not exceed five acre-feet per year.

(k) MWD -- The Metropolitan Water District of Southern California.

(l) Operating Safe Yield -- The annual amount of ground water which Watermaster shall determine, pursuant to criteria specified in Exhibit "I", can be produced from Chino Basin by the Appropriative Pool parties free of replenishment obligation under the Physical Solution herein.

(m) Overdraft -- A condition wherein the total annual production from the Basin exceeds the Safe Yield thereof.

(n) Overlying Right -- The appurtenant right of an owner of lands overlying Chino Basin to produce water from the Basin for overlying beneficial use on such lands.

(o) Person. Any individual, partnership, association, corporation, governmental entity or agency, or other organization.

(p) PVMWD -- Defendant Pomona Valley Municipal Water District.

(q) Produce or Produced -- To pump or extract ground water from Chino Basin.

(r) Producer -- Any person who produces water from Chino Basin.

(s) Production -- Annual quantity, stated in acre feet, of water produced.

(t) Public Hearing -- A hearing after notice to all parties and to any other person legally entitled to notice.

(u) Reclaimed Water -- Water which, as a result of processing of waste water, is suitable for a controlled use.

(v) Replenishment Water -- Supplemental water used to recharge the Basin pursuant to the Physical Solution, either directly by percolating the water into the Basin or indirectly by delivering the water for use in lieu of production and use of safe yield or Operating Safe Yield.

(w) Responsible Party -- The owner, co-owner, lessee or other person designated by multiple parties interested in a well as the person responsible for purposes of filing reports hereunder.

(x) Safe Yield -- The long-term average annual quantity of ground water (excluding replenishment or stored water but including return flow to the Basin from use of replenishment or stored water) which can be produced from the Basin under cultural conditions of a particular year without causing an undesirable result.

(y) SBVMWD -- San Bernardino Valley Municipal Water

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District.

(z) State Water -- Supplemental Water imported through the State Water Resources Development System, pursuant to Chapter 8, Division 6, Part 6 of the Water Code.

(aa) Stored Water -- Supplemental water held in storage, as a result of direct spreading, in lieu delivery, or otherwise, for subsequent withdrawal and use pursuant to agreement with Watermaster.

(bb) Supplemental Water -- Includes both water imported to Chino Basin from outside Chino Basin Watershed, and reclaimed water.

(cc) WMWD -- Defendant Western Municipal Water District of Riverside County.

5. List of Exhibits. The following exhibits are attached to this Judgment and made a part hereof:

"A" -- "Location Map of Chino Basin" showing boundaries of Chino Basin Municipal Water District, and other geographic and political features.

"B" -- "Hydrologic Map of Chino Basin" showing hydrologic features of Chino Basin.

"C" -- Table Showing Parties in Overlying (Agricultural) Pool.

"D" -- Table Showing Parties in Overlying (Non-agricultural Pool and Their Rights.

"E" -- Table Showing Appropriators and Their Rights.

"F" -- Overlying (Agricultural) Pool Pooling Plan.

"G" -- Overlying (Non-agricultural) Pool Pooling Plan.

"H" -- Appropriative Pool Pooling Plan.

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"I" -- Engineering Appendix.

"J" -- Map of In Lieu Area No. 1.

"K" -- Legal Description of Chino Basin.

II. DECLARATION OF RIGHTS

A. HYDROLOGY

6. Safe Yield. The Safe Yield of Chino Basin is 140,000 acre feet per year.

7. Overdraft and Prescriptive Circumstances. In each year for a period in excess of five years prior to filing of the First Amended Complaint herein, the Safe Yield of the Basin has been exceeded by the annual production therefrom, and Chino Basin is and has been for more than five years in a continuous state of overdraft. The production constituting said overdraft has been open, notorious, continuous, adverse, hostile and under claim of right. The circumstances of said overdraft have given notice to all parties of the adverse nature of such aggregate over-production.

B. WATER RIGHTS IN SAFE YIELD

8. Overlying Rights. The parties listed in Exhibits "C" and "D" are the owners or in possession of lands which overlie Chino Basin. As such, said parties have exercised overlying water rights in Chino Basin. All overlying rights owned or exercised by parties listed in Exhibits "C" and "D" have, in the aggregate, been limited by prescription except to the extent such rights have been preserved by self-help by said parties. Aggregate preserved overlying rights in the Safe Yield for agricultural pool use, including the rights of the State of California, total 82,800 acre feet per year. Overlying rights for non-agricultural pool use

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total 7,366 acre feet per year and are individually decreed for each affected party in Exhibit "D". No portion of the Safe Yield of Chino Basin exists to satisfy unexercised overlying rights, and such rights have all been lost by prescription. However, uses may be made of Basin Water on overlying lands which have no preserved overlying rights pursuant to the Physical Solution herein. All overlying rights are appurtenant to the land and cannot be assigned or conveyed separate or apart therefrom.

9. Appropriative Rights. The parties listed in Exhibit "E" are the owners of appropriative rights, including rights by prescription, in the unadjusted amounts therein set forth, and by reason thereof are entitled under the Physical Solution to share in the remaining Safe Yield, after satisfaction of overlying rights and rights of the State of California, and in the Operating Safe Yield in Chino Basin, in the annual shares set forth in Exhibit "E".

(a) Loss of Priorities. By reason of the long continued overdraft in Chino Basin, and in light of the complexity of determining appropriative priorities and the need for conserving and making maximum beneficial use of the water resources of the State, each and all of the parties listed in Exhibit "E" are estopped and barred from asserting special priorities or preferences, *inter se*. All of said appropriative rights are accordingly deemed and considered of equal priority.

(b) Nature and Quantity. All rights listed in Exhibit "E" are appropriative and prescriptive in nature. By reason of the status of the parties, and the provisions of Section

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1007 of the Civil Code, said rights are immune from reduction or limitation by prescription.

10. Rights of the State of California. The State of California, by and through its Department of Corrections, Youth Authority and Department of Fish and Game, is a significant producer of ground water from and the State is the largest owner of land overlying Chino Basin. The precise nature and scope of the claims and rights of the State need not be, and are not, defined herein. The State, through said departments, has accepted the Physical Solution herein decreed, in the interests of implementing the mandate of Section 2 of Article X of the California Constitution. For all purposes of this Judgment, all future production by the State or its departments or agencies for overlying use on State-owned lands shall be considered as agricultural pool use.

C. RIGHTS TO AVAILABLE GROUND WATER STORAGE CAPACITY

11. Available Ground Water Storage Capacity. There exists in Chino Basin a substantial amount of available ground water storage capacity which is not utilized for storage or regulation of Basin Waters. Said reservoir capacity can appropriately be utilized for storage and conjunctive use of supplemental water with Basin Waters. It is essential that said reservoir capacity utilization for storage and conjunctive use of supplemental water be undertaken only under Watermaster control and regulation, in order to protect the integrity of both such Stored Water and Basin Water in storage and the Safe Yield of Chino Basin.

12. Utilization of Available Ground Water Capacity. Any person or public entity, whether a party to this action or not, may make reasonable beneficial use of the available ground water

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storage capacity of Chino Basin for storage of supplemental water; provided that no such use shall be made except pursuant to written agreement with Watermaster, as authorized by Paragraph 28. In the allocation of such storage capacity, the needs and requirements of lands overlying Chino Basin and the owners of rights in the Safe Yield or Operating Safe Yield of the Basin shall have priority and preference over storage for export.

III. INJUNCTION

13. Injunction Against Unauthorized Production of Basin Water. Each party in each of the respective pools is enjoined, as follows:

(a) Overlying (Agricultural) Pool. Each party in the Overlying (Agricultural) Pool, its officers, agents, employees, successors and assigns, is and they each are ENJOINED AND RESTRAINED from producing ground water from Chino Basin in any year hereafter in excess of such party's correlative share of the aggregate of 82,800 acre feet allocated to said Pool, except pursuant to the Physical Solution or a storage water agreement.

(b) Overlying (Non-Agricultural) Pool. Each party in the Overlying (Non-agricultural) Pool, its officers, agents, employees, successors and assigns, is and they each are ENJOINED AND RESTRAINED from producing ground water of Chino Basin in any year hereafter in excess of such party's decreed rights in the Safe Yield, except pursuant to the provisions of the Physical Solution or a storage water agreement.

(c) Appropriative Pool. Each party in the

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Appropriative Pool, its officers, agents, employees, successors and assigns, is and they are each ENJOINED AND RESTRAINED from producing ground water of Chino Basin in any year hereafter in excess of such party's decreed share of Operating Safe Yield, except pursuant to the provisions of the Physical Solution or a storage water agreement.

14. Injunction Against Unauthorized Storage or Withdrawal of Stored Water. Each party, its officers, agents, employees, successors and assigns is and they each are ENJOINED AND RESTRAINED from storing supplemental water in Chino Basin for withdrawal, or causing withdrawal of, water stored by that party, except pursuant to the terms of a written agreement with Watermaster and in accordance with Watermaster regulations. Any supplemental water stored or recharged in the Basin, except pursuant to such a Watermaster agreement, shall be deemed abandoned and not classified as Stored Water. This paragraph has no application, as such, to supplemental water spread or provided in lieu by Watermaster pursuant to the Physical Solution.

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IV. CONTINUING JURISDICTION

15. Continuing Jurisdiction. Full jurisdiction, power and authority are retained and reserved to the Court as to all matters contained in this judgment, except:

(a) The redetermination of Safe Yield, as set forth in Paragraph 6, during the first ten (10) years of operation of the Physical Solution;

(b) The allocation of Safe Yield as between the several pools as set forth in Paragraph 44 of the Physical Solution;

(c) The determination of specific quantitative rights and shares in the declared Safe Yield or Operating Safe Yield herein declared in Exhibits "D" and "E"; and

(d) The amendment or modification of Paragraphs 7(a) and (b) of Exhibit "H", during the first ten (10) years of operation of the Physical Solution, and thereafter only upon affirmative recommendation of at least 67% of the voting power (determined pursuant to the formula described in Paragraph 3 of Exhibit "H"), but not less than one-third of the members of the Appropriative Pool Committee representatives of parties who produce water within CBMWD or WMWD; after said tenth year the formula set forth in said Paragraph 7(a) and 7(b) of Exhibit "H" for payment of the costs of replenishment water may be changed to 100% gross or net, or any percentage split thereof, but only in response to recommendation to the Court by affirmative vote of at least 67% of said voting power of the Appropriative Pool representatives of parties who produce ground water within CBMWD or WMWD, but not less than one-third of their number. In such event, the Court shall act in conformance with such recommendation unless there are compelling reasons to the contrary; and provided, further, that the fact that the allocation of Safe Yield or Operating Safe Yield shares may be rendered moot by a recommended change in the formula for replenishment assessments shall not be deemed to be such a "compelling reason."

Said continuing jurisdiction is provided for the purpose of enabling the Court, upon application of any party, the Watermaster, the Advisory Committee or any Pool Committee, by motion and, upon

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at least 30 days' notice thereof, and after hearing thereon, to make such further or supplemental orders or directions as may be necessary or appropriate for interpretation, enforcement or carrying out of this Judgment, and to modify, amend or amplify any of the provisions of this Judgment.

V. WATERMASTER

A. APPOINTMENT

16. Watermaster Appointment. CBMWD, acting by and through a majority of its board of directors, is hereby appointed Watermaster, to administer and enforce the provisions of this Judgment and any subsequent instructions or orders of the Court hereunder. The term of appointment of Watermaster shall be for five (5) years. The Court will by subsequent orders provide for successive terms or for a successor Watermaster. Watermaster may be changed at any time by subsequent order of the Court, on its own motion, or on the motion of any party after notice and hearing. Unless there are compelling reasons to the contrary, the Court shall act in conformance with a motion requesting the Watermaster be changed if such motion is supported by a majority of the voting power of the Advisory Committee.

B. POWERS AND DUTIES

17. Powers and Duties. Subject to the continuing supervision and control of the Court, Watermaster shall have and may exercise the express powers, and shall perform the duties, as provided in this Judgment or hereafter ordered or authorized by the Court in the exercise of the Court's continuing jurisdiction.

18. Rules and Regulations. Upon recommendation by the

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Advisory Committee, Watermaster shall make and adopt, after public hearing, appropriate rules and regulations for conduct of Watermaster affairs, including meeting schedules and procedures, and compensation of members of Watermaster at not to exceed $25 per member per meeting, or $300 per member per year, whichever is less, plus reasonable expenses related to activities within the Basin. Thereafter, Watermaster may amend said rules from time to time upon recommendation, or with approval of the Advisory Committee after hearing noticed to all active parties. A copy of said rules and regulations, and of any amendments thereof, shall be mailed to each active party.

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19. Acquisition of Facilities. Watermaster may purchase, lease, acquire and hold all necessary facilities and equipment; provided, that it is not the intent of the Court that Watermaster acquire any interest in real property or substantial capital assets.

20. Employment of Experts and Agents. Watermaster may employ or retain such administrative, engineering, geologic, accounting, legal or other specialized personnel and consultants as may be deemed appropriate in the carrying out of its powers and shall require appropriate bonds from all officers and employees handling Watermaster funds. Watermaster shall maintain records for purposes of allocation of costs of such services as well as of all other expenses of Watermaster administration as between the several pools established by the Physical Solution.

21. Measuring Devices. Watermaster shall cause parties, pursuant to uniform rules, to install and maintain in good operating condition, at the cost of each party, such necessary measuring

devices or meters as Watermaster may deem appropriate. Such measuring devices shall be inspected and tested as deemed necessary by Watermaster, and the cost thereof shall constitute an expense of Watermaster.

22. Assessments. Watermaster is empowered to levy and collect all assessments provided for in the pooling plans and Physical Solution.

23. Investment of Funds. Watermaster may hold and invest any and all Watermaster funds in investments authorized from time to time for public agencies of the State of California.

24. Borrowing. Watermaster may borrow from time to time amounts not exceeding the annual anticipated receipts of Watermaster during such year.

25. Contracts. Watermaster may enter into contracts for the performance of any powers herein granted; provided, however, that Watermaster may not contract with or purchase materials, supplies or services from CBMWD, except upon the prior recommendation and approval of the Advisory Committee and pursuant to written order of the Court.

26. Cooperation With Other Agencies. Subject to prior recommendation or approval of the Advisory Committee, Watermaster may act jointly or cooperate with agencies of the United States and the State of California or any political subdivisions, municipalities or districts or any person to the end that the purpose of the Physical Solution may be fully and economically carried out.

27. Studies. Watermaster may, with concurrence of the Advisory Committee or affected Pool Committee and in accordance with Paragraph 54(b), undertake relevant studies of hydrologic

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conditions, both quantitative and qualitative, and operating aspects of implementation of the management program for Chino Basin.

28. Ground Water Storage Agreements. Watermaster shall adopt, with the approval of the Advisory Committee, uniformly applicable rules and a standard form of agreement for storage of supplemental water, pursuant to criteria therefor set forth in Exhibit "I". Upon appropriate application by any person, Watermaster shall enter into such a storage agreement; provided that all such storage agreements shall first be approved by written order of the Court, and shall by their terms preclude operations which will have a substantial adverse impact on other producers.

29. Accounting for Stored Water. Watermaster shall calculate additions, extractions and losses and maintain an annual account of all Stored Water in Chino Basin, and any losses of water supplies or Safe Yield of Chino Basin resulting from such Stored Water.

30. Annual Administrative Budget. Watermaster shall submit to Advisory Committee an administrative budget and recommendation for each fiscal year on or before March 1. The Advisory Committee shall review and submit said budget and their recommendations to Watermaster on or before April 1, following. Watermaster shall hold a public hearing on said budget at its April quarterly meeting and adopt the annual administrative budget which shall include the administrative items for each pool committee. The administrative budget shall set forth budgeted items in sufficient detail as necessary to make a proper allocation of the expense among the several pools, together with Watermaster's proposed allocation. The budget shall contain such additional comparative information

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or explanation as the Advisory Committee may recommend from time to time. Expenditures within budgeted items may thereafter be made by Watermaster in the exercise of powers herein granted, as a matter of course. Any budget transfer in excess of 20% of a budget category during any budget year or modification of such administrative budget during any year shall be first submitted to the Advisory Committee for review and recommendation.

31. Review Procedures. All actions, decisions or rules of Watermaster shall be subject to review by the Court on its own motion or on timely motion by any party, the Watermaster (in the case of a mandated action), the Advisory Committee, or any Pool Committee, as follows:

(a) Effective Date of Watermaster Action. Any action, decision or rule of Watermaster shall be deemed to have occurred or been enacted on the date on which written notice thereof is mailed. Mailing of copies of approved Watermaster minutes to the active parties shall constitute such notice to all parties.

(b) Noticed Motion. Any party, the Watermaster (as to any mandated action), the Advisory Committee, or any Pool Committee may, by a regularly noticed motion, apply to the Court for review of any Watermaster's action, decision or rule. Notice of such motion shall be served personally or mailed to Watermaster and to all active parties. Unless otherwise ordered by the Court, such motion shall not operate to stay the effect of such Watermaster action, decision or rule.

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(c) Time for Motion. Notice of motion to review any Watermaster action, decision or rule shall be served and filed within ninety (90) days after such Watermaster action, decision or rule, except for budget actions, in which event said notice period shall be sixty (60) days.

(d) De Novo Nature of Proceedings. Upon the filing of any such motion, the Court shall require the moving party to notify the active parties, the Watermaster, the Advisory Committee and each Pool Committee, of a date for taking evidence and argument, and on the date so designated shall review de novo the question at issue. Watermaster's findings or decision, if any, may be received in evidence at said hearing, but shall not constitute presumptive or prima facie proof of any fact in issue.

(e) Decision. The decision of the Court in such proceeding shall be an appealable supplemental order in this case. When the same is final, it shall be binding upon the Watermaster and all parties.

C. ADVISORY AND POOL COMMITTEES

32. Authorization. Watermaster is authorized and directed to cause committees of producer representatives to be organized to act as Pool Committees for each of the several pools created under the Physical Solution. Said Pool Committees shall, in turn, jointly form an Advisory Committee to assist Watermaster in performance of its functions under this judgment. Pool Committees shall be composed as specified in the respective pooling plans, and the Advisory Committee shall be composed of not to exceed ten (10) voting representatives from each pool, as designated by the

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respective Pool Committee. WMWD, PVMWD and SBVMWD shall each be entitled to one non-voting representative on said Advisory Committee.

33. Term and Vacancies. Members of any Pool Committee, shall serve for the term, and vacancies shall be filled, as specified in the respective pooling plan. Members of the Advisory Committee shall serve at the will of their respective Pool Committee.

34. Voting Power. The voting power on each Pool Committee shall be allocated as provided in the respective pooling plan. The voting power on the Advisory Committee shall be one hundred (100) votes allocated among the three pools in proportion to the total assessments paid to Watermaster during the preceding year; provided, that the minimum voting power of each pool shall be

(a) Overlying (Agricultural) Pool 20,

(b) Overlying (Non-agricultural) Pool 5, and

(c) Appropriative Pool 20.

In the event any pool is reduced to its said minimum vote, the remaining votes shall be allocated between the remaining pools on said basis of assessments paid to Watermaster by each such remaining pool during the preceding year. The method of exercise of each pool's voting power on the Advisory Committee shall be as determined by the respective pool committees.

35. Quorum. A majority of the voting power of the Advisory Committee or any Pool Committee shall constitute a quorum for the transaction of affairs of such Advisory or Pool Committee; provided, that at least one representative of each Pool Committee shall be required to constitute a quorum of the Advisory Committee. No Pool Committee representative may purposely absent himself or

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herself, without good cause, from an Advisory Committee meeting to deprive it of a quorum. Action by affirmative vote of a majority of the entire voting power of any Pool Committee or the Advisory Committee shall constitute action by such committee. Any action or recommendation of a Pool Committee or the Advisory Committee shall be transmitted to Watermaster in writing, together with a report of any dissenting vote or opinion.

36. Compensation. Pool or Advisory Committee members may receive compensation, to be established by the respective pooling plan, but not to exceed twenty-five dollars ($25.00) for each meeting of such Pool or Advisory Committee attended, and provided that no member of a Pool or Advisory Committee shall receive compensation of more than three hundred ($300.00) dollars for service on any such committee during any one year. All such compensation shall be a part of Watermaster administrative expense. No member of any Pool or Advisory Committee shall be employed by Watermaster or compensated by Watermaster for professional or other services rendered to such Pool or Advisory Committee or to Watermaster, other than the fee for attendance at meetings herein provided, plus reimbursement of reasonable expenses related to activities within the Basin.

37. Organization.

(a) Organizational Meeting. At its first meeting in each year, each Pool Committee and the Advisory Committee shall elect a chairperson and a vice chairperson from its membership. It shall also select a secretary, a treasurer and such assistant secretaries and treasurers as may be appropriate, any of whom may, but need not, be members of

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such Pool or Advisory Committee.

(b) Regular Meetings. All Pool Committees and the Advisory Committee shall hold regular meetings at a place and time to be specified in the rules to be adopted by each Pool and Advisory Committee. Notice of regular meetings of any Pool or Advisory Committee, and of any change in time or place thereof, shall be mailed to all active parties in said pool or pools.

(c) Special Meetings. Special meetings of any Pool or Advisory Committee may be called at any time by the Chairperson or by any three (3) members of such Pool or Advisory Committee by delivering notice personally or by mail to each member of such Pool or Advisory Committee and to each active party at least 24 hours before the time of each such meeting in the case of personal delivery, and 96 hours in the case of mail. The calling notice shall specify the time and place of the special meeting and the business to be transacted. No other business shall be considered at such meeting.

(d) Minutes. Minutes of all Pool Committee, Advisory Committee and Watermaster meetings shall be kept at Watermaster's offices. Copies thereof shall be mailed or otherwise furnished to all active parties in the pool or pools concerned. Said copies of minutes shall constitute notice of any Pool or Advisory Committee action therein reported, and shall be available for inspection by any party.

(e) Adjournments. Any meeting of any Pool or Advisory Committee may be adjourned to a time and place specified in the order of adjournment. Less than a quorum may so adjourn

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from time to time. A copy of the order or notice of adjournment shall be conspicuously posted forthwith on or near the door of the place where the meeting was held.

38. Powers and Functions. The powers and functions of the respective Pool Committees and the Advisory Committee shall be as follows:

(a) Pool Committees. Each Pool Committee shall have the power and responsibility for developing policy recommendations for administration of its particular pool, as created under the Physical Solution. All actions and recommendations of any Pool Committee which require Watermaster implementation shall first be noticed to the other two pools. If no objection is received in writing within thirty (30) days, such action or recommendation shall be transmitted directly to Watermaster for action. If any such objection is received, such action or recommendation shall be reported to the Advisory Committee before being transmitted to Watermaster.

(b) Advisory Committee. The Advisory Committee shall have the duty to study, and the power to recommend, review and act upon all discretionary determinations made or to be made hereunder by Watermaster.

[1] Committee Initiative. When any recommendation or advice of the Advisory Committee is received by Watermaster, action consistent therewith may be taken by Watermaster; provided, that any recommendation approved by 80 votes or more in the Advisory Committee shall constitute a mandate for action by Watermaster consistent therewith. If Watermaster is unwilling or unable to act

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pursuant to recommendation or advice from the Advisory Committee (other than such mandatory recommendations), Watermaster shall hold a public hearing, which shall be followed by written findings and decision. Thereafter, Watermaster may act in accordance with said decision, whether consistent with or contrary to said Advisory Committee recommendation. Such action shall be subject to review by the Court, as in the case of all other Watermaster determinations.

[2] Committee Review. In the event Watermaster proposes to take any discretionary action, other than approval or disapproval of a Pool Committee action or recommendation properly transmitted, or execute any agreement not theretofore within the scope of an Advisory Committee recommendation, notice of such intended action shall be served on the Advisory Committee and its members at least thirty (30) days before the Watermaster meeting at which such action is finally authorized.

(c) Review of Watermaster Actions. Watermaster (as to mandated action), the Advisory Committee or any Pool Committee shall be entitled to employ counsel and expert assistance in the event Watermaster or such Pool or Advisory Committee seeks Court review of any Watermaster action or failure to act. The cost of such counsel and expert assistance shall be Watermaster expense to be allocated to the affected pool or pools.

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VI. PHYSICAL SOLUTION

A. GENERAL

39. Purpose and Objective. Pursuant to the mandate of Section 2 of Article X of the California Constitution, the Court hereby adopts and orders the parties to comply with a Physical Solution. The purpose of these provisions is to establish a legal and practical means for making the maximum reasonable beneficial use of the waters of Chino Basin by providing the optimum economic, long-term, conjunctive utilization of surface waters, ground waters and supplemental water, to meet the requirements of water users having rights in or dependent upon Chino Basin.

40. Need for Flexibility. It is essential that this Physical Solution provide maximum flexibility and adaptability in order that Watermaster and the Court may be free to use existing and future technological, social, institutional and economic options, in order to maximize beneficial use of the waters of Chino Basin. To that end, the Court's retained jurisdiction will be utilized, where appropriate, to supplement the discretion herein granted to the Wastermaster.

41. Watermaster Control. Watermaster, with the advice of the Advisory and Pool Committees, is granted discretionary powers in order to develop an optimum basin management program for Chino Basin, including both water quantity and quality considerations. Withdrawals and supplemental water replenishment of Basin Water, and the full utilization of the water resources of Chino Basin, must be subject to procedures established by and administered through Watermaster with the advice and assistance of the Advisory and Pool Committees composed of the affected producers. Both the

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quantity and quality of said water resources may thereby be preserved and the beneficial utilization of the Basin maximized.

42. General Pattern of Operations. It is contemplated that the rights herein decreed will be divided into three (3) operating pools for purposes of Watermaster administration. A fundamental premise of the Physical Solution is that all water users dependent upon Chino Basin will be allowed to pump sufficient waters from the Basin to meet their requirements. To the extent that pumping exceeds the share of the Safe Yield assigned to the Overlying Pools, or the Operating Safe Yield in the case of the Appropriative Pool, each pool will provide funds to enable Watermaster to replace such overproduction. The method of assessment in each pool shall be as set forth in the applicable pooling plan.

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B. POOLING

43. Multiple Pools Established. There are hereby established three (3) pools for Watermaster administration of, and for the allocation of responsibility for, and payment of, costs of replenishment water and other aspects of this Physical Solution.

(a) Overlying (Agricultural) Pool. The first pool shall consist of the State of California and all overlying producers who produce water for other than industrial or commercial purposes. The initial members of the pool are listed in Exhibit "C".

(b) Overlying (Non-agricultural) Pool. The second pool shall consist of overlying producers who produce water for industrial or commercial purposes. The initial members of this pool are listed in Exhibit "D".

(c) Appropriative Pool. A third and separate pool shall

consist of owners of appropriative rights. The initial members of the pool are listed in Exhibit "E".

Any party who changes the character of his use may, by subsequent order of the Court, be reassigned to the proper pool; but the allocation of Safe Yield under Paragraph 44 hereof shall not be changed. Any non-party producer or any person who may hereafter commence production of water from Chino Basin, and who may become a party to this physical solution by intervention, shall be assigned to the proper pool by the order of the Court authorizing such intervention.

44. Determination and Allocation of Rights to Safe Yield of Chino Basin. The declared Safe Yield of Chino Basin is hereby allocated as follows:

Pool	Allocation
Overlying (Agricultural) Pool	414,000 acre feet in any five (5) consecutive years.
Overlying (Non-agricultural) Pool.	7,366 acre feet per year.
Appropriative Pool	49,834 acre feet per year.

The foregoing acre foot allocations to the overlying pools are fixed. Any subsequent change in the Safe Yield shall be debited or credited to the Appropriative Pool. Basin Water available to the Appropriative Pool without replenishment obligation may vary from year to year as the Operating Safe Yield is determined by Watermaster pursuant to the criteria set forth in Exhibit "I".

45. Annual Replenishment. Watermaster shall levy and collect assessments in each year, pursuant to the respective pooling plans, in amounts sufficient to purchase replenishment water to replace production by any pool during the preceding year which exceeds that

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pool's allocated share of Safe Yield in the case of the overlying pools, or Operating Safe Yield in the case of the Appropriative Pool. It is anticipated that supplemental water for replenishment of Chino Basin may be available at different rates to the various pools to meet their replenishment obligations. If such is the case, each pool will be assessed only that amount necessary for the cost of replenishment water to that pool, at the rate available to the pool, to meet its replenishment obligation.

46. Initial Pooling Plans. The initial pooling plans, which are hereby adopted, are set forth in Exhibits "F", "G" and "H", respectively. Unless and until modified by amendment of the judgment pursuant to the Court's continuing jurisdiction, each such plan shall control operation of the subject pool.

C. REPORTS AND ACCOUNTING

47. Production Reports. Each party or responsible party shall file periodically with Watermaster, pursuant to Watermaster rules, a report on a form to be prescribed by Watermaster showing the total production of such party during the preceding reportage period, and such additional information as Watermaster may require, including any information specified by the affected Pool Committee.

48. Watermaster Reports and Accounting. Watermaster's annual report, which shall be filed on or before November 15 of each year and shall apply to the preceding year's operation, shall contain details as to operation of each of the pools and a certified audit of all assessments and expenditures pursuant to this Physical Solution and a review of Watermaster activities.

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D. REPLENISHMENT

49. Sources of Supplemental Water. Supplemental water may be obtained by Watermaster from any available source. Watermaster shall seek to obtain the best available quality of supplemental water at the most reasonable cost for recharge in the Basin. To the extent that costs of replenishment water may vary between pools, each pool shall be liable only for the costs attributable to its required replenishment. Available sources may include, but are not limited to:

(a) Reclaimed Water. There exist a series of agreements generally denominated the Regional Waste Water Agreements between CBMWD and owners of the major municipal sewer systems within the basin. Under those agreements, which are recognized hereby but shall be unaffected and unimpaired by this judgment, substantial quantities of reclaimed water may be made available for replenishment purposes. There are additional sources of reclaimed water which are, or may become, available to Watermaster for said purposes. Maximum beneficial use of reclaimed water shall be given high priority by Watermaster.

(b) State Water. State water constitutes a major available supply of supplemental water. In the case of State Water, Watermaster purchases shall comply with the water service provisions of the State's water service contracts. More specifically, Watermaster shall purchase State Water from MWD for replenishment of excess production within CBMWD, WMWD and PVMWD, and from SBVMWD to replenish excess production within SBVMWD's boundaries in Chino Basin, except to the

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extent that MWD and SBVMWD give their consent as required by such State water service contracts.

(c) Local Import. There exist facilities and methods for importation of surface and ground water supplies from adjacent basins and watersheds.

(d) Colorado River Supplies. MWD has water supplies available from its Colorado River Aqueduct.

50. Methods of Replenishment. Watermaster may accomplish replenishment of overproduction from the Basin by any reasonable method, including:

(a) Spreading and percolation or Injection of water in existing or new facilities, subject to the provisions of Paragraphs 19, 25 and 26 hereof.

(b) In Lieu Procedures. Watermaster may make, or cause to be made, deliveries of water for direct surface use, in lieu of ground water production.

E. REVENUES

51. Production Assessment. Production assessments, on whatever basis, may be levied by Watermaster pursuant to the pooling plan adopted for the applicable pool.

52. Minimal Producers. Minimal Producers shall be exempted from payment of production assessments, upon filing of production reports as provided in Paragraph 47 of this Judgment, and payment of an annual five dollar ($5.00) administrative fee as specified by Watermaster rules.

53. Assessment Proceeds -- Purposes. Watermaster shall have the power to levy assessments against the parties (other than minimal pumpers) based upon production during the preceding period

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of assessable production, whether quarterly, semi-annually or annually, as may be determined most practical by Watermaster or the affected Pool Committee.

54. Administrative Expenses. The expenses of administration of this Physical Solution shall be categorized as either (a) general Watermaster administrative expense, or (b) special project expense.

(a) General Watermaster Administrative Expense shall include office rental, general personnel expense, supplies and office equipment, and related incidental expense and general overhead.

(b) Special Project Expense shall consist of special engineering, economic or other studies, litigation expense, meter testing or other major operating expenses. Each such project shall be assigned a Task Order number and shall be separately budgeted and accounted for.

General Watermaster administrative expense shall be allocated and assessed against the respective pools based upon allocations made by the Watermaster, who shall make such allocations based upon generally accepted cost accounting methods. Special Project Expense shall be allocated to a specific pool, or any portion thereof, only upon the basis of prior express assent and finding of benefit by the Pool Committee, or pursuant to written order of the Court.

55. Assessments -- Procedure. Assessments herein provided for shall be levied and collected as follows:

(a) Notice of Assessment. Watermaster shall give written notice of all applicable assessments to each party on

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or before ninety (90) days after the end of the production period to which such assessment is applicable.

(b) Payment. Each assessment shall be payable on or before thirty (30) days after notice, and shall be the obligation of the party or successor owning the water production facility at the time written notice of assessment is given, unless prior arrangement for payment by others has been made in writing and filed with Watermaster.

(c) Delinquency. Any delinquent assessment shall bear interest at 10% per annum (or such greater rate as shall equal the average current cost of borrowed funds to the Watermaster) from the due date thereof. Such delinquent assessment and interest may be collected in a show-cause proceeding herein instituted by the Watermaster, in which case the Court may allow Watermaster its reasonable costs of collection, including attorney's fees.

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56. Accumulation of Replenishment Water Assessment Proceeds. In order to minimize fluctuation in assessment and to give Watermaster flexibility in purchase and spreading of replenishment water, Watermaster may make reasonable accumulations of replenishment water assessment proceeds. Interest earned on such retained funds shall be added to the account of the pool from which the funds were collected and shall be applied only to the purchase of replenishment water.

57. Effective Date. The effective date for accounting and operation under this Physical Solution shall be July 1, 1977, and the first production assessments hereunder shall be due after July 1, 1978. Watermaster shall, however, require installation of

meters or measuring devices and establish operating procedures immediately, and the costs of such Watermaster activity (not including the cost of such meters and measuring devices) may be recovered in the first administrative assessment in 1978.

VII. MISCELLANEOUS PROVISIONS

58. Designation of Address for Notice and Service. Each party shall designate the name and address to be used for purposes of all subsequent notices and service herein, either by its endorsement on the Stipulation for Judgment or by a separate designation to be filed within thirty (30) days after Judgment has been served. Said designation may be changed from time to time by filing a written notice of such change with the Watermaster. Any party desiring to be relieved of receiving notices of Watermaster or committee activity may file a waiver of notice on a form to be provided by Watermaster. Thereafter such party shall be removed from the Active Party list. Watermaster shall maintain at all times a current list of active parties and their addresses for purposes of service. Watermaster shall also maintain a full current list of names and addresses of all parties or their successors, as filed herein. Copies of such lists shall be available, without cost, to any party, the Advisory Committee or any Pool Committee upon written request therefor.

59. Service of Documents. Delivery to or service upon any party or active party by the Watermaster, by any other party, or by the Court, of any item required to be served upon or delivered to such party or active party under or pursuant to the Judgment shall be made personally or by deposit in the United States mail, first

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class, postage prepaid, addressed to the designee and at the address in the latest designation filed by such party or active party.

60. Intervention After Judgment. Any non-party assignee of the adjudicated appropriative rights of any appropriator, or any other person newly proposing to produce water from Chino Basin, may become a party to this judgment upon filing a petition in intervention. Said intervention must be confirmed by order of this Court. Such intervenor shall thereafter be a party bound by this judgment and entitled to the rights and privileges accorded under the Physical Solution herein, through the pool to which the Court shall assign such intervenor.

61. Loss of Rights. Loss, whether by abandonment, forfeiture or otherwise, of any right herein adjudicated shall be accomplished only (1) by a written election by the owner of the right filed with Watermaster, or (2) by order of the Court upon noticed motion and after hearing.

62. Scope of Judgment. Nothing in this Judgment shall be deemed to preclude or limit any party in the assertion against a neighboring party of any cause of action now existing or hereafter arising based upon injury, damage or depletion of water supply available to such party, proximately caused by nearby pumping which constitutes an unreasonable interference with such complaining party's ability to extract ground water.

63. Judgment Binding on Successors. This Judgment and all provisions thereof are applicable to and binding upon not only the parties to this action, but also upon their respective heirs, executors, administrators, successors, assigns, lessees and

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licensees and upon the agents, employees and attorneys in fact of all such persons.

64. Costs. No party shall recover any costs in this proceeding from any other party.

Dated: JAN 27 1978.

[signature]

Judge

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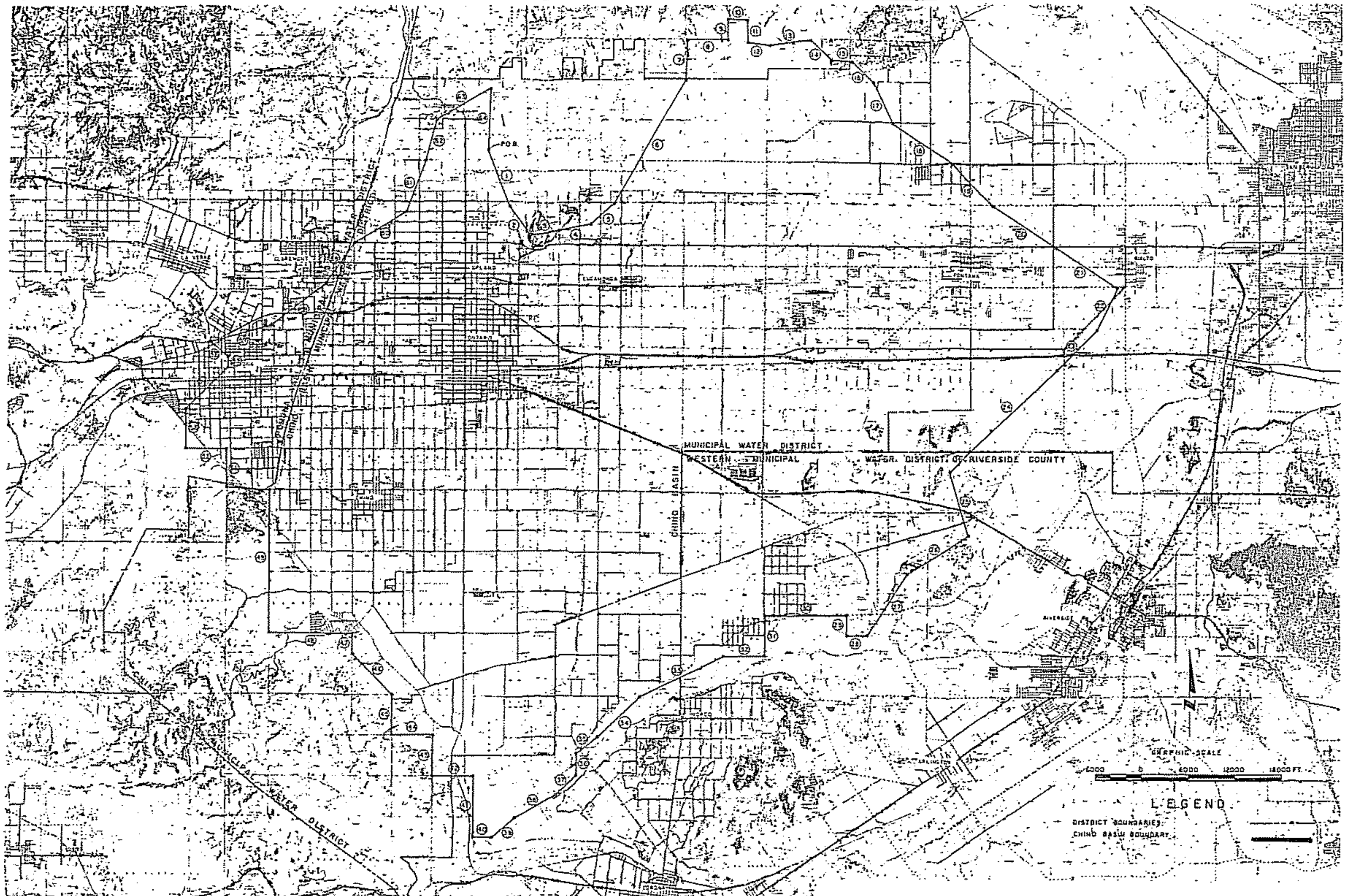
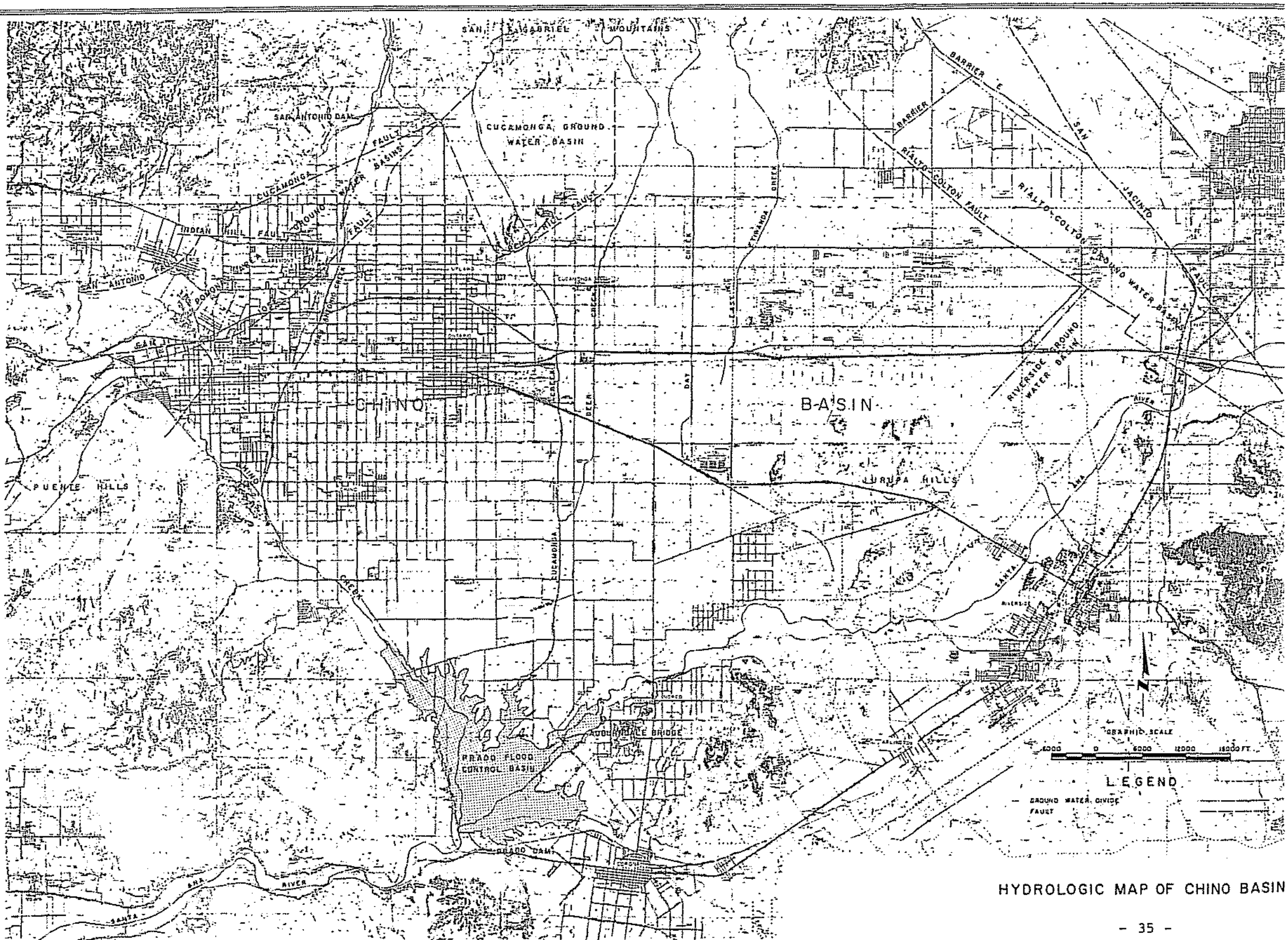


LOCATION MAP OF CHINO BASIN

EXHIBIT A



HYDROLOGIC MAP OF CHINO BASIN

EXHIBIT B

STIPULATING OVERLYING AGRICULTURAL PRODUCERS

STATE OF CALIFORNIA
COUNTY OF SAN BERNARDINO
Abacherli Dairy, Inc.
Abacherli, Frank
Abacherli, Shirley
Abbona, Anna
Abbona, James
Abbona, Jim
Abbona, Mary
Agliani, Amelia H.
Agman, Inc.
Aguerre, Louis B.
Ahmanson Trust Co.
Akiyama, Shizuye
Akiyama, Tomoo
Akkerman, Dave
Albers, J. N.
Albers, Nellie
Alewyn, Jake J.
Alewyn, Normalee
Alger, Mary D.
Alger, Raymond
Allen, Ben F.
Allen, Jane F.
Alta-Dena Dairy
Anderson Farms
Anguiano, Sarah L. S.
Anker, Gus

Aphessetche, Xavier
Arena Mutual Water Assn.
Armstrong Nurseries, Inc.
Arretche, Frank
Arretche, Jean Pierre
Arvidson, Clarence F.
Arvidson, Florence
Ashley, George W.
Ashley, Pearl E.
Atlas Farms
Atlas Ornamental Iron Works, Inc.
Aukeman, Carol
Aukeman, Lewis
Ayers, Kenneth C., aka Kelley Ayers
Bachoc, Raymond
Baldwin, Edgar A.
Baldwin, Lester
Banbury, Carolyn
Bangma Dairy
Bangma, Arthur
Bangma, Ida
Bangma, Martin
Bangma, Sam
Barba, Anthony B.
Barba, Frank
Barcellos, Joseph
Barnhill, Maurine W.

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Barnhill, Paul
Bartel, Dale
Bartel, Ursula
Bartel, Willard
Barthelemy, Henry
Barthelemy, Roland
Bassler, Donald V., M.D.
Bates, Lowell R.
Bates, Mildred L.
Beahm, James W.
Beahm, Joan M.
Bekendam, Hank
Bekendam, Pete
Bello, Eugene
Bello, Olga
Beltman, Evelyn
Beltman, Tony
Bergquist Properties, Inc.
Bevacqua, Joel A.
Bevacqua, Marie B.
Bidart, Bernard
Bidart, Michael J.
Binnell, Wesley
Black, Patricia E.
Black, Victor
Bodger, John & Sons Co.
Boer, Adrian
Boersma and Wind Dairy

Boersma, Angie
Boersma, Berdina
Boersma, Frank
Boersma, Harry
Boersma, Paul
Boersma, Sam
Boersma, William L.
Bohlander & Holmes, Inc.
Bokma, Peter
Bollema, Jacob
Boonstoo, Edward
Bootsma, Jim
Borba, Dolene
Borba, Dolores
Borba, Emily
Borba, George
Borba, John
Borba, John & Sons
Borba, John Jr.
Borba, Joseph A.
Borba, Karen E.
Borba, Karen M.
Borba, Pete, Estate of
Borba, Ricci
Borba, Steve
Borba, Tom
Bordisso, Alleck
Borges, Angelica M.

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EXHIBIT "C"

Borges, Bernadette
Borges, John O.
Borges, Linda L.
Borges, Manual Jr.
Borges, Tony
Bos, Aleid
Bos, Gerrit
Bos, John
Bos, John
Bos, Margaret
Bos, Mary
Bos, Mary Beth
Bos, Tony
Bosch, Henrietta
Bosch, Peter T.
Boschma, Betty
Boschma, Frank
Boschma, Greta
Boschma, Henry
Bosma, Dick
Bosma, Florence G.
Bosma, Gerrit
Bosma, Jacob J.
Bosma, Jeanette Thea
Bosman, Frank
Bosman, Nellie
Bosnyak, Goldie M.
Bosnyak, Martin

Bothof, Roger W.
Bouma, Cornie
Bouma, Emma
Bouma, Henry P.
Bouma, Martin
Bouma, Peter G. & Sons Dairy
Bouma, Ted
Bouman, Helen
Bouman, Sam
Bower, Mabel E.
Boys Republic
Breedyk, Arie
Breedyk, Jessie
Briano Brothers
Briano, Albert
Briano, Albert Trustee for
Briano, Albert Frank
Briano, Lena
Brink, Russell N.
Brinkerhoff, Margaret
Brinkerhoff, Robert L.
Britschgi, Florence
Britschgi, Magdalena Garetto
Britschgi, Walter P.
Brommer, Marvin
Brookside Enterprizes, dba
Brookside Vineyard Co.
Brothers Three Dairy

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Brown, Eugene	Chino Corona Investment
Brun, Martha M.	Chino Water Co.
Brun, Peter Robert	Christensen, Leslie
Buma, Duke	Christensen, Richard G.
Buma, Martha	Christian, Ada R.
Bunse, Nancy	Christian, Harold F.
Bunse, Ronnie L.	Christy, Ella J.
Caballero, Bonnie L.	Christy, Ronald S.
Caballero, Richard F.	Cihigoyenetche, Jean
Cable Airport Inc.	Cihigoyenetche, Leona
Cadlini, Donald	Cihigoyenetche, Martin
Cadlini, Jesse R.	Clarke, Arthur B.
Cadlini, Marie Edna	Clarke, Nancy L.
Cambio, Anna	Clarke, Phyllis J.
Cambio, Charles, Estate of	Coelho, Isabel
Cambio, William V.	Coelho, Joe A. Jr.
Cardoza, Florence	Collins, Howard E.
Cardoza, Olivi	Collins, Judith F.
Cardoza, Tony	Collinsworth, Ester L.
Carnesi, Tom	Collinsworth, John E.
Carver, Robt M., Trustee	Collinsworth, Shelby
Cauffman, John R.	Cone Estate (05-2-00648/649)
Chacon Bros.	Consolidated Freightways Corp. of Delaware
Chacon, Elvera P.	
Chacon, Joe M.	Corona Farms Co.
Chacon, Robert M.	Corra, Rose
Chacon, Virginia L.	Costa, Dimas S.
Chez, Joseph C.	Costa, Laura

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Costa, Myrtle
Costamagna, Antonio
Costamagna, Joseph
Cousyn, Claus B.
Cramer, Carole F.
Cramer, William R.
Crossroads Auto Dismantlers, Inc.
Crouse, Beatrice I.
Crouse, Roger
Crowley, Juanita C.
Crowley, Ralph
Cucamonga Vintners
D'Astici, Teresa
Da Costa, Cecilia B.
Da Costa, Joaquim F.
Daloisio, Norman
De Berard Bros.
De Berard, Arthur, Trustee
De Berard, Charles
De Berard, Chas., Trustee
De Berard, Helan J.
De Berard, Robert
De Berard, Robert, Trustee
De Bie, Adrian
De Bie, Henry
De Bie, Margaret M.
De Bie, Marvin
De Boer, Fred
De Boer, L. H.
De Boer, Sidney
De Bos, Andrew
De Graaf, Anna Mae
De Graaf, Gerrit
De Groot, Dick
De Groot, Dorothy
De Groot, Ernest
De Groot, Henrietta
De Groot, Jake
De Groot, Pete Jr.
De Haan, Bernadena
De Haan, Henry
De Hoog, Adriana
De Hoog, Joe
De Hoog, Martin
De Hoog, Martin L.
De Hoog, Mitch
De Hoog, Tryntje
De Jager, Cobi
De Jager, Edward D.
De Jong Brothers Dairy
De Jong, Cornelis
De Jong, Cornelius
De Jong, Grace
De Jong, Jake
De Jong, Lena
De Leeuw, Alice

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EXHIBIT "C"

De Leeuw, Sam	Dirkse, Catherine
De Soete, Agnes	Dirkse, Charles C.
De Soete, Andre	Dixon, Charles E.
De Vries, Abraham	Dixon, Geraldine A.
De Vries, Case	Doesberg, Hendrica
De Vries, Dick	Doesburg, Theodorus P.
De Vries, Evelyn	Dolan, Marion
De Vries, Henry, Estate of	Dolan, Michael H.
De Vries, Hermina	Dominguez, Helen
De Vries, Jack H.	Dominguez, Manual
De Vries, Jane	Donkers, Henry A.
De Vries, Janice	Donkers, Nellie G.
De Vries, John	Dotta Bros.
De Vries, John J.	Douma Brothers Dairy
De Vries, Neil	Douma, Betty A.
De Vries, Ruth	Douma, Fred A.
De Vries, Theresa	Douma, Hendrika
De Wit, Gladys	Douma, Herman G.
De Wit, Peter S.	Douma, Narleen J.
De Wyn, Evert	Douma, Phillip M.
De Zoete, Hattie V.	Dow Chemical Co.
De Zoete, Leo A.	Dragt, Rheta
Decker, Hallie	Dragt, William
Decker, Henry A.	Driftwood Dairy Farm
Demmer, Ernest	Droogh, Case
Di Carlo, Marie	Duhalde, Marian
Di Carlo, Victor	Duhalde, Lauren
Di Tommaso, Frank	Duits, Henrietta

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Duits, John
Dunlap, Edna Kraemer, Estate of
Durrington, Glen
Durrington, William F.
Dusi, John, Sr.
Dykstra, Dick
Dykstra, John
Dykstra, John & Sons
Dykstra, Wilma
Dyt, Cor
Dyt, Johanna
E and S Grape Growers
Eaton, Thomas, Estate of
Echeverria, Juan
Echeverria, Carlos
Echeverria, Pablo
Eilers, E. Myrle
Eilers, Henry W.
El Prado Golf Course
Ellsworth, Rex C.
Engelsma, Jake
Engelsma, Susan
Escojeda, Henry
Etiwanda Grape Products Co.
Euclid Ave. Investment One
Euclid Ave. Investment Four
Euclid Ave. Three Investment

Excelsior Farms
F.D.I.C.
Fagundes, Frank M.
Fagundes, Mary
Fernandes, Joseph Jr.
Fernandes, Velma C.
Ferraro, Ann
Ferreira, Frank J.
Ferreira, Joe C. Jr.
Ferreira, Narcie
Filippi, J. Vintage Co.
Filippi, Joseph
Filippi, Joseph A.
Filippi, Mary E.
Fitzgerald, John R.
Flameling Dairy Inc.
Flamingo Dairy
Foss, Douglas E.
Foss, Gerald R.
Foss, Russel
Fred & John Troost No. 1 Inc.
Fred & Maynard Troost No. 2 Inc.
Freitas, Beatriz
Freitas, Tony T.
Gakle, Louis L.
Galleano Winery, Inc.
Galleano, Bernard D.
Galleano, D.
Galleano, Mary M.

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Garcia, Pete
Gardner, Leland V.
Gardner, Lola M.
Garrett, Leonard E.
Garrett, Patricia T.
Gastelluberry, Catherine
Gastelluberry, Jean
Gilstrap, Glen E.
Gilstrap, Marjorie J.
Godinho, John
Godinho, June
Gonsalves, Evelyn
Gonsalves, John
Gorzeman, Geraldine
Gorzeman, Henry A.
Gorzeman, Joe
Govea, Julia
Goyenetche, Albert
Grace, Caroline E.
Grace, David J.
Gravatt, Glenn W.
Gravatt, Sally Mae
Greydanus Dairy, Inc.
Greydanus, Rena
Griffin Development Co.
Haagsma, Dave
Haagsma, John
Hansen, Mary D.
Hansen, Raymond F.
Hanson, Ardeth W.
Harada, James T.
Harada, Violet A.
Haringa, Earl and Sons
Haringa, Herman
Haringa, Rudy
Haringa, William
Harper, Cecilia de Mille
Harrington, Winona
Harrison, Jacqueline A.
Hatanaka, Kenichi
Heida, Annie
Heida, Don
Heida, Jim
Heida, Sam
Helms, Addison D.
Helms, Irma A.
Hermans, Alma I.
Hermans, Harry
Hettinga, Arthur
Hettinga, Ida
Hettinga, Judy
Hettinga, Mary
Hettinga, Wilbur
Heublein, Inc., Grocery Products Group
Hibma, Catherine M.

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Hibma, Sidney
Hicks, Kenneth I.
Hicks, Minnie M.
Higgins Brick Co.
Highstreet, Alfred V.
Highstreet, Evada V.
Hilarides, Bertha as Trustee
Hilarides, Frank
Hilarides, John as Trustee
Hindelang, Tillie
Hindelang, William
Hobbs, Bonnie C.
Hobbs, Charles W.
Hobbs, Hazel I.
Hobbs, Orlo M.
Hoekstra, Edward
Hoekstra, George
Hoekstra, Grace
Hoekstra, Louie
Hofer, Paul B.
Hofer, Phillip F.
Hofstra, Marie
Hogeboom, Jo Ann M.
Hogeboom, Maurice D.
Hogg, David V.
Hogg, Gene P.
Hogg, Warren G.
Hohberg, Edith J.

Hohberg, Harold C.
Hohberg, Harold W.
Holder, Arthur B.
Holder, Dorothy F.
Holmes, A. Lee
Holmes, Frances P.
Hoogeboom, Gertrude
Hoogeboom, Pete
Hoogendam, John
Hoogendam, Tena
Houssels, J. K. Thoroughbred Farm
Hunt Industries
Idsinga, Ann
Idsinga, William W.
Imbach Ranch, Inc.
Imbach, Kenneth E.
Imbach, Leonard K.
Imbach, Oscar K.
Imbach, Ruth M.
Indaburu, Jean
Indaburu, Marceline
Iseli, Kurt H.
Ito, Kow
J & B Dairy Inc.
Jaques, Johnny C. Jr.
Jaques, Mary
Jaques, Mary Lou

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Jay Em Bee Farms	Knevelbaard, John
Johnson Bro's Egg Ranches, Inc.	Knudsen, Ejnar
Johnston, Ellwood W.	Knudsen, Karen M.
Johnston, George F. Co.	Knudsen, Kenneth
Johnston, Judith H.	Knudson, Robert
Jones, Leonard P.	Knudson, Darlene
Jongsma & Sons Dairy	Koel, Helen S.
Jongsma, Diana A.	Koetsier, Gerard
Jongsma, Dorothy	Koetsier, Gerrit J.
Jongsma, George	Koetsier, Jake
Jongsma, Harold	Koning, Fred W.
Jongsma, Henry	Koning, Gloria
Jongsma, John	Koning, J. W. Estate
Jongsma, Nadine	Koning, James A.
Jongsma, Tillie	Koning, Jane
Jordan, Marjorie G.	Koning, Jane C.
Jordan, Troy O.	Koning, Jennie
Jorritsma, Dorothy	Koning, John
Juliano, Albert	Koning, Victor A.
Kamper, Cornelis	Kooi Holstein Corporation
Kamstra, Wilbert	Koolhaas, Kenneth E.
Kaplan, Lawrence J.	Koolhaas, Simon
Kasbergen, Martha	Koolhaas, Sophie Grace
Kasbergen, Neil	Koopal, Grace
Kazian, Angelen Estate of	Koopal, Silas
Kingsway Const. Corp.	Koopman, Eka
Klapps Market	Koopman, Gene T.
Kline, James K.	Koopman, Henry G.

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Koopman, Ted

Koopman, Tena

Koot, Nick

Koster, Aart

Koster, Frances

Koster, Henry B.

Koster, Nellie

Kroes, Jake R.

Kroeze, Bros

Kroeze, Calvin E.

Kroeze, John

Kroeze, Wesley

Kruckenberg, Naomi

Kruckenberg, Perry

L. D. S. Welfare Ranch

Labrucherie, Mary Jane

Labrucherie, Raymond F.

Lako, Samuel

Landman Corp.

Lanting, Broer

Lanting, Myer

Lass, Jack

Lass, Sandra L.

Lawrence, Cecelia, Estate of

Lawrence, Joe H., Estate of

Leal, Bradley W.

Leal, John C.

Leal, John Craig

Leck, Arthur A.

Leck, Evelyn M.

Lee, Harold E.

Lee, Helen J.

Lee, Henrietta C.

Lee, R. T. Construction Co.

Lekkerkerk, Adriana

Lekkerkerk, L. M.

Lekkerkerker, Nellie

Lekkerkerker, Walt

Lewis Homes of California

Livingston, Dorothy M.

Livingston, Rex E.

Lokey, Rosemary Kraemer

Lopes, Candida A.

Lopes, Antonio S.

Lopez, Joe D.

Lourenco, Carlos, Jr.

Lourenco, Carmelina P.

Lourenco, Jack C.

Lourenco, Manual H.

Lourenco, Mary

Lourenco, Mary

Luiten, Jack

Luiz, John M.

Luna, Christine I.

Luna, Ruben T.

Lusk, John D. and Son
a California corporation

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Lyon, Gregory E.
Lyon, Paula E.
M & W Co. #2
Madole, Betty M.
Madole, Larry B.
Marquez, Arthur
Marquine, Jean
Martin, Lelon O.
Martin, Leon O.
Martin, Maria D.
Martin, Tony J.
Martins, Frank
Mathias, Antonio
Mc Cune, Robert M.
Mc Masters, Gertrude
Mc Neill, J. A.
Mc Neill, May F.
Mees, Leon
Mello and Silva Dairy
Mello and Sousa Dairy
Mello, Emilia
Mello, Enos C.
Mello, Mercedes
Mendiondo, Catherine
Mendiondo, Dominique
Meth. Hosp. - Sacramento
Metzger, R. S.
Metzger, Winifred

Mickel, Louise
Miersma, Dorothy
Meirsma, Harry C.
Minaberry, Arnaud
Minaberry, Marie
Mistretta, Frank J.
Mocho and Plaa Inc.
Mocho, Jean
Mocho, Noeline
Modica, Josephine
Montes, Elizabeth
Montes, Joe
Moons, Beatrice
Moons, Jack
Moramarco, John A. Enterprises
Moreno, Louis W.
Moss, John R.
Motion Pictures Associates, Inc.
Moynier, Joe
Murphy, Frances V.
Murphy, Myrl L.
Murphy, Naomi
Nanne, Martin Estate of
Nederend, Betty
Nederend, Hans
Norfolk, James
Norfolk, Martha
Notrica, Louis

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Nyberg, Lillian M.	Ormonde, Viva
Nyenhuis, Annie	Ortega, Adeline B.
Nyenhuis, Jim	Ortega, Bernard Dino
Occidental Land Research	Osterkamp, Joseph S.
Okumura, Marion	Osterkamp, Margaret A.
Okumura, Yuiche	P I E Water Co.
Oldengarm, Effie	Palmer, Eva E.
Oldengarm, Egbert	Palmer, Walter E.
Oldengarm, Henry	Parente, Luis S.
Oliviera, Manuel L.	Parente, Mary Borba
Oliviera, Mary M.	Parks, Jack B.
Olson, Albert	Parks, Laura M.
Oltmans Construction Co.	Patterson, Lawrence E. Estate of
Omlin, Anton	Payne, Clyde H.
Omlin, Elsie L.	Payne, Margo
Ontario Christian School Assn.	Pearson, Athelia K.
Oord, John	Pearson, William C.
Oostdam, Jacoba	Pearson, William G.
Oostdam, Pete	Pene, Robert
Oosten, Agnes	Perian, Miller
Oosten, Anthonia	Perian, Ona E.
Oosten, Caroline	Petrissans, Deanna
Oosten, John	Petrissans, George
Oosten, Marinus	Petrissans, Jean P.
Oosten, Ralph	Petrissans, Marie T.
Orange County Water District	Pickering, Dora M.
Ormonde, Manuel	(Mrs. A. L. Pickering)
Ormonde, Pete, Jr.	Pierce, John

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Pierce, Sadie
Pietszak, Sally
Pine, Joe
Pine, Virginia
Pires, Frank
Pires, Marie
Plaa, Jeanne
Plaa, Michel
Plantenga, Agnes
Plantenga, George
Poe, Arlo D.
Pomona Cemetery Assn.
Porte, Cecelia, Estate of
Porte, Garritt, Estate of
Portsmouth, Vera McCarty
Ramella, Mary M.
Ramirez, Concha
Rearick, Hildegard H.
Rearick, Richard R.
Reinalda, Clarence
Reitsma, Greta
Reitsma, Louis
Rice, Bernice
Rice, Charlie E.
Richards, Karin
(Mrs. Ronnie Richards)
Richards, Ronald L.
Ridder, Jennie Wassenaar

Righetti, A. T.
Riley, George A.
Riley, Helen C.
Robbins, Jack K.
Rocha, John M.
Rocha, Jose C.
Rodrigues, John
Rodrigues, Manuel
Rodrigues, Manuel, Jr.
Rodrigues, Mary L.
Rodriquez, Daniel
Rogers, Jack D.
Rohrer, John A.
Rohrer, Theresa D.
Rohrs, Elizabeth H.
Rossetti, M. S.
Roukema, Angeline
Roukema, Ed.
Roukema, Nancy
Roukema, Siebren
Ruderian, Max J.
Russell, Fred J.
Rusticus, Ann
Rusticus, Charles
Rynsburger, Arie
Rynsburger, Berdena, Trust
Rynsburger, Joan Adele
Rynsburger, Thomas

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EXHIBIT "C"

S. P. Annex, Inc.	Scott, Frances M.
Salisbury, Elinor J.	Scott, Linda F.
Sanchez, Edmundo	Scott, Stanley A.
Sanchez, Margarita O.	Scritsmier, Lester J.
Santana, Joe Sr.	Serl, Charles A.
Santana, Palmira	Serl, Rosalie P.
Satragni, John B. Jr.	Shady Grove Dairy, Inc.
Scaramella, George P.	Shamel, Burt A.
Schaafsma Bros.	Shelby, Harold E.
Schaafsma, Jennie	Shelby, John A.
Schaafsma, Peter	Shelby, Velma M.
Schaafsma, Tom	Shelton, Alice A.
Schaap, Andy	Sherwood, Robert W.
Schaap, Ids	Sherwood, Sheila J.
Schaap, Maria	Shue, Eva
Schacht, Sharon C.	Shue, Gilbert
Schakel, Audrey	Sieperda, Anne
Schakel, Fred	Sieperda, James
Schmid, Olga	Sigrist, Hans
Schmidt, Madeleine	Sigrist, Rita
Schoneveld, Evert	Silveira, Arline L.
Schoneveld, Henrietta	Silveira, Frank
Schoneveld, John	Silveira, Jack
Schoneveld, John Allen	Silveira, Jack P. Jr.
Schug, Donald E.	Simas, Dolores
Schug, Shirley A.	Simas, Joe
Schuh, Bernatta M.	Singleton, Dean
Schuh, Harold H.	Singleton, Elsie R.

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Sinnott, Jim	Staal, John
Sinnott, Mildred B.	Stahl, Zippora P.
Slegers, Dorothy	Stampfl, Berta
Slegers, Hubert J.	Stampfl, William
Slegers, Jake	Stanley, Robert E.
Slegers, Jim	Stark, Everett
Slegers, Lenwood M.	Stellingwerf, Andrew
Slegers, Martha	Stellingwerf, Henry
Slegers, Tesse J.	Stellingwerf, Jenette
Smith, Edward S.	Stellingwerf, Shana
Smith, Helen D.	Stellingwerf, Stan
Smith, James E.	Stelzer, Mike C.
Smith, Keith J.	Sterk, Henry
Smith, Lester W.	Stiefel, Winifred
Smith, Lois Maxine	Stiefel, Jack D.
Smith, Marjorie W.	Stigall, Richard L.
Soares, Eva	Stigall, Vita
Sogioka, Mitsuyoshi	Stockman's Inn
Sogioka, Yoshimato	Stouder, Charlotte A.
Sousa, Sam	Stouder, William C.
Southern Pacific Land Co.	Struikmans, Barbara
Southfield, Eddie	Struikmans, Gertie
Souza, Frank M.	Struikmans, Henry Jr.
Souza, Mary T.	Struikmans, Henry Sr.
Spickerman, Alberta	Struikmans, Nellie
Spickerman, Florence	Swager, Edward
Spickerman, Rudolph	Swager, Gerben
Spyksma, John	Swager, Johanna

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Swager, Marion	Terpstra, Theodore G.
Swierstra, Donald	Teune, Tony
Swierstra, Fanny	Teunissen, Bernard
Sybrandy, Ida	Teunissen, Jane
Sybrandy, Simon	Thomas, Ethel M.
Sytsma, Albert	Thommen, Alice
Sytsma, Edith	Thommen, Fritz
Sytsma, Jennie	Tillema, Allie
Sytsma, Louie	Tillema, Harold
Te Velde, Agnes	Tillema, Klaas D.
Te Velde, Bay	Timmons, William R.
Te Velde, Bernard A.	Tollerup, Barbara
Te Velde, Bonnie	Tollerup, Harold
Te Velde, Bonnie G.	Trapani, Louis A.
Te Velde, George	Trimlett, Arlene R.
Te Velde, George, Jr.	Trimlett, George E.
Te Velde, Harm	Tristant, Pierre
Te Velde, Harriet	Tuinhout, Ale
Te Velde, Henry J.	Tuinhout, Harry
Te Velde, Jay	Tuinhout, Hilda
Te Velde, Johanna	Tuls, Elizabeth
Te Velde, John H.	Tuls, Jack S.
Te Velde, Ralph A.	Tuls, Jake
Te Velde, Zwaantina, Trustee	Union Oil Company of California
Ter Maaten, Case	United Dairyman's Co-op.
Ter Maaten, Cleone	Urquhart, James G.
Ter Maaten, Steve	Usle, Cathryn
Terpstra, Carol	Usle, Faustino

EXHIBIT "C"

V & Y Properties
Vaile, Beryl M.
Valley Hay Co.
Van Beek Dairy Inc.
Van Canneyt Dairy
Van Canneyt, Maurice
Van Canneyt, Wilmer
Van Dam, Bas
Van Dam, Isabelle
Van Dam, Nellie
Van Den Berg, Gertrude
Van Den Berg, Joyce
Van Den Berg, Marinus
Van Den Berg, Marvin
Van Der Linden, Ardith
Van Der Linden, John
Van Der Linden, Stanley
Van Der Veen, Kenneth
Van Diest, Anna T.
Van Diest, Cornelius
Van Diest, Ernest
Van Diest, Rena
Van Dyk, Bart
Van Dyk, Jeanette
Van Foeken, Martha
Van Foeken, William
Van Hofwegan, Steve
Van Hofwegen, Adrian A.

Van Hofwegen, Clara
Van Hofwegen, Jessie
Van Klaveren, A.
Van Klaveren, Arie
Van Klaveren, Wilhelmina
Van Klaveren, William
Van Leeuwen, Arie C.
Van Leeuwen, Arie C.
Van Leeuwen, Arlan
Van Leeuwen, Clara G.
Van Leeuwen, Cornelia L.
Van Leeuwen, Harriet
Van Leeuwen, Jack
Van Leeuwen, John
Van Leeuwen, Letie
Van Leeuwen, Margie
Van Leeuwen, Paul
Van Leeuwen, William A.
Van Ravenswaay, Donald
Van Ryn Dairy
Van Ryn, Dick
Van Surksum, Anthonetta
Van Surksum, John
Van Veen, John
Van Vliet, Effie
Van Vliet, Hendrika
Van Vliet, Hugo
Van Vliet, Klaas

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Vande Witte, George	Vander Laan, Katie
Vanden Berge, Gertie	Vander Laan, Martin Jr.
Vanden Berge, Gertie	Vander Laan, Tillie
Vanden Berge, Jack	Vander Leest, Anna
Vanden Berge, Jake	Vander Leest, Ann
Vanden Brink, Stanley	Vander Meer, Alice
Vander Dussen, Agnes	Vander Meer, Dick
Vander Dussen, Cor	Vander Poel, Hank
Vander Dussen, Cornelius	Vander Poel, Pete
Vander Dussen, Edward	Vander Pol, Irene
Vander Dussen, Geraldine Marie	Vander Pol, Margie
Vander Dussen, James	Vander Pol, Marines
Vander Dussen, John	Vander Pol, William P.
Vander Dussen, Nelvina	Vander Schaaf, Earl
Vander Dussen, Rene	Vander Schaaf, Elizabeth
Vander Dussen, Sybrand Jr.	Vander Schaaf, Henrietta
Vander Dussen, Sybrand Sr.	Vander Schaaf, John
Vander Dussen Trustees	Vander Schaaf, Ted
Vander Eyk, Case Jr.	Vander Stelt, Catherine
Vander Eyk, Case Sr.	Vander Stelt, Clarence
Vander Feer, Peter	Vander Tuig, Arlene
Vander Feer, Rieka	Vander Tuig, Sylvester
Vander Laan, Ann	Vander Veen, Joe A.
Vander Laan, Ben	Vandervlag, Robert
Vander Laan, Bill	Vander Zwan, Peter
Vander Laan, Corrie	Vanderford, Betty W.
Vander Laan, Henry	Vanderford, Claud R.
Vander Laan, James	Vanderham, Adrian

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Vanderham, Cornelius
Vanderham, Cornelius P.
Vanderham, Cory
Vanderham, E. Jane
Vanderham, Marian
Vanderham, Martin
Vanderham, Pete C.
Vanderham, Wilma
Vasquez, Eleanor
Veenendaal, Evert
Veenendaal, John H.
Veiga, Dominick Sr.
Verbree, Jack
Verbree, Tillie
Verger, Bert
Verger, Betty
Verhoeven, Leona
Verhoeven, Martin
Verhoeven, Wesley
Vermeer, Dick
Vermeer, Jantina
Vernola Ranch
Vernola, Anthonietta
Vernola, Anthony
Vernola, Frank
Vernola, Mary Ann
Vernola, Pat F.
Vestal, Frances Lorraine
Vestal, J. Howard
Visser, Gerrit
Visser, Grace
Visser, Henry
Visser, Jess
Visser, Louie
Visser, Neil
Visser, Sam
Visser, Stanley
Visser, Tony D.
Visser, Walter G.
Von Der Ahe, Fredric T.
Von Euw, George
Von Euw, Marjorie
Von Lusk, a limited partnership
Voortman, Anna Marie
Voortman, Edward
Voortman, Edwin J.
Voortman, Gertrude Dena
Wagner, Richard H.
Walker, Carole R.
Walker, Donald E.
Walker, Wallace W.
Wardle, Donald M.
Warner, Dillon B.
Warner, Minnie
Wassenaar, Peter W.
Waters, Michael

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Weeda, Adriana	Wiersma, Jake
Weeda, Daniel	Wiersma, Otto
Weeks, O. L.	Wiersma, Pete
Weeks, Verona E.	Winchell, Verne H., Trustee
Weidman, Maurice	Wind, Frank
Weidman, Virginia	Wind, Fred
Weiland, Adaline I.	Wind, Hilda
Weiland, Peter J.	Wind, Johanna
Wesselink, Jules	Woo, Frank
West, Katharine R.	Woo, Sem Gee
West, Russel	Wybenga, Clarence
West, Sharon Ann	Wybenga, Gus
Western Horse Property	Wybenga, Gus K.
Westra, Alice	Wybenga, Sylvia
Westra, Henry	Wynja, Andy
Westra, Hilda	Wynja, Iona F.
Westra, Jake J.	Yellis, Mildred
Weststeyn, Freida	Yellis, Thomas E.
Weststeyn, Pete	Ykema-Harmsen Dairy
Whitehurst, Louis G.	Ykema, Floris
Whitehurst, Pearl L.	Ykema, Harriet
Whitmore, David L.	Yokley, Betty Jo
Whitmore, Mary A.	Yokley, Darrell A.
Whitney, Adolph M.	Zak, Zan
Wiersema, Harm	Zivelonghi, George
Wiersema, Harry	Zivelonghi, Margaret
Wiersma, Ellen H.	Zwaagstra, Jake
	Zwaagstra, Jessie M.
Wiersma, Gladys J.	Zwart, Case

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EXHIBIT "C"

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NON-PRODUCER WATER DISTRICTS

Chino Basin Municipal Water District

Chino Basin Water Conservation District

Pomona Valley Municipal Water District

Western Municipal Water District of Riverside County

EXHIBIT "C"

DEFAULTING OVERLYING AGRICULTURAL PRODUCERS

Cheryl L. Bain	Roy W. Lantis
Warren Bain	Sharon I. Lantis
John M. Barcelona	Frank Lorenz
Letty Bassler	Dagney H. MacDonald
John Brazil	Frank E. Martin
John S. Briano	Ruth C. Martin
Lupe Briano	Connie S. Mello
Paul A. Briano	Naldiro J. Mello
Tillie Briano	Felice Miller
Arnie B. Carlson	Ted Miller
John Henry Fikse	Masao Nerio
Phyllis S. Fikse	Tom K. Nerio
Lewellyn Flory	Toyo Nerio
Mary I. Flory	Yuriko Nerio
L. H. Glazer	Harold L. Rees
Dorothy Goodman	Alden G. Rose
Sidney D. Goodman	Claude Rouleau, Jr.
Frank Grossi	Patricia M. Rouleau
Harada Brothers	Schultz Enterprises
Ellen Hettinga	Albert Shaw
Hein Hettinga	Lila Shaw
Dick Hofstra, Jr.	Cathy M. Stewart
Benjamin M. Hughey	Marvin C. Stewart
Frieda L. Hughey	Betty Ann Stone
Guillaume Indart	John B. Stone
Ellwood B. Johnston, Trustee	Vantoll Cattle Co., Inc.
Perry Kruckenberg, Jr.	Catherene Verburg

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Martin Verburg

Donna Vincent

Larry Vincent

Cliff Wolfe & Associates

Ada M. Woll

Zarubica Co.

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EXHIBIT "C"

EXHIBIT "D"

OVERLYING NON-AGRICULTURAL RIGHTS

Party	Total Overlying Non-Agricultural Rights (Acre Feet)	Share of Safe Yield (Acre Feet)
Ameron Steel Producers, Inc.	125	97.858
County of San Bernardino	171	133.870
Conrock Company	406	317.844
Kaiser Steel Corporation	3,743	2,930.274
Red Star Fertilizer	20	15.657
Southern California Edison Co.	1,255	982.499
Space Center, Mira Loma	133	104.121
Southern Service Co., dba Blue Seal Linen	24	18.789
Sunkist, Orange Products Division	2,393	1,873.402
Carlsberg Mobile Home Properties, Ltd. '73	593	464.240
Union Carbide Corporation	546	427.446
Quaker Chemical Co.	0	0
Totals	9,409	7,366.000

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EXHIBIT "E"
APPROPRIATIVE RIGHTS

Party	Appropriative Right (Acre Feet)	Share of Initial Operating Safe Yield (Acre Feet)	Share of Operating Safe Yield (Percent)
City of Chino	5,271.7	3,670.067	6.693
City of Norco	289.5	201.545	0.368
City of Ontario	16,337.4	11,373.816	20.742
City of Pomona	16,110.5	11,215.852	20.454
City of Upland	4,097.2	2,852.401	5.202
Cucamonga County Water District	4,431.0	3,084.786	5.626
Jurupa Community Services District	1,104.1	768.655	1.402
Monte Vista County Water District	5,958.7	4,148.344	7.565
West San Bernardino County Water District	925.5	644.317	1.175
Etiwanda Water Company	768.0	534.668	0.975
Felspar Gardens Mutual Water Company	68.3	47.549	0.087
Fontana Union Water Co.	9,188.3	6,396.736	11.666
Marygold Mutual Water Co.	941.3	655.317	1.195
Mira Loma Water Co.	1,116.0	776.940	1.417
Monta Vista Irr. Co.	972.1	676.759	1.234
Mutual Water Company of Glen Avon Heights	672.2	467.974	0.853
Park Water Company	236.1	164.369	0.300
Pomona Valley Water Co.	3,106.3	2,162.553	3.944
San Antonio Water Co.	2,164.5	1,506.888	2.748
Santa Ana River Water Company	1,869.3	1,301.374	2.373
Southern California Water Company	1,774.5	1,235.376	2.253
West End Consolidated Water Company	1,361.3	947.714	1.728
TOTAL	78,763.8	54,834.000	100.000

EXHIBIT "F"
OVERLYING (AGRICULTURAL) POOL
POOLING PLAN

1. Membership in Pool. The State of California and all producers listed in Exhibit "C" shall be the initial members of this pool, which shall include all producers of water for overlying uses other than industrial or commercial purposes.

2. Pool Meetings. The members of the pool shall meet annually, in person or by proxy, at a place and time to be designated by Watermaster for purposes of electing members of the Pool Committee and conducting any other business of the pool. Special meetings of the membership of the pool may be called and held as provided in the rules of the pool.

3. Voting. All voting at meetings of pool members shall be on the basis of one vote for each 100 acre feet or any portion thereof of production from Chino Basin during the preceding year, as shown by the records of Watermaster.

4. Pool Committee. The Pool Committee for this pool shall consist of not less than nine (9) representatives selected at large by members of the pool. The exact number of members of the Pool Committee in any year shall be as determined by majority vote of the voting power of members of the pool in attendance at the annual pool meeting. Each member of the Pool Committee shall have one vote and shall serve for a two-year term. The members first elected shall classify themselves by lot so that approximately one-half serve an initial one-year term. Vacancies during any term shall be filled by a majority of the remaining members of the Pool Committee.

5. Advisory Committee Representatives. The number of

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representatives of the Pool Committee on the Advisory Committee shall be as provided in the rules of the pool from time to time but not exceeding ten (10). The voting power of the pool on the Advisory Committee shall be apportioned and exercised as determined from time to time by the Pool Committee.

6. Replenishment Obligation. The pool shall provide funds for replenishment of any production by persons other than members of the Overlying (Non-agricultural) Pool or Appropriator Pool, in excess of the pool's share of Safe Yield. During the first five (5) years of operations of the Physical Solution, reasonable efforts shall be made by the Pool Committee to equalize annual assessments.

7. Assessments. All assessments in this pool (whether for replenishment water cost or for pool administration or the allocated share of Watermaster administration) shall be in an amount uniformly applicable to all production in the pool during the preceding year or calendar quarter. Provided, however, that the Agricultural Pool Committee, may recommend to the Court modification of the method of assessing pool members, inter se, if the same is necessary to attain legitimate basin management objectives, including water conservation and avoidance of undesirable socio-economic consequences. Any such modification shall be initiated and ratified by one of the following methods:

(a) Excess Production. In the event total pool production exceeds 100,000 acre feet in any year, the Pool Committee shall call and hold a meeting, after notice to all pool members, to consider remedial modification of the assessment formula.

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(b) Producer Petition. At any time after the fifth full year of operation under the Physical Solution, a petition by ten percent (10%) of the voting power or membership of the Pool shall compel the holding of a noticed meeting to consider revision of said formula of assessment for replenishment water.

In either event, a majority action of the voting power in attendance at such pool members' meeting shall be binding on the Pool Committee.

8. Rules. The Pool Committee shall adopt rules for conducting meetings and affairs of the committee and for administering its program and in amplification of the provisions, but not inconsistent with, this pooling plan.

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EXHIBIT "G"
OVERLYING (NON-AGRICULTURAL) POOL
POOLING PLAN

1. Membership in Pool. The initial members of the pool, together with the decreed share of the Safe Yield of each, are listed in Exhibit "D". Said pool includes producers of water for overlying industrial or commercial (non-agricultural) purposes, or such producers within the Pool who may hereafter take water pursuant to Paragraph 8 hereof.

2. Pool Committee. The Pool Committee for this pool shall consist of one representative designated by each member of the pool. Voting on the committee shall be on the basis of one vote for each member, unless a volume vote is demanded, in which case votes shall be allocated as follows:

> The volume voting power on the Pool Committee shall be 1,484 votes. Of these, 742 votes shall be allocated on the basis of one vote for each ten (10) acre feet or fraction thereof of decreed shares in Safe Yield. (See Exhibit "D".) The remaining 742 votes shall be allocated proportionally on the basis of assessments paid to Watermaster during the preceding year.*

3. Advisory Committee Representatives. At least three (3) members of the Pool Committee shall be designated by said committee to serve on the Advisory Committee. The exact number of such representatives at any time shall be as determined by the Pool Committee. The voting power of the pool shall be exercised in the

*Or production assessments paid under Water Code Section 72140 et seq., as to years prior to the second year of operation under the Physical Solution hereunder.

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Advisory Committee as a unit, based upon the vote of a majority of said representatives.

4. Replenishment Obligation. The pool shall provide funds for replenishment of any production in excess of the pool's share of Safe Yield in the preceding year.

5. Assessment. Each member of this pool shall pay an assessment equal to the cost of replenishment water times the number of acre feet of production by such producer during the preceding year in excess of (a) his decreed share of the Safe Yield, plus (b) any carry-over credit under Paragraph 7 hereof. In addition, the cost of the allocated share of Watermaster administration expense shall be recovered on an equal assessment against each acre foot of production in the pool during such preceding fiscal year or calendar quarter; and in the case of Pool members who take substitute ground water as set forth in Paragraph 8 hereof, such producer shall be liable for its share of administration assessment, as if the water so taken were produced, up to the limit of its decreed share of Safe Yield.

6. Assignment. Rights herein decreed are appurtenant to the land and are only assignable with the land for overlying use thereon; provided, however, that any appropriator who may, directly or indirectly, undertake to provide water service to such overlying lands may, by an appropriate agency agreement on a form approved by Watermaster, exercise said overlying right to the extent, but only to the extent necessary to provide water service to said overlying lands.

7. Carry-over. Any member of the pool who produces less than its assigned water share of Safe Yield may carry such unexercised

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right forward for exercise in subsequent years. The first water produced during any such subsequent year shall be deemed to be an exercise of such carry-over right. In the event the aggregate carry-over by any pool member exceeds its share of Safe Yield, such member shall, as a condition of preserving such surplus carry-over, execute a storage agreement with Watermaster.

8. Substitute Supplies. To the extent that any Pool member, at the request of Watermaster and with the consent of the Advisory Committee, takes substitute surface water in lieu of producing ground water otherwise subject to production as an allocated share of Safe Yield, said party shall nonetheless remain a member of this Pool.

9. Rules. The Pool Committee shall adopt rules for administering its program and in amplification of the provisions, but not inconsistent with, this pooling plan.

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EXHIBIT "H"
APPROPRIATIVE POOL
POOLING PLAN

1. Qualification for Pool. Any city, district or other public entity and public utility -- either regulated under Public Utilities Commission jurisdiction, or exempt therefrom as a non-profit mutual water company (other than those assigned to the Overlying [Agricultural] Pool) -- shall be a member of this pool. All initial members of the pool are listed in Exhibit "E", together with their respective appropriative rights and acre foot allocation and percentage shares of the initial and subsequent Operating Safe Yield.

2. Pool Committee. The Pool Committee shall consist of one (1) representative appointed by each member of the Pool.

3. Voting. The total voting power on the Pool Committee shall be 1,000 votes. Of these, 500 votes shall be allocated in proportion to decreed percentage shares in Operating Safe Yield. The remaining 500 votes shall be allocated proportionally on the basis of assessments paid to Watermaster during the preceding year.* Routine business of the Pool Committee may be conducted on the basis of one vote per member, but upon demand of any member a weighted vote shall be taken. Affirmative action of the Committee shall require a majority of the voting power of members in attendance, provided that it includes concurrence by at least one-third of its total members.

4. Advisory Committee Representatives. Ten (10) members of

*Or production assessments paid under Water Code Section 72140 et seq., as to years prior to the second year of operation under the Physical Solution hereunder.

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the Pool Committee shall be designated to represent this pool on the Advisory Committee. Each major appropriator, i.e., the owner of an adjudicated appropriative right in excess of 3,000 acre feet, shall be entitled to one representative. The remaining members representing the Appropriative Pool on the Advisory Committee shall be elected at large by the remaining members of the pool. The voting power of the Appropriative Pool on the Advisory Committee shall be apportioned between the major appropriator representatives in proportion to their respective voting power in the Pool Committee. The remaining two representatives shall exercise equally the voting power proportional to the Pool Committee voting power of all remaining appropriators; provided, however, that if any representative fails to attend an Advisory Committee meeting, the voting power of that representative shall be allocated among the representatives of the Appropriator Pool in attendance in the same proportion as their own respective voting powers.

5. Replenishment Obligation. The pool shall provide funds for purchase of replenishment water to replace any production by the pool in excess of Operating Safe Yield during the preceding year.

6. Administrative Assessment. Costs of administration of this pool and its share of general Watermaster expense shall be recovered by a uniform assessment applicable to all production during the preceding year.

7. Replenishment Assessment. The cost of replenishment water required to replace production from Chino Basin in excess of Operating Safe Yield in the preceding year shall be allocated and recovered as follows:

(a) For production, other than for increased export, within CBMWD or WMWD:

(1) Gross Assessment. 15% of such replenishment water costs shall be recovered by a uniform assessment against all production of each appropriator producing in said area during the preceding year.

(2) Net Assessment. The remaining 85% of said costs shall be recovered by a uniform assessment on each acre foot of production from said area by each such appropriator in excess of his allocated share of Operating Safe Yield during said preceding year.

(b) For production which is exported for use outside Chino Basin in excess of maximum export in any year through 1976, such increased export production shall be assessed against the exporting appropriator in an amount sufficient to purchase replenishment water from CBMWD or WMWD in the amount of such excess.

(c) For production within SBVMWD or PVMWD:

By an assessment on all production in excess of an appropriator's share of Operating Safe Yield in an amount sufficient to purchase replenishment water through SBVMWD or MWD in the amount of such excess.

8. Socio-Economic Impact Review. The parties have conducted certain preliminary socio-economic impact studies. Further and more detailed socio-economic impact studies of the assessment formula and its possible modification shall be undertaken for the Appropriator Pool by Watermaster no later than ten (10) years from the effective date of this Physical Solution, or whenever total

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production by this pool has increased by 30% or more over the decreed appropriative rights, whichever is first.

9. Facilities Equity Assessment. Watermaster may, upon recommendation of the Pool Committee, institute proceedings for levy and collection of a Facilities Equity Assessment for the purposes and in accordance with the procedures which follow:

(a) Implementing Circumstances. There exist several sources of supplemental water available to Chino Basin, each of which has a differential cost and quantity available. The optimum management of the entire Chino Basin water resource favors the maximum use of the lowest cost supplemental water to balance the supplies of the Basin, in accordance with the Physical Solution. The varying sources of supplemental water include importations from MWD and SBVMWD, importation of surface and ground water supplies from other basins in the immediate vicinity of Chino Basin, and utilization of reclaimed water. In order to fully utilize any of such alternate sources of supply, it will be essential for particular appropriators having access to one or more of such supplies to have invested, or in the future to invest, directly or indirectly, substantial funds in facilities to obtain and deliver such water to an appropriate point of use. To the extent that the use of less expensive alternate sources of supplemental water can be maximized by the inducement of a Facilities Equity Assessment, as herein provided, it is to the long-term benefit of the entire basin that such assessment be authorized and levied by Watermaster.

(b) Study and Report. At the request of the Pool

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Committee, Watermaster shall undertake a survey study of the utilization of alternate supplemental supplies by members of the Appropriative Pool which would not otherwise be utilized and shall prepare a report setting forth the amount of such alternative supplies being currently utilized, the amount of such supplies which could be generated by activity within the pool, and the level of cost required to increase such uses and to optimize the total supplies available to the basin. Said report shall contain an analysis and recommendation for the levy of a necessary Facilities Equity Assessment to accomplish said purpose.

(c) Hearing. If the said report by Watermaster contains a recommendation for imposition of a Facilities Equity Assessment, and the Pool Committee so requests, Watermaster shall notice and hold a hearing not less than 60 days after distribution of a copy of said report to each member of the pool, together with a notice of the hearing date. At such hearing, evidence shall be taken with regard to the necessity and propriety of the levy of a Facilities Equity Assessment and full findings and decision shall be issued by Watermaster.

(d) Operation of Assessment. If Watermaster determines that it is appropriate that a Facilities Equity Assessment be levied in a particular year, the amount of additional supplemental supplies which should be generated by such assessment shall be estimated. The cost of obtaining such supplies, taking into consideration the investment in necessary facilities shall then be determined and spread equitably among the producers within the pool in a manner so that those

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producers not providing such additional lower cost supplemental water, and to whom a financial benefit will result, may bear a proportionate share of said costs, not exceeding said benefit; provided that any producer furnishing such supplemental water shall not thereby have its average cost of water in such year reduced below such producer's average cost of pumping from the Basin. In so doing, Watermaster shall establish a percentage of the total production by each party which may be produced without imposition of a Facilities Equity Assessment. Any member of the pool producing more water than said percentage shall pay such Facilities Equity Assessment on any such excess production. Watermaster is authorized to transmit and pay the proceeds of such Facilities Equity Assessment to those producers who take less than their share of Basin water by reason of furnishing a higher percentage of their requirements through use of supplemental water.

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10. <u>Unallocated Safe Yield Water</u>. To the extent that, in any five years, any portion of the share of Safe Yield allocated to the Overlying (Agricultural) Pool is not produced, such water shall be available for reallocation to members of the Appropriative Pool, as follows:

(a) <u>Priorities</u>. Such allocation shall be made in the following sequence:

(1) to supplement, in the particular year, water available from Operating Safe Yield to compensate for any reduction in the Safe Yield by reason of recalculation thereof after the tenth year of operation hereunder.

(2) pursuant to conversion claims as defined in Subparagraph (b) hereof.

(3) as a supplement to Operating Safe Yield, without regard to reductions in Safe Yield.

(b) Conversion Claims. The following procedures may be utilized by any appropriator:

(1) Record of Land Use Conversion. Any appropriator who undertakes, directly or indirectly, during any year, to permanently provide water service to lands which during the immediate preceding five (5) consecutive years was devoted to irrigated agriculture may report such change in land use or water service to Watermaster. Watermaster shall thereupon verify such change in water service and shall maintain a record and account for each appropriator of the total acreage involved and the average annual water use during said five-year period.

(2) Establishment of Allocation Percentage. In any year in which unallocated Safe Yield water from the Overlying (Agricultural) Pool is available for such conversion claims, Watermaster shall establish allocable percentages for each appropriator based upon the total of such converted acreage recorded to each such appropriator's account.

(3) Allocation and Notice. Watermaster shall thereafter apply the allocated percentage to the total unallocated Safe Yield water available for special allocation to derive the amount thereof allocable to

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each appropriator; provided that in no event shall the allocation to any appropriator as a result of such conversion claim exceed 50% of the average annual amount of water actually applied to the areas converted by such appropriator prior to such conversion. Any excess water by reason of such limitation on any appropriator's right shall be added to Operating Safe Yield. Notice of such special allocation shall be given to each appropriator and shall be treated for purposes of this Physical Solution as an addition to such appropriator's share of the Operating Safe Yield for the particular year only.

(4) Administrative Costs. Any costs of Watermaster attributable to administration of such special allocations and conversion claims shall be assessed against appropriators participating in such reporting.

11. In Lieu Procedures. There are, or may develop, certain areas within Chino Basin where good management practices dictate that recharge of the basin be accomplished, to the extent practical, by taking surface supplies of supplemental water in lieu of ground water otherwise subject to production as an allocated share of Operating Safe Yield.

(a) Method of Operation. Any appropriator producing water within such designated in lieu area who is willing to abstain for any reason from producing any portion of such producer's share of Operating Safe Yield in any year may offer such unpumped water to Watermaster. In such event, Watermaster shall purchase said water in place, in lieu of spreading replenishment water, which is otherwise required to

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make up for over production. The purchase price for in lieu water shall be the lesser of:

(1) Watermaster's current cost of replenishment water, whether or not replenishment water is currently then obtainable, plus the cost of spreading; or

(2) The cost of supplemental surface supplies to the appropriator, less

a. said appropriator's average cost of ground water production, and

b. the applicable production assessment were the water produced.

Where supplemental surface supplies consist of MWD or SBVMWD supplies, the cost of treated, filtered State water from such source shall be deemed the cost of supplemental surface supplies to the appropriator for purposes of such calculation.

In any given year in which payments may be made pursuant to a Facilities Equity Assessment, as to any given quantity of water the party will be entitled to payment under this section or pursuant to the Facilities Equity Assessment, as the party elects, but not under both.

(b) Designation of In Lieu Areas. The first in lieu area is designated as the "In Lieu Area No. 1" and consists of an area wherein nitrate levels in the ground water generally exceed 45 mg/l, and is shown on Exhibit "J" hereto. Other in lieu areas may be designated by subsequent order of Watermaster upon recommendation or approval by Advisory Committee. Said in lieu areas may be enlarged, reduced or

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eliminated by subsequent orders; provided, however, that designation of In Lieu Areas shall be for a minimum fixed term sufficient to justify necessary capital investment. In Lieu Area No. 1 may be enlarged, reduced or eliminated in the same manner, except that any reduction of its original size or elimination thereof shall require the prior order of Court.

12. Carry-over. Any appropriator who produces less than his assigned share of Operating Safe Yield may carry such unexercised right forward for exercise in subsequent years. The first water produced during any such subsequent year shall be deemed to be an exercise of such carry-over right. In the event the aggregate carry-over by any appropriator exceeds its share of Operating Safe Yield, such appropriator shall, as a condition of preserving such surplus carry-over, execute a storage agreement with Watermaster. Such appropriator shall have the option to pay the gross assessment applicable to such carry-over in the year in which it accrued.

13. Assignment, Transfer and Lease. Appropriative rights, and corresponding shares of Operating Safe Yield, may be assigned or may be leased or licensed to another appropriator for exercise in a given year. Any transfer, lease or license shall be ineffective until written notice thereof is furnished to and approved as to form by Watermaster, in compliance with applicable Watermaster rules. Watermaster shall not approve transfer, lease or license of a right for exercise in an area or under conditions where such production would be contrary to sound basin management or detrimental to the rights or operations of other producers.

14. Rules. The Pool Committee shall adopt rules for

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administering its program and in amplification of the provisions, but not inconsistent with, this pooling plan.

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EXHIBIT "I"

ENGINEERING APPENDIX

1. Basin Management Parameters. In the process of implementing the physical solution for Chino Basin, Watermaster shall consider the following parameters:

(a) Pumping Patterns. Chino Basin is a common supply for all persons and agencies utilizing its waters. It is an objective in management of the Basin's waters that no producer be deprived of access to said waters by reason of unreasonable pumping patterns, nor by regional or localized recharge of replenishment water, insofar as such result may be practically avoided.

(b) Water Quality. Maintenance and improvement of water quality is a prime consideration and function of management decisions by Watermaster.

(c) Economic Considerations. Financial feasibility, ecnomic impact and the cost and optimum utilization of the Basin's resources and the physical facilities of the parties are objectives and concerns equal in importance to water quantity and quality parameters.

2. Operating Safe Yield. Operating Safe Yield in any year shall consist of the Appropriative Pool's share of Safe Yield of the Basin, plus any controlled overdraft of the Basin which Watermaster may authorize. In adopting the Operating Safe Yield for any year, Watermaster shall be limited as follows:

(a) Accumulated Overdraft. During the operation of this Judgment and Physical Solution, the overdraft accumulated from and after the effective date of the Physical

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Solution and resulting from an excess of Operating Safe Yield over Safe Yield shall not exceed 200,000 acre feet.

(b) Quantitative Limits. In no event shall Operating Safe Yield in any year be less than the Appropriative Pool's share of Safe Yield, nor shall it exceed such share of Safe Yield by more than 10,000 acre feet. The initial Operating Safe Yield is hereby set at 54,834 acre feet per year. Operating Safe Yield shall not be changed upon less than five (5) years' notice by Watermaster.

Nothing contained in this paragraph shall be deemed to authorize, directly or indirectly, any modification of the allocation of shares in Safe Yield to the overlying pools, as set forth in Paragraph 44 of the Judgment.

3. Ground Water Storage Agreements. Any agreements authorized by Watermaster for storage of supplemental water in the available ground water storage capacity of Chino Basin shall include, but not be limited to:

(a) The quantities and term of the storage right.

(b) A statement of the priority or relation of said right, as against overlying or Safe Yield uses, and other storage rights.

(c) The procedure for establishing delivery rates, schedules and procedures which may include

[1] spreading or injection, or

[2] in lieu deliveries of supplemental water for direct use.

(d) The procedures for calculation of losses and annual accounting for water in storage by Watermaster.

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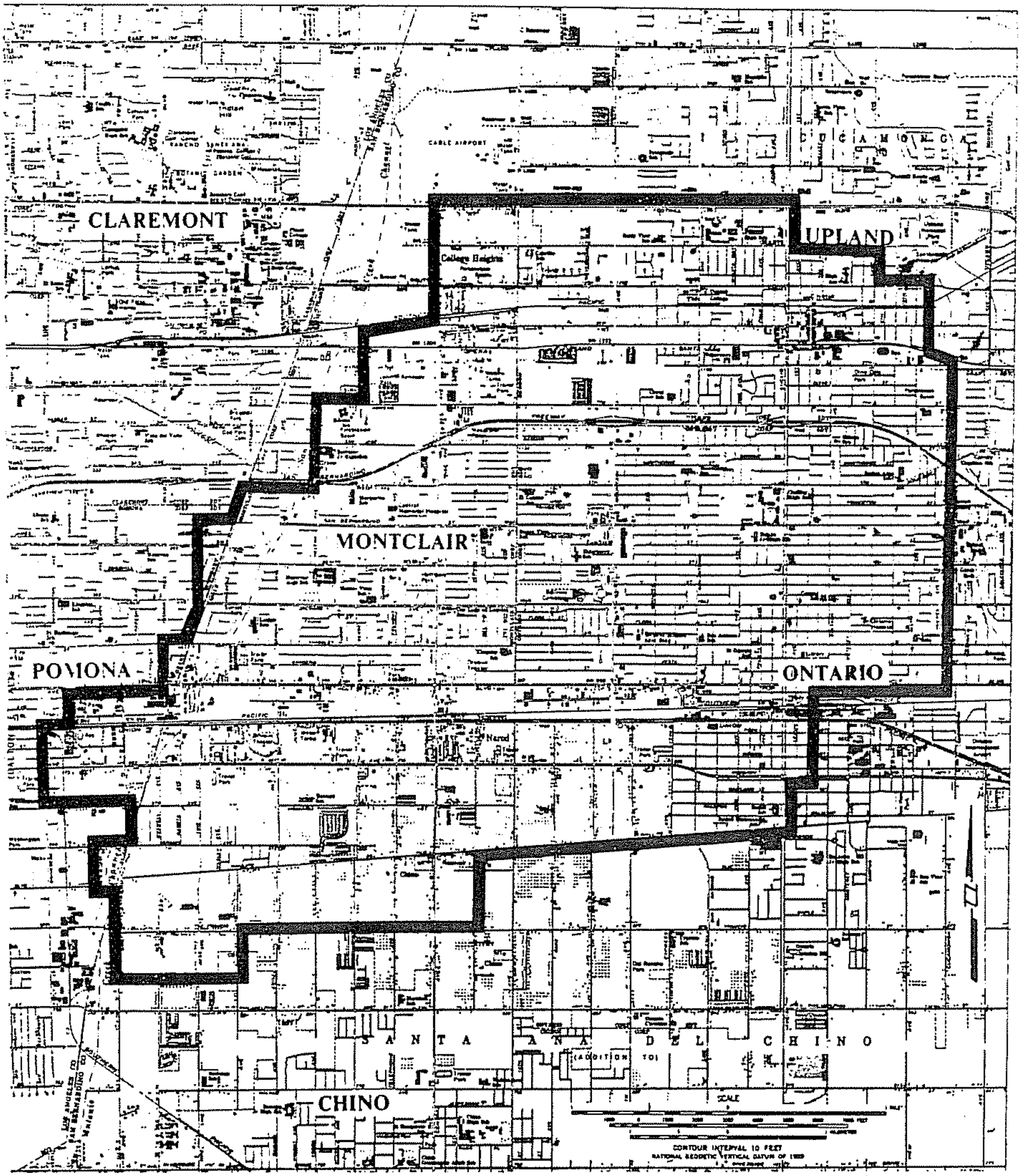
IRVINE, CALIFORNIA 92715
(714) 752-8971

(e) The procedures for establishment and administration of withdrawal schedules, locations and methods.

LAW OFFICES
DONALD D. STARK
A PROFESSIONAL CORPORATION
SUITE 201
2061 BUSINESS CENTER DRIVE
IRVINE, CALIFORNIA 92715
(714) 752-8971



CHINO BASIN

IN LIEU AREA NO. 1

EXHIBIT "J"

LEGAL DESCRIPTION

OF CHINO BASIN

Preamble

All of the townships and ranges referred to in the following legal description are the San Bernardino Base and Meridian. Certain designated sections are implied as the System of Government Surveys may be extended where not established. Said sections are identified as follows:

Section 20, T1N, R8W is extended across Rancho Cucamonga;

Section 36, T1N, R8W is extended across the City of Upland;

Sections 2, 3, and 4, T1S, R7W are extended across Rancho Cucamonga;

Section 10, T1S, R8W is extended across the City of Claremont;

Sections 19, 20, 21, 30, 31 and 32, T1S, R8W are extended across the City of Pomona;

Sections 4, 5, and 28, T2S, R8W are extended across Rancho Santa Ana Del Chino;

Sections 15 and 16, T3S, R7W are extended across Rancho La Sierra; and

Sections 17 and 20, T3S, R7W are extended across Rancho El Rincon.

Description

Chino Basin is included within portions of the Counties of San Bernardino, Riverside and Los Angeles, State of California, bounded by a continuous line described as follows:

BEGINNING at the Southwest corner of Lot 241 as shown on Map of Ontario Colony Lands, recorded in Map Book 11, page 6, Office of the County Recorder of San Bernardino County, said corner being the Point of Beginning;

1. Thence Southeasterly to the Southeast corner

of Lot 419 of said Ontario Colony Lands;

2. Thence Southeasterly to a point 1300 feet North of the South line and 1300 feet East of the West line of Section 4, T1S, R7W;

3. Thence Easterly to a point on the East line of Section 4, 1800 feet North of the Southeast corner of said Section 4;

4. Thence Easterly to the Southeast corner of the Southwest quarter of the Northeast quarter of Section 3, T1S, R7W;

5. Thence Northeasterly to a point on the North line of Section 2, T1S, R7W, 1400 feet East of the West line of said Section 2;

6. Thence Northeasterly to the Southwest corner of Section 18, T1N, R6W;

7. Thence Northerly to the Northwest corner of said Section 18;

8. Thence Easterly to the Northeast corner of said Section 18;

9. Thence Northerly to the Northwest corner of the Southwest quarter of Section 8, T1N, R6W;

10. Thence Easterly to the Northeast corner of said Southwest quarter of said Section 8;

11. Thence Southerly to the Southeast corner of said Southwest quarter of said Section 8;

12. Thence Easterly to the Northeast corner of Section 17, T1N, R6W;

13. Thence Easterly to the Northeast corner of Section 16, T1N, R6W;

14. Thence Southeasterly to the Northwest corner of the Southeast quarter of Section 15, T1N, R6W;

15. Thence Easterly to the Northeast corner of said Southeast quarter of said Section 15;

16. Thence Southeasterly to the Northwest corner of the Northeast quarter of Section 23, T1N, R6W;

17. Thence Southeasterly to the Northwest corner

of Section 25, T1N, R6W;

18. Thence Southeasterly to the Northwest corner of the Northeast quarter of Section 31, T1N, R5W;

19. Thence Southeasterly to the Northeast corner of the Northwest quarter of Section 5, T1S, R5W;

20. Thence Southeasterly to the Southeast corner of Section 4, T1S, R5W;

21. Thence Southeasterly to the Southeast corner of the Southwest quarter of Section 11, T1S, R5W;

22. Thence Southwesterly to the Southwest corner of Section 14, T1S, R5W;

23. Thence Southwest to the Southwest corner of Section 22, T1S, R5W;

24. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 6, T2S, R5W;

25. Thence Southeasterly to the Northeast corner of Section 18 T2S, R5W;

26. Thence Southwesterly to the Southwest corner of the Southeast quarter of Section 13, T2S, R6W;

27. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 26, T2S, R6W;

28. Thence Westerly to the Southwest corner of the Northwest quarter of said Section 26;

29. Thence Northerly to the Northwest corner of said Section 26;

30. Thence Westerly to the Southwest corner of Section 21, T2S, R6w:

31. Thence Southerly to the Southeast corner of Section 29, T2S, R6W;

32. Thence Westerly to the Southeast corner of Section 30, T2S, R6W;

33. Thence Southwesterly to the Southwest corner of Section 36, T 2 S, R 7 W;

34. Thence Southwesterly to the Southeast corner

of Section 3, T3S, R7W;

35. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 10, T3S, R7W;

36. Thence Southerly to the Northeast corner of the Northwest quarter of Section 15, T3S, R7W;

37. Thence Southwesterly to the Southeast corner of the Northeast quarter of Section 16, T3S, R7W;

38. Thence Southwesterly to the Southwest corner of said Section 16;

39. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 20, T3S, R7W;

40. Thence Westerly to the Southwest corner of the Northwest quarter of said Section 20;

41. Thence Northerly to the Northwest corner of Section 17, T3S, R7W;

42. Thence Westerly to the Southwest corner of Section 7, T3S, R7W;

43. Thence Northerly to the Southwest corner of Section 6, T3S, R7W;

44. Thence Westerly to the Southwest corner of Section 1, T3S, R8W;

45. Thence Northerly to the Southeast corner of Section 35, T2S, R8W;

46. Thence Northwesterly to the Northwest corner of said Section 35;

47. Thence Northerly to the Southeast corner of Lot 33, as shown on Map of Tract 3193, recorded in Map Book 43, pages 46 and 47, Office of the County Recorder of San Bernardino County;

48. Thence Westerly to the Northwest corner of the Southwest quarter of Section 28, T2S, R8W;

49. Thence Northerly to the Southwest corner of Section 4, T2S, R8W;

50. Thence Westerly to the Southwest corner of Section 5, T2S, R8W;

51. Thence Northerly to the Southwest corner of Section 32, T1S, R8W;

52. Thence Westerly to the Southwest corner of Section 31, T1S, R8W;

53. Thence Northerly to the Southwest corner of Section 30, T1S, R8W;

54. Thence Northeasterly to the Southwest corner of Section 20, T1S, R8W;

55. Thence Northerly to the Northwest corner of the Southwest quarter of the Southwest quarter of said Section 20;

56. Thence Northwesterly to the Northeast corner of the Southeast quarter of the Southeast quarter of the Northwest quarter of Section 19, T1S, R8W;

57. Thence Easterly to the Northwest corner of Section 21, T1S, R8W;

58. Thence Northeasterly to the Southeast corner of the Southwest quarter of the Southwest quarter of Section 10, T1S, R8W;

59. Thence Northeasterly to the Southwest corner of Section 2, T1S, R8W;

60. Thence Northeasterly to the Southeast corner of the Northwest quarter of the Northwest quarter of Section 1, T1S, R8W;

61. Thence Northerly to the Northeast corner of the Northwest quarter of the Northeast quarter of Section 36, T1N, R8W;

62. Thence Northerly to the Southeast corner of Section 24, T1N, R8W;

63. Thence Northeasterly to the Southeast corner of the Northwest quarter of the Northwest quarter of Section 20, T1N, R7W; and

64. Thence Southerly to the Point of Beginning.

Sections Included

Said perimeter description includes all or portions of the following Townships, Ranges and Sections of San Bernardino Base and Meridian:

T1N, R5W - Sections:	30, 31 and 32
T1N, R6W - Sections:	8, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36
T1N, R7W - Sections:	19, 20, 24, 25, 26, 29, 30, 31, 32, 35 and 36
T1N, R8W - Sections:	25 and 36
T1S, R5W - Sections:	4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 28, 29, 30, 31 and 32.
T1S, R6W - Sections:	1 through 36, inclusive
T1S, R7W - Sections:	1 through 36, inclusive
T1S, R8W - Sections:	1, 2, 10, 11, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36
T2S, R5W - Sections:	6, 7 and 18
T2S, R6W - Sections:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 29, 30 and 31
T2S, R7W - Sections:	1 through 36, inclusive
T2S, R8W - Sections:	1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 35 and 36
T3S, R7W - Sections:	2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17 and 20
T3S, R8W - Section:	1.

SUPERIOR COURT OF CALIFORNIA · COUNTY OF SAN BERNARDINO · OFFICIAL SEAL

THE DOCUMENT TO WHICH THIS CERTIFICATION IS ATTACHED IS A FULL, TRUE AND CORRECT COPY OF THE ORIGINAL ON FILE AND OF RECORD IN MY OFFICE.

ATTEST OCT 2 9 2002

Clerk of the Superior Court of the State of California, in and for the County of San Bernardino

By Terry Wittenborn Deputy

Terry Wittenborn

92 pages

E

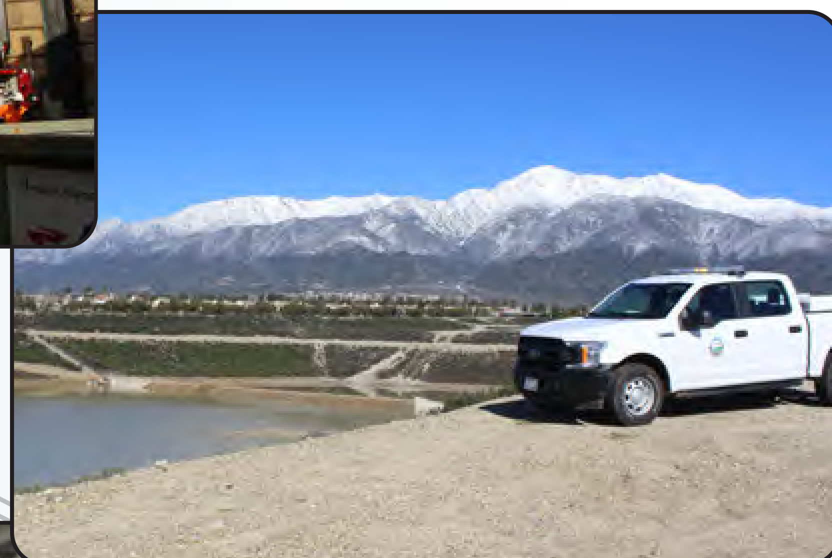
Appendix E. Chino Basin 2020 Optimum Basin Management Program

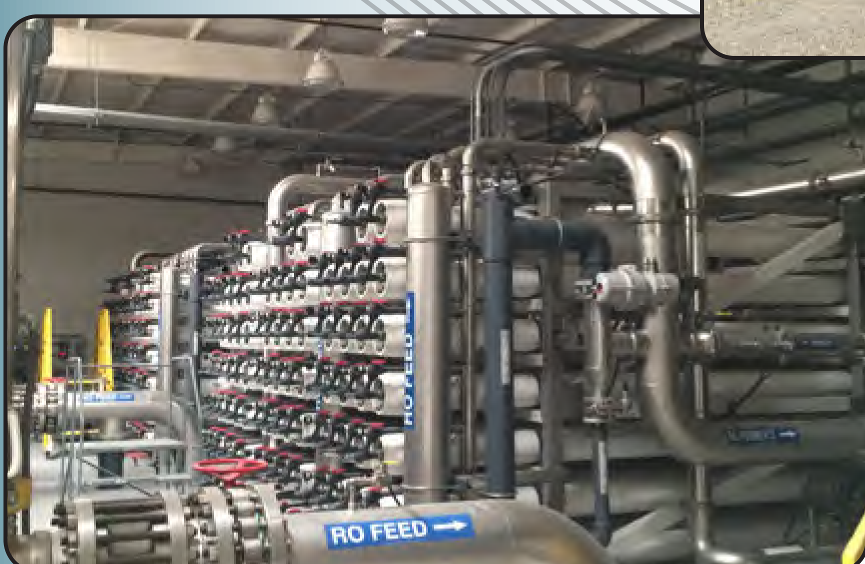
2020

Optimum Basin Management Program Update Report

Prepared for:

Chino Basin Watermaster
Partners in Basin Management





January 2020

WEI
Wildermuth Environmental, Inc.

To: Chino Basin Watermaster Stakeholders

From: Watermaster 2020 OBMP Update Team

Subject: 2020 Optimum Basin Management Program Update Report

Date: Draft November 22, 2019; Final January 24, 2020

Table of Contents

List of Inset Tables

List of Attached Exhibits

1.0 Introduction and Background

In September 2018, the Chino Basin Watermaster (Watermaster) initiated the process to update its Optimum Basin Management Program (OBMP) and the associated Implementation Plan. A detailed description of the development of the 2000 OBMP and the rationale for and process to prepare the 2020 OBMP Update was described in a white paper prepared for the stakeholders: *White Paper – 2020 Update to Chino Basin Optimum Basin Management Program* (OBMP White Paper). The OBMP White Paper is included herein as Appendix A.

The purpose of this *2020 Optimum Basin Management Program Update Report* (2020 OBMP Update Report) is to document the stakeholder process to update the OBMP and describe the recommended 2020 OBMP management plan. The management plan will form the foundation for Watermaster and the Chino Basin Judgment Parties (hereafter, Parties[1]) to develop a final implementation plan (the 2020 OBMP Implementation Plan) and the agreements necessary to implement it. The draft 2020 OBMP Update Report was released for stakeholder review and comment on November 22, 2019. This version reflects changes made in response to comments received. A record of the comments received and the responses provided by Watermaster are included herein as Appendix B.

1.1 History of the OBMP and its Implementation

The Chino Basin Judgment invested Watermaster with the discretionary authority to develop an OBMP for the Chino Basin, including both water quantity and quality considerations. Paragraph 41 (within the Physical Solution), states:

> 41. Watermaster Control. Watermaster, with the advice of the Advisory and Pool Committees, is granted discretionary powers in order to develop an optimum basin management program for Chino Basin, including both water quantity and quality considerations. Withdrawals and supplemental water replenishment of Basin Water, and the full utilization of the water resources of Chino Basin, must be subject to procedures established by and administered through Watermaster with the advice and assistance of the Advisory and Pool Committees composed of the affected producers. Both the quantity and quality of said water resources may thereby be preserved and the beneficial utilization of the Basin maximized.[2]

1.1.1 The OBMP and the Peace Agreement

Watermaster, at the direction of the Court, began developing the OBMP in 1998 and completed it in July 2000. The OBMP was developed in a collaborative public process that identified the needs and wants of all stakeholders, described the physical state of the groundwater basin, defined a set of management goals, characterized impediments to those goals, and developed a series of actions that could be taken to remove the impediments and achieve the management goals. This work was documented in the *Optimum Basin Management Program – Phase I Report* (OBMP Phase 1 Report).[3]

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[1] Defined terms in the Court Approved Management Agreements will appear with the first letter of each word capitalized.

[2] See Restated Judgment, ¶ 41

[3] WEI. (1999). *Optimum Basin Management Program – Phase I Report*. Prepared for the Chino Basin Watermaster. August 19, 1999. http://www.cbwm.org/docs/engdocs/OBMP%20-%20Phase%20I%20(Revised%20DigDoc).pdf

The four goals of the 2000 OBMP included:

Goal 1 – Enhance Basin Water Supplies

Goal 2 – Protect and Enhance Water Quality

Goal 3 – Enhance Management of the Basin

Goal 4 – Equitably Finance the OBMP

The actions defined by the stakeholders to remove impediments to the OBMP goals were logically grouped into sets of coordinated activities called Program Elements (PEs), each of which included a list of implementation actions and an implementation schedule. The nine PEs defined in the 2000 OBMP included:

PE 1 – Develop and Implement Comprehensive Monitoring Program. The objectives of the comprehensive monitoring program are to collect the data necessary to support the implementation of the other eight PEs and periodic updates to the *State of the Basin Report*.[4]

PE 2 – Develop and Implement Comprehensive Recharge Program. The objectives of the comprehensive recharge program include increasing stormwater recharge to offset the recharge lost due to channel lining, to increase Safe Yield, and to ensure that there will be enough supplemental water recharge capacity available to Watermaster to meet its Replenishment Obligations.

PE 3 – Develop and Implement a Water Supply Plan for Impaired Areas. The objective of this program is to maintain and enhance Safe Yield with a groundwater desalting program that is designed to replace declining agricultural groundwater pumping in the southern part of the basin with new pumping to meet increasing municipal water demands in the same area, to minimize groundwater outflow to the Santa Ana River, and to increase Santa Ana River recharge into the basin.

PE 4 – Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1. The objectives of this land subsidence management program are to characterize the spatial and temporal occurrence of land subsidence, to identify its causes, and, where appropriate, to develop and implement a program to minimize or stop land subsidence.

PE 5 – Develop and Implement Regional Supplemental Water Program. The objective of this program is to improve the regional conveyance and availability of imported and recycled waters throughout the basin.

PE 6 – Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management. The objectives of this water quality management program are to identify water quality trends in the basin and the impact of the OBMP implementation on them, to determine whether point and non-point contamination sources are being addressed by water quality regulators, and to collaborate with water-quality regulators to identify and facilitate the cleanup of soil and groundwater contamination.

[4] See for example: WEI (2019). *Optimum Basin Management Program 2018 State of the Basin Report*. Prepared for the Chino Basin Watermaster. June 2018.

PE 7 – Develop and Implement Salt Management Plan. The objectives of this salinity management program are to characterize current and future salt and nutrient conditions in the basin and to develop and implement a plan to manage them.

PE 8 – Develop and Implement Groundwater Storage Management Program. The objectives of this storage program are to implement and periodically update a storage management plan that prevents overdraft, protects water quality, and ensures equity among the Parties, and to periodically recalculate Safe Yield. This PE explicitly defined the storage management plan, including a "Safe Storage Capacity" for the managed storage of 500,000 acre-feet (af)–inclusive of Local and Supplemental Storage and Storage and Recovery Programs.

PE 9 – Develop and Implement Storage and Recovery Programs. The objectives of this conjunctive use program are to develop Storage and Recovery Programs that will provide broad mutual benefit to the Parties and ensure that Basin Water and storage capacity are put to maximum beneficial use while causing no Material Physical Injury (MPI).

The PEs and their associated implementation actions were incorporated into a recommended management plan. The Parties used the management plan as the basis for developing the OBMP Implementation Plan and an agreement (the Peace Agreement) to implement it. The OBMP Implementation Plan is Exhibit B to the Peace Agreement. The Peace Agreement was reviewed in a programmatic environmental impact report (PEIR) that was certified by the Inland Empire Utilities Agency (IEUA) in July 2000.

The Parties entered into the Peace Agreement in June 2000. Under Resolution 2000-05,[5] Watermaster adopted the goals and plans of the OBMP Phase 1 Report and agreed to proceed in accordance with the Peace Agreement and the OBMP Implementation Plan. Following a July 2000 hearing, the Court directed Watermaster to proceed in a manner consistent with the Peace Agreement in order to implement the OBMP and received and filed the PEIR.

For the purposes of the discussions in this report, the term "OBMP" refers to the collective programs implemented by Watermaster and others (e.g. IEUA, Chino Basin Desalter Authority [CDA], etc.) pursuant to the Peace Agreements, the OBMP Implementation Plan, the PEIR, and any amendments to these documents.

1.1.2 2007 Supplement to the OBMP Implementation Plan and the Peace II Agreement

The work to develop the OBMP determined that the groundwater production of the Chino Basin Desalters would ultimately need to be 40,000 acre-feet per year (afy) to accomplish the goals of the OBMP. The Chino I Desalter production capacity prior to the Peace Agreement was 8 million gallons per day (mgd; 9,000 afy). The Peace Agreement provided for the expansion of the Chino I Desalter to up to 14 mgd (15,700 afy) and the construction of the Chino II Desalter, with a production capacity of 10 mgd. The Peace Agreement required a minimum combined Desalter production capacity of 20 mgd (22,400 afy) and it committed the Parties to developing expansion and funding plans for the remaining capacity within five years of approval of the Peace Agreement. The Parties developed the Peace II Agreement, which included provisions to expand the desalting capacity such that groundwater production reaches

[5] Chino Basin Watermaster. (2002). *Twenty Fourth Annual Report Fiscal Year 2000-2001*; Appendix O http://www.cbwm.org/docs/annualrep/24th%20Annual%20Report%20-%20Approved.pdf

40,000 afy. The Peace II Agreement introduced Re-operation[6] to achieve Hydraulic Control[7] of the Chino Basin and maintain Safe Yield. Hydraulic Control is both a goal of the OBMP and a requirement of the maximum-benefit salt-and-nutrient management plan (maximum benefit SNMP) that was developed by Watermaster and the IEUA under PE 7 to enable the expansion of recycled water recharge and reuse throughout the basin under PEs 2 and 5.

The Parties executed the Peace II Agreement in 2007, which included a supplement to the OBMP Implementation Plan to expand the Chino Basin Desalters to 40,000 afy of groundwater pumping, to incorporate Re-operation and Hydraulic Control, and to resolve other issues. There were no changes to the storage management plan in the OBMP Implementation Plan.

The IEUA Board certified a supplemental environmental impact report (SEIR) for the Peace II Agreement in 2010.

1.1.3 2017 Addendum to the 2010 Peace II SEIR

In 2016, Watermaster identified the need to update the storage management plan in the OBMP Implementation Plan because the total amount of water in managed storage accounts was projected to exceed the Safe Storage Capacity (SSC) limit of 500,000 af defined in the 2000 OBMP. In 2017, the IEUA adopted an addendum to the SEIR to provide a "temporary increase in the Safe Storage Capacity from 500,000 af to 600,000 af for the period of July 1, 2017 through June 30, 2021 […] until a comprehensive re-evaluation of the Safe Storage Capacity value/concept can be completed before June 30, 2021."[8] The addendum was supported with engineering work that demonstrated that this temporary increase in SSC would not cause MPI or loss of Hydraulic Control.

1.1.4 Grant Funding for OBMP Implementation

The OBMP provided the certainty necessary for Watermaster, the IEUA, the Parties, and regulators to mobilize for rapid implementation of the OBMP PEs as well as to attract significant outside funding for the design and construction of facilities. The following are a few examples:

- Under PE 2, having recharge master plans (RMPs) that clearly defined the financial and water-supply benefits of the projects enabled the IEUA to obtain about $40 million in grant funding and $16 million in low-interest loans to construct the recharge improvements recommended in the 2001 RMP and 2013 RMP Update, covering about 70 percent of the total capital costs.
- In support of PE 3, Watermaster, the IEUA and Western Municipal Water District successfully obtained about $148 million in grants for the design and construction of the Chino Basin Desalters, including Desalter I expansion, Desalter II, the Chino Creek wellfield, and the current

[6] Re-operation is the controlled overdraft of the basin by the managed withdrawal of groundwater pumping for the Chino Basin Desalters and the potential increase in the cumulative un-replenished pumping from the 200,000 acre-feet authorized by paragraph 3 of the Engineering Appendix Exhibit I to the Restated Judgment, to 600,000 acre-feet for the express purpose of securing and maintaining Hydraulic Control as a component of the Physical Solution.

[7] Hydraulic Control is the elimination of groundwater discharge from the Chino-North Groundwater Management Zone to the Santa Ana River or its reduction to less than 1,000 afy.

[8] Tom Dodson & Associates. (2017). *Addendum No. 1 to the Optimum Basin Management Program Project*. Page 2.

Desalter II expansion to incorporate treatment of point-source contamination associated with the South Archibald trichloroethene (TCE) plume. This funding has covered about 45 percent of the total capital costs of these facilities.

- In support of PEs 2 and 5, the IEUA successfully obtained about $64 million in grants and $115 million in low-interest loans for the construction of the recycled water distribution system, covering about 70 percent of the total capital costs.

In total, Watermaster and the IEUA have obtained over $230 million in grant funding and over $130 million in low-interest loans to implement the OBMP.

1.2 Need for the 2020 OBMP Update

The current OBMP contains a set of management programs that improve the reliability and long-term sustainability of the Chino Basin and the water supply reliability of the Judgment Parties. The framework for developing the OBMP—including the goals of the Parties, the hydrologic understanding of the basin, the institutional and regulatory environment, an assessment of the impediments to achieving the Parties' goals, and the actions required to remove the impediments and achieve the goals—were all based on 1998-1999 conditions.

As of 2019, many of the projects and management programs envisioned in the 2000 OBMP have been implemented; though some have not. The understanding of the hydrology and hydrogeology of the Chino Basin has improved since 2000, and new water-management issues have been identified. The strategic drivers and trends that shaped the goals and activities of the OBMP in the late 1990s have since changed. And, there are several drivers and trends in today's water management space that may challenge the ability of the Parties to protect their collective interests in the Chino Basin and their water supply reliability.

Exhibit 1 characterizes the drivers and trends shaping water management and their basin management implications for the Parties. "Drivers" are external forces that cause changes in the Chino Basin water space, such as climate change, regulations, and funding. Grouped under each driver are expected trends that emanate from that driver. For example, trends associated with climate change include reduced groundwater recharge, increased evaporation, and reduced imported water supply. The relationship of the drivers/trends to the management implications are shown by arcs that connect trends to implications. For example, a management implication of reduced groundwater recharge is the reduction of the Chino Basin Safe Yield.

The drivers, trends, and implications were first identified in the OBMP White Paper and served as the initial rationale for recommending an update to the OBMP. Exhibit 1 represents the final characterization of the drivers, trends, and implications, based on stakeholder input during the process to update the OBMP. The basin management implications that form the stakeholders' rationale for the 2020 OBMP Update are:

- Reductions in Chino Basin Safe Yield
- Reduced imported water availability and increased cost
- Imported water quality degradation
- Chino Basin water quality degradation
- Inability to pump groundwater with existing infrastructure
- Increased cost of groundwater use
- Recycled water quality degradation
- Reduced recycled water availability and increased cost

- Increased cost of Basin Plan compliance

Additionally, the PEIR and SEIR for the OBMP are nineteen and nine years old, respectively. Knowledge of the basin's characteristics has improved since these documents were adopted, water management challenges have intensified, and environmental considerations have changed. An updated PEIR will better support decision-making, investment, and grant applications for ongoing and new management actions under the OBMP.

Finally, it is anticipated that it will become increasingly difficult to secure grants and low-interest loans due to increased competition in the future. Most grant and low-interest loan programs require, or heavily favor, projects that are within watersheds and groundwater basins with adopted integrated regional management plans, groundwater sustainability plans, or their equivalents. The 2020 OBMP Update is equivalent to a regional water resources and groundwater management plan that, in addition to allowing the implementation of the Physical Solution, will enable the stakeholders to be competitive in applying for grants and low-interest loans.

For these reasons, Watermaster and the Parties need to update the OBMP and its Implementation Plan, and perform the CEQA process, to set the framework for the next 20 years of basin-management activities.

1.3 Stakeholder Process for the 2020 OBMP Update

The 2020 OBMP Update was facilitated using a collaborative stakeholder process like that employed for the development of the 2000 OBMP. Throughout 2019, Watermaster held a series of public listening sessions to support the development of the 2020 OBMP Update. The purpose of the listening sessions was to obtain information, ideas, and feedback from the stakeholders to define their issues, needs, and wants; their collective goals for the 2020 OBMP Update; impediments to achieving the goals; the management actions required to remove the impediments; and a proposed plan to implement the management actions.

Watermaster established an OBMP Update Team to facilitate the stakeholder process, composed of Watermaster staff, Watermaster legal counsel, engineers and scientists from Wildermuth Environmental Inc. (WEI; Watermaster's engineering consultant), and IEUA staff. The OBMP Update Team provided key information prior to and during each listening session to enable the stakeholders to provide their input on each topic discussed. The objectives were to communicate the process for updating the OBMP, to ensure that the ideas and opinions of every stakeholder were heard, to present the information that will be considered for inclusion in the OBMP Update, and to ensure the stakeholder feedback is captured correctly.

The OBMP Update Team held eight listening sessions on the following dates:

- Listening Session 1: January 15, 2019
- Listening Session 2: February 12, 2019
- Listening Session 3: March 21, 2019
- Listening Session 4: May 16, 2019
- Listening Session 5: July 31, 2019
- Listening Session 6: September 11, 2019
- Listening Session 7: October 17, 2019
- Listening Session 8: December 11, 2019

The objectives of the first four listening sessions were (1) to confirm the need to update the OBMP; (2) to identify the issues, needs, and wants of the stakeholders; (3) to define goals for the 2020 OBMP

Update; and (4) to identify new and revised activities that could be included in the 2020 OBMP Update to remove impediments to achieving the 2020 OBMP Update goals. The *2020 OBMP Scoping Report* (Scoping Report) summarized and integrated the work products of these four listening sessions and described the recommended scope of work to implement each of the "2020 OBMP Update Activities" defined by the stakeholders. The final Scoping Report, including responses to stakeholder comments, is included herein as Appendix C and is discussed further in Section 2.2 of this report.

The objectives of Listening Sessions 5 and 6 were to present and obtain feedback on the scopes of work described in Section 3 of the Scoping Report. The objective of Listening Session 7 was to present and obtain feedback on the integration of the 2020 OBMP Update Activities defined in the Scoping Report with the 2000 OBMP PEs. The objectives of Listening Session 8 were to present and obtain feedback on the recommended 2020 OBMP management plan documented in the *Draft 2020 OBMP Update Report* and to begin discussions on the 2020 OBMP Implementation Plan and implementation agreements.

Appendix D to this report documents the stakeholder attendance at the listening sessions. All documents related to the 2020 OBMP Update, including meeting materials from the listening sessions and report deliverables, are available on the Watermaster's website.[9]

1.4 Organization and Use of this Report

This *2020 OBMP Update Report* describes the 2020 OBMP Update process (Section 1), the OBMP goals and new activities for the 2020 OBMP Update (Section 2), the status of the OBMP PEs and ongoing activities within them (Section 3), and the recommended 2020 OBMP management plan – inclusive of ongoing and new activities (Section 4). The management plan in Section 4 will form the foundation for the Parties to develop a final implementation plan (2020 OBMP Implementation Plan) and the agreements necessary to implement it. Exhibit 2 shows the parallels between the 2000 and 2020 documentation and the subsequent processes to develop implementation plans and agreements for approval by the Court and environmental review under CEQA.

Implementation of the management plan described in Section 4 may or may not result in the construction of new facilities, and nothing in this document obligates Watermaster or the Parties to implement the optimization recommendations. However, some of the implementation actions included in the management plan are required by Watermaster to administer the Physical Solution or comply with other Watermaster or regulatory requirements. These required implementation actions may or may not result in the development and implementation of projects.

[9] http://www.cbwm.org/OBMPU.htm

2.0 2020 OBMP Goals and Activities

2.1 OBMP Goals

The issues, needs, and wants of the stakeholders form the basis of the management goals of the 2020 OBMP Update and inform the identification of impediments to the goals as well as the action items to remove the impediments. Through the listening session process, 57 unique needs and wants were identified by the stakeholders. The classes of identified issues were effectively the same as the implications for basin management defined in Exhibit 1. Exhibit 3 is a matrix, summarizing the needs and wants of the stakeholders, organized by basin management issue (rows) and showing attribution to stakeholders that share each need/want (columns).

Through the assessment of basin management issues, needs, and wants, the stakeholders concluded that the goals defined in the 2000 OBMP are still relevant today. The Parties' intent for each goal of the 2020 OBMP Update, as documented in the Scoping Report, are:

> ***Goal No. 1 - Enhance Basin Water Supplies.*** The intent of this goal is to increase the water supplies available for Chino Basin Parties and improve water supply reliability. This goal applies to Chino Basin groundwater and all other sources of water available for beneficial use.
>
> ***Goal No.2 - Protect and Enhance Water Quality.*** The intent of this goal is to ensure the protection of the long-term beneficial uses of Chino Basin groundwater.
>
> ***Goal No.3 - Enhance Management of the Basin.*** The intent of this goal is to encourage sustainable management of the Chino Basin to avoid Material Physical Injury, promote local control, and improve water-supply reliability for the benefit of all Chino Basin Parties.
>
> ***Goal No. 4 - Equitably Finance the OBMP***. The intent of this goal is to identify and use efficient and equitable methods to fund OBMP implementation.

The far right-hand column in Exhibit 3 illustrates the nexus of the OBMP goals to the needs and wants of the Parties.

2.2 New Activities to Achieve the Goals of the 2020 OBMP Update

There are physical, institutional, and financial impediments to achieving the 2020 OBMP goals. The issues, needs, and wants of the stakeholders shown in Exhibit 3 recognize these impediments. The stakeholders identified and described 12 activities that, if implemented, would address their issues, needs, and wants. The 12 activities, as initially defined by the stakeholders, are listed in Exhibit 4 (the activities are identified by the letters A through L). Exhibit 3 illustrates which of the 12 activities the stakeholders believe have the potential to address each of their needs and wants. 55 of the 57 needs and wants were identified as addressed by one or more of the proposed activities.

Exhibit 5 illustrates the nexus of the OBMP goals, the impediments to achieving these goals, the stakeholder-defined activities to remove the impediments, and the potential outcomes (i.e. the implications) of implementing each activity. Exhibit 5 also shows the nexus of each activity to addressing the issues, needs, and wants of the stakeholders, categorized by basin management issues. In the process of describing the nexus of the goals and activities shown in Exhibit 5, it was identified that some of the activities in Exhibit 4 are related enough to be combined into a single management activity. Nine of the activities (A, B, C, D, E, F, G, K, and L) were combined into seven basin management activities. The remaining three activities (H, I, and J) were identified as actions that could either be accomplished by incorporating them into the scopes of work of every activity or were more appropriate for inclusion within an implementation agreement.[10]

The seven basin management activities described in the Scoping Report are:[11]

Activity A – Increase the capacity to store and recharge storm and supplemental water

Activity B – Develop, implement, and optimize Storage and Recovery Programs

Activity CG – Identify and implement regional conveyance and treatment projects/programs and optimize the use of all water supply sources

Activity D – Maximize the reuse of recycled water produced by the IEUA and others

Activity EF – Develop and implement a groundwater-quality management plan to address contaminants of emerging concern

Activity K – Develop a management strategy within the maximum-benefit salt and nutrient management plan to ensure compliance with recycled water recharge dilution requirements.

Activity L – Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance requirements

The Scoping Report described each of the seven activities at the detail required to define a scope of work to implement them. The potential outcomes described in Exhibit 5 provided the basis for the scope of each activity. For each activity, the Scoping Report includes: a description of the activity, the need and function of the activity—including supporting technical demonstrations, the activity's relationship to the OBMP PEs, a recommended scope of work to perform the activity to achieve the desired outcomes, a preliminary schedule for implementing the tasks that comprise the scopes of work, and a budget-level cost estimate to implement the initial tasks that could reasonably be estimated on currently available information.

Each activity is a management process to optimize some aspect of basin management, such as water quality (EF, K) or managed recharge (A). Thus, the scope of work for each activity represents the methodical process to characterize and analyze the basin management challenge (including technical data and institutional information), to define potential management alternatives, and to select the optimum management solution(s). Each management process is generally composed of four phases:

(1) Scoping (S) – In this phase, the stakeholders convene to precisely articulate the objectives of the management process and refine the scope of work, cost, and schedule to execute it.

(2) Evaluate the need for projects or other management solutions (PN) – In this phase, available and/or new data and information are compiled and analyzed to characterize and demonstrate the need for management programs or projects to achieve the stakeholder objectives defined in the scoping phase.

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[10] See the *2020 OBMP Scoping Report* (included herein as Appendix C) for more details on how Activities H, I, and J can be incorporated in the activity scopes of work and/or the 2020 OBMP Implementation Plan agreement(s).

[11] The activity names listed here have been simplified from the original descriptions defined by the stakeholders and shown in Exhibit 4.

(3) Define and evaluate management alternatives (PE) – The evaluation phase includes the following generalized steps: develop planning, screening, and evaluation criteria; identify the potential program or project alternatives; develop reconnaissance-level engineering design and operating plans for project alternatives; develop an engineering cost opinion for each alternative; describe how each alternative could be implemented and financed; evaluate alternatives based on the evaluation criteria; and select the preferred program or project alternative.

(4) Implementation (I) – In this phase, the preferred program or project alternative is implemented subject to developing the necessary agreements between participating Parties. If a project is identified, implementation also includes: preparing the preliminary design of the recommended alternative, preparing the environmental documentation that will tier-off the 2020 OBMP Update PEIR, preparing a financial plan for constructing the recommended alternative, preparing final design of the recommended alternative, acquiring permits for constructing and operating the recommended alternative, and constructing the recommended alternative.

The end of each phase represents a check in point where the scope of work can be adapted to deal with changed conditions or an off-ramp where a go/no-go decision can be made to continue with the next phase of the management process. Thus, activities may or may not result in the design and implementation of management plans or facilities.

Exhibits 6 through 12 summarize the key features of each of the seven activities described in detail in the Scoping Report. For each activity, the exhibit summarizes the need and objectives, the scope of work, and a general implementation schedule with go/no-go decision points identified. The scopes of work are divided into tasks, and for each task, the following are identified: the corresponding management process phase (S, PN, PE, I), the expected outcomes, Watermaster's role in implementing the task (if any), and whether Watermaster deems the outcomes as required to administer the Physical Solution or comply with other Watermaster or regulatory requirements.

Implementation of the management processes characterized in Exhibits 6 through 12 may or may not result in the construction of new facilities, and nothing in this document obligates Watermaster or the Parties to implement the scopes as described. In activity implementation, for those outcomes that are deemed necessary to administer the Physical Solution or comply with other requirements, Watermaster will provide for the opportunity to revise the scopes of work and cost in the scoping phase. Any revisions will be subject to the discretion of Watermaster to ensure that the final scope of work achieves the required outcomes.

The following sections summarize the seven 2020 OBMP Update Activities identified by the Parties and describes the new implementation actions for inclusion in the 2020 OBMP Update Management Plan (in Section 4) to accomplish the objectives of the activities.

2.2.1 Activity A – Increase the capacity to store and recharge storm and supplemental water

The stakeholders have identified a lost opportunity for stormwater recharge in the basin and a limitation of Watermaster and the IEUA's existing economic selection criteria for new recharge projects. The use of the existing criteria resulted in a recommendation in the 2018 RMP Update (RMPU) that no new recharge projects be implemented. Thus, the Activity A objectives are (1) to maximize stormwater capture pursuant to Watermaster's diversion permits,[12] (2) to promote the long-term balance of recharge and discharge, (3) to ensure sufficient supplemental water recharge capacity for future replenishment, (4) to reduce dependence on imported water by maintaining or enhancing Safe Yield, (5) to improve water quality, and (6) to ensure a supply of dilution water to comply with recycled water recharge permit requirements. For the remainder of this report, the term "recharge" is inclusive of diverting, storing, and recharging storm and supplemental waters.

The Scoping Report identified that based on the alignment of the scope of work to achieve the outcomes of Activity A with those of the RMPU process, implemented through OBMP PE 2, the outcomes of Activity A can be accomplished as part of the existing RMPU process, which is updated at least every five years as required by the Court. Thus, implementation of the scope of work characterized in the Scoping Report and summarized in Exhibit 6 will result in the completion of the required 2023 RMPU, including obtaining consensus on its objectives, developing an implementation and financing plan, preparing the report, and implementing recharge projects. These outcomes are required by Watermaster to ensure that the yield of the basin is maintained and that the supplemental recharge capacity is sufficient to meet Replenishment Obligations. Although not required, the next (or a future) RMPU process could accomplish the objectives of Activity A by updating the project selection criteria and considering projects that will meet other needs of the Parties, such as providing additional recharge capacity for Storage and Recovery Programs or addressing pumping sustainability issues.

Based on the scope of work and alignment with the existing PE 2 implementation actions, there are no new implementation actions required for inclusion in the 2020 OBMP Update to accomplish Activity A.

2.2.2 Activity B - Develop, implement, and optimize Storage and Recovery Programs

The Peace Agreement states that "Watermaster shall prioritize its efforts to regulate and condition the storage and recovery of water developed in a Storage and Recovery Program for the mutual benefit of the Parties to the Judgment and give first priority to Storage and Recovery Programs that provide broad mutual benefits."[13] For this and other reasons, the Parties desire to develop "optimized" Storage and Recovery Programs that avoid potential MPI and provide broad benefits, such as increased water-supply reliability, protected or enhanced Safe Yield, improvements to water quality, and reduced cost of OBMP implementation.

The objective of Activity B is to prepare a Storage and Recovery Program guidance document in a collaborative setting that clearly articulates the specific objectives of the Parties and the required benefits to be realized from Storage and Recovery Programs. Implementation of the scope of work described in the Scoping Report and summarized in Exhibit 7 will result in: (1) consensus on the objectives and desired benefits of Storage and Recovery programs, (2) conceptual descriptions of various types of Storage and Recovery programs that achieve the defined objectives and benefits and are consistent with the *2020 Storage Management Plan*, (3) reconnaissance-level project designs and

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[12] Watermaster holds three permits with the State Water Resources Control Board (State Board) for the diversion and recharge of stormwater in trust for the Parties. The San Bernardino County Flood Control District (SBCFCD) is a co-permittee for two of these permits, 19895 and 20753. Each permit defines a maximum diversion limit and the period over which diversions are allowed to occur each year (diversion season): (1) Permit 19895 has a diversion limit of 15,000 acre-feet (af) from November 1 to April 30, (2) Permit 20753 has a diversion limit of 27,000 af from October 1 to May 1, and (3) Permit 21225 has a diversion limit of 68,500 af from January 1 to December 31.

[13] See Peace Agreement, § 5.2(c)

operating plans and the costs of the Storage and Recovery Program alternatives, and (4) the development of a *Storage and Recovery Program Master Plan* that will support the design of Storage and Recovery Programs that are consistent with the *2020 Storage Management Plan* and the Peace Agreement. Watermaster deems the development of a *Storage and Recovery Program Master Plan* a necessary outcome so that Watermaster is able to review, condition, and approve Storage and Recovery Program applications in a manner that is uniform, predictable, and consistent with the Peace Agreement.

Based on the scope of work, the new implementation actions for inclusion in the 2020 OBMP Update to accomplish Activity B are:

- Develop a *Storage and Recovery Master Plan* to support the design of optimized Storage and Recovery Programs that are consistent with the 2020 Storage Management Plan and to provide the Watermaster with criteria to review, condition, and approve applications in a manner that is consistent with the Judgment and the Peace Agreement.

2.2.3 Activity CG - Identify and implement regional conveyance and treatment projects/programs and optimize the use of all water supply sources

The stakeholders have identified basin management challenges, such as land subsidence and poor water quality, that could limit their ability to fully exercise their pumping rights using existing infrastructure. Thus, the Activity CG objectives are to optimize the use of all sources of water available to the Parties to meet their demands despite these basin management challenges and to potentially help mitigate these challenges. Implementation of the scope of work characterized in the Scoping Report and summarized in Exhibit 8 will result in (1) a plan that describes the universe of water reliability concerns of the Parties, the opportunities and limitations of existing/planned infrastructure to meet the reliability goals, conceptual project designs and operating plans, and the costs of the reliability alternatives; and (2) implementation of the selected reliability project(s). As identified in the Scoping Report, the Activity CG scope of work is effectively the same as the IEUA's existing Integrated Water Resources Plan (IRP) process that addresses water supply reliability for its member agencies. Activity CG is an expansion that would address the water supply reliability concerns of all Parties to the Judgment. Currently, IEUA is preparing its 2020 IRP and other related planning efforts with its member agencies. This effort, or future IRP updates could be expanded by others to include neighboring agencies, including Three Valleys Municipal Water District (TVMWD), Western Municipal Water District (WMWD), or others. To create a coordinated planning effort, any of these agencies could lead and coordinate the collaborative regional effort on behalf of the Parties.

Although this activity optimizes the management of all water supplies in the Chino Basin, Watermaster does not deem these outcomes necessary for administration of the Physical Solution or compliance with other Watermaster or regulatory requirements.

Based on the scope of work, and considering its overlap with IEUA planning efforts, the new implementation actions for inclusion in the 2020 OBMP Update to accomplish Activity CG are:

- The IEUA, the TVMWD, the WMWD, and/or other Party acting as a coordinating agency will establish and/or expand integrated water resources planning efforts to address water supply reliability for all Watermaster Parties.
- Watermaster will support the IEUA, TVMWD, WMWD, and/or others in their efforts to improve water supply reliability to ensure those efforts are integrated with Watermaster's groundwater management efforts.

These implementation actions are included as part of the 2020 OBMP Update to complement existing regional planning efforts, not to duplicate them.

2.2.4 Activity D - Maximize the reuse of recycled water produced by the IEUA and others

The objective of Activity D is to maximize the reuse of recycled water produced by the IEUA and other publicly owned treatment works (POTWs) in proximity to the Chino Basin to meet future demands and improve local water-supply reliability, especially during dry periods. Expanded reuse activities could include direct non-potable reuse (landscape irrigation or industrial uses), artificial recharge by spreading and/or injection (indirect potable reuse), and direct potable reuse. Increasing recycled water reuse is an integral part of the OBMP goal to enhance water supplies. The direct use of recycled water increases the availability of native and imported waters for higher-priority beneficial uses. And, the Judgment states that Watermaster shall give high priority to maximizing the beneficial use of recycled water for replenishment purposes.[14] Implementation of the scope of work characterized in the Scoping Report and summarized in Exhibit 9 will result in (1) a plan that describes the objectives for optimizing and maximizing recycled water reuse, the demand and opportunities for increased recycled water reuse, the impacts of recycled water reuse and required mitigation, conceptual project designs and operating plans, and the costs of the reuse project alternatives; and (2) implementation of the selected recycled water reuse project(s).

As identified in the Scoping Report, the scope of work is similar to the IEUA's existing planning efforts for the IRP and Chino Basin Program (CBP) on behalf of its member agencies. These efforts, or similar future efforts, could be expanded by others to include neighboring agencies, including the TVMWD, the WMWD, or others. To create a coordinated planning effort, any of these agencies could lead and coordinate the collaborative regional effort to maximize recycled water reuse on behalf of the Parties.

Although this activity maximizes the management of recycled water supplies in the Chino Basin, Watermaster does not deem these outcomes necessary for administration of the Physical Solution or compliance with other Watermaster or regulatory requirements. However, any expansion of recycled water reuse would be subject to Watermaster review to ensure compliance with the maximum benefit SNMP.

Based on the scope of work, and considering its overlap with IEUA planning efforts, the new implementation actions for inclusion in the 2020 OBMP Update to accomplish Activity D are:

- IEUA, the TVMWD, the WMWD, and/or other Party acting as a coordinating agency will expand future recycled water reuse planning efforts to maximize the reuse of all available sources of recycled water.
- Watermaster will support the IEUA, TVMWD, WMWD, and/or others in their efforts to maximize recycled water reuse to ensure these efforts are integrated with Watermaster's groundwater and salinity management efforts.

These implementation actions are included as part of the 2020 OBMP Update to complement existing regional planning efforts, not to duplicate them.

[14] See Restated Judgment, ¶ 49(a)

2.2.5 Activity EF - Develop and implement a groundwater-quality management plan to address contaminants of emerging concern

Groundwater contaminants are present across the Chino Basin, new contaminants are being discovered, and water-quality regulations are evolving and becoming more restrictive. These trends threaten to limit the beneficial use of groundwater and increase the cost of the water supply. The objectives of Activity EF are to characterize the water-quality challenges across the Chino Basin and identify the most efficient means to address these challenges, including the potential for multi-benefit collaborative projects to ensure that groundwater is put to beneficial use. Implementation of the scope of work described in the Scoping Report and summarized in Exhibit 10 will result in (1) the development and implementation of initial and long-term emerging contaminants monitoring plans, (2) a water-quality assessment of the Chino Basin that characterizes the need for a groundwater-quality management plan, and (3) the development and implementation of a *Groundwater-Quality Management Plan*. The *Groundwater-Quality Management Plan* would document the most current water-quality assessment, the long-term monitoring and analysis plan, the reconnaissance-level engineering designs and operating plans for alternative water quality improvement projects, the selected project(s) for implementation, and an implementation plan.

As previously noted, Paragraph 41 of the Judgment provides Watermaster the discretion to develop an OBMP that includes both water quantity and water quality considerations. If water quality is not effectively managed, the Parties may not be able to utilize their water rights, which could result in negative impacts to the basin, such as reductions in net recharge, loss of hydraulic control, and movement of contaminant plumes. Effective management of water quality in the Basin to preserve maximum beneficial use can only be accomplished through a systematic assessment of the emerging contaminant threats to the use of groundwater resources, and thoughtfully preparing a plan to respond to those threats. A *Groundwater-Quality Management Plan* would provide the Parties with the comprehensive data and information, including best practices for monitoring, required to understand and manage the future water-quality challenges that could impact the Parties' ability to fully utilize their pumping rights. Hence, Watermaster deems the outcomes of Activity EF as required for administration of the Physical Solution.

Based on the scope of work, the new implementation actions for inclusion in the 2020 OBMP Update to accomplish Activity EF are:

- Develop and implement an initial emerging contaminants monitoring plan.
- Prepare a water quality assessment of the Chino Basin to evaluate the need for a Groundwater Quality Management Plan.
- Develop and implement a long-term emerging contaminants monitoring plan.
- Develop and implement a Groundwater Quality Management Plan.

2.2.6 Activity K - Develop a management strategy within the maximum-benefit salt and nutrient management plan to ensure compliance with recycled water recharge dilution requirements

Watermaster and the IEUA are co-permittees for the Chino Basin maximum-benefit SNMP incorporated in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan). The maximum-benefit SNMP was developed pursuant to PE 7 (see Section 3.2.7 for additional details) to enable the recharge and reuse of recycled water planned in PEs 2 and 5. It defines the management actions that Watermaster and IEUA must take to manage total dissolved solids (TDS) and nitrate concentrations in Chino Basin groundwater and in the IEUA's recycled water and the TDS and nitrate concentration limitations for recycled water reuse activities. The objective of Activity K is to determine if compliance with the recycled water recharge dilution requirements defined in Watermaster and the IEUA's maximum-benefit SNMP can be achieved under existing management plans and, if not, to develop a plan to achieve compliance. Implementation of the scope of work described in the Scoping Report and summarized in Exhibit 11 will result in (1) the periodic characterization and understanding of the ability to comply with the TDS and nitrate dilution requirements in the short- and long-term; and if non-compliance is projected, (2) a plan that describes the conceptual designs, operating plans, and costs of alternative salt-offset programs or projects, and (3) implementation of the selected salt-offset program or projects. Because the maximum-benefit SNMP is an explicit requirement of Basin Plan, these are required outcomes for Watermaster and the IEUA to continue the recycled water recharge program.

Based on the scope of work, the new implementation actions for inclusion in the 2020 OBMP Update to accomplish Activity K are:

- Periodically prepare TDS and nitrate concentration projections to evaluate compliance with the maximum benefit SNMP dilution requirements, and, if necessary, based on the outcome of the evaluation, prepare a plan and schedule to implement a salt-offset compliance strategy.

2.2.7 Activity L – Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance requirements

Watermaster conducts data-collection programs and prepares reports and data deliverables to comply with regulations, to fulfill its obligations under its agreements and Court orders, to comply with its requirements under CEQA, and to assess the performance of OBMP Implementation. The objective of Activity L is to refine the monitoring and reporting requirements of Watermaster to ensure that the objectives of each requirement are being met efficiently at a minimum cost. Implementation of the Activity L scope of work described in the Scoping Report and summarized in Exhibit 12 will result in (1) the comprehensive review of all monitoring/reporting programs in an open stakeholder process, (2) the development and periodic update of an *OBMP Monitoring and Reporting Work Plan*, and (3) potential revisions to Watermaster's non-discretionary monitoring and reporting programs. Watermaster is required to implement the monitoring and reporting programs to comply with the Judgment and other regulations and obligations; however, these specific outcomes are not required. This activity will allow the Parties to offer more direct input in the implementation of the required monitoring programs, but Watermaster does not deem this outcome necessary to comply with the monitoring requirements.

Based on the scope of work, the new implementation actions for inclusion in the 2020 OBMP Update to accomplish Activity L are:

- Perform review and update of Watermaster's regulatory and Court-ordered monitoring and reporting programs and document them in a work plan: *OBMP Monitoring and Reporting Work Plan*.
- Perform periodic review and update of *the OBMP Monitoring and Reporting Work Plan* and modify the monitoring and reporting programs, as appropriate.

If the above implementation actions are not initiated by the Parties, Watermaster staff and the Watermaster engineer would continue their existing process to periodically review and refine Watermaster's monitoring and reporting efforts to meet all requirements and achieve efficiencies.

3.0 Integration of the 2020 OBMP Update Activities with the 2000 OBMP Program Elements

3.1 Nexus of the 2020 OBMP Update Activities to the 2000 OBMP Program Elements

Through the process of defining the scopes of work to achieve the desired outcomes of the 2020 OBMP Update Activities, it became apparent that the PEs defined in the 2000 OBMP are still relevant today as the overarching program elements of a basin management program. Each of the seven activities in the Scoping Report had objectives and tasks that were directly related to one or more of the 2000 OBMP PEs. Exhibit 13 is a matrix that demonstrates the nexus between the PEs (rows) and the activities (columns) based the PE objectives (listed in Section 1.1 herein) and the objectives of the 2020 OBMP Update Activities (described in Section 2.2 herein). The matrix is symbolized with anchors and dots. Anchors indicate a direct relationship between an activity and a PE (i.e. the activity and the PE have similar or identical objectives and thus the activity can be integrated into the existing PE). Dots indicate an indirect relationship between an activity and a PE (i.e. the activity has the potential to provide benefits to PEs).

Based on this finding, the nine PEs defined in the 2000 OBMP will be retained for the 2020 OBMP Update. Each of the seven activities, and the associated implementation actions, was mapped to the PE to which it is anchored in Exhibit 13. Based on the need for ongoing activities under the existing PE and the new activities defined by the stakeholders, the implementation actions were modernized and updated.

3.2 OBMP Program Elements – Progress and Ongoing Management Actions

For each of the nine PEs, this section describes the objectives and implementation actions of the PE as established in 2000, implementation progress since 2000, and ongoing management activities, including the new actions to be incorporated in the 2020 OBMP, as identified in Section 2.2 of this report.

3.2.1 Program Element 1. Develop and Implement Comprehensive Monitoring Program

The 2000 OBMP included PE 1—*Develop and Implement Comprehensive Monitoring Program* —to provide the information necessary to support the implementation of all other OBMP PEs and to evaluate their performance. The types of monitoring programs called for by PE 1 in the OBMP included:

- Groundwater-level monitoring
- Groundwater-quality monitoring
- Groundwater-production monitoring
- Surface-water discharge and quality monitoring (including managed artificial recharge)
- Ground-level monitoring
- Well construction, abandonment, and destruction

The implementation actions incorporated into the 2000 OBMP Implementation Plan are summarized in Table 1 below. Each implementation action in Table 1 is categorized as a one-time or ongoing action, and the right-most column of the table indicates if the action was implemented.

Table 1. Program Element 1 – Implementation Actions Defined in the 2000 OBMP*

Implementation Actions and Schedule	One-time/ Ongoing	Implemented?
Years 1 through 3		
*Perform initial tasks to survey sites and design and set up all long-term monitoring programs for groundwater level, groundwater quality, ground level, surface water, and recharge monitoring programs.	One-time	✓
Complete initial meter installation program for overlying agricultural pool.	One-time	✓
Develop agreements with county and state agencies regarding notification of new well drilling. Well construction and related information will be requested as new wells are constructed. Prepare and update a list of abandoned wells and coordinate with the counties to ensure that abandoned wells are destroyed properly.	One-time	✓
Years 4 through 50		
*Start and continue all groundwater level, groundwater production, groundwater quality, ground level (including remote sensing), surface water, and well construction/destruction monitoring programs. Key wells should be relocated as necessary.	Ongoing	✓

**Note: Actions marked with "*" are combined from multiple actions in the OBMP Implementation Plan.*

3.2.1.1 Implementation Progress since 2000

Watermaster began implementing its monitoring programs as part of the development of the OBMP. Pursuant to the OBMP Implementation Plan, long-term plans for monitoring groundwater production, groundwater level, groundwater quality, ground level (including remote sensing), surface water, and well construction/destruction monitoring programs have been developed, implemented, and updated as necessary.

The monitoring programs have evolved over time to ensure that the data and information acquired not only meet the OBMP requirements, but also other regulatory requirements and Watermaster obligations under agreements, Court orders, and CEQA. In some instances, the monitoring programs were expanded to satisfy new basin-management initiatives and regulations. In other instances, the scope of the monitoring programs has been reduced with periodic reevaluation and redesign to achieve the monitoring objectives at reduced cost. Table 2 below is a list of each Watermaster monitoring and reporting requirement and the entities that require the monitoring and reporting. The Scoping Report provides a comprehensive overview of the status of the monitoring programs as of 2018.

Watermaster developed a centralized environmental database to store, manage, and visualize its datasets. Data management includes a detailed quality assurance and quality control protocol. The database and the database-management procedures ensure the quality and accuracy of the data, allow for efficient data exploration and analysis, and include standardized reports and data exports in formats for regulatory data deliverables or further analysis (e.g. creation of model input files).

Table 2. Watermaster Monitoring and Reporting Requirements

Monitoring and Reporting Requirement	Requiring Entity					
	Court	State Board	Regional Board	California DFW	California DWR	CEQA
Water Rights Compliance Annual Reports		X		X		
SGMA Annual Report for Adjudicated Basins					X	
Biannual Evaluation of the Cumulative Effect of Transfers	X					
Biannual Evaluation of the Balance of Recharge and Discharge	X					
Annual Finding of Substantial Compliance with the Recharge Master Plan	X					
Annual Report of Compliance with SB 88 and SWRCB Regulations for Measurement and Reporting of Diverted Surface Water		X				
Safe Yield Recalculation	X					
Recharge Master Plan Update (RMPU)	X					
State of the Basin Report	X					
California Statewide Groundwater Elevation Monitoring Program (CASGEM)					X	
Chino Basin Maximum Benefit Annual Report			X			
Annual Report of the Prado Basin Habitat Sustainability Committee						X
Water Recycling Requirements for the Chino Basin Recycled Water Groundwater Recharge Program			X			
Annual Report of the Ground-Level Monitoring Committee	X					
OBMP Semi-Annual Status Reports	X					

3.2.1.2 Ongoing implementation actions for the 2020 OBMP

The following summarizes each of the Watermaster's monitoring and data-collection programs that need to continue to be implemented to satisfy the requirements of the OBMP and the other requirements summarized in Table 2 above. Section 4.1 of this report summarizes the 2020 OBMP Management Plan for PE 1.

Groundwater-production monitoring. Watermaster uses groundwater-production data to quantify and levy assessments pursuant to the Judgment. Estimates of production are also essential inputs to recalibrate Watermaster's groundwater flow model, which is used to inform the recalculation of Safe

Yield, evaluate the state of Hydraulic Control, perform MPI evaluations, and support many other Watermaster initiatives. Members of the Appropriative and Overlying Non-Agricultural Pools and CDA record their own meter data and submit them to Watermaster. For Agricultural Pool wells, Watermaster performs a field program to install totalizing flow meters, repair or replace broken meters, and visit the wells quarterly to record the metered data. Watermaster has determined that for some Agricultural Pool wells it is not practical to repair, replace or install new meters. In these cases, Watermaster applies a water-duty based method to estimate production on an annual basis.

Groundwater-level monitoring. Watermaster's groundwater-level monitoring program supports many Watermaster management functions, including: groundwater model development and recalibration, periodic recalculations of Safe Yield, evaluating the cumulative impacts of transfers and the balance of recharge and discharge, subsidence management, MPI evaluations, estimation of storage change, other scientific demonstrations required for groundwater management, and many regulatory requirements, such as the demonstration of Hydraulic Control, the triennial recomputation of ambient water quality, and Prado Basin habitat sustainability. The monitoring program includes field monitoring programs implemented by Watermaster staff at private wells and monitoring wells, and cooperative programs to compile and store data from well owners and other entities managing monitoring programs, including municipal water agencies, private water companies, the California Department of Toxic Substance Control (DTSC), the County of San Bernardino, and various private consulting firms. To continue to support assessments of Hydraulic Control, and other analyses, it is anticipated that new monitoring wells will need to be constructed to replace the currently monitored private wells that will be lost as land is converted from agricultural uses to urban uses.

Groundwater-quality monitoring. Watermaster's groundwater-quality monitoring program supports many Watermaster management and regulatory-compliance functions, including: compliance with the maximum benefit SNMP, characterization of non-point source contamination and plumes associated with point-source discharges, support for ground-water modeling, characterization of groundwater/surface-water interactions in the Prado Basin area, and characterization of basin-wide trends in groundwater quality as part of the Watermaster's biennial State of the Basin report. The monitoring program includes field monitoring programs implemented by Watermaster staff at private wells and monitoring wells, and cooperative programs to compile and store data from well owners and other entities managing monitoring programs (see examples noted for groundwater-level monitoring). To continue to support the triennial ambient water quality recomputation, and other analyses, it is anticipated that new monitoring wells will need to be constructed to replace the currently monitored private wells that will be lost as land is converted from agricultural uses to urban uses.

Surface-water and climate monitoring. Watermaster's surface-water and climate monitoring program supports many Watermaster management functions, including: groundwater model development and recalibration, periodic recalculations of Safe Yield, evaluating the cumulative impacts of transfers and the balance of recharge and discharge, MPI evaluations, recharge master planning, evaluating Prado Basin habitat sustainability, and evaluating compliance with the SWRCB diversion permits, the maximum benefit SNMP, and the recycled-water recharge permits. Most of the datasets are collected from publicly available sources, including POTW discharge data, USGS stream gaging station data, and precipitation and temperature data measured at public weather stations or downloaded from spatially gridded datasets. Chino Basin stormwater, imported water, and recycled water recharge data are collected by the IEUA and shared with Watermaster. Watermaster staff also performs field surface water monitoring of the Santa Ana River in compliance with the maximum-benefit SNMP.

Ground-level monitoring. Watermaster's ground-level monitoring program is conducted pursuant to the *Chino Basin Subsidence Management Plan*. The ground-level monitoring program consists of high-frequency, groundwater level monitoring at wells, monitoring of the vertical component of aquifer system compression and expansion at Watermaster extensometer facilities, and measurement of horizontal ground-surface deformation across areas that are experiencing differential land subsidence by electronic distance measurements (EDMs) to understand the potential threats and locations of ground fissuring.

Biological monitoring. Watermaster's biological monitoring program is conducted pursuant to the adaptive monitoring program (AMP) for the Prado Basin Habitat Sustainability Program (PBHSP). The objective of the PBHSP is to ensure that the groundwater-dependent ecosystem in Prado Basin will not incur unforeseeable significant adverse impacts due to implementation of the Peace II Agreement. The monitoring program produces a time series of data and information on the extent and quality of the riparian habitat in the Prado Basin over a historical period that includes both pre- and post-Peace II implementation. Two types of monitoring and assessment are performed: regional and site-specific. Regional monitoring and assessment of the riparian habitat is performed by mapping the extent and quality of riparian habitat over time using multi-spectral remote-sensing data and air photos. Site-specific monitoring performed in the Prado Basin includes field vegetation surveys and seasonal ground-based photo monitoring.

Water-supply and water-use monitoring. Watermaster compiles water supply and water-use data from the Parties to support two required reporting efforts: the Watermaster Annual Report to the Court and annual reporting requirements for adjudicated basins pursuant to the Sustainable Groundwater Management Act (SGMA). The data are also used to support calibration of Watermaster's surface water and groundwater models. Monthly water use volumes for supply sources other than Chino Basin groundwater are collected from the Parties; this includes groundwater from other basins, recycled water, imported water, and native surface water.

Planning information. Watermaster periodically collects and compiles information on the Parties' best estimates of their future demands and associated water supply plans. The data are used for future planning investigations that require the use of Watermaster's surface and groundwater models, such as Safe Yield recalculations and RMP updates. These data include:

- Water demands and water-supply plans of the Watermaster Parties:
  - i. Projected total water demand
  - ii. Projected amount of each water supply by source to meet the projected water demand
  - iii. Monthly distribution of water supplies used to meet the demand
  - iv. Projected groundwater pumping at each existing well and future planned wells
  - v. Groundwater pumping schedules (i.e. well use priorities and capacities)
  - vi. Pumping capacities, required pumping combinations, and sustainable pumping levels (pumping sustainability metric) at each well
- Assumptions for how:
  - i. Managed storage will be used to meet Replenishment Obligations
  - ii. Lands currently in agricultural uses will be converted to urban uses
  - iii. Additional potential conservation above that currently required for new land development
- Future projections of location and magnitude of stormwater and supplemental water recharge

Well construction, abandonment, and destruction. Watermaster maintains a database on wells in the basin and performs periodic well inspections. Sometimes, Watermaster staff identifies a new well while implementing its monitoring programs. Well owners must obtain permits from the appropriate county and state agencies to drill a well and to put the well in use. Watermaster has developed cooperative agreements with the State Water Board's Division of Drinking Water (DDW) and the Counties of Los Angeles, Orange, Riverside, and San Bernardino to ensure that the appropriate entities know that a new well has been constructed. Watermaster staff makes best efforts to obtain well design information, lithologic and geophysical logs, groundwater level and quality data, and aquifer stress test data.

The presence of abandoned wells is a threat to groundwater supply and a physical hazard. Watermaster staff periodically reviews its database, makes appropriate inspections, consults with well owners, maintains a list of abandoned wells in the Chino Basin, and provides this list to the counties for follow-up and enforcement. The owners of the abandoned wells are requested to properly destroy their wells following the ordinances developed by the county in which they are located.

3.2.2 Program Element 2. Develop and Implement Comprehensive Recharge Program

The 2000 OBMP included PE 2–*Develop and Implement Comprehensive Recharge Program*—to reverse the loss of yield caused by urbanization and the concrete lining of natural streams overlying the Chino Basin. PE 2 is also meant to ensure that there will be enough supplemental water recharge capacity available to Watermaster to meet Replenishment Obligations.

The implementation actions incorporated into the 2000 OBMP Implementation Plan are summarized in Table 3 below. Each implementation action in Table 3 is categorized as a one-time or ongoing action, and the right-most column of the table indicates if the action was implemented.

Table 3. Program Element 2 – Implementation Actions Defined in the 2000 OBMP

Implementation Action	One-time/ Ongoing	Implemented?
Years 1 through 3		
Watermaster advisory committee will form an ad-hoc committee to coordinate with CBWCD and SBCFCD.	One-time	✓
Implement all high priority recharge projects that involve only re-operation of existing recharge/flood control facilities.	One-time	✓
Complete the RMP.	One-time	✓
Complete design and construction of early action recharge projects identified in the first year of the implementation of the OBMP.	One-time	✓
Years 4 through 50		
By year 5 implement all high priority projects that involve construction and re-operation at existing facilities.	One-time	✓
Implement all other recharge projects based on need and available resources.	Ongoing	✓
Update the comprehensive recharge program every five years.	Ongoing	✓

3.2.2.1 Implementation Progress since 2000

The scope of work defined under PE 2 was to continue the recharge master plan study initiated by Watermaster and the Chino Basin Water Conservation District (CBWCD) in 1998. The implementation plan for PE 2 includes the preparation of a recharge master plan update (RMPU) at least every five years. The objectives and scope of each RMPU are defined at the beginning of each update and are derived from several guiding documents: the Peace Agreement, the Peace II Agreement, and the Special Referee's December 2007 Report. Pursuant to these guiding documents, the general objectives of the RMPU are to ensure there is enough recharge capacity and supplemental water available to meet future replenishment requirements, to balance the recharge and discharge in every area and subarea, to maximize the recharge of recycled and storm waters where feasible, and to protect or enhance Safe Yield. To meet these objectives, the RMPUs must consider and address recharge requirement projections, the availability of storm and supplemental waters for recharge and replenishment, and the physical means to satisfy these recharge projections. To the extent that new or modified facilities are required to meet the objectives, the RMPUs include a schedule for the planning, design, and construction of recharge improvements. The 2001 Recharge Master Plan and subsequent RMPUs (2010, 2013, and 2018) were developed in open and transparent planning processes that were convened by Watermaster through an ad-hoc committee. As part of the *2013 Amendment to the 2010 RMPU* (2013 RMPU), the RMPU Steering Committee, now referred to as the Recharge Investigations and Projects Committee (RIPComm), was created to assist Watermaster and the IEUA in preparing RMPUs. The RIPComm is open to all interested stakeholders and meets regularly through the development of RMPUs. The outcomes of the 2001 Recharge Master Plan and subsequent RMPUs (2010, 2013, and 2018) are summarized below:

- 2001 Recharge Master Plan: Watermaster, in collaboration with the IEUA, constructed the first set of recharge facilities to exercise its rights pursuant to its diversion permits, increasing average annual stormwater recharge by about 9,500 afy. As part of this work, Watermaster and the IEUA modified seventeen existing flood retention facilities to increase diversion rates, conservation storage, and recharge, and constructed two new recharge facilities. The cost of these recharge improvements was about $60 million. The IEUA and Watermaster paid for about half of this cost, while the other half was funded through Proposition 13 grants and other grant programs.
- 2010 RMPU and 2013 Update: As of this writing, Watermaster and the IEUA are completing the final design/construction of five of the recommended 2013 RMPU facilities, and they should be online in 2021. These facilities are expected to increase stormwater recharge by about 4,700 afy.
- 2018 RMPU: The 2018 RMPU did not recommend any new recharge projects. One of the findings of the 2018 recharge master plan update was that Watermaster has enough supplemental water recharge capacity to it meet its Replenishment Obligations via wet-water recharge through 2050.

Upon completion of the 2013 RMPU facilities, the annual average stormwater recharge performed pursuant its diversion permits is expected to be about 14,950 afy.[15] Thus, in the first 20 years of OBMP

[15] WEI (2018). Recharge Master Plan Update. September 2018.
http://www.cbwm.org/docs/engdocs/2018%20RMPU/20180914_2018_RMPU_final.pdf

implementation, stormwater recharge will have increased by about 14,150 afy, and supplemental water recharge capacity will have increased by 27,600 afy. And, the IEUA has increased the recharge of recycled water from about 500 afy in 2000 to about 16,000 afy in 2018. The next RMPU must be completed and submitted to the Court by October 2023.

3.2.2.2 Ongoing implementation actions for the 2020 OBMP

The RMPU process is an ongoing requirement of the 2000 OBMP Implementation Plan. The next RMPU is due to the Court by October 2023 and must be updated no less frequently than every five years thereafter. As identified in Activity A, the Parties have expressed interest in maximizing the recharge of recycled, imported, and storm waters where feasible. Although meeting these objectives is not a requirement for the RMPU, the next (or a future) RMP process could accomplish the objectives of Activity A by considering projects that will meet other needs of the Parties, such as providing additional recharge capacity for Storage and Recovery Programs or addressing pumping sustainability issues. As summarized below and described in further detail in the Scoping Report, there are opportunities and challenges for increasing these efforts in the future:

- The theoretical average annual stormwater discharge available for diversion under the existing water rights permits is about 74,000 afy (ranging from 21,400 to 110,500 afy for the combined permitted diversions) and the annual average stormwater recharge performed pursuant to these permits is expected to be about 14,950 afy. The difference between these two values, about 60,000 afy, is a lost opportunity for stormwater recharge. Improvements to existing facilities and operations and/or new facilities are required to achieve the stormwater recharge potential.

- New recharge facilities and/or improvements to existing facilities may be needed if Parties want to increase supplemental water recharge.

- Based on Watermaster and the IEUA's existing economic selection criteria (projects are selected for implementation only if the melded unit cost of stormwater recharge resulting from the projects is less than the avoided unit cost of purchasing imported water from the Metropolitan Water District of Southern California [Metropolitan]), no new recharge projects were recommended for implementation in the 2018 RMPU. If the Parties desire to develop a list of projects that will increase recharge in the basin, the economic criteria for selecting projects needs to be reevaluated.

- Finally, the criteria on how and where to conduct recharge needs to be updated to more effectively address existing basin management issues, including: land subsidence, maintaining Hydraulic Control, and pumping sustainability. Historically, Watermaster has attempted to manage the recharge of storm and supplemental water to promote the balance of recharge and discharge. This method of managing recharge does not specifically address current basin management issues, such as existing land subsidence in Management Zone 1 (MZ-1) and parts of MZ-2 and pumping sustainability issues in the Jurupa Community Services District (JCSD) and CDA well fields. There is a need to define additional criteria on how and where to conduct recharge to better address existing basin management issues.

Thus, during the scoping phase of the next RMPU, the Parties should determine if the economic and physical criteria for project evaluation should be revaluated to accomplish Activity A.

Section 4.2 of this report summarizes the 2020 OBMP Management Plan for PE 2.

3.2.3 Program Element 3. Develop and Implement a Water Supply Plan for Impaired Areas

The 2000 OBMP included PE 3—*Develop and Implement a Water Supply Plan for Impaired Areas*—to maintain and enhance Safe Yield and maximize beneficial uses of groundwater. The OBMP recognized that urban land uses would ultimately replace agricultural land uses, which had been the primary land use in the southern portion of the basin throughout the 20th century, and that if municipal pumping did not replace agricultural pumping, groundwater levels would rise and discharge to the Santa Ana River. The potential consequences would be the loss of Safe Yield and the outflow of high-TDS and -nitrate groundwater from the Chino Basin to the Santa Ana River—the latter of which could impair downstream beneficial uses in Orange County. The OBMP estimated that to maintain the Safe Yield, approximately 40,000 afy of groundwater would need to be produced to replace Agricultural Pool pumping in the southern part of the basin. The Chino Basin Desalters were identified as the optimal multi-benefit project to replace the expected decrease in agricultural production to maintain or enhance Safe Yield, to pump and treat high-salinity groundwater in support of PE 7, to meet growing municipal demands in support of PE 5, and to protect the beneficial uses of the Santa Ana River. Additionally, PE 6 envisioned that the Chino Basin Desalters could also be used to clean up the volatile organic compound (VOC) plumes that would eventually be intercepted by the Desalter wells.

The implementation actions incorporated into the 2000 OBMP Implementation Plan are summarized in Table 4 below. Each implementation action in Table 4 is categorized as a one-time or ongoing action, and the right-most column of the table indicates if the action was implemented.

Table 4. Program Element 3 – Implementation Actions Defined in the 2000 OBMP

Implementation Action	One-time/ Ongoing	Implemented?
Years 1 through 3		
Complete the Water Facilities Plan Report for the Expansion of the Chino I Desalter and the construction of the Chino II Desalter. It should be noted that this action is entirely consistent with the OBMP, and is being taken prior to completion of the OBMP.	One-time	✓
Start expansion of the Chino I Desalter and the construction of the Chino II Desalter in early 2001.	One-time	✓
Years 4 through 50		
Complete construction and start up of the expanded Chino I and new Chino II Desalters.	One-time	✓
Watermaster, IEUA and WMWD will periodically review the Regional Water Supply Plan and the need for new Desalter capacity in the southern water-quality impaired part of the Basin, and initiate the construction of new Desalter capacity as determined by Watermaster. Expansion of the Desalter capacity will occur as agricultural production in the southern water-quality impaired part of the basin declines.	Ongoing	✓

3.2.3.1 Implementation Progress since 2000

The OBMP established that desalter production would ultimately need to be increased to 40,000 afy to protect Safe Yield. The Peace Agreement provided for the expansion of the Chino I Desalter to a design capacity of up to 14 mgd (15,700 afy) and the construction of the Chino II Desalter, with a capacity of 10 mgd. The Parties executed the Peace II Agreement in 2007, which included a supplement to the OBMP Implementation Plan to expand the Chino Desalter pumping to 40,000 afy (36 mgd) and introduce Re-operation.

The construction and operation of the Chino Basin Desalters also became a fundamental component of the Chino Basin maximum-benefit SNMP developed pursuant to PE 7.[16] Watermaster and the IEUA are jointly responsible for the implementation of the maximum benefit SNMP, which enables the recycled-water reuse and recharge programs in the Chino Basin in support of PEs 2 and 5. The SNMP includes nine "maximum-benefit commitments." One commitment is the achievement and attainment of Hydraulic Control to limit groundwater outflow from the Chino-North Groundwater Management Zone (GMZ) to *de minimis* levels to protect downstream beneficial uses. Hydraulic Control is also necessary to maximize the Safe Yield. The operation of the Chino Basin Desalters is necessary to attain Hydraulic Control. Three of the nine maximum-benefit commitments are related to the design and construction of the Chino Basin Desalters.

As of the writing of this report, there are 31 Chino Desalter wells with the capacity to pump about 34 mgd (37,600 afy) of groundwater from the southern portion of the Chino Basin, though not all wells are currently in operation. Pumped groundwater is conveyed to two treatment facilities (the Chino-I and Chino-II Desalters) that treat the groundwater with reverse osmosis and ion exchange to reduce TDS and nitrate concentrations. The treated water is then delivered to a conveyance system that serves the CDA's member agencies. The brine created in the treatment process is discharged to the Inland Empire Brine Line. Over the last five years, total desalter production has ranged from about 28,100 to 30,000 afy, averaging 29,200 afy. The following describes the history of the expansion of the Chino Basin Desalters:

- The Chino-I Desalter, which included 11 production wells, began operating in 2000 with a design capacity of 8 million gallons per day (mgd; about 9,000 afy).
- In 2005, the Chino-I Desalter capacity was expanded to 14 mgd (about 16,000 afy) with the construction of three additional wells.
- The Chino-II Desalter, which included eight production wells, began operating in June 2006 with a design capacity of 15 mgd (about 17,000 afy).
- In 2012, the CDA completed construction of the Chino Creek Well Field (CCWF) in the western portion of the basin which added five wells and additional capacity of about 1.3 mgd (1,500 afy) to the Chino-I Desalter; four of these wells began pumping between 2014 and 2016.
- In 2015, two additional Chino-II Desalter wells were constructed, and pumping began in 2018. These two wells, plus one additional well that is planned for construction, are part of the final expansion of the Chino Basin Desalters to meet the 40,000 afy pumping requirement of the OBMP, Peace Agreements, and maximum benefit SNMP. This final expansion is expected to be completed by 2021.

[16] Refer to Section 3.2.7 of this report for a complete overview of the maximum-benefit SNMP.

The Chino Basin Desalters are also being used to support the clean-up of point-source contamination in the southern Chino Basin:

- Two of the Chino-II Desalter expansion wells and CDA Well I-11 will be pumped to capture groundwater contaminants from the South Archibald plume. The Chino-II Desalter, which will be modified to treat the volatile organic compounds (VOCs) associated with the plume (see Section 3.2.6).
- The use of two of the CCWF wells is being evaluated for use as part of the remediation solution for the Chino Airport plume; however, the evaluation of the remediation alternatives is ongoing (see Section 3.2.6).

3.2.3.2 Ongoing implementation actions for the 2020 OBMP

The capacity to pump the Chino Basin Desalter goal of 40,000 afy is expected to be achieved by 2021. Operation at this capacity, once all agricultural land uses have converted to urban uses, would fulfill the objectives of PE 3. As previously noted, the operation of the Chino Basin Desalters is necessary to attain Hydraulic Control, which is a regulatory requirement of the maximum benefit SNMP. Thus, the ongoing implementation actions for the 2020 OBMP related to the operation of the Chino Basin Desalters are included under PE 7 (see Sections 3.2.7 and 4.7).

3.2.4 Program Element 4. Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1

The 2000 OBMP included PE 4—*Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1*—to characterize land subsidence spatially and temporarily, identify its causes, and, where appropriate, develop and implement a program to manage it. The 2000 OBMP identified pumping-induced decline of groundwater levels and subsequent aquifer-system compaction as the most likely cause of the land subsidence and ground fissuring observed in the southwestern portion of MZ-1 in the early 1990s. PE 4 recognized that the occurrence of land subsidence and ground fissuring in MZ-1 is not acceptable and should be reduced to tolerable levels or stopped.

PE 4 called for the development and implementation of an interim management plan for MZ-1 that would: minimize subsidence and fissuring in the short-term, collect the information necessary to understand the extent, rate, and mechanisms of subsidence and fissuring, and formulate a long-term management plan to prevent future subsidence and fissuring or reduce it to tolerable levels.

The implementation actions for PE 4 that were incorporated into the 2000 OBMP Implementation Plan are summarized in Table 5 below. Each implementation action in Table 5 is categorized as a one-time or ongoing action and the right-most column of the table indicates if the action was implemented.

Table 5. Program Element 4 – Implementation Actions Defined in the 2000 OBMP

Implementation Action	One-time/ Ongoing	Implemented?
Years 1 through 5		
Arrange for the physical recharge of 6,500 afy of Supplemental Water at MZ1 spreading facilities. Evaluate for the continued need after FY2004-05.	Ongoing	✓
Convene a MZ1 technical committee to develop a recommended interim management plan to minimize subsidence while data is collected and a long-term subsidence management plan is developed.	One time	✓
Implement the interim management plan, including appropriate monitoring, annual assessment of data from monitoring programs, and modification of monitoring programs, if necessary.	One time	✓
Develop a long-term subsidence management plan.	One time	✓
Implement the long-term subsidence management plan and adapt if necessary.	Ongoing	✓
Years 6 through 50		
Assess data from the monitoring program every three years and modify the subsidence management plan, if necessary.	Ongoing	✓
Implement the long-term subsidence management plan and adapt if necessary.	Ongoing	✓

3.2.4.1 Implementation Progress since 2000

Supplemental Water Recharge

Since the development of the OBMP, Watermaster has exercised best efforts to arrange for the physical recharge of 6,500 afy of supplemental water at the MZ-1 spreading facilities. And, pursuant to the Peace II Agreement, Watermaster committed to continue the physical recharge of at least 6,500 afy of supplemental water as an annual average through the term of the Peace Agreement.

Subsidence Management Plan

From 2001 to 2005, Watermaster developed, coordinated, and conducted the *MZ-1 Interim Monitoring Program* (IMP)[17] under the guidance of the MZ-1 Technical Committee. The MZ-1 Technical Committee was comprised of representatives from all major MZ-1 producers and their technical consultants, including the Agricultural Pool; the Cities of Chino, Chino Hills, Ontario, Pomona, and Upland; the Monte Vista Water District; the Golden State Water Company; and the California Institution for Men (CIM).

The IMP consisted of three main monitoring elements for use in analyzing subsidence: ground-level surveys, remote-sensing (InSAR), and aquifer-system monitoring. The ground-level surveys and InSAR

[17] Chino Basin Watermaster. (2003). *Optimum Basin Management Program, Management Zone 1 Interim Monitoring Program*. Prepared by Wildermuth Environmental, Inc. January 8, 2003.

analyses were used to characterize vertical ground motion. Aquifer-system monitoring of hydraulic and mechanical changes within the aquifer-system was used to characterize the causes of aquifer-system deformation.

The IMP was implemented in two phases: the Reconnaissance Phase and the Comprehensive Phase.

1. The Reconnaissance Phase consisted of constructing 11 piezometers screened at various depths at Rubin S. Ayala Park (Ayala Park) in the City of Chino and installing pressure transducer data-loggers in nearby pumping wells and monitoring wells to measure hydraulic head. Following installation of the monitoring network, several months of aquifer-system monitoring and testing were conducted. Testing included aquifer-system stress tests at pumping wells in the area.
2. The Comprehensive Phase consisted of constructing a dual-borehole pipe extensometer at Ayala Park (Ayala Park Extensometer), near the area of historical fissuring. Following installation of the Ayala Park Extensometer, two aquifer-system stress tests were conducted, followed by passive aquifer-system monitoring.

The IMP provided enough information for Watermaster to develop "Guidance Criteria" for the MZ-1 Parties that, if followed, would minimize the potential for subsidence and fissuring in the investigation area. The methods, results, and conclusions of the IMP, including the Guidance Criteria, were described in detail in the *MZ-1 Summary Report*.[18] The Guidance Criteria formed the basis for the long-term management plan, documented as the *MZ-1 Subsidence Management Plan* (MZ-1 Plan),[19] which was prepared under the guidance of the MZ-1 Technical Committee. To minimize the potential for future subsidence and fissuring in the Managed Area, the MZ-1 Plan recommended that the MZ-1 Parties manage their groundwater pumping pursuant to the Guidance Criteria. The MZ-1 Plan was approved by the Watermaster Board in October 2007 and the Court in November 2007.

Implementation of the MZ-1 Plan began in 2008. The MZ-1 Plan called for the continuation of monitoring, data analysis, annual reporting, and adjustments to the MZ-1 Plan, as warranted by the data. Additionally, the MZ-1 Plan expanded monitoring of the aquifer-system and land subsidence into other areas of the Chino Basin where the IMP indicated concerns for future subsidence and ground fissuring. These so-called "Areas of Subsidence Concern" are: Central MZ-1, Northwest MZ-1, Northeast Area, and Southeast Area.

The MZ-1 Plan described the following potential expanded investigation: (1) more intensive monitoring of horizontal strain across the zone of historical ground fissuring to assist in developing management strategies related to fissuring, (2) injection feasibility studies within the Managed Area, (3) additional pumping tests to refine the Guidance Criteria, (4) computer-simulation modeling of groundwater flow and subsidence, and (5) the development of alternative pumping plans for the MZ-1 Parties affected by the MZ-1 Plan. The MZ-1 Technical Committee (now called the Ground-Level Monitoring Committee or GLMC) discussed these potential future efforts, and if deemed prudent and necessary, they were

[18] Chino Basin Watermaster. (2006). *Optimum Basin Management Program, Management Zone 1 Interim Monitoring Program, MZ-1 Summary Report*. Prepared by Wildermuth Environmental, Inc. February 2006. http://www.cbwm.org/docs/engdocs/Land%20Subsidence/20071017_MZ1_Plan%20--%20Appendix_A_MZ1_SummaryReport_20060226.pdf

[19] Chino Basin Watermaster. (2007). *Chino Basin Optimum Basin Management Program, Management Zone 1 Subsidence Management Plan*. October 2007. http://www.cbwm.org/docs/engdocs/Land%20Subsidence/20071017_MZ1_Plan.pdf

recommended to Watermaster for implementation. Watermaster and the MZ-1 Parties have performed work to implement (1), (2), and (4) above, but have not performed work on (3) and (5).

The MZ-1 Plan stated that if data from existing monitoring efforts in the Areas of Subsidence Concern indicate the potential for adverse impacts due to subsidence, Watermaster would revise the plan to avoid those adverse impacts. The 2014 Annual Report of the GLMC[20] recommended that the MZ-1 Plan be updated to better describe Watermaster's land subsidence efforts and obligations, including areas outside of MZ-1. As such, the update included a name change to the *2015 Chino Basin Subsidence Management Plan* (Subsidence Management Plan)[21] and a recommendation to develop a subsidence management plan for Northwest MZ-1. Land subsidence in Northwest MZ-1 was first identified as a concern in 2006 in the MZ-1 Summary Report and again in 2007 in the MZ-1 Plan. Since then, Watermaster has been monitoring vertical ground motion in this area via InSAR and groundwater levels with pressure transducers at selected wells.

Of particular concern is that subsidence across the San Jose Fault in Northwest MZ-1 has occurred in a pattern of concentrated differential subsidence—the same pattern of differential subsidence that occurred in the Managed Area during the time of ground fissuring. Ground fissuring is the main subsidence-related threat to infrastructure. Because of the threat for ground fissuring, Watermaster increased monitoring efforts in Northwest MZ-1 beginning in FY 2012/13 to include ground elevation surveys and EDMs to monitor ground motion and the potential for fissuring.

In 2015, the GLMC developed the *Work Plan to Develop a Subsidence Management Plan for the Northwest MZ-1 Area* (Work Plan).[22] The Work Plan is an ongoing Watermaster effort and includes a description of a multi-year scope-of-work, a cost estimate, and an implementation schedule. The Work Plan was included in the Subsidence Management Plan as Appendix B. Implementation of the Work Plan began in 2015.

Pursuant to the Subsidence Management Plan, each year, Watermaster has produced the *Annual Report of the GLMC* that contains the results of ongoing monitoring efforts, interpretations of the data, and recommended adjustments to the Subsidence Management Plan, if any. The annual report includes the results and interpretations for the data collected during the prior year as well as recommendations for Watermaster's ground-level monitoring program for the subsequent fiscal year. The Watermaster publishes the annual reports on its website. The most recent annual report was finalized in October 2019.

[20] WEI. (2015). *2014 Annual Report of the Ground-Level Monitoring Committee*. July 2015. http://www.cbwm.org/docs/engdocs/2014%20Final%20Report%20-%20Ground%20Level%20Monitoring%20Committee/Final_2014_Annual%20Report_July2015.pdf

[21] Chino Basin Watermaster. (2015). *Chino Basin Subsidence Management Plan.* July 23, 2015. http://www.cbwm.org/docs/engdocs/Land%20Subsidence/20150724%20-%20Chino%20Basin%20Subsidence%20Management%20Plan%202015/FINAL_2015_CBSMP.pdf

[22] Chino Basin Watermaster. (2015). *Work Plan, Develop a Subsidence-Management Plan for the Northwest MZ-1 Area.* July 23, 2015. http://www.cbwm.org/docs/engdocs/Land%20Subsidence/20150724%20-%20Chino%20Basin%20Subsidence%20Management%20Plan%202015/FINAL_CBSMP_Appendix_B.pdf

3.2.4.2 Ongoing implementation actions for the 2020 OBMP

Supplemental Water Recharge

Pursuant to the Peace II Agreement, Watermaster will continue to arrange for the physical recharge of at least 6,500 afy of Supplemental Water in MZ-1 as an annual average through the term of the Peace Agreement.

Subsidence Management Plan

The Chino Basin will always be susceptible to the future occurrence of land subsidence and ground fissuring, so Watermaster will continue to implement the Subsidence Management Plan pursuant to PE 4, which includes:

- Conducting the ground-level monitoring program pursuant to the Subsidence Management Plan and the recommendations of the GLMC (The monitoring program includes the monitoring of groundwater pumping, recharge, groundwater levels, aquifer-system deformation, and vertical and horizontal ground motion across the western portion of the Chino Basin. The then-current description of the ground-level monitoring program is always included in each Annual Report of the GLMC [third bullet below]).
- Convening the GLMC annually to review and interpret the data from the ground-level monitoring program.
- Preparing annual reports of the GLMC that include recommendations for changes to the monitoring program (The annual report describes recommended activities for the monitoring program for the future fiscal year[s] in the form of a proposed scope-of-work, schedule, and budget. The recommended scope-of-work, schedule, and budget is run through Watermaster's budgeting process for revisions [if needed] and approval. The final scope-of-work, schedule, and budget for the upcoming fiscal year is included in the final annual report.)
- A key element of the Subsidence Management Plan is the verification of its protective nature against land subsidence and ground fissuring in the Chino Basin. This verification is accomplished through continued monitoring, testing, and reporting by the GLMC (as described above), and revision of the Subsidence Management Plan when appropriate. In this sense, the Subsidence Management Plan is adaptive. (The process of annual data analysis and reporting includes the evaluation of the effectiveness of the Subsidence Management Plan to minimize or stop land subsidence and ground fissuring and, if warranted by the data, a recommendation to update the Subsidence Management Plan. The GLMC will make these recommendations within its annual reports and prepare a draft revised Subsidence Management Plan that will be run through the Watermaster process for revisions and/or approval. Upon Watermaster Board approval, the revised Subsidence Management Plan will be submitted to the Court.)

3.2.5 Program Element 5. Develop and Implement Regional Supplemental Water Program

The 2000 OBMP included PE 5—*Develop and Implement Regional Supplemental Water Program*—to improve regional conveyance and the availability of imported and recycled waters throughout the basin. The OBMP recognized that water demands of the Parties would increase. The demand projections at the time estimated that water demands would reach 348,000 afy by 2000 and increase to 418,000 afy by 2020. The increase was assumed to be driven by municipal and industrial demands. Agriculture demands were expected to decrease from about 48,000 afy in 2000 to 8,000 afy by 2020. The OBMP also recognized the limitations to the traditional supplies, such as imported water from Metropolitan, and the need to find alternative supplies such as recycled water.

The implementation actions incorporated into the 2000 OBMP Implementation Plan are summarized in Table 6 below. Each implementation action in Table 6 is categorized as a one-time or ongoing action and the right-most column of the table indicates if the action was implemented.

Table 6. Program Element 5 – Implementation Actions Defined in the 2000 OBMP

Implementation Action	One-time/ Ongoing	Implemented?
Years 4 through 50		
IEUA will construct recycled water facilities to meet the demand for recycled water and for replenishment.	Ongoing	✓

It should be noted that early in the development of the PE 5 implementation plan, the stakeholders discussed the development of a regional water facilities plan that, when implemented, would enable the Parties to maximize the use of imported water in years when Metropolitan has surplus water and to be able to rely completely on local supplies during years when Metropolitan supplies are low or completely interrupted due to planned or catastrophic outages. This plan involved the construction of new wells and groundwater treatment and regional conveyance improvements; the water produced in this plan would be used exclusively by the Parties. The stakeholders ultimately did not include this plan in the 2000 OBMP Implementation Plan, preferring at that time to focus on expanding groundwater desalting in the lower Chino Basin (PE 3), increasing stormwater recharge (PE 2), and implementing a large-scale recycled water program to maximize its reuse (PEs 2 and 5).

3.2.5.1 Implementation Progress since 2000

Although the water demands of the Parties increased at a slower rate than projected when the OBMP was developed, Watermaster and the IEUA have aggressively pursued programs to improve water supply reliability through the implementation of PEs 2, 3, and 5. Since 2000, the IEUA has constructed and operated a recycled water conveyance system throughout the basin, enabling it to provide recycled water to its member agencies. The IEUA owns and operates four wastewater treatment facilities: Regional Plant No. 1 (RP-1), Regional Plant No. 4 (RP-4), Regional Plant No. 5 (RP-5), and the Carbon Canyon Water Reclamation Facility (CCWRF). Recycled water produced by these plants is used for direct uses, groundwater recharge, and discharged to Chino Creek or Cucamonga Creek, which are tributaries to the Santa Ana River. Historically, the IEUA's operating plan has prioritized the use of recycled water as follows: (1) to meet the IEUA's discharge obligation to the Santa Ana River (17,000 afy), (2) to meet direct reuse demands for recycled water, and (3) to recharge the remaining recycled water.

Although recycled water had been reused since the 1970s, the growth of the IEUA's recycled water reuse programs started in 1997, and in 2005 the OBMP enabled the IEUA's recycled water reuse program to be aggressively expanded. When the OBMP was completed in 2000, the IEUA was recharging about 500 afy of recycled water and utilizing about 3,200 afy for non-potable direct uses. The incorporation of Watermaster and the IEUA's maximum benefit SNMP into the Basin Plan in 2004 triggered the ability to rapidly increase recycled water reuse. Over the last five years, the annual direct reuse of recycled water ranged from 17,000 afy to 24,600 afy and averaged 20,600 afy. And, the annual recycled water recharge ranged from 10,800 to 13,900 afy and averaged 13,000 afy.

The recycled water provided by the IEUA has replaced a like amount of groundwater and imported water that would have otherwise been used for non-potable purposes. Much of the post-2000 increase in supplemental water storage in the Chino Basin is attributable to the increased availability and recharge of recycled water.

3.2.5.2 Ongoing implementation actions for the 2020 OBMP

Recycled Water Reuse

The IEUA is continuing to expand its recycled-water distribution system and recharge facilities throughout the Chino Basin for direct non-potable uses and recharge. Growth is still occurring in the Chino Basin and will result in additional wastewater flows to the IEUA's treatment plants. Much of this supply will be used to meet increasing non-potable demands as the currently remaining agricultural land uses convert to urban uses.

The IEUA is currently performing planning efforts for the CBP, which is a large Storage and Recovery Program to provide for regional, dry-year water supplies and associated infrastructure. The CBP was conditionally awarded approximately $207 million of Proposition 1 Water Storage Investment Program funding. Over its 25-year project life, the CBP would increase recycled water recharge in the Chino Basin by 15,000 afy, and during dry years, the water in storage would subsequently be recovered and pumped into Metropolitan's system for use in Southern California in lieu of imported water from the State Water Project. The planned sources of recycled water for the CBP are currently being evaluated by the IEUA, but it is certain additional supplies beyond those produced by the IEUA will be needed. Thus, the objective to maximize the reuse of recycled water produced by the IEUA and others as envisioned by Activity D is currently being pursued by the IEUA on behalf of the Parties and with the support of Watermaster and other regional entities.

As part of the CBP, the IEUA, together with regional agencies, is developing a significant body of work to evaluate opportunities to acquire the surplus recycled water supplies needed for the CBP. The CBP is still undergoing planning and evaluation, and its implementation is not certain. If the CBP is not implemented, the significant body of work developed by the IEUA can be leveraged to support future planning efforts to maximize recycled water reuse in a manner that is consistent with the Judgment and the maximum-benefit SNMP.

Water Reliability

In addition to the efforts to maximize recycled water reuse, the IEUA and its member agencies are currently preparing the 2020 IRP, which will serve as a regional implementation strategy for long-term water resources management within the IEUA's service area. The objective of the IRP is to identify the facilities needed to ensure that the IEUA's water supplies over the next 25 years are reliable, cost-effective, and environmentally responsible.

As described in the Scoping Report, the total water demand of the Chino Basin Parties is projected to grow from about 290,000 afy in 2015 to about 420,000 afy by 2040, an increase of about 130,000 afy. The projected growth in water demand by the Appropriative Pool Parties drives the increase in aggregate water demand as some Appropriative Pool Parties are projected to serve new urban water demands created by the conversion of agricultural and vacant land uses to urban uses, a similar challenge observed during the development of PEs 3 and 5 in the 2000 OBMP. Table 7 below shows the historical (2015) and projected aggregate water demand and supply plan for all Parties by water source.

Table 7. Aggregate Water Supply Plan for Watermaster Parties: 2015 to 2040[23]

Water Source	2015 (Actual)	2020	2025	2030	2035	2040
Volume (af)						
Chino Basin Groundwater	147,238	145,904	153,804	157,716	168,987	176,652
Non-Chino Basin Groundwater	51,398	55,755	63,441	64,999	66,691	68,483
Local Surface Water	8,108	15,932	15,932	18,953	18,953	18,953
Imported Water from Metropolitan	53,784	86,524	93,738	100,196	102,166	109,492
Other Imported Water	8,861	9,484	10,095	10,975	11,000	11,000
Recycled Water for Direct Reuse	20,903	24,008	24,285	26,583	29,836	33,223
Total	**290,292**	**337,607**	**361,295**	**379,422**	**397,633**	**417,803**
Percentage						
Chino Basin Groundwater	51%	43%	43%	42%	42%	42%
Non-Chino Basin Groundwater	18%	17%	18%	17%	17%	16%
Local Surface Water	3%	5%	4%	5%	5%	5%
Imported Water from Metropolitan	19%	26%	26%	26%	26%	26%
Other Imported Water	3%	3%	3%	3%	3%	3%
Recycled Water for Direct Reuse	7%	7%	7%	7%	8%	8%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Each of the water sources available to the Chino Basin Parties listed has its limitations:

- The ability to produce groundwater from the Chino Basin is limited by current basin management issues, such as ongoing land subsidence in MZ-1 and parts of MZ-2, pumping sustainability issues in the JCSD and CDA well field areas, and water quality.
- The challenges to imported water include reliability of its supply and infrastructure and the local capacity to treat it for municipal supply.
- The reliability of non-Chino Basin groundwater depends on water quality, water rights, and infrastructure to convey it to Parties' water systems.
- The reliability of local surface water depends on the hydrologic characteristics of the individual supplies, water quality, water rights, and infrastructure to convey it from points of diversion to a Party's water system.
- The challenges to maximizing the reuse of recycled water include: the timing of recycled water availability and complying with the maximum benefit SNMP and water quality regulations.

[23] Sourced from: WEI. (2018). *Storage Framework Investigation*. October 2018; revised January 2019. This document is available on Watermaster's FTP site at http://www.cbwm.org/

In addition to the challenges to specific water sources, climate change is likely to result in higher temperatures, longer dry periods, and shorter more intense wet periods, which can ultimately affect the availability and management of all water supply sources. For example, shorter more intense precipitation periods are expected to result in reduced recharge, and longer dry periods are expected to result in reduced imported water supplies (as occurred with State Water Project supplies in the recent drought from 2013 to 2016). And, many of the challenges are interrelated and compounding. For example, the reliability of imported water (and other non-groundwater supplies) not only affects the imported water supply but also the groundwater supplies that are dependent on imported water for blending.

As previously mentioned, the IEUA is currently developing the 2020 IRP, which will serve as a foundational regional implementation strategy for long-term water resources management within IEUA's service area and can be expanded by the Chino Basin Parties for the benefit of the region. Although the TVMWD and WMWD member agencies and Watermaster are participants in the development in the 2020 IRP, the current planning effort could be expanded to address regional reliability and to enhance integration with Watermaster's groundwater management efforts.

3.2.6 Program Element 6. Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management

The 2000 OBMP included PE 6—*Develop and Implement Cooperative Programs with the Regional Board and other Agencies to Improve Basin Management*—to assess water quality trends in the basin, to evaluate the impact of OBMP implementation on water quality, to determine whether point and non-point contamination sources are being addressed by water quality regulators, and to collaborate with water quality regulators to identify and facilitate the cleanup of soil and groundwater contamination.

The implementation actions for PE 6 incorporated into the 2000 OBMP Implementation Plan are summarized in Table 8 below. Each implementation action in Table 8 is categorized as a one-time or ongoing action and the right-most column of the table indicates if the action was implemented.

Table 8. Program Element 6 – Implementation Actions Defined in the 2000 OBMP

Implementation Action	One-time/ Ongoing	Implemented?
Years 1 through 3		
Watermaster will form an ad hoc committee, hereafter water quality committee. The schedule and frequency of the meeting will be developed with the Regional Board during the first year of OBMP implementation.	Both	✓
Watermaster will refine its monitoring efforts to support the detection and quantification of water quality anomalies. This may require additional budgeting for analytical staff/support.	One-time	✓
If necessary, Watermaster will conduct investigation to assist the Regional Board in accomplishing mutually beneficial objectives.	Ongoing	✓
Watermaster will seek funding from outside sources to accelerate detection and cleanup efforts.	Ongoing	✓

Implementation Action	One-time/ Ongoing	Implemented?
Years 4 through 50		
Continue monitoring coordination efforts with the Regional Board.	Ongoing	✓
Annually update priority list and schedule for cleaning up known water quality anomalies.	Ongoing	
Continue to seek funding from outside sources to accelerate cleanup efforts.	Ongoing	✓
Implement projects of mutual interest.	Ongoing	✓

3.2.6.1 Implementation Progress since 2000

During the development of the OBMP, Watermaster was conducting a multi-year comprehensive basin-wide water quality monitoring program (from 1999-2001) to sample every well possible to support the development and implementation of the OBMP. The comprehensive water quality monitoring program included collecting data from all Appropriators and cooperators in the Chino Basin and adjacent basins and performing monitoring at all private wells in the southern portion of the basin. During this time, Watermaster performed monitoring at 602 private wells. Data from this comprehensive water quality monitoring program established a baseline on the state of groundwater quality at the start of OBMP implementation. These data also became the foundation for achieving the objectives of PE 6: to assess water quality trends in the basin, to evaluate the impact of OBMP implementation on water quality, and to determine whether point and non-point contamination sources are being addressed by water quality regulators. Since 2000, Watermaster's groundwater quality monitoring efforts have continued in alignment with the Groundwater Quality Monitoring Program described in PE 1 and have been periodically refined as needed to support the detection and quantification of water quality anomalies and contaminants of concern, such as perchlorate, hexavalent chromium, and 1,2,3-trichloroethene (1,2,3-TCP). Watermaster has regularly assessed groundwater quality in the Chino Basin using data compiled through its own monitoring at private production wells and dedicated monitoring wells and the monitoring efforts of others. Watermaster reports on water quality trends and findings in several reports, including the State of the Basin Reports, which are prepared and submitted to the Court every two years.

In 2003, the Water Quality Committee was convened to coordinate many of the activities performed under PE 6. The Committee met intermittently through 2010. The main activities of the Water Quality Committee included investigations to characterize and address point and non-point sources of groundwater contamination in the Chino Basin and collaboration with the Santa Ana Regional Water Quality Control Board (Regional Board) in its efforts to facilitate the cleanup of groundwater contamination. Some of the significant groundwater quality investigations performed under the guidance of the committee included: the characterization of groundwater contamination in MZ-3 near the former Kaiser Steel Mill and Alumax facilities, tracking studies on the source and extent of the Chino Airport plume, the identification of sources and responsible Parties for the South Archibald plumes, and the identification of the sources of legacy perchlorate contamination in groundwater throughout the basin. The investigations were coordinated through the Water Quality Committee for the Chino Airport and South Archibald plumes and contributed to the definitive identification of responsible Parties and the issuance of cleanup and abatement orders by the Regional Board.

Since 2010, Watermaster has continued to perform monitoring for contaminants related to point-source and non-point source contamination, to assist the Regional Board with the investigation and regulation of point source contaminant sites in the Chino Basin, and to prepare status reports on the monitoring and remediation of point-source contaminant sites in the basin. Periodic status reports have been prepared for: the Chino Airport and South Archibald plumes[24] and the General Electric (GE) Test Cell plume, the GE Flatiron plume, the former Kaiser Steel Mill Facility plume, the CIM plume, the Stringfellow plume, and the Milliken Landfill plume. Updated delineations of the spatial extent of the plumes in the Chino Basin are prepared every two years by Watermaster and are included in the plume status reports and biennial State of the Basin Reports.

Currently, the responsible Parties for the Chino Airport plume and South Archibald plume are initiating remedial strategies that include the use of the Chino Basin Desalters for pumping and treating the contaminated groundwater associated with these plumes. This use of the Chino Basin Desalters as a mutually beneficial project was recognized in the OBMP Implementation Plan as a potential management strategy and provides cost sharing benefits to all involved Parties. Additionally, the CDA and IEUA have acquired over $85 million in federal and state grant funds for the Chino Basin Desalter Phase III expansion project that is planned to be used for portions of the remediation of the Chino Airport and South Archibald plumes.

3.2.6.2 Ongoing implementation actions for the 2020 OBMP

Pursuant to the PE 6 implementation plan, Watermaster will continue to perform the following to ensure that point-source contamination is being adequately addressed: monitor water quality at monitoring wells and private wells within the basin and collect data from others to support the quantification of point-source contaminant plumes, prepare updated delineations of the plume extents for the biennial State of the Basin Reports, and track and report on the status of remediation in the recurrent plume status reports and other ad-hoc investigations as needed to support the Regional Board in their efforts to address groundwater contamination. Watermaster will also continue to support the Regional Board or other Parties to identify and implement mutually beneficial projects for addressing groundwater contamination cleanup and identify outside sources to finance the cleanup efforts, such as the funds awarded for the Chino Desalter expansion project. Watermaster will continue to characterize and report on water-quality since OBMP implementation in the biennial State of the Basin Reports using data collected for the PE 1 Groundwater Quality Monitoring Program.

While PE 6 in the 2000 OBMP Implementation Plan provides a strategy to support the Regional Board in its efforts to address groundwater contamination cleanup in the Chino Basin, there are emerging contaminants with regulatory water quality standards set by the DDW that can impact the beneficial uses of groundwater. As described in the Scoping Report for Activity EF, there are contaminants in groundwater that limit its direct use for drinking water supply and reductions in pumping due to water quality challenges can result in negative impacts to the basin, such as reductions in net recharge, loss of hydraulic control, and movement of contaminant plumes. The enforceable drinking water standards developed by the DDW are continuously evolving and becoming more stringent as laboratory analytical technologies to detect contaminants are advancing. Hence, it is likely that new contaminants will be identified and regulated. The *Groundwater Quality Management Plan* envisioned for Activity EF is a

[24] Status reports for the Chino Airport and South Archibald plumes were prepared monthly in 2013; quarterly from 2014-2017; and semi-annually effective in 2018. Status reports for the other plumes and sites are prepared annually effective 2018.

refinement on PE 6 from the 2000 OBMP in that it is a proactive and basin-wide approach to address emerging contaminants to prepare the Parties for addressing compliance with new and increasingly stringent drinking water regulations defined by the DDW and ensure the long-term maximum beneficial use of the Basin.

3.2.7 Program Element 7. Develop and Implement Salt Management Plan

The 2000 OBMP included PE 7—*Develop and Implement Salt Management Plan*—to characterize current and future salt and nutrient conditions in the basin and to subsequently develop and implement a plan to manage them. Such a management strategy was necessary to address historical salt and nutrient accumulation from agricultural operations and to support the aggressive expansion of recycled water recharge and reuse envisioned in PEs 2 and 5.

The implementation actions incorporated into the 2000 OBMP Implementation Plan are summarized in Table 9 below. Each implementation action in Table 9 is categorized as a one-time or ongoing action, and the right-most column of the table indicates if the action was implemented.

Table 9. Program Element 7 – Implementation Actions Defined in the 2000 OBMP

Implementation Action	One-time/ Ongoing	Implemented?
Years 1 through 3		
Develop salt budget goals, develop the salt budget tool and review all the OBMP actions.	One-time	✓
Watermaster will continue to monitor the nitrogen and salt management activities within the basin.	Ongoing	✓
Years 4 through 50		
As part of periodic updates of the OBMP, re-compute the salt budget using the salt budget tool. The salt budget tool will be used to reassess future OBMP actions to ensure the salt management goals are attained.	Ongoing	✓
Watermaster will continue to monitor the nitrogen and salt management activities within the basin.	Ongoing	✓

3.2.7.1 Implementation Progress since 2000

In 2002, recognizing that implementing the recycled water reuse program would require large-scale treatment and mitigation of salt loading under the then-current antidegradation objectives for TDS and nitrate defined in the Basin Plan, Watermaster and the IEUA petitioned the Regional Board to establish a maximum-benefit-based SNMP that involved (1) increasing the TDS and nitrate objectives for the Chino-North GMZ[25] to numerically higher values to enable maximization of recycled water reuse and (2) committing to a program of salt and nutrient management activities and projects ("maximum benefit

[25] The Chino-North GMZ has a maximum-benefit TDS objective of 420 mgl and is a combination of the Chino-1, Chino-2, and Chino-3 antidegradation GMZs that have lower TDS objectives, ranging from 250 to 280 mgl.

commitments") that ensure the protection of beneficial uses of the Chino-North GMZ and downgradient waters (the Santa Ana River and the Orange County GMZ). The technical work performed to support the maximum-benefit SNMP proposal included the development and use of an analytical salt budget tool to project future TDS and nitrate concentrations in the Chino-North GMZ with and without the maximum-benefit SNMP. The maximum-benefit SNMP was incorporated into the Basin Plan by the Regional Board in January 2004.

Implementation of the maximum-benefit SNMP is a regulatory requirement of the Basin Plan. The requirement is also incorporated into Watermaster and the IEUA's recycled water recharge program permit (R8-2007-0039) and the IEUA's recycled water discharge and direct reuse permit (R8-2015-0021; NPDES No. CA 8000409). There are nine maximum-benefit commitments included in the Basin Plan and recycled water permits:

1. The development and implementation of a surface-water monitoring program
2. The development and implementation of a groundwater monitoring program
3. The expansion of the Chino-I Desalter to 10 mgd and the construction of the Chino-II Desalter with a design capacity of 10 mgd
4. The additional expansion of desalter capacity to a total capacity of 40 mgd pursuant to the OBMP and the Peace Agreement
5. The construction of the recharge facilities included in the Chino Basin Facilities Improvement Program
6. The management of recycled water quality to ensure that the IEUA agency-wide, 12-month running average wastewater effluent quality does not exceed 550 milligrams per liter (mgl) for TDS and 8 mgl for total inorganic nitrogen (TIN)
7. The management of the basin-wide, volume-weighted TDS and nitrate concentrations of artificial recycled, storm, and imported waters to concentrations that are less than or equal to the maximum-benefit objectives as a five-year rolling average
8. The achievement and maintenance of the Hydraulic Control of groundwater outflow from the Chino Basin, specifically from the Chino-North GMZ, to protect the water quality of the Santa Ana River and downstream beneficial uses
9. The triennial recalculation of ambient TDS and nitrate concentrations of the Chino Basin GMZs

These commitments are all activities that were planned to be implemented under the OBMP through implementation actions within PEs 1, 2, 3, 5, and 7.

Watermaster and the IEUA are also required to prepare an annual report to the Regional Board on the status of implementation of the maximum-benefit commitments, including reporting of annual data collected through the monitoring program and assessments of compliance with the groundwater and recycled water-quality limits defined in the SNMP. If the maximum-benefit commitments are not implemented to the Regional Board's satisfaction, the antidegradation objectives would apply for regulatory purposes. The application of the antidegradation objectives would result in a finding of no assimilative capacity for TDS and nitrate in the Chino-North GMZ, and the Regional Board would require mitigation for all recycled water discharges to Chino-North that exceeded the antidegradation objectives retroactively to January 1, 2004. The retroactive mitigation for past discharges would be required to be completed within a ten-year period, following the Regional Board's finding that the maximum-benefit commitments were not met.

Watermaster has prepared and submitted annual reports to the Regional Board every year since 2005. As of the most recent annual report for CY 2018, Watermaster and the IEUA remain in compliance with all requirements of the maximum-benefit commitments.[26] A more detailed summary of the commitments and progress towards implementation is provided in Exhibit 14.

3.2.7.2 Ongoing implementation actions for the 2020 OBMP

Compliance with the maximum benefit commitments is an ongoing requirement of the Basin Plan. The ongoing actions to implement the maximum-benefit SNMP as currently defined in the basin, and thus PE 7, will include:

- Continue implementation of the surface and groundwater monitoring programs.
- Complete the expansion of the Chino Basin Desalter pumping capacity to 40,000 afy (expected in 2020).
- Maintain Hydraulic Control of the Chino-North GMZ through operation of the Chino Basin Desalters and other means, as necessary.
- Continue the storm and imported water recharge program to comply with recycled water recharge dilution requirements.
- Periodically analyze and report groundwater, surface water, and recycled water quality data to assess compliance with the metrics established in the maximum-benefit SNMP.
- Construct treatment and/or salt-offset facilities *if* one or more of the compliance metrics is exceeded.

There are three water-quality limitations and associated compliance metrics established in the maximum-benefit SNMP. When these metrics are exceeded, Watermaster and the IEUA must develop a plan and schedule to achieve compliance. The limitations, compliance metrics, and compliance actions are summarized in Exhibit 15.

The management actions for achieving compliance with the metrics once they are exceeded could include, but are not limited to: desalting recycled water to reduce TDS concentrations, increasing the recharge of low-TDS supply sources (storm or imported waters), or additional desalting of high-TDS groundwater as a salt offset.

With the exception of the ambient nitrate concentration of the Chino-North GMZ, which has exceeded the objective of 5.0 mgl since it was established in 2004, none of the other TDS and nitrate limitations have been exceeded. That said, the ambient TDS and nitrate concentrations in the Chino-North GMZ continue to increase due to legacy agricultural activities, recycled water reuse, and current irrigation practices. The current ambient TDS and nitrate concentrations are 360 and 10.3 mgl, respectively. Based on the rate of increase of the ambient TDS concentration since 1997, which has been about three mgl per year, the maximum-benefit objective of 420 mgl is not expected to be exceeded until about 2035.

More recently, the TDS concentration of recycled water has approached the compliance metric defined in commitment number 6. During the 2012 to 2016 drought, the 12-month running-average IEUA agency-wide TDS concentration in recycled water approached the 545 mgl action limit that would require the IEUA and Watermaster to submit a water-quality improvement plan and schedule. In analyzing the available data, the IEUA determined that the primary drivers for the increasing recycled

[26] WEI. (2019). *Optimum Basin Management Program Chino Basin Maximum Benefit Annual Report 2018*. April 2019.

water TDS concentration were the increase in the TDS concentration of the water supplies used by its member agencies and an increase of the TDS waste increment due to indoor water conservation. Similarly, drought conditions also threaten the ability to comply with the recycled water recharge dilution requirements. During drought conditions there is: a reduction in the amount of high-quality stormwater recharge, limited or no availability of imported water for recharge, an increase in the TDS concentrations of imported water, and a concomitant increase in the TDS concentrations of the recycled water. Not only are the two primary sources of low-TDS recharge water less available during drought periods, but the source water quality of municipal water supplies is also higher in TDS due to increases in imported water TDS and indoor water conservation practices. A more detailed discussion of this issue is provided in the Scoping Report. The Scoping Report discussion demonstrated the meaningful impact that drought has on compliance with the various recycled water quality metrics and indicates that climate change, which is expected to result in longer drier droughts, could potentially threaten future compliance with the limits.

Although the 12-month running-average IEUA agency-wide TDS concentration declined from the 2015 peak before reaching the 545 mgl action limit, it was an important indicator that the TDS concentration of recycled water is likely to approach or exceed the recycled water action limit during the next prolonged dry period and trigger the planning for recycled water quality improvements. In May 2017, recognizing the potential cost of implementing recycled water quality improvements for what might be only short-term exceedances of the action limit, Watermaster and the IEUA petitioned the Regional Board to consider updating the maximum-benefit SNMP to incorporate a revised compliance metric for recycled water TDS and nitrate specifically to allow a longer-term averaging period. The Regional Board agreed that an evaluation of the recycled water compliance metric is warranted and directed Watermaster and the IEUA to develop a technical scope of work to demonstrate the potential impacts of the revised compliance metric.

The primary objectives of the technical work to support the maximum-benefit SNMP and permit updates are: to develop and use an updated groundwater solute-transport model to evaluate the TDS and nitrate concentrations of the Chino Basin (e.g. a new salt-budget tool), to define alternative salinity management scenarios, and to project the future TDS and nitrate concentrations in the Chino Basin for each scenario. The results will be used to work with the Regional Board to develop a regulatory compliance strategy that potentially includes a new compliance metric based on a longer-term averaging period for recycled water TDS, contingent on the ongoing modeling and analysis efforts. The regulatory compliance strategy can also address any projected challenges in complying with the recycled water dilution requirements. The work began in September 2017 and is expected to be completed in 2020.

The Regional Board has indicated that in accepting any proposal to modify the recycled water compliance metrics, it will require Watermaster and the IEUA to add a new maximum-benefit commitment to the Basin Plan that involves updating the TDS and nitrate projections every five years. Thus, the need for the proactive planning to achieve compliance, as envisioned by Activity K, is a required ongoing activity under PE 7 and the maximum-benefit SNMP.

3.2.8 Program Element 8. Develop and Implement Groundwater Storage Management Program *and* Program Element 9. Develop and Implement Storage and Recovery Programs

The Judgment recognized the existence of unused storage space within the Chino Basin that could be used to store water for subsequent beneficial use. The Judgment requires that the use of such storage capacity be undertaken only under Watermaster control and regulation to protect all stored water, to protect Safe Yield, and to avoid adverse impacts to groundwater pumpers. The Judgment prioritizes the use of storage space by the Parties over the use of storage space for the export of stored water.

The 2000 OBMP included two PEs to address the management and use of storage space:

Program Element 8. Develop and Implement Groundwater Storage Management Program

Program Element 9. Develop and Implement Storage and Recovery Programs

The objectives of PE 8 are (1) to develop and implement a storage management plan that prevents overdraft, protects water quality, and ensures equity among the Parties, and (2) to periodically recalculate Safe Yield. The objective of PE 9 is to develop Storage and Recovery Programs that benefit all Parties in the basin and ensure that basin waters and storage capacity are put to maximum beneficial use without causing MPI to any producer or the basin.

The 2000 OBMP storage management plan in PE 8 consists of managing groundwater production, replenishment, recharge, and storage such that total storage within the basin ranges from a low of 5,300,000 af to a high of 5,800,000 af. The following definitions are included in the OBMP Implementation Plan to describe the storage management plan:

- Operational Storage Requirement (OSR) is the storage or volume in the Chino Basin that is necessary to maintain the Safe Yield. The OSR was estimated in the development of the OBMP to be about 5.3 million af.[27]
- Safe Storage is an estimate of the maximum amount of storage space in the basin that can be used and not cause significant water-quality and/or high-groundwater related problems. Safe Storage was estimated in the development of the OBMP to be about 5.8 million af.
- SSC is the difference between Safe Storage and the OSR and is the storage space that can be safely used by producers and Watermaster for storage programs. Based on the above, the SSC is about 500,000 af, including water in existing storage accounts. The allocation and use of storage space in excess of the SSC will preemptively require mitigation; that is, mitigation must be defined and resources committed to mitigation prior to its allocation and use.

The Peace Agreement describes the actions, programs, and procedures Watermaster will take in performance of Storage and Recovery Programs.[28]

The implementation plan for PEs 8 and 9 were combined in the OBMP Implementation Plan. The implementation actions incorporated into the 2000 OBMP Implementation Plan are summarized in Table 10 below. Each implementation action is categorized as a one-time or ongoing action and the right-most column of the table indicates if the action was implemented.

[27] This storage value was set as the estimated storage in the basin in 1997. See Page 2-11 of the OBMP Phase 1 Report.

[28] See Peace Agreement, § 5.2

Table 10. Program Elements 8 and 9 – Implementation Actions Defined in the 2000 OBMP

Implementation Action	One-time/ Ongoing	Implemented?
Years 1 through 3		
Evaluate the need to modify Watermaster UGRR* regarding storage management plans and procedures.	One-time	✓
Determine the operational storage requirement and safe storage.	One-time	✓
Years 4 through 50		
Start assessing losses at 2% per year in year 2005. This amount will be subject to modification in future years.	Ongoing	✓
In year 2010/11 and every ten years thereafter, compute Safe Yield and storage loss rate for prior ten-year period, and reset Safe Yield and storage loss rates for the next ten-year period. Reassess storage management plan and modify Watermaster UGRR, if needed.	Ongoing	✓

*UGRR stands for Uniform Groundwater Rules and Regulations. The UGRR was incorporated in the Watermaster's Rules and Regulations and is no longer a stand along document.

3.2.8.1 Implementation progress since 2000 and ongoing implementation actions for the 2020 OBMP

A final SSC of 500,000 af was established in the OBMP Implementation Plan. The water occupying the SSC includes Carryover, Excess Carryover, Local Storage, and Supplemental Waters stored by the Parties, including water stored for Storage and Recovery Programs. Carryover, Excess Carryover, Local Storage, and Supplemental Waters in storage accounts are referred to collectively as "managed storage."

Storage Agreements and Existing Managed Storage

The Restated Judgment provides that the Basin's groundwater storage capacity may be utilized for the storage and conjunctive use of supplemental water only under Watermaster control and regulation and that no use of such capacity be made except pursuant to written agreement with Watermaster.[29] The Pooling Plans of the Overlying (Non-Agricultural) Pool[30] and the Appropriative Pool[31] each require a Party to have an agreement with Watermaster as a condition of storing Excess Carryover water within the Basin. Watermaster has developed rules and regulations, standard storage agreements, and related forms pursuant to the Judgment and Peace Agreement.

There are three types of storage agreements that result in five types of storage accounts: Excess Carryover, Local Supplemental-Recycled, Local Supplemental-Imported, Pre-2000 Quantified Supplemental, and Storage and Recovery. An Excess Carryover account includes a Party's unproduced rights in the Safe Yield (Safe Yield for Overlying Non-Agricultural Pool Parties and Operating Safe Yield for Appropriative Pool Parties) and Basin Water acquired from other Parties. A Local Supplemental Water account includes imported and recycled water that is recharged by a Party and similar water acquired from other Parties. A Storage and Recovery account includes Supplemental Water and the

[29] See Restated Judgment, ¶ 11, 12 and Peace Agreement, § 5.2(a)

[30] See Restated Judgment Exhibit "G"

[31] See Restated Judgment Exhibit "H"

Peace Agreement requires that Watermaster shall give first priority to Storage and Recovery Programs that produce a "broad and mutual benefit to the Parties to the Judgment."[32]

In evaluating applications for storage agreements, Watermaster conducts an investigation to determine if the water stored and recovered under a proposed storage agreement has the potential to cause MPI to a Party or the basin. If Watermaster determines that implementation of the proposed storage agreement has the potential to cause MPI, the applicant must revise its application and demonstrate that there will be no MPI, or Watermaster must impose conditions in the storage agreement to ensure there is no MPI. Watermaster cannot approve a storage agreement that has the potential to cause MPI.

The Parties, amongst themselves, are also actively involved in water transfers of annual unproduced rights in the Safe Yield and water in their storage accounts. Watermaster has an application and review process for transfers that is similar to the storage agreement application process. Transfers are one way that the Parties recover water held in storage accounts.

The only active Storage and Recovery Program in the basin is the Metropolitan Dry-Year Yield Program (DYYP). The DYYP can store up to 100,000 af with maximum puts of 25,000 afy and maximum takes of 33,000 afy. The DYYP Storage and Recovery agreement provides that puts and takes can exceed these values if agreed to by Watermaster (as was done in fiscal years 2018 and 2009, respectively). The agreement that authorizes the DYYP will expire in 2028.

Watermaster tracks the puts, takes, losses, transfers, and end of year storage totals for all of these storage accounts, and reports on this accounting in the annual assessment process. Starting in 2005, pursuant to the Peace Agreement and OBMP IP, Watermaster began assessing losses in stored water at a rate of 2.0 percent per year. In February 2016, Watermaster changed the loss rate to 0.07 percent per year, based on the estimated groundwater discharge from the Chino-North GMZ to the Santa Ana River (a finding of the Safe Yield recalculation).

Exhibit 16 summarizes the amount of water in managed storage by the Parties and for the DYYP. The total volume of water in managed storage as of June 30, 2019 was about 549,200 af, which includes about 46,000 af stored in the DYYP account. As previously stated, and described below, in 2017, the IEUA adopted an addendum to the Peace II SEIR that provided a temporary increase in the SSC to 600,000 af through June 30, 2021 and required Watermaster to update the storage management plan.

Safe Yield Reset

Starting in 2011, Watermaster began the technical effort to recalculate the Safe Yield of the basin, which at that time was set at 140,000 afy. This work involved updating the hydrogeologic conceptual model of the basin, updating the historical hydrology, updating and recalibrating numerical models that simulate the surface and groundwater hydrology of the Chino Basin area, and projecting the surface and groundwater response of the basin to future management plans that included storage management. Watermaster's methodology for calculating Safe Yield was approved by the Court in April 2017.

This work is documented in *2013 Chino Basin Groundwater Model Update and Recalculation of Safe Yield Pursuant to the Peace Agreement*[33] (hereafter, Safe Yield report). The results of that work yielded a

[32] See Peace Agreement, §5.2(c)(iv)(b)

[33] WEI. (2015). *2013 Chino Basin Groundwater Model Update and Recalculation of Safe Yield Pursuant to the Peace Agreement.* October 2015. http://www.cbwm.org/docs/engdocs/WEI%202013%20CBWM%20Recalculation%20Model%20Update/20151005_WEI_2013_CBWM_Recal_Model_Final_low.pdf

reassessment of the hydrology of the basin from 1961 through 2011 and projections of basin hydrology through 2050, based on the best available planning information. And, based on the investigation results in the Safe Yield report, the Safe Yield was estimated to be 135,000 afy for the period FY 2010/11 to FY 2019/20.

The conclusions of the Safe Yield report related to storage management were:

- On July 1, 2000, the total water in storage in the basin was about 5,935,000 af, inclusive of about 236,000 af of managed storage. This is about 635,000 af greater than the OSR of 5,300,000 af that was established in the OBMP Implementation Plan.
- Managed storage was projected to increase from 487,000 af in 2016 to about 663,000 af by 2030 (exceeding the SSC by 163,000 af) and decline thereafter to zero af by 2051. Managed storage was projected to be used to meet future Replenishment Obligations.
- Total storage was projected to fall below the OSR of 5.3 million af in 2041.

Based on these findings, Watermaster conducted an investigation to determine if the use of managed storage up to 663,000 af would cause potential MPI and concluded it would not. Subsequently, the IEUA adopted an addendum to the Peace II SEIR to temporarily increase the SSC to 600,000 through June 30, 2021 to enable Watermaster and the Judgment Parties to update the OBMP storage management plan.

The next effort to recalculate Safe Yield is currently underway, and Watermaster is using the same Court-approved methodology used in the Safe Yield report to recalculate Safe Yield for the period FY 2020/21 to FY 2029/30.

2020 Storage Management Plan

The 2000 OBMP storage management plan is based on fixed storage volumes (e.g. the OSR, the SSC, and the Safe Storage), and its technical basis is not supported by new information available after the storage management plan was first developed. Review of the new information developed pursuant to the OBMP since 1999 indicated that it is possible to use more storage space than contemplated in the 2000 OBMP. This new information includes: an updated hydrogeologic conceptual model; 20 years of intensive monitoring of basin operations (not available in 1999), including monitoring the basin response as the total volume of managed storage approached 500,000 af; and groundwater model-based projections of the basin response to future management plans where the managed storage exceeded 500,000 af. The new information developed since 1999 also suggests that the use of managed storage to satisfy future desalter and other Replenishment Obligations could cause potential MPI and other adverse impacts: it has the potential to exacerbate land subsidence and pumping sustainability challenges, impact net recharge and Safe Yield, increase groundwater discharge through the CCWF and cause a loss of Hydraulic Control, and change the direction and speed of the contaminant plumes. Thus, Watermaster initiated a process to update the OBMP storage management plan to enable increased storage by the Parties and to include features that will ensure there is no MPI to a Party or the basin caused by the conjunctive-use activities of the Parties and Storage and Recovery Programs.

The *Storage Framework Investigation* (SFI) was completed in 2018 to the provide the technical information required to update the storage management plan.[34] In the SFI, future projections of the use of managed storage were estimated and evaluated for potential MPI. The SFI projected that for the

[34] WEI. (2018). *Storage Framework Investigation – Final Report*. Prepared for the Chino Basin Watermaster. October 2018.

planned use of up to 700,000 af of managed storage by the Parties that Hydraulic Control would be maintained, that there would be no MPI, and that there would be an adverse impact from the reduction of net recharge and Safe Yield attributable to the use of managed storage. The 2018 SFI also projected that for Storage and Recovery Programs that would operate in an identical manner to the existing Metropolitan DYYP and using the managed storage space between 700,000 af and 800,000 af. The SFI also evaluated the impacts of prospective Storage and Recovery Programs that would use up to an additional 200,000 af of storage space (total storage of 1,000,000 af) and projected that MPI and other adverse impacts could occur and described the potential facilities and operating concepts that, if implemented, would minimize potential MPI. The results of the SFI, together with the *Final 2020 Storage Management Plan White Paper,*[35] were used to inform the development of the *2020 Storage Management Plan* (SMP).

The Watermaster completed the 2020 SMP in December 2019, and it is included herein as Appendix E. The 2020 SMP no longer includes the management concepts of Safe Storage, OSR, and SSC that were a part of the 2000 OBMP storage management plan. The provisions of the 2020 SMP are described below.

The 2020 SMP includes the following provisions regarding the use of storage space in the basin:

- An aggregate amount of 800,000 af is reserved for the Parties' conjunctive-use activities (includes Carryover, Excess Carryover, and Supplemental Accounts) and Metropolitan's DYYP. This amount is referred to as the "First Managed Storage Band" (FMSB).
- An aggregate amount of 800,000 af is reserved for the Parties' conjunctive-use activities (includes Carryover, Excess Carryover, and Supplemental Accounts) and Metropolitan's DYYP. This amount is referred to as the "First Managed Storage Band" (FMSB).
- The managed storage space between 800,000 and 1,000,000 af is reserved for Storage and Recovery Programs.
    - Storage and Recovery Programs that utilize the managed storage space above 800,000 af will be required to mitigate potential MPI and other adverse impacts as if the 800,000 af in the FMSB is fully used.
    - Renewal or extension of the DYYP agreement will require the DYYP to use storage space above the 800,000 af of the FMSB.
- The allocation of storage space for use by Parties and for Storage and Recovery Programs may be revised in subsequent updates of the SMP.
- The use of managed storage greater than 1,000,000 af may be possible provided the storing entity submits a Storage and Recovery Program application, demonstrates that the program has broad mutual benefit, demonstrates that the program's mitigation measures will meet the mitigation requirements of the Watermaster to ensure there will be no MPI and other adverse impacts[36], complies with CEQA, and obtains approval from the Watermaster.

The 2020 SMP includes the following provisions regarding the use of spreading basin facilities for storage programs:

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[35] WEI. (2019). *Final 2020 Storage Management Plan White Paper*. Prepared for the Chino Basin Watermaster. July 2019.

[36] Adverse impacts include reductions in net recharge and Safe Yield; and an increase in the groundwater discharge from the Chino North GMZ to the Santa Ana River contributing to a loss of Hydraulic Control.

- Watermaster will prioritize the use of spreading basins to satisfy Watermaster's recharge and Replenishment Obligations over the use of spreading basins for other uses subject to limitations provided in existing agreements with the owners of the facilities.

The 2020 SMP includes the following provisions specific to the Parties and Storage and Recovery Program:

- With regard to the storage management activities of the Parties:
    - Watermaster acknowledges transfers or leases of water rights and water held in managed storage (hereafter transfers) from Parties that are situated such that they pump groundwater outside of MZ-1 to Parties that pump in MZ-1 have the potential to cause potential MPI.
    - Any reduction in net recharge caused by storage in the FMSB is an adverse impact, and Watermaster considers this adverse impact to be mitigated by the prospective calculation of Safe Yield.
- With regard to the Storage and Recovery Programs:
    - Puts and takes should be prioritized to occur in MZ-2 and MZ-3 to avoid new land subsidence and interfering with land subsidence management in MZ-1, to minimize pumping sustainability challenges, to minimize the impact of Storage and Recovery operations on solvent plumes, to preserve the state of Hydraulic Control, and to take advantage of the larger and more useful storage space in MZ-2 and MZ-3.
    - Watermaster will review each Storage and Recovery Program application, estimate the surface and ground water systems response, prepare a report that describes the response and potential MPI, and develop mitigation requirements to mitigate MPI caused by the proposed Storage and Recovery Program. The Storage and Recovery Program applicant will develop mitigation measures pursuant to these requirements and incorporate them into their Storage and Recovery Program application. Upon approval by Watermaster, these mitigation measures will be incorporated into the Storage and Recovery Program storage agreement.
    - Adverse impacts due to a Storage and Recovery Program must be mitigated. Adverse impacts include but are not limited to reductions in net recharge and Safe Yield and an increase in the groundwater discharge from the Chino-North GMZ to the Santa Ana River contributing to a loss of Hydraulic Control.
        - As part of the Storage and Recovery Program application review process, Watermaster will: make a projection of the program's expected impact on net recharge and Safe Yield and on the state of Hydraulic Control and review these impacts and develop mitigation requirements for the proposed Storage and Recovery Program.
        - The Storage and Recovery Program applicant will develop mitigation measures pursuant to these requirements and incorporate them into their Storage and Recovery Program application. Upon approval by Watermaster, these mitigation measures will be incorporated into the Storage and Recovery Program storage agreement.

        - Watermaster will estimate the reduction in net recharge and Safe Yield for each Storage and Recovery Program and deduct it from water stored in each Storage and Recovery Program storage account to compensate for its impact on net recharge and Safe Yield.
    - Watermaster will periodically review current and projected basin conditions and compare this information to the projected basin conditions prepared in the evaluation of the Storage and Recovery Program applications; compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations; make findings regarding the efficacy of related mitigation of MPI and other adverse impact requirements and measures in the Storage and Recovery Program storage agreements; and based on its review and findings, require changes in the Storage and Recovery Program agreements to mitigate MPI and adverse impacts.

The 2020 SMP includes the following provisions regarding the Storage Agreement Application Process:

- Watermaster will modify the existing Form 8 Local Storage Agreements to be consistent with an "evergreen agreement" paradigm and establish that the evergreen agreements will be valid for the duration of the Peace Agreement and will be automatically adjusted upon Watermaster's approval of each subsequent Assessment Package so long as the cumulative amount of water in storage is less than the quantity reserved for the Parties' conjunctive-use operations and Metropolitan's DYYP (cumulatively, the FMSB) and Watermaster has made no finding that MPI is threatened to occur as a result of the increase in the quantity of water in storage.

The 2020 SMP includes the following provisions regarding the update of the SMP:

- Watermaster will periodically review and update the SMP at a frequency of no less than a once every five years, when the Safe Yield is recalculated, when it determines a review and update is warranted based new information and/or the needs of the Parties or the basin, and at least five years before the aggregate amount of managed storage by the Parties is projected to fall below 340,000 af.

4.0 2020 OBMP Update Management Plan

This section describes the recommended 2020 OBMP management plan for each of the nine PEs. The management plan is based on the ongoing 2000 OBMP implementation actions of each PE described in Section 3 and includes the new implementation actions listed in Section 2 for each of the 2020 OBMP Update Activities. For each management plan, the implementation action items are assigned a general schedule over a 20-year implementation period, and the actions are characterized as one-time or ongoing. Additionally, for each PE, the entities responsible for implementation of the PE management actions are identified.

The complete 2020 OBMP Update management plan, inclusive of all PEs, is summarized in Exhibit 17. Exhibit 17 lists each implementation action and characterizes if they originated from the 2000 OBMP or the 2020 OBMP Update and whether Watermaster deems their implementation required to administer the Physical Solution of the Judgment or comply with other regulatory or Watermaster requirements, including the basis for the requirements.

4.1 Program Element 1. Develop and Implement Comprehensive Monitoring Program

The objective of PE 1 is to collect the data and information necessary to support the implementation of all other OBMP PEs and to satisfy other regulations and Watermaster's obligations under its agreements, Court orders, and CEQA. Watermaster is responsible for the implementation of PE 1. The implementation actions and general schedule for implementation are summarized in Table 11 below.

Table 11. Program Element 1 – 2020 OBMP Management Plan

Implementation Action	One-time/ Ongoing
Years 1 through 3	
Watermaster will continue to conduct the required monitoring and reporting programs, including collection of: groundwater production, groundwater level, groundwater quality, ground level, surface water, climate, water supply planning, biological, and well construction/destruction monitoring data.	Ongoing
Perform review and update of Watermaster's regulatory and Court-ordered monitoring and reporting programs and document in a work plan: *OBMP Monitoring and Reporting Work Plan.*	One-time
Years 4 through 20	
Watermaster will continue to conduct the required monitoring and reporting programs pursuant to the *OBMP Monitoring and Reporting Work Plan* (or other guidance documents developed by Watermaster).	Ongoing
Perform periodic review and update of the *OBMP Monitoring and Reporting Work Plan* (or other guidance documents developed by Watermaster) and modify the monitoring and reporting programs, as appropriate.	Ongoing

4.2 Program Element 2. Develop and Implement Comprehensive Recharge Program

The objectives of PE 2 are to increase stormwater recharge to offset the recharge lost due to channel lining, to ensure there will be enough supplemental water recharge capacity available to Watermaster to replenish overdraft, and to maximize the recharge of recycled and supplemental waters to protect or enhance Safe Yield.

Watermaster, the IEUA, the CBWCD, and the SBCFCD are partners in conducting recharge in the Chino Basin and are jointly responsible for the implementation of PE 2. The implementation actions and general schedule for implementation are summarized in Table 12 below.

Table 12. Program Element 2 – 2020 OBMP Management Plan

Implementation Action	One-time/ Ongoing
Years 1 through 3	
Continue to convene the Recharge Investigations and Projects Committee.	Ongoing
Complete the 2023 Recharge Master Plan Update (RMPU).	One-time
Years 4 through 20	
Implement recharge projects based on need and available resources.	Ongoing
Continue to convene the Recharge Investigations and Projects Committee.	Ongoing
Update the RMPU no less than every five years (2028, 2033, 2038).	Ongoing

4.3 Program Element 3. Develop and Implement a Water Supply Plan for Impaired Areas

The objectives of PE 3 in the 2000 OBMP were to maintain and enhance Safe Yield and maximize beneficial uses of groundwater by constructing and operating the Chino Basin Desalters at an ultimate capacity of 40,000 afy. As described in Section 3.2.3, the final facilities to reach the ultimate capacity of 40,000 afy are under construction and are expected to be completed by 2021. Operation at this capacity, once all agricultural land uses have converted to urban uses, will fulfill the objectives of PE 3. Because the operation of the Chino Basin Desalters is necessary to attain Hydraulic Control, which is a regulatory requirement of the maximum benefit SNMP under PE 7, the implementation actions related to the ongoing operation of the Chino Basin Desalters are contained in PE 7. Thus, there are no separate implementation actions for PE 3 for the 2020 OBMP Update.

4.4 Program Element 4. Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1

The objective of PE 4 is to reduce or stop the occurrence of land subsidence and prevent ground fissuring in the Chino Basin or reduce it to tolerable levels. PE 4 achieves this objective by implementing the Watermaster's Subsidence Management Plan and updating the plan as warranted by data, analyses, and interpretations. Watermaster is responsible for the implementation of PE 4 with guidance from the GLMC.

The implementation actions for PE 4 and the general schedule for implementation are summarized in Table 13 below.

Table 13. Program Element 4 – 2020 OBMP Management Plan

Implementation Action	One-time/ Ongoing
Years 1 through 20	
Implement Watermaster's Subsidence Management Plan, and adapt it as necessary.	Ongoing
Watermaster will arrange for the physical recharge of at least 6,500 afy of Supplemental Water in MZ-1 as an annual average. Watermaster may re-evaluate the minimum annual quantity of Supplemental Water recharge in MZ-1 and may increase this quantity through the term of the Peace Agreement.	Ongoing

4.5 Program Element 5. Develop and Implement Regional Supplemental Water Program

The objective of this PE is to improve the regional conveyance and availability of imported and recycled waters throughout the basin. This is a basin-wide activity that involves the Parties, the IEUA, the TVMWD, and the WMWD. IEUA will continue to lead the efforts to maximize the reuse of IEUA recycled water in the Chino Basin. There are other current and forthcoming water supply reliability planning efforts by the IEUA, the Parties, and neighboring agencies that provide a prime opportunity to expand coordination and leverage the efforts for broad, regional benefit. Currently, the IEUA is preparing the 2020 IRP and conducting other related planning efforts with its member agencies. This effort could be expanded by neighboring agencies, including the TVMWD, the WMWD, or other Parties. Any of these agencies could lead and coordinate the collaborative, regional planning effort on behalf of the Parties. Watermaster would participate in the planning efforts, to ensure that any water supply or recycled water projects that are recommended for implementation are integrated with its groundwater management planning efforts and are consistent with the Judgment, Peace Agreements and other agreements, the Watermaster Rules and Regulations.

The implementation actions and general schedule for implementation are summarized in Table 14 below. Each action is categorized as one-time or ongoing.

Table 14. Program Element 5 – 2020 OBMP Management Plan

Implementation Action	One-time/ Ongoing
Years 1 through 20	
The IEUA will maximize the reuse of its recycled water in the Chino Basin.	Ongoing
The IEUA, the TVMWD, the WMWD, and/or other Party acting as a coordinating agency will establish or expand future recycled water planning efforts to maximize the reuse of all available sources of recycled water.	Ongoing
Watermaster will support the IEUA, the TVMWD, the WMWD, and/or others in their efforts to maximize recycled water reuse to ensure these efforts are integrated with Watermaster's groundwater and salinity management efforts.	Ongoing
The IEUA, the TVMWD, the WMWD, and/or other Party acting as a coordinating agency will establish or expand future integrated water resources planning efforts to address water supply reliability for all Watermaster Parties.	Ongoing
Watermaster will support the IEUA, the TVMWD, the WMWD, and/or others in their efforts to improve water supply reliability to ensure those efforts are integrated with Watermaster's groundwater management efforts.	Ongoing

4.6 Program Element 6. Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management

The objectives of PE 6 are to perform routine and coordinated water quality monitoring to characterize water quality in the Chino Basin so that there is adequate information to ensure that contamination sources are being addressed by water quality regulators and to help address compliance with new and increasingly stringent drinking water regulations for emerging contaminants established by the DDW.

The implementation actions and general schedule for implementation are summarized in Table 15 below.

Table 15. Program Element 6 – 2020 OBMP Management Plan

Implementation Action	One-time/ Ongoing
Years 1 through 3	
Re-convene the water quality committee and meet periodically to update groundwater quality management priorities.	Ongoing
Develop and implement an initial emerging contaminants monitoring plan.	One-time
Prepare a water quality assessment of the Chino Basin to evaluate the need for a Groundwater Quality Management Plan and prepare a long-term emerging contaminants monitoring plan.	One-time
Continue to support the Parties in identifying funding from outside sources to finance cleanup efforts.	Ongoing
Years 4 through 20	
Develop and implement a Groundwater Quality Management Plan and periodically update it.	Ongoing
Implement long-term emerging contaminants monitoring plan.	One-time
Continue to conduct investigations to assist the Parties and/or the Regional Board in accomplishing mutually beneficial objectives as needed.	Ongoing
Implement projects of mutual interest.	Ongoing

Watermaster will convene the Water Quality Committee and lead the stakeholder process to achieve the implementation actions for PE 6, including the development and implementation of a Groundwater Quality Management Plan and perform the initial and long-term water-quality monitoring at the monitoring and private wells sampled by Watermaster pursuant to PE 1.

Projects of mutual interest will be implemented pursuant to agreements among the implementing Parties with Watermaster support, as needed.

4.7 Program Element 7. Develop and Implement Salt Management Plan

The objective of PE 7 is to implement, and periodically update, the maximum-benefit SNMP. The SNMP is a management program to monitor, characterize, and manage current and future salt and nutrient conditions in the Chino Basin. The maximum-benefit SNMP enables the implementation of the recycled water recharge program in PE 2 and the direct reuse of recycled water in PE 5.

Watermaster and the IEUA are co-permittees for the maximum-benefit SNMP and the recycled water recharge program and will be jointly responsible for implementation of PE 7. The implementation actions and general schedule for implementation are summarized in Table 16 below.

Table 16. Program Element 7 – 2020 OBMP Management Plan

Implementation Action	One-time/ Ongoing
Years 1 through 3	
Complete the 2020 update of TDS and nitrate projections to evaluate compliance with maximum benefit salt and nutrient management plan, and, if necessary, based on the outcome, prepare a plan and schedule to implement a salt offset compliance strategy.	One-time
Continue to implement the maximum-benefit salt and nutrient management plan pursuant to the Basin Plan, including: • Implement monitoring program and reporting requirements • Maintain Hydraulic Control through operation of the Chino Basin Desalters and other means, as necessary • Increase and maintain desalter pumping at 40,000 afy • Continue storm and imported water recharge program to comply with recycled water recharge dilution requirements • Comply with recycled water TDS and TIN limitations • Compute ambient water quality every three years • Construct treatment and/or salt-offset facilities *if* one or more of the compliance limits are exceeded	Ongoing
Years 4 through 20	
Continue to implement the maximum-benefit salt and nutrient management plan pursuant to the Basin Plan, and any amendments thereto.	Ongoing
Starting in 2025 and every five years thereafter, update water quality projections to evaluate compliance with the maximum-benefit salt and nutrient management plan.	Ongoing

4.8 Program Element 8. Develop and Implement Groundwater Storage Program *and* Program Element 9. Develop and Implement Storage and Recovery Programs

The objectives of PEs 8 and 9 are to:

- Implement, and periodically update, a storage management plan that: (1) is based on the most current information and knowledge of the basin, (2) prevents unauthorized overdraft, (3) prioritizes the use of storage space to meet the needs and requirements of the lands overlying the Chino Basin and of the Parties over the use of storage space to store water for export.
- Support the development and implementation of Storage and Recovery Programs in the Chino Basin that provide defined benefits to the Parties and the basin.

Watermaster is responsible for the implementation of PEs 8 and 9. The implementation actions and general schedule for implementation are summarized in Table 17 below.

Table 17. Program Elements 8 and 9 – 2020 OBMP Management Plan

Implementation Action	One-time/ Ongoing
Years 1 through 3	
Complete and submit to the Court the 2020 Safe Yield Recalculation.	One-time
Complete and submit to the Court the 2020 Storage Management Plan.	One-time
Develop a *Storage and Recovery Master Plan* to support the design of optimized Storage and Recovery Programs that are consistent with the 2020 Storage Management Plan and provide the Watermaster with criteria to review, condition, and approve applications in a manner that is consistent with the Judgment and the Peace Agreement.	One-time
Assess losses from storage accounts based on the findings of the 2020 Safe Yield Recalculation.	Ongoing
Years 4 through 20	
Update the Storage Management Plan in 2025 and every five years thereafter and when: • the Safe Yield is recalculated, • Watermaster determines a review and update is warranted based new information and/or the needs of the Parties or the basin, and • at least five years before the aggregate amount of managed storage by the Parties is projected to fall below 340,000 af	Ongoing
Perform Safe Yield recalculation every 10 years (2030, 2040).	Ongoing
Update the storage loss rate following each recalculation of Safe Yield (2030, 2040) and during periodic updates of the SMP.	Ongoing

Exhibit 1 – Drivers and Trends and Their Implications
2020 OBMP Update

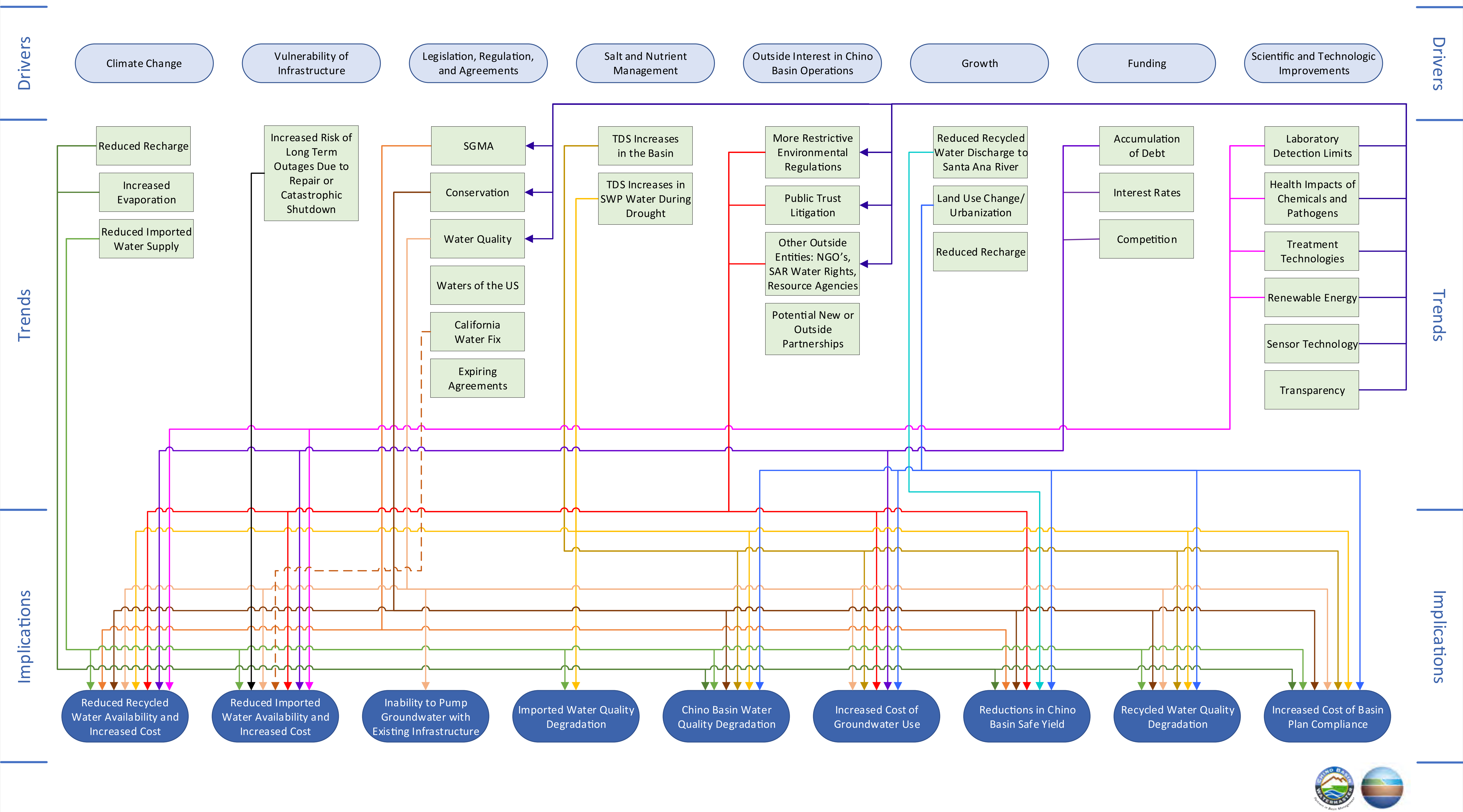

Exhibit 2
Comparison of the 2000 and 2020 OBMP Process

2000 OBMP

OBMP Phase 1 Report
1. Introduction
2. State of the Basin
3. OBMP Goals
4. Management Plan

OBMP Implementation Plan Program Elements (PEs)
1. Monitoring
2. Recharge Program
3. Water Supply Plan for Impaired Areas
4. Subsidence Management
5. Regional Supplemental Water Program
6. Cooperative Program with Regulators
7. Salt Management Plan
8. Storage Management Plan
9. Storage and Recovery Programs

Peace Agreement

OBMP PEIR

2020 OBMP Update

2020 OBMPU Scoping Report (TM1)
1. Introduction
2. Development of Activities
3. Scope of Work to Perform Proposed 2020 OBMP Update Activities.
   - Activity A: Increase the capacity to store and recharge storm and supplemental water
   - Activity B: Develop, implement and optimize Storage and Recovery Programs
   - Activity D: Maximize use of recycled water
   - Activity E/F: WQ Management Plan and Strategic Compliance Solutions
   - Activity C/G: Regional conveyance and treatment
   - Activity K: Salt and Nutrient Management Plan compliance
   - Activity L: Appropriate Monitoring

Integrate 2000 OBMP PEs with 2020 OBMP Update Activities

2020 OBMP Update Report (TM2)
1. Introduction
2. 2020 OMBP Goals and Activities
3. Integration of the 2020 OBMP Update Activities to the 2000 OBMP Program Elements.
4. 2020 OBMP Update Management Plan

2020 OBMP Implementation Plan

Implementation Agreement

2020 OBMP PEIR

Exhibit 3
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ⚫ Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

<table>
<tr><th rowspan="3">Needs and Wants Categorized by Basin Management Issues</th><th colspan="14">Pool Parties</th><th colspan="6" rowspan="2">Others</th><th rowspan="3">Addressed by Activities in Table 3*</th><th rowspan="3">Alignment with 2000 OBMP Goals</th></tr>
<tr><th colspan="10">Appropriative</th><th colspan="3">Agricultural</th><th rowspan="2">Overlying Non-Ag</th></tr>
<tr><th>Pomona</th><th>Chino</th><th>Fontana</th><th>CVWD</th><th>SAWCO</th><th>MVWD</th><th>Chino Hills</th><th>Upland</th><th>JCSD</th><th>Ontario</th><th>Crops</th><th>Dairy</th><th>State of CA</th><th>IEUA</th><th>TVMWD</th><th>WMWD</th><th>Metropolitan</th><th>CBWCD</th><th>CDA</th></tr>
<tr><td colspan="23">Reductions in Chino Basin Safe Yield</td></tr>
<tr><td>Develop a storage management plan to optimize the use of unused storage space in the basin, avoid undesirable results, and encourage Storage and Recovery Programs</td><td>🔴</td><td>🔴</td><td></td><td>🔴</td><td>🔴</td><td></td><td></td><td>🔴</td><td>🔴</td><td>🔴</td><td>🔴</td><td></td><td>⚫</td><td></td><td>🔴</td><td></td><td>🔴</td><td></td><td></td><td></td><td>B, C</td><td>1, 2, 3</td></tr>
<tr><td>Design storage management and storage & recovery programs that maintain or enhance Safe Yield</td><td>🔴</td><td>⚫</td><td></td><td></td><td></td><td></td><td></td><td>🔴</td><td>🔴</td><td>⚫</td><td></td><td></td><td>🔴</td><td></td><td>⚫</td><td></td><td>⚫</td><td></td><td></td><td>⚫</td><td>B, C</td><td>1, 3</td></tr>
<tr><td>Maintain or enhance the Safe Yield of the basin without causing undesirable results</td><td>🔴</td><td>⚫</td><td></td><td>🔴</td><td>🔴</td><td></td><td></td><td>🔴</td><td>🔴</td><td>🔴</td><td>⚫</td><td></td><td></td><td></td><td>⚫</td><td></td><td>⚫</td><td></td><td></td><td>🔴</td><td>B, D</td><td>1, 3</td></tr>
<tr><td>Manage the basin Safe Yield for the long-term viability and reliability of groundwater supply</td><td>🔴</td><td>⚫</td><td></td><td></td><td></td><td></td><td></td><td>🔴</td><td>🔴</td><td>🔴</td><td>🔴</td><td></td><td></td><td>🔴</td><td></td><td></td><td>⚫</td><td>⚫</td><td></td><td>🔴</td><td>A, B, C</td><td>1, 3</td></tr>
<tr><td>Reassess the frequency of the Safe Yield recalculation</td><td>⚫</td><td></td><td></td><td></td><td>⚫</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>⚫</td><td></td><td></td><td></td><td>I</td><td>3</td></tr>
<tr><td>Continue to model and track Safe Yield, but utilize other management strategies to address a decline.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>⚫</td><td></td><td></td><td></td><td>B</td><td>1, 3</td></tr>
<tr><td>Develop recharge programs that maintain or enhance Safe Yield</td><td>🔴</td><td>⚫</td><td></td><td></td><td></td><td></td><td>⚫</td><td>⚫</td><td>🔴</td><td>⚫</td><td></td><td></td><td></td><td></td><td>⚫</td><td></td><td>⚫</td><td></td><td></td><td>⚫</td><td>A, B</td><td>1, 3</td></tr>
<tr><td>Develop more facilities to capture, store, and recharge water</td><td>⚫</td><td>🔴</td><td></td><td></td><td></td><td></td><td>🔴</td><td></td><td></td><td>⚫</td><td>⚫</td><td></td><td></td><td></td><td>⚫</td><td></td><td>⚫</td><td></td><td></td><td></td><td>A, B, D</td><td>1, 2</td></tr>
<tr><td>Enhance recharge in northeast MZ-3</td><td>⚫</td><td></td><td>⚫</td><td></td><td></td><td></td><td></td><td></td><td>🔴</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>⚫</td><td></td><td></td><td></td><td>A, C</td><td>1, 3</td></tr>
<tr><td>Maximize use of existing recharge facilities</td><td>⚫</td><td>⚫</td><td></td><td></td><td></td><td></td><td></td><td>⚫</td><td>🔴</td><td>⚫</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>A, C, F, G</td><td>3</td></tr>
<tr><td>Establish incentives to encourage recharge of high-quality imported water</td><td>⚫</td><td></td><td>⚫</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>H, I</td><td>2, 3</td></tr>
<tr><td>Develop an OBMP Update that is consistent with the Physical Solution and allows access to the basin for users to meet their requirements</td><td>🔴</td><td>⚫</td><td></td><td></td><td></td><td>🔴</td><td></td><td>🔴</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>C, E</td><td>3</td></tr>
<tr><td>Engage with regional water management planning efforts in the Upper Santa Ana River Watershed that have the potential to impact Chino Basin operations or Safe Yield</td><td>⚫</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>🔴</td><td></td><td>⚫</td><td></td><td></td><td>🔴</td><td>I, D</td><td>3</td></tr>
</table>

Exhibit 3
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: ● (Need) Need ● Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural											
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA	Overlying Non-Ag	IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Inability to Pump Groundwater with Existing Infrastructure																						
Pursue collaborative, regional partnerships to implement regional solutions to water management challenges	●			●	●			●							● (Need)	●	●	●	● (Need)	● (Need)	B, E, F, G, I	3
Ensure that sufficient, reliable water supplies will be available to meet current and future water demands	● (Need)	● (Need)	● (Need)	● (Need)			●	● (Need)	●	●	●				● (Need)	●	●	● (Need)	●		A, B, D, G	1, 3
Develop conjunctive use agreements that provide certainty in the ability to perform during put and take years by clearly defining facilities/infrastructure and operating plans, and that leverage the lessons learned from obstacles encountered during the implementation of the current Dry Year Yield program	●						●	●	●						●		●	●			B, G, I	1, 2, 3
Develop management strategies that enable the Parties to produce or leverage their respective water rights that may be impacted by physical basin challenges like land subsidence or water quality	● (Need)						●	● (Need)							●		●				A, C, D, E, F, G, I	3
Design storage management and storage & recovery programs to raise funding to build infrastructure	●			●											●		●				B, D, I, J	3, 4
Develop process to support/facilitate project implementation	●																				F, H, J	4
Design subsidence management plans to allow flexibility in the location and volume of groundwater production in MZ-1 and MZ-2	●						●	● (Need)		● (Need)				●	●						A, C, G	3

Exhibit 3
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

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Increased Cost of Groundwater Use																						
Seek supplemental financial resources to support the implementation of the OBMP Update	🔴	🔴		●			●	🔴	🔴	●					●	🔴	●		●		D, F, G, I, J	4
Develop regional partnerships to help reduce costs	●			●			●	●	🔴						🔴	●	●			●	F, G, I, J	4
Monetize agencies' unused water rights for equitable balance of basin assets			●																		G, H	4
Decrease Watermaster assessment costs	●				●			●													I, J	4
Support to develop a justification for increases in water rates and developer fees to invest in needed water infrastructure	🔴	●							●								●				F, G, H	
Develop an equitable distribution of costs/benefits of the OBMP	●	●		●		🔴	●	🔴	🔴	●				🔴	●						H, J	4
Watermaster assessments for implementation of the OBMP should be allocated based on benefits received	●				●																H	4
Continue or enhance incentives to pump groundwater from the Chino Basin			🔴																		G, I	3, 4
Improve flexibility for Parties to execute water rights transfers														🔴							G, I	4

Exhibit 3
Issues, Needs and Wants of the Chino Basin Stakeholders

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Chino Basin Water Quality Degradation																						
Develop a water quality management plan to ensure ability to produce groundwater rights	● Need	●		●			●	●	●	●				● Need	●		●	●			E, F, G, J	2, 3
Develop regional infrastructure to address water quality contamination and treatment				●	●			●													A, B, C, E, F, G, I, J	2
Plan for and be prepared for new drinking water quality regulations that may result in an increase in groundwater treatment and costs	●	●	● Need	● Need			● Need	●	● Need	●					● Need		●				E, F	2
Be more proactive and engaged in the process to develop new drinking water quality regulations								●													A, B, D, E, G, J	2
Recycled Water Quality Degradation																						
Maintain compliance with recycled water and dilution requirements pursuant to the Chino Basin groundwater recharge permit		●					●	●	● Need	● Need				● Need	● Need						A, B, D, E, G, J	2
Increased Cost of Basin Plan Compliance																						
Develop management strategy to ensure sufficient supplies to blend with recycled water and comply with Salt and Nutrient Management Plan	●	●									● Need				●		●				G, K	2
Perform the minimum amount of monitoring/reporting that is required for basin management and regulatory compliance	●			●			●	●													L	3, 4

Exhibit 3
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

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Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Reduced Recycled Water Availability and Increased Cost																						
Fully utilize IEUA recycled water resources		🔴		●			●	●		🔴					●						A, D, E, F, G	1
Maximize the use of recycled water for direct use or recharge	●	🔴		🔴			●	🔴	🔴	🔴					●						A, D, E, F, G	1
Evaluate the potential for direct potable reuse of recycled water	●								●						●						D, E, F	1
Develop alternative management strategies to comply with the recycled water discharge obligations to the Santa Ana River	●	●		●			●	●		●					●		●				D, E, F	1, 3
Utilize non-IEUA sources of recycled water that are not being put to beneficial use	🔴	●					●	●	🔴	🔴					●		●				D, E, F	1
Other																						
Coordinate timing of agreements, grants, etc. to ensure implementation of the OBMP Update	●							●	🔴	●					●	●	●				F, G, H, I, J	
Improve communication between the Parties	🔴			🔴				●						🔴	●		●				F, H, I	
Educate elected officials and decision makers on the need and urgency to address the water management challenges	●	🔴							🔴						●	●	●				F, G, H, I, J	
Consider a long-term planning horizon of up to 50 years	●								●	●					●						F, G, H, I, J	3

Exhibit 3

Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ⚫ Want/Unspecified

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Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
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Reduced Imported Water Availability and Increased Cost																						
Ensure that there is a reliable local water supply to replace imported water during shut down of imported water delivery infrastructure for maintenance and longer-term emergency outages	🔴	⚫	⚫	🔴			⚫	🔴	⚫	⚫					🔴	🔴	🔴	🔴			B, C, G	1, 3
Identify and utilize new sources of supplemental water	🔴	⚫		⚫			🔴	⚫	⚫	⚫					⚫	⚫	⚫				A, B	1, 3
Construct inter-basin and intra-basin connections for the benefit of regional water supply and conjunctive use	⚫	⚫		🔴			⚫	⚫	🔴			🔴			⚫	🔴	⚫	🔴			C, G	1, 3
Understand how imported water reliability from Metropolitan Water District will be affected with and without the California Water Fix	⚫							⚫	🔴						⚫	⚫	⚫				-	1, 3
Develop management strategies that ensure Parties will meet future Chino Basin Desalter Replenishment Obligation and have the money to fund it	⚫	⚫		🔴			🔴		⚫								⚫			🔴	H, I, J	3
Increase water-supply reliability at the lowest possible cost	🔴			⚫			⚫	⚫				🔴		🔴	⚫		⚫				A, B, D, J	3
Need a better understanding of the water management plans of the Parties to be able to better plan for imported water needs and to assure reliability of Metropolitan Water District water supply	⚫			⚫					🔴			🔴			⚫	⚫	⚫	🔴			A	3
Analyze water management scenarios that plan for unexpected challenges and emergencies	⚫							⚫	🔴	⚫					⚫	⚫	⚫				E, G	3
Ensure that sufficient supplemental water supplies will be available to meet future replenishment requirements							⚫		🔴	⚫		🔴			⚫					🔴	A	1, 3
Despite the best efforts of the Parties to decrease reliance on imported water, the cost of the total water supply continues to increase	⚫																				-	3
Use more recycled water for Replenishment Obligation	⚫			🔴			🔴		🔴								⚫				A, D, E, F	3
Continue to build collaborative programs between the Metropolitan Water District and Chino Basin	🔴						⚫	⚫	⚫						⚫		⚫	⚫			B, I	3

Exhibit 4
Activities for Consideration in the 2020 OBMP Update

ID	Activity
A	Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge
B	Develop, implement, and optimize Storage-and-Recovery Programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality.
C	Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence.
D	Maximize the reuse of recycled water produced by IEUA and others
E	Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses
F	Develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits in managing water quality
G	Optimize the use of all sources of water supply by improving the ability to move water across the basin and amongst stakeholders, prioritizing the use of existing infrastructure.
H	Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements
I	Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement
J	Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update
K	Develop management strategy within the Salt and Nutrient Management Plan to ensure ability to comply with dilution requirements for recycled water recharge
L	Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance

Exhibit 5
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
			Reductions in Chino Basin Safe Yield	Inability to Pump Groundwater with Existing Infrastructure	Increased Cost of Groundwater Use	Chino Basin Water Quality Degradation	Recycled Water Quality Degradation	Increased Cost of Basin Plan Compliance	Reduced Recycled Water Availability and Increased Cost	Reduced Imported Water Availability and Increased Cost
Goal 1 - Enhance Basin Water Supplies										
1a • Not all of the stormwater runoff available to the Chino Basin is diverted and recharged; failure to divert and recharge stormwater is a permanently lost opportunity. • The existing methodology to select recharge projects for implementation is based on the cost of imported water. There are currently no known projects with a unit cost lower than the cost of imported water, hindering expansion of stormwater capture and recharge • Pumping capacity in some areas of the basin is limited due to low groundwater levels, land subsidence, and water quality	A Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge	• Increases recharge of high-quality stormwater that will: • protect/enhance the Safe Yield, • improve water quality, • reduce dependence on imported water, • increase pumping capacity in areas of low groundwater levels and areas of subsidence concern, and • provide new supply of blending water to support the recycled-water recharge program. • Provides additional supplemental-water recharge capacity for replenishment and implementation of Storage and Recovery Programs. • Provides additional surface water storage capacity. • Revised economic criteria for selecting recharge projects for implementation.	✓	✓	✓	✓	✓	✓		✓

Exhibit 5

OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
			Reductions in Chino Basin Safe Yield	Inability to Pump Groundwater with Existing Infrastructure	Increased Cost of Groundwater Use	Chino Basin Water Quality Degradation	Recycled Water Quality Degradation	Increased Cost of Basin Plan Compliance	Reduced Recycled Water Availability and Increased Cost	Reduced Imported Water Availability and Increased Cost
Goal 1 - Enhance Basin Water Supplies										
1b • There is a surplus of recycled water potentially available to the Chino Basin Parties that is not being put to beneficial use. • Existing infrastructure limits the expansion or reuse and recharge of recycled water in the Chino Basin. • Existing requirements to discharge recycled water to the Santa Ana River limit the amount of IEUA recycled water available for reuse and recharge •The Department of Drinking Water and the Regional Board blending requirements for recycled water recharge could limit expanded recharge opportunities	D Maximize the reuse of recycled water produced by IEUA and others	• Results in a new, consistent volume of in-lieu and/or wet water recharge that will: • protect/enhance the Safe Yield, • reduce dependence on imported water, • improve water-supply reliability, especially during dry periods, and • increase pumping capacity in areas of low groundwater levels and areas of subsidence concern. • Identify additional sources of water to satisfy IEUA discharge requirements pursuant to the Santa Ana River Judgment.	✓	✓					✓	✓

Exhibit 5
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
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Goal 2 - Protect and Enhance Water Quality										
2a • Areas of the basin are contaminated with VOCs, nitrate, perchlorate and other contaminants of emerging concern (CECs). • Water-quality regulations are evolving and becoming more restrictive, which limits the beneficial uses of groundwater. • Groundwater treatment may be necessary to meet beneficial uses, but can be expensive to build and operate. • The basin is hydrologically closed, which causes accumulation and concentration of salts, nutrients, and other contaminants. • Some stored water in the Chino Basin cannot be used due to water quality and insufficient treatment capacity • Recharge sources may contribute CECs to the groundwater basin	E Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses F Develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits in managing water quality	• Proactively addresses new and near-future drinking water regulations. • Enables the Parties to make informed decisions on infrastructure improvements for water-quality management and regulatory compliance. • Removes groundwater contaminants from the Chino Basin and thereby improves groundwater quality. • Enables the Parties to produce or leverage their water rights that may be constrained by water quality. • Ensures that groundwater is pumped and thereby protects/enhances the Safe Yield.	✓	✓	✓	✓				✓
2b • Water-quality regulations are evolving and generally becoming more stringent, which could limit the reuse and recharge of recycled water.	K Develop management strategy within the Salt and Nutrient Management Plan to ensure ability to comply with dilution requirements for recycled water recharge	• Enables the continued and expanded recharge of recycled water, which will: • protect water quality, • improve water-supply reliability, especially during dry periods, and • protect/enhance the Safe Yield.	✓			✓	✓	✓		✓

Exhibit 5

OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

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Goal 3 - Enhance Management of the Basin										
3a • Existing infrastructure (pumping and treatment capacity and conveyance) is insufficient to conduct puts and takes under proposed storage programs. • There is unused storage space in the Basin the use of which is constrained by the storage limits defined in existing CEQA documentation. • Watermaster's current storage management plan is not optimized to protect/enhance basin yield, improve water quality, avoid new land subsidence, ensure balance of recharge and discharge, maintain Hydraulic Control, etc. • Storage and recovery operations could be limited by contaminant plumes or other CECs in groundwater	B Develop, implement, and optimize Storage and Recovery Programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality.	• Storage programs that protect/enhance basin yield, improve water quality, avoid new land subsidence, ensure balance of recharge and discharge, maintain Hydraulic Control, etc. • New regional infrastructure to optimize put and take operations • Leverages unused storage space in the Basin. • Reduces reliance on imported water, especially during dry periods. • Potentially provides outside funding sources to implement the OBMP Update. • Improves water quality through the recharge of high quality water.	✓	✓	✓	✓				✓

Exhibit 5
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

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Goal 3 - Enhance Management of the Basin										
3b • Land subsidence in northwest MZ1 may limit the ability for Parties to pump their respective rights in this area. • Poor water quality and increasingly restricting water quality regulations limits the ability for some Parties to pump their respective rights. • Low groundwater levels impact pumping capacity	C Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence. G Optimize the use of all sources of water supply by improving the ability to move water across the basin and amongst stakeholders, prioritizing the use of existing infrastructure.	• Enables producers in MZ1 and MZ2 to obtain water through regional conveyance, which supports management of groundwater levels to reduce the potential for subsidence and ground fissuring. • Enables the Parties to increase production in areas currently constrained by poor water quality. • Removes groundwater contaminants from the Chino Basin and thereby improves water quality. • Protects/enhances the Safe Yield. • Maximizes the use of existing infrastructure, which will minimize costs. • Provides infrastructure that can also be used to implement Storage and Recovery Programs.	✓	✓	✓	✓				✓
3c • Watermaster needs information to comply with regulations and its obligations under its agreements and Court orders, yet financial resources to collect this information are limited.	L Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance	• Ensures full compliance with regulatory requirements. • Ensures full support of basin management initiatives. • Enables Parties to monitor the performance of the OBMP Update. • Continual review and revision of requirements and monitoring program to ensure cost efficiency	✓	✓	✓	✓	✓	✓	✓	✓

Exhibit 5

OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities: Reductions in Chino Basin Safe Yield	Inability to Pump Groundwater with Existing Infrastructure	Increased Cost of Groundwater Use	Chino Basin Water Quality Degradation	Recycled Water Quality Degradation	Increased Cost of Basin Plan Compliance	Reduced Recycled Water Availability and Increased Cost	Reduced Imported Water Availability and Increased Cost
Goal 4 - Equitably Finance the OBMP										
4a • The distribution of benefits associated with the OBMP Update is not defined. • Funding needed for the OBMP implementation activities of the Watermaster is not projected beyond the current year budget, which limits Parties ability to plan required funding for the future. • There is currently no formal process to evaluate and adapt the OBMP implementation plan, schedule and cost.	H Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements	• Provides transparency as to the benefits of the OBMP Update activities • Identifies Watermaster roles and costs to the Parties • Formal process to revisit implementation plan and adjust priorities and schedule as necessary to address changed conditions • Periodic updates of cost projections for OBMP implementation needed to plan financial resources. • Improves readiness to apply for grants as they become available • Improves the likelihood that the OBMP will be implemented.			✓			✓	✓	✓
4b • Limited financial resources constraint the implementation of the OBMP. • Future reliability of grant funding is uncertain	I Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement	• Lowers the cost of OBMP implementation. • Improves the likelihood that the OBMP will be implemented.			✓			✓	✓	✓
	J Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update				✓			✓	✓	✓

Exhibit 6
2020 OBMP Update - Activity A:

Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental waters, particularly in areas of the basin that will promote the long-term balance of recharge and discharge

Need and Objectives: The objectives of Activity A are (1) to maximize stormwater capture pursuant to Watermaster's diversion permits, (2) to promote the long-term balance of recharge and discharge, (3) to ensure sufficient supplemental water recharge capacity for future replenishment, (4) to reduce dependence on imported water by maintaining or enhancing Safe Yield, (5) to improve water quality, and (6) to ensure a supply of dilution water to comply with recycled water recharge permit requirements. Based on the alignment of the objectives of Activity A with those of the RMPU, Activity A can be accomplished through the existing RMPU process.

Phase	Task	Outcomes	Watermaster Role	Are these outcomes necessary for Watermaster to Administer the Physical Solution or Comply with Other Requirements ?
S	1 – Define objectives and refine scope of work	Consensus on objectives of 2023 RMPU	Convene the Recharge Investigations and Projects Committee	The process to perform these steps is required to the extent that additional recharge capacity is needed to meet replenishment obligations. If, in scoping the committee does not establish the additional need to evaluate projects beyond replenishment capacity, those projects are not required to be evaluated.
PN	2 – Develop planning, screening, and evaluation criteria	New criteria for selecting projects	Technical support role	
PAE	3 – Describe recharge enhancement opportunities 4 – Develop reconnaissance-level engineering design and operating plan	Conceptual design, operating plans, and costs of recharge alternatives Project implementation and financing plan	Technical support role	
I	5 – Plan, design, and construct selected recharge projects	New recharge projects	Technical support role	Yes, to the extent that additional recharge capacity is needed for replenishment.

**Phase Descriptions: S = Scoping PN = Evaluate need for project PAE = Project alternative evaluation I = Implementation*

Activity Implementation Schedule and Go/No-Go Decision Points

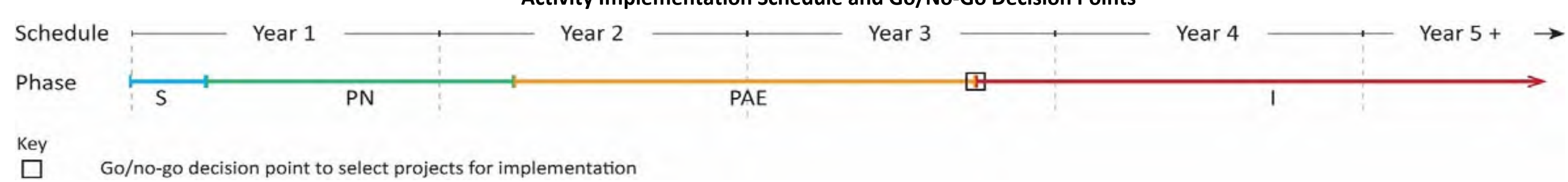


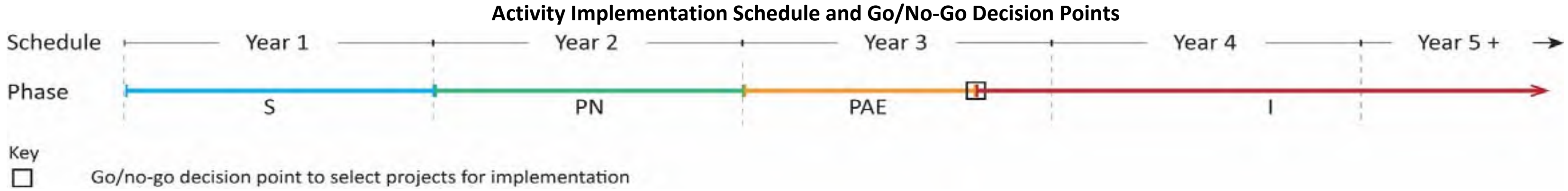
Exhibit 7
2020 OBMP Update - Activity B

Develop, implement, and optimize Storage and Recovery Programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality

Need and Objectives: The parties desire to develop and implement "optimized" Storage and Recovery Programs that avoid potential MPI and provide broad benefits, such as increased water-supply reliability, protected or enhanced Safe Yield, improvements to water quality, and reduced cost for OBMP implementation. The objectives of Activity B are to prepare a *Storage and Recovery Master Plan* in a collaborative setting that clearly articulates the specific objectives of the parties and the required benefits to be realized from storage and recovery programs. The master plan will assist the parties and their storing partners to select and implement Storage and Recovery Programs that achieve the their objectives and the desired benefits.

Phase*	Task	Outcomes	Watermaster Role	Are these outcomes necessary for Watermaster to Administer the Physical Solution or Comply with Other Requirements ?
S	1 – Convene the Storage and Recovery Program Committee, define objectives, and refine scope of work	Consensus on objectives and desired benefits of Storage and Recovery Programs	Convene committee	Section 5.2.c.iv.(b) of the Peace Agreement states that "Watermaster shall prioritize its efforts to regulate and condition the storage and recovery of water developed in a Storage and Recovery Program for the mutual benefit of the Parties to the Judgment and give first priority to Storage and Recovery Programs that provide broad mutual benefits." Watermaster must document the basis by which it will review, condition, and approve applications in a manner that is predictable, uniform, and consistent with the Peace Agreement and the 2020 SMP. A master plan is the most efficient process to do this.
PN	2 – Develop conceptual alternatives for Storage and Recovery Programs at various scales	Conceptual descriptions of various types of Storage and Recovery Programs that achieve the objectives defined in Task 1	Assist in the development and documentation of conceptual alternatives	
PAE	3 – Describe and evaluate reconnaissance-level facility plans and costs for Storage and Recovery Program alternatives	Conceptual design, operating plans, and costs for various Storage and Recovery Program alternatives	Assist in development of alternatives Groundwater modeling to estimate basin response	
I	4 – Prepare *Storage and Recovery Program Master Plan*	*Storage and Recovery Program Master Plan* that will support Storage and Recovery Program selection, solicitation of storing partners, applications for funding, and Watermaster approvals	Prepare draft and final master plan	

Activity Implementation Schedule and Go/No-Go Decision Points



**Phase Descriptions: S = Scoping PN = Evaluate need for project PAE = Project alternative evaluation I = Implementation*

Exhibit 8

2020 OBMP Update - Activity CG:

Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence AND Optimize the use of all sources of water supply by improving the ability to move water across the basin and amongst stakeholders, prioritizing the use of existing infrastructure

Need and Objectives: The parties have identified that there are basin management challenges, such as land subsidence and poor water quality, that could limit their ability to exercise their pumping rights using existing infrastructure. Additionally, there are numerous challenges to the reliability of the non-Chino Basin groundwater water supplies available to the Chino Basin parties and the infrastructure that deliver them. The objectives of Activity CG is to optimize the use of all sources of water available to the parties to meet their demands despite these challenges and potentially help mitigate them.

Phase	Task	Outcomes	Watermaster Role	Are these outcomes necessary for Watermaster to Administer the Physical Solution or Comply with Other Requirements ?
S	1 - Form the Water Supply Reliability Committee, define objectives, and refine scope	Mutual understanding of the universe of water reliability concerns of parties	Work with IEUA or other activity lead	Although these actions optimize the management of all available water supplies to achieve water supply reliability, they are not required outcomes.
PN	2 - Characterize water demands, water supply plans, and existing/planned infrastructure and its limitations	Identify opportunities and limitations in the existing/planned infrastructure to meet reliability goals defined in Task 1	Work with IEUA or other activity lead	
PAE	3 – Develop planning, screening, and evaluation criteria 4 – Identify and describe water supply reliability opportunities 5 – Develop reconnaissance-level engineering design and operating plan	Conceptual design, operating plans, and costs of reliability alternatives Project implementation and financing plan	Work with IEUA or other activity lead	
I	6 – Plan, design, and build water reliability projects	New water reliability projects	None	

**Phase Descriptions: S = Scoping PN = Evaluate need for project PAE = Project alternative evaluation I = Implementation*

Activity Implementation Schedule and Go/No-Go Decision Points

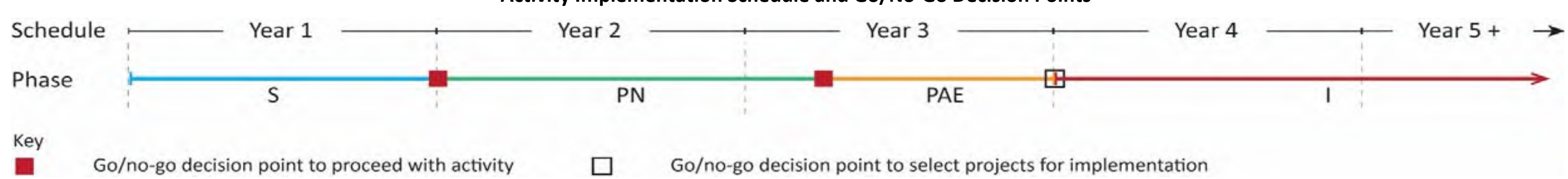


Exhibit 9
2020 OBMP Update - Activity D:

Maximize the reuse of recycled water produced by IEUA and others

Need and Objectives: The objective is to maximize the reuse of recycled water produced by the IEUA and other publicly owned treatment works (POTWs) in proximity to the Chino Basin to meet future demands and improve local water-supply reliability, especially during dry periods. Expanded reuse activities could include direct non-potable reuse (landscape irrigation or industrial uses), groundwater recharge (indirect potable reuse), and direct potable reuse. Increasing recycled water reuse is an integral part of the OBMP's goal to enhance water supplies. The direct use of recycled water increases the availability of native and imported waters for higher-priority beneficial uses.

Phase	Task	Outcomes	Watermaster Role	Are these outcomes necessary for Watermaster to Administer the Physical Solution or Comply with Other Requirements ?
S	1 – Convene Recycled Water Projects Committee, define objectives and refine scope of work	Consensus on the objectives for optimizing and maximizing recycled water reuse	Work with IEUA or other activity lead	Although these actions optimize the management of all available recycled water supplies to achieve water supply reliability, they are not required outcomes.
PN	2 – Characterize the availability of all recycled water supplies and demands	Understanding of demand and opportunities for increased recycled water reuse	Work with IEUA or other activity lead	
PAE	3 – Develop planning, screening, and evaluation criteria 4 – Identify and describe potential projects for evaluation 5 – Conduct a reconnaissance-level study for the proposed projects	Conceptual design, operating plans, and costs of reuse projects Characterization of SNMP impacts of reuse projects Project implementation and financing plan	Work with IEUA or other activity lead	
I	6 – Plan, design, and construct selected projects	New recycled water reuse projects	None	

**Phase Descriptions: S = Scoping PN = Evaluate need for project PAE = Project alternative evaluation I = Implementation*

Activity Implementation Schedule and Go/No-Go Decision Points

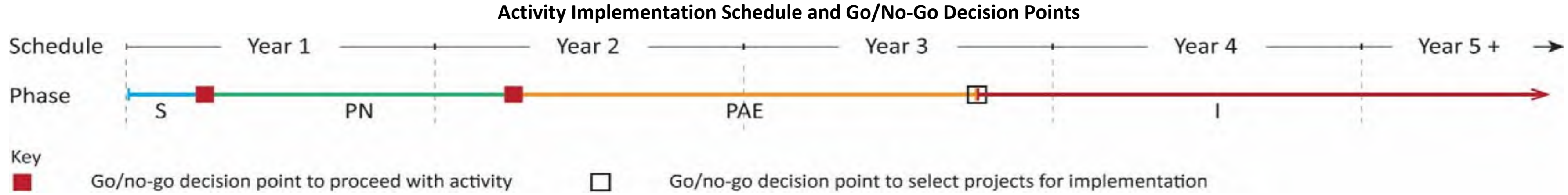


Exhibit 10

2020 OBMP Update - Activity EF

Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses AND Develop strategic regulatory-compliance solutions that achieve multiple benefits in managing water quality

Need and Objectives: Groundwater contaminants are present across the Chino Basin, new contaminants are being discovered, and water-quality regulations are evolving and becoming more restrictive. These trends are limiting the beneficial use of groundwater and increasing the cost of the water supply. The objectives of Activity EF are to characterize the water-quality challenges across the Chino Basin and identify the most efficient means to address the water-quality challenges, including the potential for multi-benefit collaborative projects, to ensure that groundwater can be put to beneficial use.

Phase*	Task	Outcomes	Watermaster Role	Are these outcomes necessary for Watermaster to Administer the Physical Solution or Comply with Other Requirements ?
S	1 - Convene the Water Quality Committee, define objectives, and refine scope of work	Mutual understanding of the universe of water quality concerns of parties	Convene committee	Paragraph 41 of the Judgement provides for both water quantity and quality considerations to maximize the beneficial utilization of the Basin. If water quality is not effectively managed, the Parties may not be able to utilize their water rights, which could result in negative impacts to the basin. Effective management of water quality can only be accomplished through a systematic assessment of the emerging contaminant threats to the use of groundwater resource and a development of a plan to respond to those threats.
PN	2 - Develop and implement an initial emerging-contaminants monitoring plan	Data	Prepare monitoring plan; collect and compile data	
PN	3 – Perform a water quality assessment and prepare a scope to develop and implement a *Groundwater Quality Management Plan*	Understanding of scale of problem; scope/cost to evaluate project alternatives; long-term monitoring plan	Perform characterization	
PAE	4 – Develop planning, screening, and evaluation criteria 5 – Identify and describe potential projects for evaluation 6 – Conduct a reconnaissance-level study for the proposed projects 7 – Prepare the *Groundwater Quality Management Plan*	Conceptual design and operating plans for project alternatives Understanding of cost to manage Chino Basin groundwater quality with and without collaborative projects Management plan to document project implementation plan and supporting info	Technical support role to evaluate project alternatives and characterize potential for MPI (if necessary) Technical support role to prepare the *Groundwater Quality Management Plan*	
I	8 – Plan, design, and build water quality management projects	New groundwater quality improvement projects	None	No

**Phase Descriptions: S = Scoping PN = Evaluate need for project PAE = Project alternative evaluation I = Implementation*

Activity Implementation Schedule and Go/No-Go Decision Points

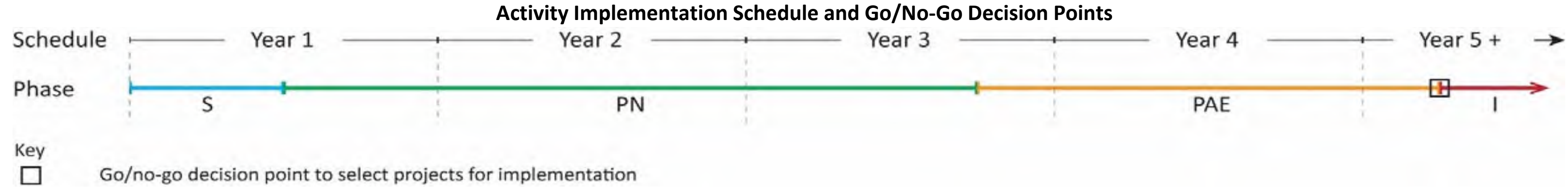


Exhibit 11
2020 OBMP Update - Activity K:

Develop a management strategy within the salt and nutrient management plan to ensure the ability to comply with the dilution requirements for recycled water recharge

Need and Objectives: The Watermaster and IEUA implement a recycled water recharge program to improve supply reliability. The Maximum Benefit SNMP requires that the recharge be diluted with other sources of low-salinity water to comply with Basin Plan Objectives. If sufficient dilution supplies are not available to comply with the dilution metric, treatment of recycled water, or other salt offset program will be required by the Regional Board. The objective of this activity is to determine if compliance with the Maximum Benefit SNMP recycled water recharge dilution requirements can be achieved under existing management plans, and if not, to develop a plan to achieve compliance.

Phase	Task	Outcomes	Watermaster Role	Are these outcomes necessary for Watermaster to Administer the Physical Solution or Comply with Other Requirements ?
S/PN	1 – Prepare projection to evaluate compliance with recycled water dilution requirements 5 – Periodically reevaluate compliance with dilution requirements	Understanding of ability to comply with the TDS and nitrate dilution requirements in the SNMP (near-term and long-term)	Perform technical work in collaboration with IEUA	Yes. Watermaster and IEUA have already begun this project and are required to complete it by the Regional Board to obtain a revised recycled water compliance program related to total dissolved solids concentrations. If approved, the Regional Board will require the study to be updated every five years to re-evaluate the need for revised compliance strategies.
PAE	2 – Identify alternative compliance strategies 3 – Evaluate alternative compliance strategies	Conceptual design, operating plans, and costs of project alternatives Report to document compliance plan and supporting info	Technical support role to IEUA to evaluate hydrogeologic impacts of project alternatives	
I	4 – Implement the selected compliance strategy	Compliance project (or other compliance action)	Level of support depends on the compliance action	

**Phase Descriptions: S = Scoping PN = Evaluate need for project PAE = Project alternative evaluation I = Implementation*

Activity Implementation Schedule and Go/No-Go Decision Points

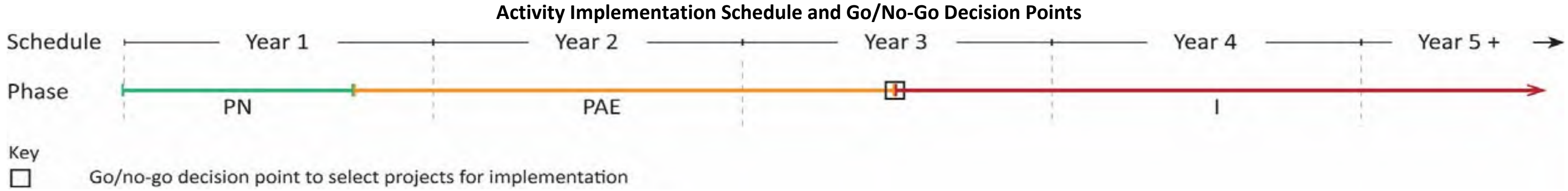


Exhibit 12

2020 OBMP Update - Activity L

Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance

Need and Objectives: Watermaster conducts data-collection programs and prepares reports and data deliverables to comply with regulations, to fulfill its obligations under its agreements and Court orders, to comply with its requirements under CEQA, and to assess the performance of the evolving OBMP IP, including the 2020 OBMP Update. These monitoring and reporting efforts are described in the Scoping Report, and will need to continue. The objective of Activity L is to refine the monitoring and reporting requirements of Watermaster to ensure that the objectives of each requirement are being met efficiently at a minimum cost.

Phase*	Task	Outcomes	Watermaster Role	Are these outcomes necessary for Watermaster to Administer the Physical Solution or Comply with Other Requirements?
S, PN	1 – Convene Monitoring and Reporting Committee and prepare the *Monitoring and Reporting Work Plan*	Understanding of all monitoring/reporting programs *Monitoring and Reporting Work Plan* *Recommended Revisions to Watermaster's Non-Discretionary Monitoring and Reporting Programs*	Convene committee Prepare work plan	No, however, monitoring and reporting are required to implement the Judgment and comply with regulations and Watermaster obligations. Since the beginning of OBMP implementation, Watermaster staff and engineer have continually refined the monitoring and reporting efforts to meet all requirements and achieve efficiencies and will continue to do so. This activity continues these refinement efforts in closer collaboration with the parties.
I	2 – Implement recommendations in *Monitoring and Reporting Work Plan*	Revisions to Watermaster's non-discretionary monitoring and reporting programs Future updates to the *Monitoring and Reporting Work Plan*	Perform technical demonstrations to gain approval for revisions to the monitoring/reporting program Update work plan, when necessary	
PN, I	3 – (recurring future task) – Bi-Annual review of scope of work and cost to implement the *Monitoring and Reporting Work Plan* in the subsequent fiscal year	Update to *Monitoring and Reporting Work Plan* A scope of work and budget for the subsequent fiscal year	Update the work plan Prepare scope and budget recommendation for subsequent year	

Activity Implementation Schedule and Go/No-Go Decision Points

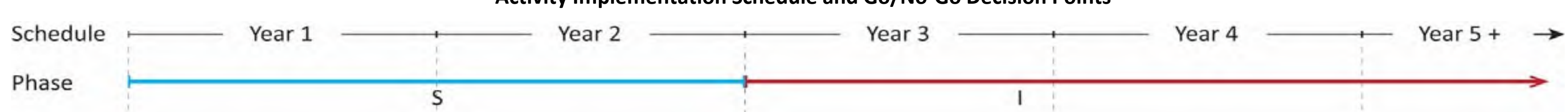


Exhibit 13

Nexus of the 2020 OBMP Update Activities to the 2000 OBMP Program Elements

2000 OBMP Program Elements (PEs)	**2020 OBMP Update Activities**						
	A - Increase Recharge	**B** - Optimize Storage and Recovery	**CG** - Regional Conveyance	**D** - Maximize RW Reuse	**EF** - Water Quality Mgmt.	**K** - Plan for SNMP Dilution Compliance	**L** - Monitoring
1 - Monitoring							⚓
2 - Recharge Program	⚓	●					●
3 - Impaired Areas		●			●	●	●
4 - Subsidence Mgmt.	●	●	●				●
5 - Supplemental Water		●	⚓	⚓	●		●
6 - Water Quality	●	●	●	●	⚓	●	●
7 - SNMP				●		⚓	●
8 – Storage Mgmt. Plan		●					●
9 – S&R Programs	●	⚓	●				●

⚓ Direct relationship between an activity and a PE (i.e. the activity and the PE have similar or identical objectives and thus the activity can be integrated into the existing PE)

● Indirect relationship between an activity and a PE (i.e. the activity has the potential to provide benefits to PEs)

Exhibit 14
Status of Compliance with the Chino Basin Maximum-Benefit Commitments

Description of Commitment	Compliance Date – as soon as possible, but no later than	Status of Compliance
1. Surface Water Monitoring Program[1] a. Submit draft Monitoring Program to Regional Board b. Implement Monitoring Program c. Submit Draft Revised Monitoring Program to Regional Board d. Implement Revised Monitoring Program e. Submit Draft Revised Monitoring Program(s) (subsequent to that required in "c", above) to Regional Board f. Implement Revised Monitoring Program(s) g. Annual data report submittal	a. January 23, 2005 b. Within 30 days from the date of Regional Board approval of the monitoring plan c. 15 days from 2012 Basin Plan Amendment (BPA) approval d. Upon Regional Board approval e. Upon notification of the need to do so from the Regional Board Executive Officer and in accordance with the schedule prescribed by the Executive Officer f. Upon Regional Board approval g. April 15th	a. Draft work plan submitted to the Regional Board on January 23, 2005 b. Monitoring plan initiated prior to Regional Board approval c. Draft work plan submitted to the Regional Board on February 16, 2012, six days after 2012 BPA approval d. Revised monitoring program began in December 2012 after the BPA was approved by the Office of Administrative Law on December 6, 2012 e. No revisions requested by the Regional Board f. n/a g. All annual reports submitted by April 15 of each year since 2006
2. Groundwater Monitoring Program[1] a. Submit Draft Monitoring Program to Regional Board b. Implement Monitoring Program c. Plan and schedule for demonstrating Hydraulic Control	a. January 23, 2005 b. Within 30 days from the date of Regional Board approval of the monitoring plan c. By December 31, 2013	a. Draft monitoring plan submitted to Regional Board on January 23, 2005 b. Monitoring program initiated prior to Regional Board approval c. Plan and schedule for demonstrating Hydraulic Control submitted in the 2014 Work Plan to the Regional Board on December 23, 2013

[1] The commitments related to surface water and groundwater monitoring were revised by a Basin Plan amendment approved by the Regional Board on February 10, 2012. The commitments and status of compliance shown in this table reflect the amended commitments for surface water and groundwater monitoring.

Exhibit 14
Status of Compliance with the Chino Basin Maximum-Benefit Commitments

Description of Commitment	Compliance Date – as soon as possible, but no later than	Status of Compliance
d. Implement Hydraulic Control demonstration e. Submit Draft Revised Monitoring Program(s) (subsequent to that required in "a", above) to Regional Board f. Implement revised monitoring plans (s) g. Annual data report submittal	d. Upon Regional Board approval e. Upon notification of the need to do so from the Regional Board Executive Officer and in accordance with the schedule prescribed by the Executive Officer f. Upon Regional Board approval g. April 15th	d. Hydraulic Control demonstration reported in all annual reports e. No revisions requested by Regional Board f. n/a g. All annual reports submitted by April 15 of each year
3. Chino Desalters a. Chino-I Desalter expansion to 10 mgd b. Chino-II Desalter construction to 10 mgd capacity	a. Prior to the recharge of recycled water b. Recharge of recycled water allowed once award of contract and notice to proceed issued for construction of desalter treatment plant	a. Chino-I Desalter expansion to about 14 mgd was completed in April 2005 and operation began in October 2005; recycled water recharge began in July 2005. b. Contract for Chino-II Desalter awarded in early 2005; construction was completed to a capacity of 15 mgd, and the facility went online in June 2006.
4. Submittal of future desalters plan and schedule	October 1, 2005 Implement plan and schedule upon Regional Board approval	Several plans for desalter expansion have been submitted to the Regional Board since 2005. The capacity of the constructed desalter wells in 2015 was about 27 mgd (about 30,000 afy). Watermaster and the IEUA submitted a plan to the Regional Board on June 30, 2015 to construct three additional wells to achieve the ultimate capacity of 36 mgd (40,000 afy), per the Peace and Peace II Agreements. The first two wells are constructed and began operating in 2018. The construction of the the third well is anticipated to begin in late 2019.

Exhibit 14
Status of Compliance with the Chino Basin Maximum-Benefit Commitments

Description of Commitment	Compliance Date – as soon as possible, but no later than	Status of Compliance
5. Recharge facilities (17) built and in operation	June 30, 2005	Watermaster and the IEUA partnered with the San Bernardino County Flood Control District and the Chino Basin Water Conservation District for completion of the Chino Basin Facilities Improvement Program to construct and/or improve eighteen recharge sites. There are currently 17 basins in the Chino Basin Groundwater Recharge Program.
6. Submittal of IEUA wastewater quality improvement plan and schedule	60 days after agency-wide, 12-month running average effluent TDS quality equals or exceeds 545 mgl for 3 consecutive months, or after agency-wide, 12-month running average TIN equals or exceeds 8 mgl in any month Implement plan and schedule upon approval by Regional Board	These threshold events have not occurred; therefore, a wastewater quality improvement plan has not been submitted
7. Recycled water will be blended with other recharge sources such that the volume-weighted, 5-year running average TDS and nitrate-nitrogen concentrations of recharge are equal to or less than the maximum benefit water quality objectives. a. Submit a report that documents the location, amount of recharge, and TDS and nitrogen quality of storm water recharge before the OBMP recharge improvements were constructed and what is projected to occur after the recharge improvements are completed.	Compliance must be achieved by the end of the 5th year after initiation of recycled water recharge operations. a. Prior to initiation of recycled water recharge	a. No documentation of water quality data or quantity for storm water prior to OBMP initiation exists. Storm water has been monitored for flow, TDS, and nitrogen since 2005.

Exhibit 14
Status of Compliance with the Chino Basin Maximum-Benefit Commitments

Description of Commitment	Compliance Date – as soon as possible, but no later than	Status of Compliance
b. Submit documentation of the amount and TDS and nitrogen quality of all sources of recharge and recharge locations. For storm water recharge used for blending, submit documentation that the recharge is the result of OBMP enhanced recharge facilities.	b. Annually, by April 15th, after initiation of construction of basins/other facilities to support enhanced storm water recharge	b. The volume-weighted, 5-year running average TDS and nitrate-nitrogen concentrations of Chino Basin recharge are less than the maximum-benefit water quality objectives
8. Hydraulic Control Failure a. Plan and schedule to correct loss of Hydraulic Control b. Achievement and maintenance of Hydraulic Control c. Mitigation plan for temporary failure to achieve/maintain Hydraulic Control	a. 60 days from Regional Board finding that Hydraulic Control is not being maintained b. In accordance with plan and schedule approved by the Regional Board c. By January 23, 2005	a. No mitigation plan and schedule for the loss of Hydraulic Control has been requested. b. Hydraulic Control has been achieved to the east of Chino-I Desalter Well 20. Groundwater model estimates published in 2015 indicate that production at the CCWF will achieve Hydraulic Control in the west to *de minimis* levels (<1,000 afy of groundwater flow past the CCWF well field to the Prado Basin Management Zone). Full production at the CCWF was achieved in 2016. Watermaster and the IEUA submitted a plan on June 30, 2015 to the Regional Board to construct three additional wells to achieve the ultimate Desalter capacity of 40,000 afy. Construction of two wells is completed and they began operating in 2018. Construction of the third well is anticipated to begin in late 2019.

Exhibit 14
Status of Compliance with the Chino Basin Maximum-Benefit Commitments

Description of Commitment	Compliance Date – as soon as possible, but no later than	Status of Compliance
		c. Plan submitted to the Regional Board on March 3, 2005. No mitigation action has been triggered.
9. Ambient groundwater quality determination	July 1, 2005 and every three years thereafter	Watermaster and the IEUA have participated in the regional triennial ambient water quality determinations coordinated through Basin Monitoring Program Task Force, administered through the Santa Ana Watershed Project Authority. Watermaster and the IEUA provide their fair share of funds and substantial groundwater data for this effort.

Exhibit 15
Limitations, Compliance Metrics, and Compliance Actions for the Chino Basin Maximum-Benefit Commitments

Source Waters with Water Quality Limitations in the Chino Basin SNMP	Water Quality Limitation	Compliance Metric	Action Limit	Required Compliance Action when Compliance Metric Exceeds the Action Limit
IEUA Recycled Water (Commitment 6)	TDS: 550 mgl	The agency-wide, 12-month running-average concentration	When the compliance metric exceeds 545 mgl for three consecutive months	Submit to the Regional Board for approval a plan and schedule to comply with the water quality limitations within 60 days.
	TIN: 8 mgl		When the compliance metric exceeds 8 mgl in any month	
Combined water sources used for managed recharge: storm, imported and recycled waters (Commitment 7)	TDS: 420 mgl Nitrate: 5 mgl	The five-year, volume-weighted running-average concentration of all sources of managed recharge	TDS: 420 mgl Nitrate: 5 mgl	Prepare a salt offset plan to mitigate salt loading from recharge greater than 420 mgl. Offsets could include desalting of recycled water or groundwater, or increased recharge of low-TDS waters.
Groundwater (Commitment 9)	TDS: 420 mgl	The volume-weighted concentration of groundwater in the Chino North GMZ (computed every three years)	TDS: 420 mgl	Reduce the TDS concentration of IEUA recycled water to comply with the maximum-benefit TDS objective or prepare a salt offset plan to mitigate loading from the use of recycled water than 420 mgl.
	Nitrate: 5 mgl		n/a	This action limit was already exceeded when the objective was established. So long as all other maximum benefit commitments are met, no compliance action is required.

Exhibit 16

Ending Balances in Managed Storage in the Chino Basin[1]

(af)

Fiscal Year ending June 30	Appropriative Pool				Overlying Non-Agricultural Pool			Total Managed Storage by Parties	Dry Year Yield Program Storage	Total Managed Storage
	Carryover	Excess Carryover	Local Supplemental Storage	Subtotal	Carryover	Excess Carryover	Subtotal			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) = (7) + (4)	(9)	(10) = (9) + (8)
2000	28,911	170,342		199,253	6,541	31,031	37,572	236,825	0	236,825
2001	15,940	77,907	92,813	186,660	5,301	32,330	37,631	224,291	0	224,291
2002	13,521	70,103	87,801	171,425	5,285	33,727	39,012	210,437	0	210,437
2003	18,656	71,329	81,180	171,165	6,743	36,850	43,593	214,758	7,738	222,496
2004	21,204	70,503	80,963	172,670	7,177	40,881	48,058	220,728	26,300	247,028
2005	21,289	76,080	88,849	186,218	7,227	45,888	53,115	239,333	38,754	278,087
2006	32,062	56,062	86,170	174,294	7,227	49,178	56,405	230,699	58,653	289,352
2007	34,552	50,895	83,184	168,631	7,084	51,476	58,560	227,191	77,116	304,307
2008	41,626	83,962	81,520	207,108	6,819	45,248	52,067	259,175	74,877	334,052
2009	42,795	101,908	79,890	224,593	6,672	46,600	53,272	277,865	34,494	312,359
2010	41,263	120,897	90,133	252,293	6,934	47,732	54,666	306,959	8,543	315,502
2011	41,412	146,074	98,080	285,566	6,959	49,343	56,302	341,868	0	341,868
2012	42,614	209,981	116,138	368,733	6,914	13,993	20,907	389,640	0	389,640
2013	39,413	225,068	116,378	380,859	7,073	15,473	22,546	403,405	0	403,405
2014	41,708	224,496	123,484	389,688	6,478	12,812	19,290	408,978	0	408,978
2015	40,092	239,517	127,994	407,603	6,823	12,225	19,048	426,651	0	426,651
2016	39,733	248,013	131,522	419,267	7,195	9,949	17,144	436,411	0	436,411
2017	38,340	260,682	143,552	442,575	7,226	8,292	15,519	458,093	6,315	464,408
2018	34,582	254,221	155,018	443,821	7,198	10,775	17,973	461,795	41,380	503,174
2019	38,605	279,033	166,406	484,044	7,227	12,004	19,231	503,275	45,969	549,244

1 -- WEI. (2019). Draft Storage Management Plan.

Exhibit 17

Implementation Actions for the 2020 Optimum Basin Management Program Update by Program Element

Implementation Actions for the Next 20 Years by Program Element	Action Added in 2000* or 2020?	Schedule (Yr 1-3, 4-20, or 1-20)	Is the Action Required by Watermaster to Administer the Physical Solution or Comply with Other Regulatory or Court Requirements?	
			Yes/No	Basis
Program Element 1 - Develop and Implement Comprehensive Monitoring Program				
Watermaster will continue to conduct the required monitoring and reporting programs, including collection of: groundwater production, groundwater level, groundwater quality, ground level, surface water, climate, water supply planning, biological, and well construction/destruction monitoring data.	2000*	Years 1-20	Yes	This action included in the 2000 OBMP IP is required by the July 2000 Court Order to implement the Peace Agreement. The monitoring requirements have evolved over time. The requirements are described in Table 2 of the OBMP Update Report, which lists each Watermaster monitoring and reporting program and the associated entity (e.g. Court, Regional Board, etc.) requiring each program.
Perform review and update of Watermaster's regulatory and Court-ordered monitoring and reporting programs and document in a work plan: *OBMP Monitoring and Reporting Work Plan.*	2020	Years 1-3	No	These actions will allow the Parties to offer more direct input in the implementation of the required monitoring programs, but it is not necessary for Watermaster to convene this process to comply with the monitoring requirements. Watermaster annually reviews ongoing monitoring to achieve efficiency.
Perform periodic review and update of the *OBMP Monitoring and Reporting Work Plan* (or other guidance documents developed by Watermaster) and modify the monitoring and reporting programs, as appropriate.	2020	Years 4-20	No	
Program Element 2 - Develop and Implement Comprehensive Recharge Program				
Continue to convene the Recharge Investigations and Projects Committee.	2000	Years 1-20	Yes	These actions included in the 2000 OBMP IP are required by the July 2000 Court Order to implement the Peace Agreement. The Peace II Agreement and the Special Referee's December 2007 Report further establish the requirement and need for the recharge program. In its December 2007 Order, the Court ordered the implementation of the Peace II Agreement.
Complete the 2023 Recharge Master Plan Update (RMPU).	2000*	Years 1-3	Yes	
Implement recharge projects based on need and available resources.	2000	Years 1-20	Yes	
Update the RMPU no less than every five years (2028, 2033, 2038).	2000	Years 4-20	Yes	
Program Element 3 - Develop and Implement a Water Supply Plan for Impaired Areas				
n/a				As described in Section 3.2.3.2 of the 2020 OBMP Update report, there are no separate implementation actions for PE3 in the 2020 OBMP. The ongoing operation of the Chino Basin Desalters, which were the subject of the implementation actions of PE 3 in the 2000 OBMP is now part of PE 7 to Develop and Implement a Salt Management Program.
Program Element 4 - Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1				
Implement Watermaster's Subsidence Management Plan, and adapt it as necessary.	2000*	Years 1-20	Yes	These actions included in the 2000 OBMP are required by the July 2000 Court Order to implement the Peace Agreement. The Peace II Agreement established further requirements for the continued recharge in MZ-1 through the term of the Peace Agreement.
Watermaster will arrange for the physical recharge of at least 6,500 any of Supplemental Water in MZ-1 as an annual average. Watermaster may re-evaluate the minimum annual quantity of Supplemental Water recharge in MZ-1 and may increase this quantity through the term of the Peace Agreement.	2000*	Years 1-20	Yes	

Exhibit 17

Implementation Actions for the 2020 Optimum Basin Management Program Update by Program Element

Implementation Actions for the Next 20 Years by Program Element	Action Added in 2000* or 2020?	Schedule (Yr 1-3, 4-20, or 1-20)	Is the Action Required by Watermaster to Administer the Physical Solution or Comply with Other Regulatory or Court Requirements? Yes/No	Basis
Program Element 5 - Develop and Implement Regional Supplemental Water Program				
The IEUA will maximize the reuse of its recycled water in the Chino Basin.	2000*	Years 1-20	Yes	Pursuant to the Basin Plan, IEUA and Watermaster are required to maximize recycled water reuse in the Chino-North GMZ consistent with the Maximum Benefit SNMP.
The IEUA, the TVMWD, the WMWD, and/or other Party acting as a coordinating agency will establish or expand future recycled water planning efforts to maximize the reuse of all available sources of recycled water.	2020	Years 1-20	No	Although these actions optimize the management of all available recycled water supplies to achieve water supply reliability, they are not required by Watermaster to administer the Physical Solution or other regulatory requirements. These implementation actions are included as part of the 2020 OBMP Update to complement regional planning efforts, not to duplicate them.
Watermaster will support the IEUA, the TVMWD, the WMWD, and/or others in their efforts to maximize recycled water reuse to ensure these efforts are integrated with Watermaster's groundwater and salinity management efforts.	2020	Years 1-20	No	
The IEUA, the TVMWD, the WMWD, and/or other Party acting as a coordinating agency will establish or expand future integrated water resources planning efforts to address water supply reliability for all Watermaster Parties.	2020	Years 1-20	No	Although these actions optimize the management of all available water supplies to achieve water supply reliability, they are not required by Watermaster to administer the Physical Solution or other regulatory requirements. These implementation actions are included as part of the 2020 OBMP Update to complement regional planning efforts, not to duplicate them.
Watermaster will support the IEUA, the TVMWD, the WMWD, and/or others in their efforts to improve water supply reliability to ensure those efforts are integrated with Watermaster's groundwater management efforts.	2020	Years 1-20	No	
Program Element 6 - Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management				
Re-convene the water quality committee and meet periodically to update groundwater quality management priorities.	2000*	Years 1-3	Yes	Paragraph 41 of the Judgment states: "Watermaster Control. Watermaster, with the advice of the Advisory and Pool Committees, is granted discretionary powers in order to develop an optimum basin management program for Chino Basin, including both water quantity and quality considerations. Withdrawals and supplemental water replenishment of Basin Water, and the full utilization of the water resources of Chino Basin, must be subject to procedures established by and administered through Watermaster with the advice and assistance of the Advisory and Pool Committees composed of the affected producers. Both the quantity and quality of said water resources may thereby be preserved and the beneficial utilization of the Basin maximized." (Pgs. 19-20 of the Restated Judgment) If water quality is not considered and effectively managed, the Parties may not be able to utilize their water rights, which could result in negative impacts to the basin, such as reductions in net recharge, loss of hydraulic control, and movement of contaminant plumes. Effective management of water quality in the Basin to preserve maximum beneficial use can only be accomplished through a systematic assessment of the emerging contaminant threats to the use of groundwater resources, and thoughtfully preparing a plan to respond to those threats.
Develop and implement an initial emerging contaminants monitoring plan.	2020	Years 1-3	Yes	
Prepare a water quality assessment of the Chino Basin to evaluate the need for a *Groundwater Quality Management Plan* and prepare a long-term emerging contaminants monitoring plan.	2020	Years 1-3	Yes	
Develop and implement a *Groundwater Quality Management Plan* and periodically update it.	2020	Years 4-20	Yes	
Implement long-term emerging contaminants monitoring plan.	2020	Years 4-20	Yes	
Continue to conduct investigations to assist the parties and/or the Regional Board in accomplishing mutually beneficial objectives as needed.	2000	Years 1-20	Yes	This action included in the 2000 OBMP is required by the July 2000 Court Order to implement the Peace Agreement. Recommendations for investigations will be made to Watermaster by the Water Quality Committee.
Continue to support the Parties in identifying funding from outside sources to finance cleanup efforts.	2000	Years 1-20	Yes	This action included in the 2000 OBMP is required by the July 2000 Court Order to implement the Peace Agreement. Requests for support will be made to Watermaster by the Water Quality Committee.
Implement projects of mutual interest.	2000	Years 1-20	No	The implementation of projects is not required by the 2000 OBMP IP, however Watermaster is required to support the Parties, as requested by the Committee, and as appropriate.

Exhibit 17

Implementation Actions for the 2020 Optimum Basin Management Program Update by Program Element

Implementation Actions for the Next 20 Years by Program Element	Action Added in 2000* or 2020?	Schedule (Yr 1-3, 4-20, or 1-20)	Is the Action Required by Watermaster to Administer the Physical Solution or Comply with Other Regulatory or Court Requirements?	
			Yes/No	Basis
Program Element 7 - Develop and Implement Salt Management Plan				
Continue to implement the maximum benefit salt and nutrient management plan pursuant to the Basin Plan.	2000*	Years 1-20	Yes	Watermaster and IEUA must perform these actions pursuant to the maximum benefit SNMP in the Basin Plan.
Complete the 2020 update of TDS and nitrate projections to evaluate compliance with maximum benefit salt and nutrient management plan, and, if necessary, based on the outcome, prepare a plan and schedule to implement a salt offset compliance strategy.	2020	Years 1-3	Yes	Watermaster and IEUA have already begun this project and are required to complete it by the Regional Board to obtain a revised recycled water compliance program related to total dissolved solids concentrations.
Starting in 2025 and every five years thereafter, update water quality projections to evaluate compliance with the maximum benefit salt and nutrient management plan.	2020	Years 4-20	Yes	Watermaster and IEUA will be required to perform these actions pursuant to an anticipated amendment to the maximum benefit SNMP in the Basin Plan.
Program Element 8/9 - Develop and Implement Groundwater Storage Program *and* Develop and Implement Storage and Recovery Programs				
Complete and submit to the Court the 2020 Safe Yield Recalculation.	2000*	Years 1-3	Yes	The 2000 OBMP IP identified the ten-year recalculation requirement, which is binding on Watermaster through the 2000 Court Order. Additionally, section 4.2 of the April 2017 Court Order that followed the 2015 Safe Yield Reset further establishes the date by which the next 10-year updates must occur (2020) and affirms the 10-year update frequency.
Complete and submit to the Court the 2020 Storage Management Plan (SMP).	2020	Years 1-3	Yes	Paragraph 41 of the Judgment requires "...procedures to be established and administered through Watermaster with the advice and assistance of the Advisory and Pool Committees for the withdrawals and supplemental water replenishment of Basin water..." The SMP in the 2000 OBMP is insufficient to meet the needs of the Parties as storage already exceeds the limits in the established procedures. A new SMP is required to issue storage agreements as of July 1, 2020. And, the CEQA coverage for the existing SMP expires in July 2021.
Develop a *Storage and Recovery Master Plan* to support the design of optimized storage and recovery programs that are consistent with the 2020 Storage Management Plan and provide the Watermaster with criteria to review, condition, and approve applications in a manner that is consistent with the Judgment and the Peace Agreement.	2020	Years 1-3	Yes	Section 5.2.c.iv.(b) of the Peace Agreement states that "Watermaster shall prioritize its efforts to regulate and condition the storage and recovery of water developed in a Storage and Recovery Program for the mutual benefit of the Parties to the Judgment and give first priority to Storage and Recovery Programs that provide broad mutual benefits." Watermaster must document the basis by which it will review, condition, and approve applications in a manner that is predictable, uniform, and consistent with the Peace Agreement and the 2020 SMP. A master plan is the most efficient process to do this.
Assess losses from storage accounts based on the findings of the 2020 Safe Yield Recalculation.	2000*	Years 1-3	Yes	Section 5.2.b.xii of the Peace Agreement requires that Watermaster shall set the annual rate of loss from Local Storage for parties to the Judgment at zero through 2005. Thereafter, the rate of loss from Local Storage for parties to the Judgment will be 2% until recalculated based upon the based available scientific information. Losses will be deducted annually from each party to the Judgment's storage account. The loss rate is assessed as part of the Safe Yield recalculation.
Update the Storage Management Plan in 2025 and every five years thereafter, and when: the Safe Yield is recalculated, Watermaster determines a review and update is warranted based new information and/or the needs of the parties or the basin, and at least five years before the aggregate amount of managed storage by the parties is projected to fall below 340,000 af.	2020	Years 4-20	Yes	The 2020 SMP is based on present planning projections and technical understanding of the basin. This information can change over time and the limits established in the 2020 SMP must be revisited from time to time to ensure it meets the needs of the Parties. These triggers for updating the SMP are defined in the 2020 SMP.
Perform Safe Yield recalculation every 10 years.	2000	Years 4-20	Yes	See above basis for the 2020 Safe Yield recalculation.
Update the storage loss rate following each recalculation of Safe Yield and during periodic updates of the SMP.	2020	Years 4-20	Yes	See above basis for assessing losses based on the 2020 Safe Yield recalculation. The loss rate may also be evaluated in future SMP updates.

For the 2000 OBMP implementation actions annotated with a "", the description of the action has been modernized to reflect current terminology, reports, and requirements established after the 2000 OBMP was finalized.

Appendix A

White Paper – 2020 Update to the Chino Basin Optimum Basin Management Program

White Paper – 2020 Update to the Chino Basin Optimum Basin Management Program

Introduction

This white paper describes the Optimum Basin Management Program (OBMP) that was developed in 2000 and updated in 2007, the efficacy of the OBMP, and the need to update it. This paper is organized as follows:

- Existing OBMP – this section describes the history and accomplishments of the OBMP that was developed in 2000 and updated in 2007.
- Need to Update the OBMP – this section summarizes the need to update the OBMP.
- Benefits from Updating the OBMP – this section summarizes the benefits from updating the OBMP.
- Process to Update the OBMP – this section summarizes the process to update the OBMP.

Existing OBMP

The Chino Basin Judgment gave Watermaster the authority to develop an OBMP for the Chino Basin, including both water quantity and quality considerations. Watermaster, with direction from the Court, began the development of the OBMP in 1998 and completed it in July 2000. The OBMP was developed in a collaborative public process that identified the needs and wants of all stakeholders, described the physical state of the groundwater basin, developed a set of management goals, identified impediments to those goals, developed a series of actions that could be taken to remove those impediments and achieve the management goals, and developed agreements to implement the OBMP. The OBMP goals and the activities to achieve them were stated in the OBMP Phase I report as follows[1]:

- "Goal 1 - Enhance Basin Water Supplies. This goal applies not only to local groundwater but also to all sources of water available for the enhancement of the Chino Groundwater Basin. The following activities enhance basin water supplies:
    - Enhance recharge of storm water runoff. Increasing the recharge of storm water in the basin will increase the water supplies in the Chino Basin. The relatively low TDS and nitrate concentrations of storm flow will improve groundwater quality.
    - Increase the recharge of recycled water. The recharge of recycled water above that required for replenishment obligations can be used for safe yield augmentation and/or conjunctive use.
    - Develop new sources of supplemental water. New sources of supplemental water, including surface and groundwater from other basins, can be used to meet Chino Basin area demands, reduce dependency on Metropolitan supplies, and improve drought reliability.

[1] See Optimum Basin Management Program, Phase 1 Report, August 1999, pages 3-2 to 3-4. Document is located here: http://www.cbwm.org/docs/engdocs/OBMP%20-%20Phase%20I%20(Revised%20DigDoc).pdf

  - Promote the direct use of recycled water. Promoting the direct use of recycled water for non-potable uses will make more native groundwater available for higher-priority beneficial uses.
  - Promote the treatment and use of contaminated groundwater. In some parts of the basin, groundwater is not produced because of contamination problems and thus the yield of the basin may be reduced. The yield of the basin can be maintained and enhanced by the production and treatment of these contaminated waters.
  - Reduce groundwater outflow. Increasing groundwater production near the Santa Ana River will increase the streambed percolation of the Santa Ana River into the groundwater basin and reduce groundwater outflow from the basin and thereby increase the supply of groundwater in the basin.
  - Re-determine safe yield. Recent studies suggest that the safe yield may be greater than the 140,000 acre-ft as stated in the Judgment. The activities listed above will cause the yield to increase further. Continuing to operate the basin at 140,000 acre- ft/yr will cause groundwater in the basin to be lost to the Santa Ana River. The safe yield will be re-determined on an as-needed basis to maximize the current yield and to cause future increases in yield.

- Goal 2 - Protect and Enhance Water Quality. This goal will be accomplished by implementing activities that capture and dispose of contaminated groundwater, treat contaminated groundwater for direct high-priority beneficial uses, and encourage better management of waste discharges that impact groundwater. The following activities will protect and enhance water quality:
  - Treat contaminated groundwater to meet beneficial uses. Groundwater in some parts of the basins is not produced because of contamination problems. Groundwater quality can be protected by intercepting contaminants before they spread. Intercepted groundwater could be treated and used directly for high priority beneficial uses or injected back into the aquifer.
  - Monitor and manage the basin to reduce contaminants and to improve water quality. Actively assisting and coordinating with the Regional Board, the EPA, and other regulatory agencies in water quality management activities would help improve water quality in the basin.
  - Manage salt accumulation through dilution or blending and the export of salt.
  - Address problems posed by specific contaminants.

- Goal 3 - Enhance Management of the Basin. This goal will be accomplished by implementing activities that will lead to the optimal management of the Chino Basin. The following activities will protect and enhance the management of the basin:
  - Develop policies and procedures that will encourage stable, creative, and fair water resources management in the basin.
  - Optimize the use of local groundwater storage. Policies and procedures for local storage, cyclic storage, and other types of storage accounts will be created to maximize drought protection and improve water quality, and to create an

efficient system to transfer water from producers with surplus water to producers that need water.
    - Develop and/or encourage production patterns, well fields, treatment and water transmission facilities, and alternative water supply sources to ensure maximum and equitable availability of groundwater and to minimize land subsidence. Develop conjunctive-use programs with others to optimize the use of the Chino Basin for in-basin producers and the people

- Goal 4 - Equitably Finance the OBMP. This goal is based on the following principles:
    - The primary source of revenue to finance the implementation will be consumers of Chino Basin groundwater.
    - Consumers in the Chino Basin must be treated equitably by passing the cost of the OBMP on a per acre-foot basis or by other methods, based on formulas to be determined.
    - Financial incentives and disincentives will be established to assure that existing groundwater is pumped out of the basin and a higher quality of water is used to replenish the basin.
    - Opportunities for creativity will be provided to the producers so that they are motivated to use their assets and abilities in the implementation of the OBMP.
    - Recover value from utilization of storage of supplemental water and from rising water outflow."

The actions to remove the impediments to the OBMP goals were logically grouped into sets of coordinated activities called Program Elements. Each Program Element contains a list of definitive actions and an implementation schedule. The OBMP Implementation Plan consists of nine Program Elements. The relationship of the goals to the Program Elements is shown in the following table.

Relationship of Goals and Program Elements in the 2000 OBMP

Program Element	Goal 1 - Enhance Basin Water Supplies	Goal 2 - Protect and Enhance Water Quality	Goal 3 - Enhance Management of the Basin	Goal 4 - Equitably Finance the OBMP
Program Element 1. Develop and Implement Comprehensive Monitoring Program (Comprehensive Monitoring Program)	X	X	X	X
Program Element 2. Develop and Implement Comprehensive Recharge Program (Comprehensive Recharge)	X	X	X	X
Program Element 3. Develop and Implement a Water Supply Plan for Impaired Areas (Groundwater Desalting)	X	X	X	X
Program Element 4. Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1 (Land Subsidence Management)			X	X
Program Element 5. Develop and Implement Regional Supplemental Water Program (Recycled Water Reuse)	X	X	X	X
Program Element 6. Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management (Water Quality Management)	X	X	X	X
Program Element 7. Develop and Implement Salt Management Plan (Salt and Nutrient Management Plan)	X	X	X	X
Program Element 8. Develop and Implement Groundwater Storage Program (Groundwater Storage Management)	X	X	X	X
Program Element 9. Develop and Implement Conjunctive Use Program (Conjunctive Use)	X	X	X	X

Since October 2000, Watermaster, the Judgment parties, the IEUA, the TVMWD, and the WMWD have implemented most of the actions described in the Program Elements and the OBMP goals have been partially achieved. Some of the requirements and scope of the Program Elements have changed over time as impediments to the goals have been refined by new information, evolving technological and institutional challenges, and funding opportunities. The accomplishments from the implementation of the 2000 OBMP are summarized below.

Program Element 1. Develop and Implement Comprehensive Monitoring Program (Comprehensive Monitoring Program)

The objectives of this Program Element are to collect the data necessary to support the implementation of the other eight Program Elements and periodic updates to the state of the basin. The types of data collected include: groundwater data from wells (location, construction, lithology, pumping, water level and water quality); surface water (measuring location, discharge, recharge and water quality); ground level (vertical displacement from remote sensing, ground survey and extensometers, horizontal displacement from ground surveys); climatic data (precipitation from terrestrial stations, PRISM, NEXRAD, bias corrected and spatially disaggregated projections of future precipitation, evaporation, ET and temperature); land use and vegetation maps; normalized difference vegetation index mapping; facilities information (drainage maps, sewershed, water systems and facilities details); aerial photography; and LIDAR surveys. All these data are in stored in a relational database, GIS or other digital formats. The monitoring requirements have been reviewed annually and modified to ensure that the monitoring program delivered the minimum data required for OBMP implementation.

Program Element 2. Develop and Implement Comprehensive Recharge Program (Comprehensive Recharge)

The objectives of this Program Element include increasing stormwater recharge to offset the recharge lost due to channel lining, increase Safe Yield and to ensure that there will be enough supplemental water recharge capacity available to Watermaster to replenish overdraft. Recharge master plans were completed in 2001, 2013, and 2018. Watermaster and the IEUA implemented the 2001 recharge master plan and constructed recharge improvements that increased storm water recharge by about 9,000 afy. Watermaster and the IEUA completed a recharge master plan update in 2013 (2013 RMPU), and they are currently in the process of designing and constructing the recommended 2013 RMPU recharge projects. When completed in 2021, the 2013 RMPU projects will increase stormwater recharge by another 4,800 afy and recycled water recharge capacity by 7,100 afy. Finally, Watermaster and the IEUA completed a recharge master plan update in 2018 that recommended no new recharge projects. In the first 20 years of OBMP implementation, stormwater recharge will have increased about 13,800 afy, and supplemental water recharge capacity will have increased by 27,600 afy. One of the findings of the 2018 recharge master plan update is that Watermaster has enough supplemental water recharge capacity to it meet its replenishment obligations through wet-water recharge through 2050. The IEUA has increased the recharge of recycled water from about 500 afy in 2000 to about 16,000 afy in 2018.

Program Element 3. Develop and Implement a Water Supply Plan for Impaired Areas (Groundwater Desalting)

The objectives of this Program Element are to maintain and enhance the Safe Yield of the basin. The groundwater desalting program was designed to replace declining agricultural groundwater pumping in the southern part of the basin with new groundwater pumping to meet increasing municipal water demands in the same area. The new wells used in the groundwater desalting program were constructed in strategic locations to minimize groundwater outflow to the Santa Ana River and to increase the Santa Ana River recharge into the basin. In 2000, the groundwater desalting program included a 6,000 afy treatment plant and a series of wells constructed in the southern part of the Chino Basin near the Chino Airport. Under the OBMP, as of 2018, the desalting program has grown to two treatment plants and additional wells that in aggregate pump and treat about 30,000 afy degraded groundwater, and the program will reach the OBMP objective of 40,000 afy in 2019. The groundwater desalting program facilities are owned by the Chino Basin Desalter Authority (CDA) whose members include the Cities of Chino, Chino Hills, Ontario, and Norco; the Jurupa Community Services District; the Santa Ana River Water Company; the IEUA; and the WMWD.

Program Element 4 Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1 (Land Subsidence Management)

The objectives of this Program Element include the spatial and temporal characterization of land subsidence, identification of its causes, and, where appropriate, the development and implementation of a program to minimize or abate land subsidence. In the early 2000s, Watermaster constructed specialized monitoring wells to characterize land subsidence in the City of Chino. This work yielded two things: a successful voluntary management plan specific to certain wells located within a designated “Managed Area in the City of Chino; and a monitoring and investigative plan to characterize land subsidence throughout MZ1 and a part of MZ2. As of 2018, land subsidence monitoring is ongoing, and a focused effort is underway to develop a land subsidence management plan for the northwestern part of MZ1.

Program Element 5 Develop and Implement Regional Supplemental Water Program (Recycled Water Reuse)

The objective of this Program Element is to improve the regional conveyance and availability of imported and recycled waters throughout the basin. Since 2000, the IEUA has constructed and operated a recycled water conveyance system throughout the basin enabling it to provide recycled water to its member agencies. Recycled water deliveries grew from about 3,400 afy in 2000 to about 34,000 afy in 2017. The recycled water provided by the IEUA has replaced a like amount of groundwater and imported water that would have otherwise been used for non-potable purposes. Much of the post-2000 increase in supplemental water storage in the Chino Basin is attributable to the increased availability of recycled water. Recycled water is more reliable than imported water, and thus using it in lieu of imported water has improved the sustainability of the Chino Basin and water supply reliability. Improvements in the regional conveyance and availability of imported water were not achieved.

Program Element 6 Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management (Water Quality Management)

The objectives of this Program Element are the identification of water quality trends in the basin and the impact of the OBMP implementation on them, the determination of whether point and non-point contamination sources are being addressed by water quality regulators, and to collaborate with water quality regulators to identify and facilitate the cleanup of soil and groundwater contamination. Since 2000, Watermaster, through its own monitoring activities and the efforts of cooperating entities, has compiled surface and ground water quality and related data, assessed water quality trends, and periodically reported its findings to the Judgment parties. Watermaster has collaborated with the Regional Board in its efforts to work with dischargers to facilitate the cleanup of soil and groundwater contamination in the basin. The 2000 OBMP Implementation Plan identified the opportunities to use the Chino Desalters to assist in the remediation of the Chino Airport and South Archibald plumes, which, as of this writing, is coming to fruition.

Program Element 7 Develop and Implement Salt Management Plan (Salt and Nutrient Management Plan)

The objectives of this Program Element are to characterize current and future salt and nutrient conditions in the basin and to subsequently develop and implement a plan to manage them. Watermaster and the IEUA developed an innovative salt and nutrient management plan (SNMP) for the Chino Basin that created assimilative capacity for total dissolved solids (TDS) and that when combined with the planned new recharge of stormwater and imported water, groundwater desalting, achievement of Hydraulic Control, and monitoring, enabled the use of recycled water without treatment to reduce the TDS concentration in recycled water. The SNMP was initiated in 2004. Ambient TDS and nitrate concentrations continue to increase in the Chino Basin due to legacy agricultural activities and current irrigation practices.

Program Element 8 Develop and Implement Groundwater Storage Program (Groundwater Storage Management)

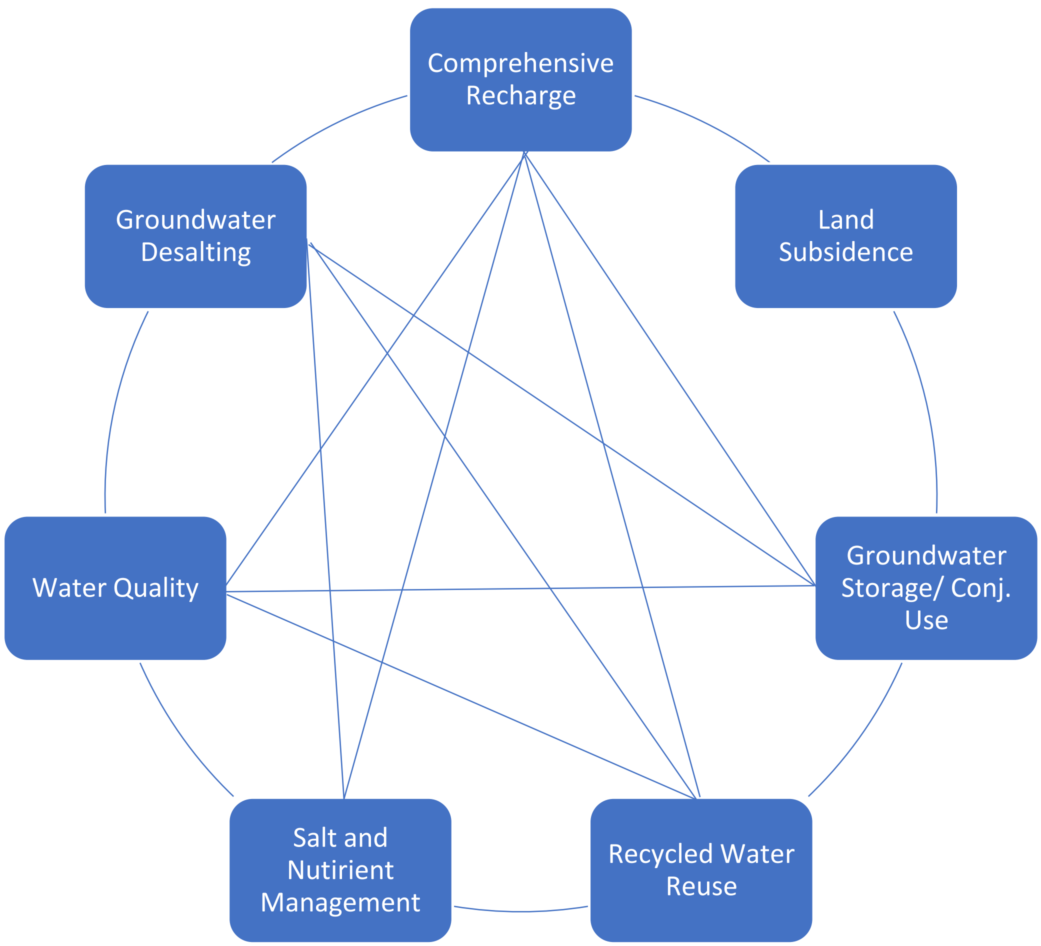
The objectives of this Program Element are to develop and implement a storage management program that is protective of water quality, prevents overdraft, and ensures equity among the Judgment parties. This Program Element also includes the recalculation of Safe Yield. The storage management plan in the OBMP implementation plan was implemented in 2000 and revised in 2016, raising the Safe Storage Capacity for managed storage from 500,000 af to 600,000 af through June 2021. Safe yield was recalculated in 2015 and, as of this writing, has not been approved by the Court. Losses from storage were initially assigned to zero through 2005, estimated at 2 percent from 2006 through 2017, and reduced to 0.07 percent thereafter with the achievement of Hydraulic Control. Watermaster conducted a Storage Framework Investigation in 2017 and 2018 to provide technical information to support the development of a new storage management plan in 2019. Technical work has commenced to recalculate the Safe Yield in 2020.

Program Element 9 Develop and Implement Conjunctive Use Program (Conjunctive Use)

The objective of this Program Element is to develop Storage and Recovery programs that will provide broad mutual benefit to the Judgment parties and reduce the cost of OBMP implementation. Watermaster, the IEUA, the TVMWD, the WMWD, and the Metropolitan Water District of Southern California (Metropolitan) implemented a 100,000 af storage program called the Dry-Year Yield Program (DYYP) in 2005. This program runs through 2028. Other than the DYYP, no Storage and Recovery programs have been implemented since 2000. IEUA is currently working to obtain a $207 million grant to develop and implement a Storage and Recovery program that will provide broad mutual benefit to the Judgment parties and state.

The 2000 OBMP Program Elements are highly related as is shown in the figure below. For example, the management activities associated with groundwater recharge impact land subsidence (a possible land subsidence management tool), groundwater storage and conjunctive use (recharge as a means to get water into storage), recycled water reuse (recharge as a means to get recycled and dilution water into the basin), and the salt and nutrient management plan (managed recharge must be blended to meet SNMP requirements). Furthermore, recharge impacts water quality directly, it has the potential to displace contaminant plumes, and future recharge increases with high quality storm and imported waters will be used to increase pumping rights and reduce future desalting requirements.

Relationship of the 2000 OBMP management activities



White Paper – 2020 Update to the Chino Basin Optimum Basin Management Program

Peace Agreements and CEQA

The 2000 OBMP and the Peace Agreement were completed in 1999 and 2000, respectively. The operable features of the OBMP were incorporated into the OBMP Implementation Plan. The OBMP Implementation Plan is Exhibit B to the Peace Agreement. The Peace Agreement was reviewed in a programmatic environmental impact report (PEIR), completed by the IEUA in July 2000.

Subsequent to the PEIR, Watermaster and the Judgment parties developed revisions to the OBMP based on the need to expand the desalting capacity to the 40,000 afy of groundwater pumping required in the OBMP Implementation Plan. Concurrently, the IEUA and Watermaster worked with the Santa Ana Regional Water Quality Control Board (Regional Board) to revise the total dissolved solids (TDS) and nitrate objectives for the Chino North Management Zone to enable the reuse of the IEUA's recycled water without desalting it for a period estimated to be at least 30 years and without impairing the beneficial use of groundwaters in the Chino and Orange County Basins (Program Element 7). One of the Regional Board's conditions for raising the TDS and nitrate objectives was the achievement of Hydraulic Control. Hydraulic Control is the elimination of groundwater discharge from the Chino North Management Zone to the Santa Ana River or its reduction to less than 1,000 afy. Hydraulic Control is a goal of the OBMP with the intent of maintaining and enhancing the Safe Yield of the basin by ensuring that agricultural groundwater pumping in the southern half of the basin will be replaced by groundwater pumping for municipal uses as the land use in that area transitions from agricultural uses to urban uses. Through extensive investigations, the expansion of desalter groundwater pumping to 40,000 afy and Reoperation were determined necessary to achieve Hydraulic Control and maintain the Safe Yield.

The Peace II Agreement was developed to implement the changes in the OBMP required to expand the desalters to 40,000 afy of groundwater pumping, to incorporate Reoperation and Hydraulic Control, and to resolve other issues. There was no change to the storage management plan in the OBMP Implementation Plan to address the implications of the reduction in storage of basin water by 400,000 af as provided for by Reoperation.

The IEUA completed and subsequently adopted a supplemental environmental impact report (SEIR) for the Peace II Agreement in 2010. The technical investigations conducted to support the expansion of desalter groundwater pumping to 40,000 afy and Reoperation also indicated that the Safe Yield of the Chino Basin had become less than that stated in the Chino Basin Judgment due to changes in cultural conditions in the watershed overlying and tributary to the Chino Basin.

Starting in 2011, Watermaster began the technical effort to recalculate the Safe Yield. This work involved updating the hydrogeologic conceptual model of the basin, updating the historical hydrology, updating and recalibrating numerical models that simulate the surface and ground water hydrology of the Chino Basin area, and projecting the surface and groundwater response of the basin to future management plans that included storage management. This work is documented in *2013 Chino Basin Groundwater Model Update and Recalculation of Safe Yield Pursuant to the Peace Agreement* (WEI, 2015; hereafter, Safe Yield report)[2].

In 2017, the IEUA adopted an addendum to the Peace II SEIR to revise the storage management plan in the OBMP through June 30, 2021. The addendum was supported with engineering work that demonstrated that the Safe Storage Capacity could be safely increased from 500,000 af to 600,000 af with the commitment that Watermaster would update the OBMP storage management plan by June 30, 2021.

Need to Update the OBMP

Understanding of the basin hydrogeology and hydrology has improved since 2000, and new water management challenges have been identified that need to be addressed to ensure long-term groundwater pumping sustainability. The strategic drivers/trends that shaped the OBMP in the late 1990s have since changed. There are several drivers and trends that will challenge the ability of the Judgment parties to rely on the OBMP environmental documentation and court approved management agreements (CAMA) to protect their collective interests in the Chino Basin and their water supply reliability. Exhibit 1 graphically illustrates these drivers, associated trends, and their basin management implications. The term "driver" as used herein corresponds to external forces that cause changes in the Chino Basin water space. Grouped under each driver are expected trends that emanate from each driver. The management implications of the drivers/trends on the present and future Chino Basin management are located on the bottom of Exhibit 1. The relationship of the drivers/trends to the management implications are shown by arcs that connect trends to implications. There may be other important drivers/trends and they will be identified in the OBMP update process. The text below summarizes the drivers, trends and management implication shown in Exhibit 1.

Climate Change

Reduced recharge. Present predictions of future precipitation indicate that precipitation patterns will change with more precipitation falling over shorter periods of time and that future droughts will be longer in duration and occur more frequently. This translates into a reduction in precipitation-based recharge to the basin and, if not mitigated, a decline in Safe Yield.

Reduced availability of imported water. Imported water supplies from the State Water Project and surface water sources in the Santa Ana River Watershed will become less reliable with climate change. The availability of imported groundwater from adjacent basins will be reduced for the same reason the Safe Yield of the Chino Basin will likely be reduced.

Legislation and Regulation

Climate science is advancing and generally reporting that the impacts of anthropogenic climate change will occur faster and be more severe than previously anticipated. New laws and regulations will be enacted to reduce greenhouse gas emissions and to mitigate climate change

[2] This report is located here:
http://www.cbwm.org/docs/engdocs/WEI%202013%20CBWM%20Recalculation%20Model%20Update/20151005_WEI_2013_CBWM_Recal_Model_Final_low.pdf

impacts. These new laws and regulations will likely place additional restrictions on water use to extend existing water supplies and to protect habitat.

Sustainable Groundwater Management Act (SGMA). Pursuant to SGMA, the Chino Basin is exempt from the development of a Groundwater Sustainability Plan (GSP). Currently, Watermaster is required to annually provide limited information to the state. In the near future, it is likely that adjudicated basins will come under greater scrutiny and be required to demonstrate sustainable groundwater management like that required for non-adjudicated basins.

Conservation. New laws and regulations to increase water conservation will reduce the deep infiltration of precipitation and applied water to the basin and, unless mitigated, will decrease the Safe Yield. Conservation may also impact a party's ability to make use of it pumping rights.

Water quality. Drinking water regulations will continue to become more stringent in the future due to new information on the health effects of various chemical and pathogenic constituents and the ability to measure constituents at increasingly lower detection levels.

Salt and Nutrient Management

TDS Increases in the Basin. Watermaster and the IEUA are co-permitees for the use of recycled water in the Chino Basin. The use of recycled water could become more difficult in the future because the ambient TDS concentration in the Chino Basin is increasing and thereby reducing assimilative capacity. Increases in ambient TDS concentrations in the future will cause an increase in the TDS concentration in recycled water produced by the IEUA and will eventually cause the IEUA to desalt its' recycled water when assimilative capacity for TDS is lost in the Chino North Management Zone. When assimilative capacity for TDS is lost under the current SNMP, the IEUA will be required to desalt its recycled water to the TDS groundwater objective of 420 mgl prior to reuse in the Chino Basin.

TDS Increases in SWP Water during Droughts. The TDS concentration in the IEUA's recycled water increased during the recent drought due to concurrent increases in TDS concentration in SWP water and almost triggered a requirement, pursuant to the current SNMP in the Basin Plan, to start the planning process to desalt recycled water. Future droughts will likely be longer in duration and occur more frequently. Unless the SNMP is updated, the requirement to implement recycled water desalting could start with the next drought.

Outside Interest in Chino Basin Operations

There is increasing interest from outside entities in how the regional water agencies and Judgment parties operate the Chino Basin. The State of California consistently enacts more restrictive laws and regulations to protect the environment and to improve habitat sustainability. Public Trust related litigation has been used to halt project development and limit water rights. The Resource Agencies, non-governmental organizations, and Santa Ana River parties are showing renewed interest in Santa Ana River discharges for habitat, water supply, and water rights.

Grant and Low-Interest Loan Project Funding

California voters have a recent history of passing bond initiatives to support water resources projects. The accumulating debt at the national and state level will make it more difficult in the future to obtain grant and low-interest loan funding for water projects. Competition for available funding will increase. Projects approved and constructed in the next few years are more likely to obtain grants and low-interest loans over projects that are deferred into the future.

Improvements in Science and Technology

Laboratory Detection Limits. Improvements in laboratory methods will reduce the detection limits for water quality constituents.

Health Impacts of Chemicals and Pathogens. The number of regulated chemicals will increase, and regulatory standards, based on new research, will become more stringent.

Treatment Technologies. Water treatment technology will improve, enabling water agencies to treat water to more restrictive drinking water standards.

Renewable Energy. The amount of renewable energy available will increase as will the need/requirement to incorporate renewable energy into new projects.

Sensor Technology. There is an increasing trend in the development, cost-efficient availability, and deployment of new terrestrial, aircraft-borne and space-borne sensors that enable the monitoring of the basin and assessment of hydrologic and ecological trends; this will result in improved hydrologic understanding of the basin.

Transparency. Federal and state agencies are requiring that water agencies submit monitoring and other data to them and that these data be made available to the public. The proliferation of these and other publicly available data sources will lead to greater regulatory scrutiny and interest by environmental organizations

The water resource management implications of these drivers and trends for the Judgment parties include:

- reductions in Chino Basin safe yield,
- Chino Basin water quality degradation,
- increased cost of groundwater use,
- reduced imported water availability,
- imported water quality degradation,
- reduced recycled water availability and increased cost,
- recycled water quality degradation, and
- increased cost of Basin Plan compliance.

Mitigation of these implications requires a proactive integrated approach to updating the OBMP.

White Paper – 2020 Update to the Chino Basin Optimum Basin Management Program

The OBMP CEQA Document Needs to Be Updated

The PEIR and SEIR for the OBMP are eighteen and eight years old, respectively: knowledge of the basin's characteristics has improved since these documents were adopted, water management challenges have intensified, and environmental considerations have changed. The PEIR and SEIR are not sufficiently current to support present decision-making and further investment. The existing environmental clearance is too old to be relied upon for receiving state grant and low interest loan funding and render Watermaster and the IEUA to make decisions relying on the earlier environmental evaluations that are vulnerable to collateral attack.

Accordingly, Watermaster needs to review and update (if necessary) its groundwater management goals, articulate impediments to those goals, update the OBMP and its implementation agreement as required by Paragraph 41 of the Judgment, and complete a new CEQA process.

Benefits from Updating the OBMP

The current OBMP contains a set of management activities that improve the reliability and long-term sustainability of the Chino Basin and the water supply reliability of the Judgment parties. The OBMP was developed in 1998 and 1999, based on the goals of the Judgment parties, the hydrologic understanding of the basin, the institutional and regulatory environment, an assessment of the impediments to achieving the Judgment parties' goals, and the actions required to remove the impediments and achieve the goals.

The Judgment parties need to consider whether the OBMP goals have changed, update them, and define the impediments to achieving the goals based on the present and expected hydrologic conditions in the basin, and current and projected trends in the institutional, regulatory, and financing spaces. The parties can then develop an action plan to overcome impediments to achieve the updated OBMP goals. In the absence of an updated OBMP, it will grow increasingly difficult to maintain current and projected groundwater pumping and recycled water reuse and to utilize the unused storage capacity in the basin. An updated OBMP will provide the Judgment parties with: a program-level water resources management plan that maximizes their pumping rights, use of recycled water, use of storage space, and an updated CEQA document to provide certainty for implementation.

Process to Update the OBMP

The process for the development of the 2000 OBMP involved the description of the state of the Chino Basin, the articulation of the Judgment parties' "issues, needs and wants," the Judgment parties' development of OBMP management goals, the articulation of the impediments to achieving the goals, the description of the actions required to remove the impediments, the development of an implementation plan and an agreement among the Judgment parties to fund and implement the OBMP, and the preparation of CEQA documentation. The table below summarizes the effort for the 2000 OBMP and the OBMP update. The text that follows summarizes the update process.

Steps involved in OBMP development

	OBMP Development Step	2000	2020
1	Prepare state of the basin assessment	X	
2	Articulate “issues, needs and wants” and management goals	X	X
3	Describe impediments to management goals	X	X
4	Develop actions to remove impediments	X	X
5	Develop implementation plan	X	X
6	Develop implementation agreement	X	X
7	Prepare CEQA documentation	X	X
8	Court approval	X	X
9	Prepare financing plan		X

1. The combination of the existing 2016 State of the Basin Report, annual report of the Ground Level Monitoring Committee, 2018 Recharge Master Plan Update report, and 2018 Storage Framework report are sufficient to understand the current state of the basin. Also, the 2018 State of Basin report is currently in preparation and will be available to the Judgment parties during the OBMP update process.

2. One to two listening sessions will be held to enable the Judgment parties to articulate their “issues, needs and wants” and their recommended goals for basin management. Watermaster staff will prepare documents that combine and systematize these items and obtain concurrence from the parties that their concerns and goals expressed at these listening sessions have been captured in the planning documents.

3. One to two listening sessions will be held to describe the impediments to achieving the goals. Watermaster staff will prepare documents that combine and systematize the impediments and obtain concurrence from the parties that the impediments expressed at these workshops have been captured in the planning documents.

4. Watermaster staff will develop an initial set of actions that if taken will remove the impediments to the OBMP goals, prepare reconnaissance-level cost estimates to implement the actions, and document this work in a draft TM. Up to three listening sessions will be held to present the actions to the Judgment parties, obtain their comments and suggestions, revise the actions, and subsequently finalize the TM.

5. Watermaster staff will create a draft implementation plan for the OBMP update and document it in a draft TM. One or two listening sessions will be held to present the implementation plan to the Judgment parties, obtain their comments and suggestions, and subsequently incorporate them into the draft TM.

6. Watermaster will provide a facilitated process for the Judgment parties to develop an agreement to implement the OBMP update.

7. The IEUA will prepare the appropriate CEQA documentation for the OBMP update.

8. Upon completion of the implementation agreement and CEQA, Watermaster and the Judgment parties will seek Court approval of the OBMP update.

9. After the CEQA document is adopted by the IEUA, the Judgment parties, the IEUA, and interested entities will prepare a financing plan.

OBMP Update Schedule

Steps 1 through 5, ending with the development of the OBMP implementation plan, will be completed in the period of January 2019 through December 2019. The development of the OBMP implementation agreement and CEQA will be completed in the period of January 2020 through June 2020. Court approval and the development of a financing plan will occur thereafter.

Appendix B

Response to Comments on the November 22, 2019
Draft 2020 OBMP Update Report

NOTE: In addition to any changes made to the 2020 OBMP Update Report based on the following comments, the text of Section 3.2.8.1 was edited to align with the final 2020 SMP published on December 11, 2019.

2020 OBMP Update Report Comments

Overlying Non-Agricultural Pool – Comments reported out of 12/12/19 Confidential Session

1. ***The Pool requests further clarification on its comment #2 regarding conjunctive use and its definitions in the Storage Management Plan:***
   Page 1-4 and Page 2-1 – Conjunctive-Use. Section 1.2 and Section 2.1 talk about conjunctive-use. How is conjunctive-use defined? What is included and excluded?

   RESPONSE: Page 1-4 of the final 2020 Storage Management Plan describes the conjunctive use activities of the Parties as "storing Basin and Supplemental Waters that are in excess of their demands and subsequently recover that water as their individual needs arise". More generally speaking, conjunctive use is the coordinated use of surface and groundwater resources such that surface water is used to augment groundwater storage (direct or in-lieu) in wet years and groundwater is used in dry years. For the SMP, this term is being used as a descriptive term, and not a term that requires definition.

City of Chino – Comments Provided by Dave Crosley (via email 12/19/19)

1. ***Typos are noted on scanned copies of pages 4, 8, 19, 24, and 35 (attached).***

   RESPONSE: Typos have been noted and corrected.

2. ***The draft OBMP Update indicates that some of the described implementation actions are required for Watermaster to properly administer the Judgment. Stakeholder agreement that these actions are "required" may be the subject of some continuing discussion. We suggest the OBMP Update remain in draft form designation until such discussion has concluded.***

   RESPONSE: The rationale for identifying implementation actions associated with the OBMP Update activities as "required" is described in part in Section 2 of the 2020 OBMP Update Report. During the forthcoming drafting sessions for the Implementation Plan Update, Watermaster will respond to questions about the basis for any specific action. To provide additional clarity, a new table (Exhibit 17) has been added to Section 4 of the final report that includes a description of the rationale for each required action in the management plan.

3. ***It would be helpful to expand Program Element tables 11 -17, describing proposed 2020 OBMP Implementation Actions, to include an additional column describing anticipated/estimated annual expense associated with the implementation of each activity (e.g. as presented in various tables included in the scoping report).***

   RESPONSE: The cost estimates for the activity scopes of work in the 2020 OBMP Update Scoping Report (TM1) were developed based on many assumptions, and should be used as very general guidance as to potential costs based a specific scope of work. These estimates have been provided only to describe a concept, i.e. the conceptual phases envisioned by Watermaster staff/consultants in developing the Implementation Actions' scope, and are not a fixed number or a budgetary commitment. The Committees envisioned to oversee the management processes will ultimately guide the actual efforts (i.e. scope, expense, schedule) similar to the GLMC. Estimated cost ranges have been described in TM1, which are included in the OBMP Update Report (TM2) as Appendix B. The draft OBMP IP Update (under preparation by Watermaster staff, to be released late January) will include a consolidated listing of the proposed new Implementation Actions and their associated cost estimates to assist the parties.

4. ***To the extent that information obtained from technical analyses performed in support of, and described in, the 2000 OBMP have been updated by more recent technical analyses, the more recently developed and updated information should be included in the draft 2020 OBMP Update to clarify the current understanding of basin circumstances.***

   RESPONSE: We understand that your question is in regard to the concept of the Safe Storage Capacity (SSC). The SSC was part of the storage management construct in the 2000 OBMP. As described in the 2018 Storage Framework Investigation, and summarized in the 2020 OBMP Update Report, the new hydrogeologic understanding of the basin developed through implementation of the OBMP has indicated that the management construct in the 2000 OBMP is no longer valid and the concept of SSC is not included in the new 2020 Storage Management Plan. The text of Section 3.2.8.1 of the 2020 OBMP Update Report has been modified to more clearly articulate this. This section was also edited to align with the final 2020 SMP published on December 11, 2019.

5. ***The draft 2020 Storage Management Plan (SMP) indicates a reduction in net recharge is believed (based on modeling) to be caused by storage, and that Watermaster considers this impact to be mitigated by the prospective calculation of Safe Yield. [a] Related to this circumstance, the SMP indicates that storage accounts may be adjusted based on findings of the 2020 Safe Yield recalculation. As the 2020 Safe Yield recalculation is currently a work-in-progress, the suggestion that storage accounts may be adjusted is premature at this time. [b] Additionally, the OBMP Update should clarify that storage is only one of several contributing factors (cultural conditions) that may have an effect on net recharge.***

   RESPONSE: 5(a) The final 2020 SMP does not state that Watermaster will adjust the storage accounts of the Parties based their water in managed storage. It does say that it will debit the storage accounts for each Storage and Recovery Program for its storage impact on net recharge and Safe Yield caused by the Storage and Recovery Program. The loss rate (reduction in net recharge caused by storage) will be established uniquely for each Storage and Recovery Program and is independent of the 2020 Safe Yield recalculation.

   5(b) Comment noted. Please see the final 2020 SMP, Appendix B2, City of Chino comment number 3 and Watermaster staff response.

6. ***The draft OBMP Update describes, pertinent to various Activities, the formation of new, or re-convening of past/existing, specific committees for the purpose of focusing attention on matters related to the subject Activity. These committees should have responsibility for recommending the scope and frequency of tasks pertinent to Activity implementation.***

   REPONSE: Comment noted. This is the intent for implementation of each management process, as articulated in Section 2, page 12, in the last paragraph, sub-bullet (1).

Overlying (Agricultural) Pool – Comments Provided by Robert Feenstra (12/20/19 letter)

7. ***Watermaster staff have requested comments on the draft 2020 OBMP Update Report (Technical Memorandum 2) (Update Report) by close of business on Friday, December 20, 2019. The Overlying (Agricultural) Pool (Ag Pool) has reviewed the draft Update Report, which incorporates the 2020 Storage Management Plan. The Ag Pool has consistently expressed concern regarding water storage that has been accumulating and used without adequate storage management, including contesting the Watermaster's continued approval of water storage and transfer/sale agreements of the Appropriative Pool. The 2020 Storage Management Plan is not complete as it must still be finalized and approved as part of the 2020 OBMP Update. The Ag Pool urges Watermaster to move forward expeditiously with the final adoption and approval of the OBMP Update including storage management.***

   RESPONSE: Comment noted

8. ***Section 1.2 of the Update Report (at page 8) uses two new terms, "water management space" and "Chino Basin water space." These new terms should be defined.***

   RESPONSE: The terms are being used as descriptive terms, and not terms that require definition.

9. ***Section 2.1. Page 11 in the Updated Report describes the attached Exhibit 3 as "a matrix, summarizing the needs and wants of the stakeholders..." But the attached Exhibit 3 does not accurately represent the Ag Pool's needs and wants as a Pool or as Pool subgroups of "Crops, Dairy, and State." The items shown in Exhibit 3 represent comments made by individuals in an early OBMP listening session/workshop that included comments from most of the other Basin stakeholders. After the initial meeting/listening session, the Ag Pool indicated to Watermaster that it preferred to report out its needs and wants as a Pool rather than as subgroups, but the Ag Pool did not complete the matrix after seeing the progress and direction of the OBMP Update process in subsequent listening sessions/workshops. Consequently, Exhibit 3 for the Ag Pool's "needs and wants" should be considered incomplete because not all needs and wants are represented and there is also mutual support between each Ag Pool subgroup (i.e., Crops, Dairy, and State) for the needs and wants indicated by the other subgroups.***

   RESPONSE: Comment noted; the OAP has been invited to offer edits to Exhibit 3 that would fully represent its Issues/Needs/Wants.

10. ***Section 3.2.3.1. At page 28 in the draft Updated Report, the first sentence of the first full paragraph uses the term "brackish." However, the term "brackish" covers a wide range of total dissolved solids (TDS), from freshwater to sea water (500 to 30,000 milligrams per Liter). We suggest being more specific or defining the general range of TDS concentrations.***

    COMMENT: The text will be adjusted for clarity.

Monte Vista Water District – Comments Provided by Justin Scott-Coe (12/23/19 letter)

11. ***If a subsequent and new OBMP Implementation Plan is agreed to by the Peace Agreement parties, will all parties initially be required to pay for the planning and management efforts (not including CEQA costs) envisioned in the OBMPU Update? If so, how will future project participants reimburse non-participants for their share of associated CEQA coverage and OBMPU planning and management costs (i.e., beneficiary pays)?***

    RESPONSE: The development of the OBMP Update to date has assumed that the existing methodology for sharing OBMP expenses will continue. Should the parties wish to share costs differently in the future, Watermaster will assess the parties accordingly.

12. ***As part of Program Element No.6, the implementation action of "develop and implement an initial emerging contaminants monitoring plan and prepare a water quality assessment of the Chino Basin to evaluate the need for a Groundwater Quality Management Plan and prepare a long-term emerging contaminants monitoring plan" has been identified as a required Watermaster action. The language of Judgment paragraph 41 does not seem to require Watermaster to perform this action. Please identify what court approved document and its language make the said implementation action a requirement.***

    RESPONSE: Paragraph 41 of the Judgment states: *"Watermaster Control. Watermaster, with the advice of the Advisory and Pool Committees, is granted discretionary powers in order to develop an optimum basin management program for Chino Basin,* ***including both water quantity and quality considerations****. Withdrawals and supplemental water replenishment of Basin Water, and* ***the full utilization of the water resources of Chino Basin, must be subject to procedures established by and administered through Watermaster with the advice and assistance of the Advisory and Pool Committees*** *composed of the affected producers.* ***Both the quantity and quality of said water resources may thereby be preserved and the beneficial utilization of the Basin maximized****."* (Pgs. 19-20 of the Restated Judgment)

    Paragraph 41 states that maximization of the beneficial use of the Basin requires consideration of both water quantity and water quality considerations. The Judgment could not and does not prescribe every conceivable water quality management action necessary to address every potential contaminant. It does recognize that If water quality is not effectively managed, Parties may not be able to utilize their water rights, which could result in negative impacts to the basin, such as reductions in net recharge, loss of hydraulic control, and movement of contaminant plumes. Program Element 7 of the 2000 OBMP, the salt and nutrient management plan, is an example of a water quality management program not specifically named in the Judgment that has been a successfully implemented to avoid the negative impacts of reduced/re-located pumping to avoid high-TDS and high-nitrate groundwater. Effective management of water quality in the Basin to preserve maximum beneficial use can only be accomplished through a systematic assessment of the emerging contaminant threats to the use of groundwater resources, and thoughtfully preparing a plan to respond to those threats.

13. ***The Storage and Recovery Master Plan, found in Program Elements 8/9, should not be considered required by Watermaster, and request that the "required" label be removed from this proposed activity in the final version of the OBMP Update and associated documentation.***

    RESPONSE: Please refer to the response to City of Chino comment #2.

14. ***MVWD encourages the Watermaster to pursue the CEQA process which will allow the up to 1 million acre-feet of storage within the basin, premised in part on the completed Storage Framework Investigation.***

    RESPONSE: Comment Noted. Watermaster is proceeding with the analysis of storage of up to 1 million acre-feet, consistent with the Appropriative Pool recommendation.

15. ***Our understanding is that, while Watermaster has discretion in managing storage through agreements, the current Storage Management Plan that Watermaster has agreed and been ordered by the Court to follow is part of the OBMP Implementation Plan, which is a component of a negotiated settlement and agreement among the parties to the Peace Agreement. Therefore, adoption of a new Storage Management Plan should be seen as an amendment to this negotiated settlement/agreement and follow the process for amending the Peace Agreement. Please confirm if this understanding is correct.***

    RESPONSE: Updating the Storage Management Plan, an element of the 2000 OBMP IP that is an Exhibit to the Peace Agreement, is an update of the OBMP IP. Other thanthe Peace Agreement's requirement of unanimous approval for amendments, as have been done on two past occasions, Watermaster is not aware of any specific procedures for amending the Peace Agreement.

16. ***Before drafting and publishing the Draft OBMP Implementation Plan, MVWD encourages Watermaster to have dialog with Peace Agreement parties to determine what elements those parties would want included in such plan.***

    RESPONSE: The implementation actions arising from the parties identification of their issues, needs, and wants have been publicly available and were last distributed during the December Advisory Committee meeting. The planned process of developing a draft Implementation Plan, as has been discussed during the Listening Sessions, and Committee meetingss , includes the initiation of drafting sessions (as needed) in early February where all concerns related to the implementation plan can be openly discussed amongst all stakeholders.

City of Ontario – Comments Provided by Scott Burton (12/20/19 letter)

17. ***The draft Optimum Basin Management Plan (OBMP) Update report represents a comprehensive set of ideas related to water management in the region including topics such as water resources, water infrastructure, emerging water quality requirements and protecting the groundwater basin. The listening sessions and guided input have provided ample opportunity for participating stakeholders to share their ideas. It is important to note that while stakeholders have had the opportunity to comment, the disposition, vetting and deliberation of varying stakeholder views was largely deferred to a later date. Currently, the draft OBMP Update report reflects the recommendations of Watermaster staff planned for the Watermaster Board.***

    RESPONSE: The OBMP Update reflects stakeholder input received by Watermaster during Listening Sessions held in 2019. The document is a compilation of all input and Watermaster staff and consultants believes it represents a collective view of what could be done to manage the Basin. The document reflects Watermaster staff conclusions of which implementation actions (management processes) are required for Watermaster to perform its duties, and captures all the suggestions offered by stakeholders.

18. ***The draft OBMP Update report includes a list of activities whose outcomes are identified as either optional or necessary for Watermaster. A number of these activities are already underway in various retail and regional forums peripheral to Watermaster. Examples include storage and recovery, movement of water between retail agencies, regional water treatment and conveyance, water supply reliability and water quality management. While the City of Ontario (Ontario) agrees that there are necessary activities in managing this critical water resource, there are some activities defined by Watermaster staff as necessary which we think may be more at the option of the stakeholders. It is highly recommended that this definitional distinction be vetted and deliberated with the stakeholders prior to the Watermaster Board acting on the OBMP Update report.***

    RESPONSE: Please refer to the response to the City of Chino comment #2.

19. ***Ontario supports the effort to consider and update the OBMP implementation with some of these new and continued ideas and believes that, consistent with the Peace Agreement, it is a step toward the meet and confer process in the 25th year of the agreement to discuss any new or modified terms. While Watermaster staff seems to consider the draft OBMP Update report substantially complete, the most critical and in-depth phase of the OBMP implementation update is just beginning. The next step is for the stakeholders to develop an Implementation Plan and Implementing Agreement(s) that reflect the common interests of the parties to the Judgement. This may differ from what is envisioned by Watermaster staff. It is Ontario's hope that to the extent there are differences, they can be reconciled prior to Watermaster Board action on the OBMP Update report.***

    RESPONSE: As with prior amendments to the Peace Agreement, Watermaster staff understands that an update of the 2000 OBMP IP can be undertaken through a focused effort as to this narrow set of issues, without addressing unrelated portions of the Peace Agreement.

Watermaster staff envisions the same next steps of creating an IP Update and crafting an amendment to the Peace Agreement to move forward. The process will begin in early February, during which all the stakeholders can weigh in on their interests and concerns on each component of the implementation plan.

20. ***As we have discussed, there are activities within the draft OBMP Update report that Ontario believes are either not necessary, already underway or may be more appropriately stakeholder managed outside of the Watermaster forum. As part of determining the OBMP implementation scope, Ontario intends to consider things such as cost-benefit analysis, prioritizing available financial resources in the context of other retail agency needs, the optimal forum for various activities to occur, avoidance of redundant efforts, determination of appropriate stakeholder funding, impact on the cost to produce groundwater, and assurance towards a reliable and sustainable groundwater basin. For activities currently required by the Peace Agreements, the Stakeholders may decide to modify or otherwise update the requirement. In addition, Ontario will need to complete its internal review process and timeline to facilitate Ontario's City Council making an informed decision on behalf of the public they represent.***

    RESPONSE: Comment noted.

21. ***The very important work ahead includes decisions still to be discussed, deliberated, and formalized in an amended Peace Agreement. Taking the technical ideas from draft report to a completed Implementation Plan and Implementing Agreement(s) requires flexibility, finesse and collaboration. Ontario is concerned that prioritizing the schedule above all else may compromise the result. As a next step, Ontario requests that the stakeholders be provided the opportunity to collaborate with Watermaster staff in setting a reasonable and realistic schedule and approach to enhance a successful outcome for this effort and the investments that will follow.***

    RESPONSE: Watermaster has engaged the stakeholders in a process designed to meet the short term needs as well as enable long term management of the Basin for the interest of the stakeholders. The City, as all stakeholders, is encouraged to provide feedback on the schedule and approach necessary to achieve a successful outcome for this effort.

Appropriative Pool – Comments provided by Tom Harder (01/22/2020 letter)

22. ***Section 3.2.8 Program Element 8. Develop and Implement a Storage Management Program and Program Element 9. Develop and Implement Storage and Recovery Programs:***
In Table 10 or preceding text, please define UGRR

    RESPONSE: The term means "Uniform Groundwater Rules and Regulations". The UGRR is now part of the Watermaster Rules and Regulations. A footnote will be added to the table for clarification.

23. ***Section 3.2.8.1 Implementation Progress Since 2000 and Ongoing Implementation Actions for the 2020 OBMP:***

    Pg. 47, section that starts, "The 2020 SMP includes the following provisions specific to the Parties and Storage and Recovery Program:" Second minor bullet under second major bullet:
    - ***With regard to the storage management activities of the Parties:***

        o ~~The~~ Any reduction in net recharge caused by storage in the FMSB is an adverse impact, and Watermaster considers this adverse impact to be mitigated by the prospective calculation of Safe Yield.

    As written, this sentence makes it sound like reduction in net recharge is a given if the volume of groundwater in storage changes. Groundwater pumping patterns also impact net recharge. This is why the change indicated in red above is recommended.

    RESPONSE: The text has been modified to reflect this suggested change.

24. ***Pg. 47, last bulleted item, "Watermaster will periodically review current and projected basin conditions and compare this information to the projected basin conditions…"***

    It is recommended that future reviews of the impact of storage and recovery projects be done on an annual basis.

    RESPONSE: Comment noted

25. ***Section 4 2020 OBMP Update Management Plan***
In general, it is noted multiple places in Section 4 reference the preparation of work plans and management plans. Program Element 1 (Table 11) describes the need to prepare an OBMP Monitoring and Reporting Work Plan. Elsewhere in the document, there are other water quality and monitoring/management work plans identified under Program Element 6, including:
    - ***Emerging Contaminants Monitoring Plan (Table 15 – 2nd and 3rd Row)***
    - ***Groundwater Quality Management Plan (Table 15 – 5th Row).***

    In addition, the Salt and Nutrient Management Plan (SNMP) under Program Element 7 includes monitoring and reporting of groundwater quality data. [A] Is it possible to combine the monitoring and reporting work plans into one comprehensive document instead of multiple individual plans? [B] Are there any negative consequences of doing so? [C] Would the

existing OBMP Maximum Benefit Monitoring Program 2014 Work Plan be replaced by the OBMP Monitoring and Reporting Work Plan?

RESPONSE:
[A] and [B] The intent is to have one single monitoring program work plan, the OBMP Monitoring and Reporting Work Plan, that covers all of the Watermaster programs listed in Table 2 of the OBMP Update Report, with the exception of the initial emerging contaminant (EC) monitoring program included in PE 6. The initial EC monitoring program is envisioned as a stand-alone work plan as it is intended to be a short-term, one-time effort to collect the data needed to evaluate ECs in the Chino Basin. PE 6 also provides for the development of a long-term EC monitoring plan as part of the development of the Groundwater Quality Management Plan. This long-term EC monitoring plan, once developed, would be incorporated into the OBMP Monitoring and Reporting Work Plan.

[C] Yes, if the Parties elect to prepare the OBMP Monitoring and Reporting Work Plan, the existing 2014 OBMP Maximum Benefit Monitoring Program Work Plan would be incorporated as part of the new work plan. Note that Watermaster and IEUA are currently working on an update to the Chino Basin maximum benefit SNMP commitments, which could result in changes to the monitoring plan described in the 2014 OBMP Maximum Benefit Monitoring Program Work Plan. Once the SNMP update work is completed and any recommended changes are approved by the Regional Board, these changes would be documented in the governing work plan.

Appendix C

2020 Optimum Basin Management Program Scoping Report

Appendix C

To: Chino Basin Watermaster Stakeholders

From: Watermaster 2020 OBMP Update Team

Subject: 2020 OBMP Update: Scoping Report – Development of Activities for Consideration

Date: Draft Part 1, July 24, 2019; Draft Part 2, August 22, 2019;
Final November 22, 2019

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List of Tables and Figures

List of Attached Exhibits

1. Introduction and Background

Objectives and Purpose of the Scoping Report

The Chino Basin Watermaster (Watermaster) is in the process of updating its Optimum Basin Management Program (OBMP) and its implementation plan. The objectives of this first Technical Memorandum, *2020 OBMP Update: Scoping Report – Development of Activities for Consideration* (Scoping Report), are: (1) to describe the stakeholder process to develop the 2020 OBMP Update, (2) to document the key outcomes of the stakeholder process to date, and (3) to describe the proposed scope of work, implementation actions, schedule, and cost to perform the following eight activities developed by the stakeholders for consideration for inclusion in the 2020 OBMP Update:

1. Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water—particularly in areas of the basin that will promote the long-term balance of recharge and discharge (Activity A).
2. Develop, implement, and optimize Storage and Recovery Programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality (Activity B)
3. Maximize the reuse of recycled water produced by IEUA and others (Activity D).
4. Develop and implement a water-quality management plan to address current and future water-quality issues, protect beneficial uses, and develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits (Activity E/F).
5. Develop a management strategy within the salt and nutrient management plan to ensure the ability to comply with the dilution requirements for recycled water recharge (Activity K).
6. Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence and optimize the use of all water supply sources (Activity C/G).
7. Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance (Activity L).
8. Develop a process to provide for the equitable distribution of the costs and benefits of the OBMP Update, to encourage regional partnerships for implementation to reduce costs, and to identify and pursue low-interest loans, grants, or other external funding sources to support the implementation of the OBMP Update (Activity H/I/J).

The purpose of the Scoping Report is to provide the Parties with an understanding of the work that would need to be performed to accomplish the desired outcomes of each of the 2020 OBMP Update activities. To the extent that the scopes of work described herein are already being partly or completely performed by Watermaster or others, this Scoping Report acknowledges such. The next steps in the process to prepare the 2020 OBMP Update will focus on the review and revision of the activities scoped herein and the integration of the ongoing activities with the existing OBMP. The recommended 2020 OBMP Implementation Plan, inclusive of ongoing and new activities will be documented in a subsequent report, *2020 Optimum Basin Management Program Update Report*, and will form the foundation for the Parties to develop a final implementation plan and agreements to implement the OBMP Update.

History of the OBMP

The Chino Basin Judgment gave Watermaster the discretionary authority to develop an OBMP for the Chino Basin, including both water quantity and quality considerations. Watermaster, with direction from the Court, began developing the OBMP in 1998 and completed it in July 2000. The OBMP was developed in a collaborative public process that identified the needs and wants of all stakeholders, described the physical state of the groundwater basin, defined a set of management goals, characterized impediments to those goals, and developed a series of actions that could be taken to remove the impediments and achieve the management goals. This work was documented in the *Optimum Basin Management Program – Phase I Report*.[1]

The four goals of the 2000 OBMP included:

Goal 1 – Enhance Basin Water Supplies

Goal 2 – Protect and Enhance Water Quality

Goal 3 – Enhance Management of the Basin

Goal 4 – Equitably Finance the OBMP

The actions defined by the stakeholders to remove impediments to the OBMP goals were logically grouped into sets of coordinated activities called Program Elements (PEs), each of which included a list of implementation actions and an implementation schedule. The nine PEs defined in the 2000 OBMP included:

PE 1 – Develop and Implement Comprehensive Monitoring Program. The objectives of the comprehensive monitoring program are to collect the data necessary to support the implementation of the other eight PEs and periodic updates to the *State of the Basin Report*[2].

PE 2 – Develop and Implement Comprehensive Recharge Program. The objectives of the comprehensive recharge program include increasing stormwater recharge to offset the recharge lost due to channel lining, to increase Safe Yield, and to ensure that there will be enough supplemental water recharge capacity available to Watermaster to meet its Replenishment Obligations.

PE 3 – Develop and Implement a Water Supply Plan for Impaired Areas. The objective of this program is to maintain and enhance Safe Yield with a groundwater desalting program that is designed (1) to replace declining agricultural groundwater pumping in the southern part of the basin with new pumping to meet increasing municipal water demands in the same area (2) to minimize groundwater outflow to the Santa Ana River, and (3) to increase the Santa Ana River recharge into the basin.

PE 4 – Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1. The objectives of this land subsidence management program are to characterize the

[1] WEI. (1999). *Optimum Basin Management Program – Phase I Report*. Prepared for the Chino Basin Watermaster. August 19, 1999. http://www.cbwm.org/docs/engdocs/OBMP%20-%20Phase%20I%20(Revised%20DigDoc).pdf

[2] See for example: WEI (2019). *Optimum Basin Management Program 2018 State of the Basin Report*. Prepared for the Chino Basin Watermaster. June 2018. This document is available on Watermaster's website at http://www.cbwm.org/

spatial and temporal occurrence of land subsidence, to identify its causes, and, where appropriate, to develop and implement a program to minimize or stop land subsidence.

PE 5 – Develop and Implement Regional Supplemental Water Program. The objective of this program is to improve the regional conveyance and availability of imported and recycled waters throughout the basin.

PE 6 – Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management. The objectives of this water quality management program are to identify water quality trends in the basin and the impact of the OBMP implementation on them, to determine whether point and non-point contamination sources are being addressed by water quality regulators, and to collaborate with water-quality regulators to identify and facilitate the cleanup of soil and groundwater contamination.

PE 7 – Develop and Implement Salt Management Plan. The objectives of this salinity management program are to characterize current and future salt and nutrient conditions in the basin and to develop and implement a plan to manage them.

PE 8 – Develop and Implement Groundwater Storage Management Program. The objectives of this storage program are (1) to implement, and periodically update, a storage management plan that prevents overdraft, protects water quality, and ensures equity among the Parties and (2) to periodically recalculate Safe Yield. This PE explicitly defined the storage management plan, including a "Safe Storage Capacity" for managed storage of 500,000 acre-feet (af) – inclusive of local and supplemental storage and Storage and Recovery Programs.

PE 9 – Develop and Implement Storage and Recovery Programs. The objectives of the conjunctive use program are to develop Storage and Recovery Programs that will provide broad mutual benefit to the Parties and ensure that basin water and storage capacity are put to maximum beneficial use while causing no Material Physical Injury (MPI).

The PEs and their associated implementation actions were incorporated into the OBMP Implementation Plan (OBMP IP). The Chino Basin Judgment Parties (Parties) then developed an agreement—the Peace Agreement—to implement it. The OBMP IP is Exhibit B to the Peace Agreement. The Peace Agreement was reviewed in a programmatic environmental impact report (PEIR), completed by the Inland Empire Utilities Agency (IEUA) in July 2000.

For purposes of the discussions in this report, the term OBMP refers to the collective programs implemented by Watermaster and others (e.g. IEUA, the Chino Basin Desalter Authority, etc.) pursuant to the Peace Agreements, the OBMP Implementation Plan, the PEIR, and any amendments to these documents.

2007 Supplement to the OBMP IP and the Peace II Agreement

The work to develop the OBMP determined that the groundwater pumping capacity of the Chino Basin Desalters would ultimately need to be 40,000 acre-feet per year (afy) to accomplish the goals of the OBMP; however the Peace Agreement only provided for the development of the first 20,000 afy of this capacity and the Parties committed to developing expansion and funding plans the remaining capacity within five years of approval of the Peace Agreement. The Parties developed the Peace II Agreement that included provisions to expand the desalting capacity to 40,000 afy. The Peace II agreement introduced Re-operation[3] to achieve Hydraulic Control[4] of the Chino Basin and maintain Safe Yield. Hydraulic Control is both a goal of the OBMP and a requirement of the maximum benefit salt-and-nutrient management plan (SNMP) that was developed by Watermaster and IEUA under PE 7 to enable the expansion of recycled water recharge and reuse throughout the basin under PEs 2 and 5.

The Parties executed the Peace II Agreement in 2007, which included a supplement to the OBMP Implementation Plan to expand the Chino Basin Desalters to 40,000 afy of groundwater pumping, to incorporate Re-operation and Hydraulic Control, and to resolve other issues. There were no changes to the storage management plan in the OBMP Implementation Plan to address the implications of the reduction in storage of basin water by 400,000 af as provided for by Re-operation.

The IEUA completed and adopted a supplemental environmental impact report (SEIR) for the Peace II Agreement in 2010.

2017 Addendum to the 2010 Peace II SEIR

In 2016, Watermaster identified the need to update the OBMP storage management plan because the total amount of water in managed storage accounts was projected to exceed the Safe Storage Capacity limit of 500,000 af defined in the 2000 OBMP. In 2017, the IEUA adopted an addendum to the Peace II SEIR to revise the storage management plan in the OBMP through June 30, 2021. The addendum was supported with engineering work that demonstrated that the Safe Storage Capacity could be safely increased to 600,000 af with the commitment that Watermaster would update the OBMP storage management plan by June 30, 2021.

Need for the 2020 OBMP Update

As of 2019, many of the projects and management programs envisioned in the 2000 OBMP have been implemented, while some have not. The understanding of the hydrology and hydrogeology of the Chino Basin has improved since 2000, and new water-management issues have been identified that need to be addressed to protect the collective interests of the Parties and their water supply reliability. For these reasons, the Parties are updating the OBMP to set the framework for the next 20 years of basin-management activities.

A more detailed description of the development of the 2000 OBMP and the rationale for and process to prepare the 2020 OBMP Update is included in a white paper prepared for the stakeholders: *White Paper – 2020 Update to Chino Basin Optimum Basin Management Program* (OBMP White Paper). The OBMP White Paper, and all documents relevant to the 2020 OBMP Update, are available on the Watermaster's website.[5]

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[3] Re-operation is the controlled overdraft of the Basin by the managed withdrawal of groundwater pumping for the Desalters and the potential increase in the cumulative un-replenished pumping from the 200,000 acre-feet authorized by paragraph 3 of the Engineering Appendix Exhibit I to the Judgment, to 600,000 acre-feet for the express purpose of securing and maintaining Hydraulic Control as a component of the Physical Solution.

[4] Hydraulic Control is the elimination of groundwater discharge from the Chino North Management Zone to the Santa Ana River or its reduction to less than 1,000 afy.

[5] http://www.cbwm.org/OBMPU.htm

Stakeholder Process for the 2020 OBMP Update

The 2020 OBMP Update is being conducted using a collaborative stakeholder process like that employed for the development of the 2000 OBMP. A series of public listening sessions are being held by the Watermaster throughout 2019 to support the 2020 OBMP Update. The purpose of the listening sessions is to obtain information, ideas, and feedback from the stakeholders to define their issues needs and wants, their collective goals for the 2020 OBMP Update, the impediments to achieving the goals, the management actions required to remove the impediments, and an implementation plan for the management actions.

The Watermaster has established an OBMP Update Team to facilitate the stakeholder process. The OBMP Update Team is composed of Watermaster staff, Watermaster legal counsel, engineers and scientists from Wildermuth Environmental Inc. ([WEI] Watermaster's engineering consultant), and staff from the IEUA. The OBMP Update Team is providing key information prior to and during each listening session to enable the stakeholders to provide their input on each topic discussed. The objective is for the ideas and opinions of every stakeholder to be heard. Participation in the listening sessions is critical to the development of the 2020 OBMP Update.

The work documented in this Scoping Report is based on the discussions and feedback from the first four listening sessions, which were held on the following dates:

- Listening Session #1: January 15, 2019
- Listening Session #2: February 12, 2019
- Listening Session #3: March 21, 2019
- Listening Session #4: May 16, 2019

The objectives of the first four listening sessions were (1) to confirm the need to update the OBMP, (2) to identify the issues, needs, and wants of the stakeholders, (3) to define goals for the 2020 OBMP Update, and (4) to identify the new and revised activities that could be included in the 2020 OBMP Update to remove impediments to achieving the 2020 OBMP Update goals. Listening Session memorandums were prepared to document the outcomes of Listening Sessions 1, 2, and 3. The listening session memorandums are included as appendices herein. This Scoping Report summarizes and integrates the work products of the first four listening sessions and provides new information on the recommended scope of work to implement the 2020 OBMP Update activities defined by the stakeholders.

The next series of listening sessions will focus on the review and revision of the activities scoped herein and the integration of those activities with the existing OBMP. The outcomes will be integrated into a recommended implementation plan for the 2020 OBMP Update. The second TM, *2020 Optimum Basin Management Program Update Report*, will form the foundation for the Parties to develop a final implementation plan and agreements to implement the OBMP Update.

2. Development of Activities for Consideration in the 2020 OBMP Update

Drivers, Trends and Implications for Basin Management

The strategic drivers and trends that shaped the goals and activities of the OBMP in the late 1990s have since changed. There a several drivers and trends in today's water management space that will challenge the ability of the Parties to protect their collective interests in the Chino Basin and their water supply reliability. Figure 1 characterizes the drivers and trends shaping water management, and their basin management implications for the Parties. "Drivers" are external forces that cause changes in the Chino Basin water space, such as climate change, regulations, and funding. Grouped under each driver are expected trends that emanate from that driver. For example, trends associated with climate change include reduced groundwater recharge, increased evaporation, and reduced imported water supply. The relationship of the drivers/trends to the management implications are shown by arcs that connect trends to implications. For example, a management implication of reduced groundwater recharge is the reduction of the Chino Basin Safe Yield.

The drivers, trends, and implications were first identified in the OBMP White Paper and served as the initial rationale for recommending an update to the OBMP. Figure 1 represents the final characterization of the drivers, trends, and implications, based on stakeholder input. The basin management implications that form the stakeholders' rationale for the 2020 OBMP Update are:

- Reductions in Chino Basin Safe Yield
- Reduced imported water availability and increased cost
- Imported water quality degradation
- Chino Basin water quality degradation
- Inability to pump groundwater with existing infrastructure
- Increased cost of groundwater use
- Recycled water quality degradation
- Reduced recycled water availability and increased cost
- Increased cost of Basin Plan compliance

Issues, Needs, and Wants of the Chino Basin Stakeholders

The issues, needs, and wants of the stakeholders form the basis of the management goals of the 2020 OBMP Update and inform the identification of impediments to the goals as well as the action items to remove the impediments. Through the listening session process, 57 unique needs and wants were identified by the stakeholders. The classes of issues identified were effectively the same as the implications for basin management defined in Figure 1 and listed above. Table 1 is a matrix that summarizes: the needs and wants of the Parties, organized by basin management issue (rows) and attribution to stakeholders that share each need/want (columns).

2020 OBMP Goals

Through the assessment of the basin management issues, needs, and wants, the stakeholders concluded that the goals defined in the 2000 OBMP are still relevant today. The following is the statement of intent developed for each goal in the 2020 OBMP Update:

> ***Goal No. 1 - Enhance Basin Water Supplies.*** The intent of this goal is to increase the water supplies available for Chino Basin Parties and improve water supply reliability. This goal applies to Chino Basin groundwater and all other sources of water available for beneficial use.

Goal No.2 - Protect and Enhance Water Quality. The intent of this goal is to ensure the protection of the long-term beneficial uses of Chino Basin groundwater.

Goal No.3 - Enhance Management of the Basin. The intent of this goal is to encourage sustainable management of the Chino Basin to avoid Material Physical Injury, promote local control, and improve water-supply reliability for the benefit of all Chino Basin Parties.

Goal No. 4 - Equitably Finance the OBMP. The intent of this goal is to identify and use efficient and equitable methods to fund OBMP implementation.

The far right-hand column of Table 1 (issues, needs, and wants) illustrates the nexus of the goals to the needs and wants of the Parties.

Activities for Consideration in the 2020 OBMP Update

There are physical, institutional, and financial impediments to achieving the 2020 OBMP's goals. The issues, needs, and wants of the stakeholders shown in Table 1 recognize these impediments. The stakeholders identified and described 12 new and revised activities that will be considered for inclusion in the 2020 OBMP Update. The 12 activities are listed in Table 2. Table 1 illustrates which of the 12 activities (identified by the letters A through L, as characterized in Table 2) the stakeholders believe have the potential to address each of their needs and wants. 55 of the 57 needs and wants were identified as addressed by one or more of the proposed activities.

Nexus Between the 2020 OBMP Update Goals, Their Impediments, and the Activities Recommended for Consideration

Table 3 illustrates the nexus of the OBMP goals, the impediments to achieving these goals, the activities to remove the impediments, and the potential outcomes (i.e. the implications) of implementing each activity. Table 3 also shows the nexus of each activity to addressing the issues needs and wants of the stakeholders, categorized by basin management issues. In the process of developing Table 3, it was identified that some of the activities defined in Table 2 are related enough to be combined into single activities. The 12 activities were condensed into eight activities. The statements of impediments, expected outcomes, and grouping of the activities were initially proposed by the 2020 OBMP Update Team, based on stakeholder input in Listening Sessions #1 through #3, and were subsequently revised, based on the feedback obtained from stakeholders during Listening Session #4.

The eight activity groups scoped out herein are:

1. Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge (Activity A).
2. Develop, implement, and optimize Storage and Recovery Programs to increase water-supply reliability, to protect or enhance Safe Yield, and to improve water quality (Activity B)
3. Maximize the reuse of recycled water produced by the IEUA and others (Activity D).
4. Develop and implement a water-quality management plan to address current and future water-quality issues, protect beneficial uses, and develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits (Activity EF).
5. Develop a management strategy within the salt and nutrient management plan to ensure ability to comply with dilution requirements for recycled water recharge (Activity K).

6. Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence and to optimize the use of all water supply sources (Activity CG).
7. Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance (Activity L).
8. Develop a process to provide for the equitable distribution of the costs and benefits of the OBMP Update, to encourage regional partnerships for implementation to reduce costs, and to identify and pursue low-interest loans, grants, or other external funding sources to support the implementation of the OBMP Update (Activity HIJ).

3. Scope of Work to Perform Proposed 2020 OBMP Update Activities

In this section, each of the eight activities identified by the stakeholders will be described in detail. The potential outcomes Table 3 provide the basis for intended scope of each activity. For each activity the following is described:

- Description of the activity
- Need and function of the activity
- Relationship to the PEs in the 2000 OBMP and OBMP IP
- Scope of work to perform the activity
- Schedule of the implementation actions
- Budget-level cost estimate to implement the initial implementation actions

Assumptions Applied in Defining the Scope of Work, Schedule, and Cost of the OBMP Activities

In order to develop the scope of work, schedule, and cost of the activities, the following assumptions were made:

Basis for scope of work and cost. The scopes of work and associated costs to perform the 2020 OBMP Update activities are based on the current understanding of the stakeholders' desired outcomes as articulated during the 2020 OBMP Update listening sessions and described in Section 2 in this TM1. The precise scopes of work and costs defined in this section are preliminary and will likely change during implementation. Each scope of work includes an introductory process to refine the objectives of the activity and to refine the scope of work, schedule, and costs, as necessary. The scopes of work will be performed by engineers hired by Watermaster, the IEUA or others responsible for implementing the OBMPU.

Estimated costs of engineering services. The estimated engineering services costs are based on 2019 WEI rates and rounded to the nearest $1,000. The estimated costs will need to be adjusted in implementation based on the final recommended scope and schedule.

Participating agency costs are not included. The staff labor costs and other direct costs incurred by agencies participating in the activities are not included in the implementation cost estimates contained herein.

Stand-alone costs. The recommended scope of work and cost for each OBMP activity were developed assuming that the activities were unrelated, or that they could be implemented independently. Once the final set of activities and scopes are selected for inclusion in the 2020 OBMP Update, the scopes will be reviewed to identify overlapping tasks among the activities and will be refined to integrate the work and reduce costs.

Existing OBMP activities. The recommended scopes of work assume that the ongoing activities of the 2000 OBMP and the 2007 supplement to the OBMP IP will continue unless otherwise specified, including, the Recharge Master Plan updates, the ongoing monitoring program under PE1, the Ground Level Monitoring Program, the maximum benefit salt and nutrient management plan, and the Prado Basin Habitat Sustainability Program.

Leveraging existing work. The recommended scopes of work and costs were assumed to leverage existing work being performed by Watermaster, such as the Safe Yield recalculation. There may be opportunities to leverage work done by other agencies to reduce the cost of implementing the recommended scope of work. In implementation, when the activity objectives and scopes of work are being refined, the ability to leverage the work of others would need to be identified and considered to eliminate redundancies and reduce cost.

Schedule. Unless otherwise stated, the schedule to implement the activities is provided in a general context (Year 1, Year 2, Year 5, etc.) and not assigned to a specific start or end date.

Activity A

Description of Activity A

Activity A defined by the stakeholders is:

> *Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental waters, particularly in areas of the basin that will promote the long-term balance of recharge and discharge.*

Activity A has the following objectives: (1) to maximize stormwater capture pursuant to Watermaster's diversion permits, (2) to promote the long-term balance of recharge and discharge, (3) to ensure sufficient supplemental water recharge capacity for future replenishment, (4) to reduce dependence on imported water by maintaining or enhancing Safe Yield, (5) to improve water quality, and (6) to ensure a supply of dilution water to comply with recycled water recharge permit requirements. For the remainder of this section, the use of the term "recharge" is inclusive of diverting, storing, and recharging storm and supplemental waters.

Through the listening session process, the stakeholders identified the following as potential outcomes of performing Activity A:

- Increase recharge of high-quality stormwater that will:
    - protect/enhance Safe Yield,
    - improve water quality,
    - reduce dependence on imported water,
    - increase pumping capacity in areas of low groundwater levels and areas of subsidence concern, and
    - provide new supply of blending water to support the recycled-water recharge program.
- Provide additional supplemental-water recharge capacity for replenishment and the implementation of Storage and Recovery Programs.
- Provide additional surface water storage capacity.

Activity A has similar objectives to those of PE 2 of the 2000 OBMP – *Develop and Implement Comprehensive Recharge Program*. PE2 was included in the 2000 OBMP to reverse the loss of yield caused by urbanization and the concrete lining of natural streams overlying the Chino Basin. The scope of work defined under PE2 was to continue the recharge master plan study initiated by Watermaster and the Chino Basin Water Conservation District (CBWCD) in 1998. The implementation plan for PE2, as defined in the Peace Agreement, requires the preparation of a recharge master plan update (RMPU) at least every five years.

The objectives and scope of each RMPU are defined at the beginning of each update and are derived from several guiding documents: the Peace Agreement, the Peace II Agreement, and the Special Referee's December 2007 Report. Pursuant to these guiding documents, the general objectives of the RMPU include:

- Ensure there is enough recharge capacity and supplemental water available to meet future replenishment requirements. Pursuant to the Judgment, there must be enough wet-water recharge capacity available to Watermaster to ensure it can replenish the basin with supplemental water to offset overproduction. The wet-water recharge capacity for replenishment must include consideration of the availability of supplemental water supplies, competing uses for the recharge facilities, and the need to balance recharge and discharge in every area and subarea.

- Maximize the recharge of recycled and storm waters where feasible. Both of these supplies are reliable: they are under local control and are less costly when compared to imported water supplies.
- Balance the recharge and discharge in every area and subarea. This provision in the Peace Agreement was included to enable Watermaster to use its discretion when conducting recharge and replenishment operations to prioritize the location and magnitude of recharge and replenishment to improve the Hydrologic Balance, to ensure pumping sustainability, and to help manage land subsidence.

To meet these objectives, the RMPUs must consider and address recharge requirement projections, the availability of storm and supplemental waters for recharge and replenishment, and the physical means to satisfy these recharge projections. To the extent that new or modified facilities are required to meet the objectives, the RMPUs include a schedule for planning, design, and construction of recharge improvements. The 2002 Recharge Master Plan and subsequent RMPUs (2010, 2013, and 2018) were developed in open and transparent planning processes that were convened by Watermaster. As part of the *2013 Amendment to the 2010 RMPU* (2013 RMPU), the RMPU Steering Committee was created to assist Watermaster and the IEUA in preparing RMPUs. The Steering Committee is open to all interested stakeholders and meets regularly through the development of RMPUs. Since the implementation of the OBMP began, Watermaster has achieved the following through the RMPU process:

- Modified seventeen existing flood retention facilities to increase diversion rates, conservation storage, and recharge, and constructed two new recharge facilities. These improvements increased average annual stormwater recharge by about 9,500 acre-feet per year (afy). The cost of these recharge improvements was about $60 million, IEUA and Watermaster paid for about half of this cost, while the other half was funded through Proposition 13 grants and other grant programs.
- Completed the design of five recharge improvement projects, expected be completed and in operation by 2021. These projects are expected to increase average annual stormwater recharge by an additional 4,700 afy.
- Ensured sufficient supplemental water recharge capacity is available to meet its Replenishment Obligations through 2050.

The next RMPU must be completed and submitted to the Court by October 2023. Based on the alignment of the objectives of Activity A with those of the RMPU, Activity A can be accomplished through the existing RMPU process. The sections below describe the limitations of the existing RMPU process to fully achieve the objectives of Activity A and the recommended scope to refine the RMPU process to accomplish the objectives.

Need and Function of Activity A

Watermaster holds three permits with the State Water Resources Control Board (State Board) for the diversion and recharge of stormwater in trust for the Parties. The San Bernardino County Flood Control District (SBCFCD) is a co-permittee for two of these permits, 19895 and 20753. Each permit defines a maximum diversion limit and the period over which diversions are allowed to occur each year (diversion season):

- Permit 19895 has a diversion limit of 15,000 acre-feet (af) from November 1 to April 30,
- Permit 20753 has a diversion limit of 27,000 af from October 1 to May 1, and
- Permit 21225 has a diversion limit of 68,500 af from January 1 to December 31.

When combined, these permits allow up to 110,500 af per year (afy) of diversion and recharge. Exhibit A-1 shows the locations where stormwater may be diverted from the stream systems (points of diversion [PODs]) as defined in Permits 19895, 20753, and 21225. The PODs for Permit 19895 are located on the Day Creek system, the PODs for Permit 20753 are located on the San Sevaine Creek system, and the PODs for Permit 21225 are located on the San Antonio/Chino Creek, Cucamonga Creek, Day Creek, and San Sevaine Creek systems. Permit 21225 includes PODs that are also listed in Permits 19895 and 20753, but expands the allowable diversion season.

From 2003 to 2005, Watermaster, working in collaboration with the IEUA, constructed the first set of recharge facilities to exercise its rights pursuant to these permits, increasing average annual stormwater recharge by about 9,500 afy. In 2013, Watermaster and the IEUA completed the 2013 RMPU, which included five new recharge facility improvement projects. As of this writing and as stated above, Watermaster and the IEUA are completing the final design/construction of the 2013 RMPU facilities, and they should be online in 2021. These facilities are expected to increase stormwater recharge by about 4,700 afy.[6] Upon completion of the 2013 RMPU facilities, the annual average stormwater recharge performed pursuant to these three permits is expected to be about 14,950 afy.[7] Exhibit A-2 shows the locations of the existing and planned facilities.

Exhibit A-3 lists the existing recharge facilities and shows the historical average stormwater recharge from 2005 to 2018, the theoretical maximum supplemental water recharge capacity, and the total theoretical maximum recharge capacity for each facility. As shown in Exhibit A-3, actual stormwater recharge has averaged about 10,150 afy which is about 10 percent of the combined diversion limit and 15 percent of the total theoretical maximum recharge capacity. The differences between the historical average stormwater recharge and the diversion limit and total theoretical maximum recharge capacity suggests lost opportunity for stormwater recharge. Because the existing diversion structures are used at their instantaneous capacities, the limitations to increasing the capture and recharge of stormwater are diversion capacity and storage capacity. Hence, Activity A has been identified to increase the capacity to divert, store, and recharge additional surface water.

Availability of Additional Stormwater for Recharge

To better understand the lost opportunity for recharge, Watermaster used its Wasteload Allocation Model (WLAM) to estimate the daily stormwater discharge available for diversion over each permit's respective diversion season, based on the historical hydrology for the 63-year period of 1950 to 2012.[8] The WLAM uses daily precipitation, evapotranspiration, evaporation, and land use data to estimate stormwater discharge entering the stream systems. The WLAM then uses hydraulic design data for channels and stormwater management facilities to computationally route the stormwater discharge through the channels, diversion works, and recharge facilities. The stormwater discharge available for diversion was determined to be the flow at the most downstream PODs on each stream system.

Exhibits A-4 and A-5 show comparisons of stormwater discharge available for diversion, model-estimated stormwater recharge, and permitted diversion limits. Exhibit A-4 presents a direct comparison of the annual time series of stormwater discharge—divided into stormwater diverted for recharge and

[6] Note that Watermaster completed its 2018 RMPU in October 2018, but no projects were selected for implementation.

[7] 2018 Recharge Master Plan Update. WEI. September 2018.

[8] WEI. (2018). *Support for Watermaster's response to State Board request for information for petition for extensions of time.* Prepared for Chino Basin Watermaster. March 7, 2018.

stormwater not diverted for recharge—and the total annual diversion limit. Exhibit A-5 presents a cumulative frequency plot that shows: (1) the probability that stormwater discharge is equal to or greater than a specified value, (2) the probability that stormwater recharge for existing and projected 2013 RMPU facilities is equal to or greater than a specified value, and (3) the permitted diversion limit. Based on Exhibit A-5, the theoretical average annual stormwater discharge is estimated to be about 74,000 afy and the projected average annual stormwater recharge with existing and projected 2013 RMPU facilities is about 14,500 afy. The difference between these two values, 60,000 afy, is the lost opportunity for stormwater recharge.

Through the RMPU process, the Steering Committee analyzes and recommends projects that can increase stormwater diversion and storage capacity and increase stormwater recharge, up to the permit limit, for Watermaster approval. Historically, Watermaster and the IEUA have selected projects for implementation only if the melded unit cost of stormwater recharge resulting from the projects was less than the avoided unit cost of purchasing imported water from the Metropolitan Water District of Southern California (Metropolitan). Over time, more expensive stormwater recharge projects will meet the criteria as the unit cost of imported water increases in the future. The use of this economic criterion alone ignores the economic value of the greater reliability of stormwater relative to imported water.

Exhibit A-6 lists the potential new stormwater recharge projects evaluated in the 2018 RMPU. The locations of these potential projects are shown in Exhibit A-7. The projects listed in Exhibit A-6 were reviewed, and their capital and unit stormwater recharge costs were projected to 2023 costs, which is the year when the next RMPU is due to be completed. The unit cost of new stormwater recharge for the projects listed in Exhibit A-6 ranges from $2,000 to $6,000 per af, and the estimated new stormwater recharge from these projects ranges from 7 to 5,000 afy. Exhibit A-8 is a time history chart showing the historical and projected cost of imported water purchased from Metropolitan compared to the projected unit stormwater recharge cost of the projects shown in Exhibit A-6. In all cases, the projected unit cost of new stormwater recharge projects listed in Exhibit A-6 exceeds the projected cost of imported water that could be supplied by Metropolitan in 2023 (about $900 per af[9]) and through the foreseeable future. Based on Watermaster and the IEUA's historical selection process, no project in Exhibit A-6 was recommended for implementation in the 2018 RMPU. To accomplish the goals of Activity A, the economic criteria for selecting projects would have to be reevaluated.

Supplemental Recharge Capacity

As part of the RMPU process, Watermaster also needs to ensure that there is sufficient supplemental water recharge capacity in the basin to meet Replenishment Obligations. As shown in Exhibit A-3, the theoretical maximum supplemental water recharge capacity under the current IEUA maintenance operations averages about 56,000 afy.[10] For comparison, during FY 2017/18, about 47,000 af of supplemental water was recharged in spreading basins, using about 85 percent of the existing supplemental water recharge capacity. This suggests that new recharge facilities and/or improvements to existing facilities may be needed if Parties want to increase supplemental water recharge.

Balance of Recharge and Discharge

Historically, Watermaster has attempted to manage the recharge of storm and supplemental water to promote the balance of recharge and discharge. This method of managing recharge does not specifically

[9] WEI. (2018). *2018 Recharge Master Plan Update*. Prepared for the Chino Basin Watermaster. September 2018.

[10] This estimate corresponds to continuous use between maintenance periods and is less than the recharge capacity that would occur if the recharge basins were used less frequently.

address current basin management issues, such as existing land subsidence in Management Zone 1 (MZ1) and parts of MZ2 and pumping sustainability issues in the Jurupa Community Services District (JCSD) and Chino Basin Desalter Authority (CDA) well fields. There is a need to define additional criteria on how and where to conduct recharge to better address existing basin management issues.

Summary

Based on the information summarized herein, the opportunities and challenges in conducting Activity A are:

- The theoretical average annual stormwater discharge available for diversion under the existing water rights permits is about 74,000 afy ranging from 21,400 to 110,500 afy (combined permitted diversion), and existing facilities divert about 14,500 afy. The difference between these two values, about 60,000 afy, is a lost opportunity for stormwater recharge. Improvements to existing facilities and/or new facilities are required to achieve the stormwater recharge potential.
- Based on Watermaster and the IEUA's existing economic selection criteria, no new recharge projects were recommended for implementation in the 2018 RMPU. To accomplish the goals of Activity A, the economic criteria for selecting projects needs to be reevaluated.
- The criteria on how and where to conduct recharge needs to be updated to more effectively address the existing basin management issues, including: land subsidence, maintaining Hydraulic Control, and pumping sustainability.

These challenges can be addressed through the existing RMPU process. The section below describes the recommended scope for developing the 2023 RMPU, refined from past RMPU scopes, to better meet the current needs of the Parties defined for Activity A.

Scope of Work for Activity A

Activity A—*Construct new facilities and improve existing facilities to increase the capacity to store and recharge surface water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge*—will be accomplished through the RMPU implementation process. The scope of work summarized below is for developing the 2023 RMPU and conducting the necessary work to achieve the objectives of Activity A. The scope of work consists of five tasks:

- Task 1 – Define objectives and refine scope of work
- Task 2 – Develop planning, screening, and evaluation criteria
- Task 3 – Describe recharge enhancement opportunities
- Task 4 – Develop reconnaissance-level engineering design and operating plan
- Task 5 – Plan, design, and construct selected recharge projects

Task 1 – Define objectives and refine scope of work. The objective of this task is to obtain consensus on the objectives of Activity A and the impediments this activity is meant to overcome. During this process, the Steering Committee will address questions raised by stakeholders during the OBMP Update, such as:

(1) Should Watermaster have a process in Activity A to identify vacant land for purchase even if there is no specified project or it becomes available outside the "call for projects" window of the RMPU process?
(2) Should Watermaster have a process to encourage developers to utilize infiltration to manage on-site runoff pursuant to the Municipal Storm (MS4) permit?

A detailed scope, cost, and schedule will be prepared to meet the defined objectives. Two meetings will be conducted (1) to define the objectives and impediments and (2) to define the scope, cost, and schedule.

Task 2 – Develop planning, screening, and evaluation criteria. The objectives of this task are to develop criteria to determine how and where new recharge capacity can be constructed and to evaluate and select a subset of projects to evaluate. The criteria developed to evaluate potential projects in Task 4 will include qualitative criteria, such as reliability, and quantitative criteria that include business case evaluations, expressed as net present value, unit cost, and others. The recharge projects with the best cost-benefit ratio at the time were constructed in earlier recharge improvement efforts in the 2000 OBMP implementation. The types of new stormwater projects required to meet the objectives described herein and subsequently refined in Task 1 will likely be more expensive than the avoided cost of purchasing imported water from Metropolitan. The Steering Committee will (1) review and refine criteria used in past RMPUs and (2) review the current projected basin management challenges to develop "smart" recharge criteria. The smart recharge criteria will ensure that project designs and operations are complementary to other Watermaster management activities, such as protecting and enhancing Safe Yield, management of land subsidence, promoting pumping sustainability, ensuring dilution supplies to comply with recycled water recharge permits, water quality improvement, maintenance of Hydraulic Control, and others.

Included in this scope is estimating future Replenishment Obligations, updating the estimated supplemental water recharge capacity, and characterizing the availability of imported and recycled water. Future Replenishment Obligations will be estimated in the 2020 Safe Yield recalculation effort and will be subsequently used as a criterion for planning supplemental water recharge. Two meetings will be scheduled to review and refine the criteria with the stakeholders.

Task 3 – Describe recharge enhancement opportunities. The objectives of this task are to identify potential projects, to screen them using the criteria developed in Task 2, and to subsequently develop a set of stormwater and supplemental water recharge projects for detailed evaluation. Two meetings will be conducted: (1) to develop a list of potential projects that can be implemented and (2) to review the screening of the projects defined during the first meeting and select projects to evaluate in Task 4.

Task 4 – Develop reconnaissance-level engineering design and operating plan. The objective of this task is to characterize the performance and costs of new recharge projects—individually and as a group/system. A reconnaissance-level engineering design and operating plan will be developed for each project. Each project design will include the approximate size, location, and alignment of major stormwater utilities, and will describe any potential implementation barriers. A cost opinion, stormwater recharge performance, and supplemental water recharge capacity will be determined for each project. The task includes evaluating the projects based on the criteria developed in Task 2 and recommending a set of projects for implementation. The deliverable of this task will be the *2023 Recharge Master Plan Update* report, summarizing the work performed under Tasks 1 through 4, and it will include an implementation plan and a plan to finance the preliminary design and CEQA documentation. Four meetings will be conducted: (1) to review the designs and estimated benefits of the projects, (2) to review the evaluation of the projects based on the criteria developed in Task 2 and the recommended list of projects for implementation, (3) to review the implementation plan, and (4) to review the 2023 RMPU report.

Task 5 – Plan, design, and construct selected recharge projects. The objective of this task is to implement the recommendations from the 2023 RMPU report. This task includes (1) developing and implementing necessary agreements between participating Parties, (2) preparing the preliminary design of the recommended recharge projects, (3) preparing the environmental documentation for the recommended recharge projects that will tier off the 2020 OBMP Update PEIR, (4) preparing a financial plan for constructing the recommended recharge projects, (5) preparing final designs of the recommended recharge projects, (6) acquiring necessary permits for constructing and operating the recommended recharge projects, and (7) constructing the recommended recharge projects.

Future Tasks – Repeat Tasks 1 through 5 every five years as required by the Court

Cooperative Efforts with Appropriate Entities to Implement Activity A

The IEUA, Watermaster, the CBWCD, and the SBCFCD are partners in conducting recharge in the Chino Basin. The four agencies have an agreement to implement the existing recharge program. They also collaborate to update the recharge master plan at least every five years with the guidance of the Steering Committee. Activity A will be achieved within the existing RMPU process and will maintain the existing institutional organization as follows:

- ***Watermaster***: Leads the stakeholder process to define the objectives in Task 1, to develop the criteria in Task 2, and to estimate the recharge benefit of the projects using the its existing modeling tools in Task 4.
- ***IEUA***: Leads the development of the list of projects for evaluation in Task 3 and preparing cost opinions for the projects in Task 4. Additionally, the IEUA will collaborate with Watermaster in leading Tasks 1 and 2.
- ***CBWCD***: Collaborates with Watermaster in leading Tasks 1 and 2. The CBWCD is responsible for reviewing and permitting all of the engineering designs developed under Task 5 for their facilities.
- ***SBCFCD***: Collaborates with Watermaster in leading Tasks 1 and 2. The SBCFCD is responsible for reviewing and permitting all of the engineering designs developed under Task 5 for their facilities.

The four Parties will continue to collaborate in the RMPU process and in conducting recharge in the Chino Basin.

Implementation Actions, Schedule, and Costs for Activity A

The recommended schedule to complete the scope of work described herein is described below:

Year one (FY 2020/21):

- Convene Steering Committee.
- Conduct a meeting regarding “current conditions” of groundwater recharge.
- Define objectives of Activity A and the RMP update (Task 1):
  - Define scope and schedule of RMP update.
- Develop criteria on how and where to conduct recharge (Task 2).
- Develop new criteria for evaluation and selection of recharge projects (Task 2).

Year two (FY 2021/22):

- Develop list of projects for evaluation (Task 3).
- Conduct a reconnaissance-level engineering study for the proposed projects (Task 4).

Year three (FY 2022/23):

- Select project(s) for implementation (Task 4).
- Prepare 2023 RMPU Report (Task 4).

Year four (FY 2023/24):

- Watermaster approves the 2023 RMPU Report by October 2023.
- Watermaster and the IEUA project implementation agreement. The objective of this agreement is to define the roles of Watermaster and the IEUA in the planning, permitting, design, and implementation of the projects, and the financing plan.

- SBCFCD and CBWCD Agreement. The Parties to this agreement include the SBCFCD, Watermaster, and the IEUA and potentially others. The objectives of this agreement are to define the terms and conditions to jointly explore and construct new conservation works on SBCFCD and IEUA properties and to conduct flood control and water conservation activities utilizing those same conservation works. The agreement will define the project sites, facility improvements, construction and maintenance cost allocations, user or license fees, operating criteria (with flood control purposes taking priority over conservation for joint use facilities), and other conditions. The SBCFCD will require Watermaster and the IEUA to fund SBCFCD engineering studies and analyses to demonstrate that all conservation improvements at flood control facilities will not negatively impact the operation and maintenance of SBCFCD facilities or reduce the level of the designed flood protection. All engineering studies and analyses shall be done and provided to SBCFCD for review and approval, and an encroachment permit shall be obtained from SBCFCD before the construction of any conservation improvements can commence. The SBCFCD will require that all applicable Environmental Agencies' permits and approvals be obtained and submitted to the SBCFCD before an encroachment permit can be issued.
- Agreement with property owners. Develop an agreement among a property owner, the IEUA, and Watermaster on the terms for use of land where land is required for a recharge project.
- In addition to these agreements, Watermaster will determine whether it is necessary to submit a Petition for Change with the State Board for selected projects that are not included in the Watermaster's current diversion permits. The duration of the Petition for Change process is unknown but would likely be more than one year.

Years five and six (FY 2024/25 and FY 2025/2026):

- Preliminary design of recommended projects. The level of design will be such that it enables the preparation of environmental documentation pursuant to CEQA, provides information for identifying and acquiring construction and related permits, and produces updated New Yield and cost estimates.
- Prepare environmental documentation for recommended projects. CEQA will cover the recommended projects at the project level and the deferred projects at a programmatic level, based on the project descriptions developed in Task 5. This documentation will tier off from the 2020 OBMP Update programmatic environmental impact report. Watermaster will conduct a MPI analysis in parallel with the CEQA process.
- Begin 2028 RMPU process (first year of the 2028 RMP update).

Years seven and eight (FY 2026/27 and FY 2027/28):

- Prepare Final Designs and Acquire Necessary Permits for the Selected Projects.

Years nine and ten (FY 2028/29 and FY 2029/30):

- Construct 2023 RMPU Selected Projects.

Exhibit A-9 shows the estimated budget-level engineering cost to complete Tasks 1 through 4, which is about $575,000. The cost of Task 5 cannot be estimated until the completion of Task 4. Exhibit A-9 also shows how Tasks 1 through 4 and their associated costs will be scheduled over the first three years of implementation. Note that because Watermaster and the IEUA are required to complete the RMPU at least every five years, the cost to perform the Activity A scope of work is not a new cost to the Parties.

Activity B

Description of Activity B

Activity B defined by the stakeholders is:

> *Develop, implement, and optimize Storage and Recovery Programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality.*

The objective of Activity B is to develop and implement Storage and Recovery Programs in the Chino Basin that provide defined benefits to the Parties and the basin.

Through the listening session process, the stakeholders identified the following desired outcomes from Activity B:

- Storage and Recovery Programs that are optimized: to protect/enhance Safe Yield, to improve water quality, to avoid land subsidence, to ensure balance of recharge and discharge, and to maintain Hydraulic Control.
- Leverage unused storage space in the basin.
- Reduce reliance on imported water, especially during dry periods.
- Potentially provide opportunity for outside funding sources to implement the OBMP Update.

The Judgment recognized the existence of unused storage space within the Chino Basin that could be used by a person or a public entity to store water for subsequent beneficial use. The Judgment requires that the use of such storage capacity be undertaken only under Watermaster control and regulation to protect all stored water, to protect Safe Yield, and to avoid adverse impacts to groundwater pumpers. The Judgment prioritizes the use of storage space by the Parties over the use of storage space for the export of stored water.

The Peace Agreement defined a " Storage and Recovery Program" as the use of available storage capacity in the Chino Basin by any person to store supplemental water in the basin pursuant to a Groundwater Storage Agreement with Watermaster, including the right to export that water for use outside the basin.

Activity B has similar objectives and desired outcomes to those of PE 9 of the 2000 OBMP—*Develop and Implement Storage and Recovery Programs*. PE 9 was included in the 2000 OBMP to implement Storage and Recovery Programs to “benefit all Parties in the basin and ensure that basin waters and storage capacity are put to maximum beneficial use while causing no MPI to any producer or the basin.” The implementation plan for PE 9 was combined with PE 8—*Develop and Implement Groundwater Storage Management Program*—in the OBMP IP and Peace Agreement.

The OBMP IP included a storage management plan that allowed the Parties to utilize a 500,000 af band of storage space in the basin and requires them to mitigate adverse impacts from its use. In 2017, the IEUA adopted an addendum to the 2010 Peace II SEIR that provided a temporary increase in the useable storage space to 600,000 af through June 30, 2021. Pursuant to the OBMP IP, Watermaster shall: (1) prioritize its efforts to regulate and condition Storage and Recovery Programs for the mutual benefit of the Parties and (2) give first priority to proposed Storage and Recovery Programs that provide broad mutual benefits to the Parties.

In 2018, Watermaster conducted a *Storage Framework Investigation*,[11] where future projections of the use of storage were estimated and evaluated for potential MPI. The *Storage Framework Investigation* projected that MPI could occur due to the implementation of prospective Storage and Recovery Programs and described potential facilities and operating concepts that, if implemented, would minimize potential MPI. The *Storage Framework Investigation* is being used to inform the development of the *2020 Storage Management Plan*. The *2020 Storage Management Plan* is in preparation, and when completed, it will inform the development of future Storage and Recovery Programs.

Need and Function of Activity B

Activity B describes the Parties' desires to implement "optimized" Storage and Recovery Programs that avoid potential MPI and provide benefits, such as:

- *Increased water-supply reliability*. Imported water is stored in the basin during times of imported-water surplus and can be recovered during times of water-supply shortage (e.g. prolonged drought, imported water shortages/outages, etc.) to supplement local supplies.
- *Protected or enhanced Safe Yield*. The operation of Storage and Recovery Programs needs to be implemented to minimize reductions in net recharge and potentially increase net recharge to the basin.
- *Improvements to water quality.* Recovery operations could be programmed to occur in areas of impaired water quality, thereby removing groundwater contaminants. This would require groundwater treatment facilities. Supplemental water recharge may provide a slight water quality improvement.
- *Reduced cost of OBMP implementation.* Leave behind water, revenue, credits, investment in facilities, external funding, or other contributions produced by a Storage and Recovery Program can be used to offset Watermaster assessments and provide other benefits.

Watermaster, the IEUA, and the Parties have tried to develop and implement Storage and Recovery Programs since the Peace Agreement came into effect in 2000. The first attempt included the issuance of a request for proposals, declaring that the Chino Basin was ready to develop Storage and Recovery Programs with water agencies outside the basin. Very few proposals were received, and the proposals that were submitted did not provide the benefits desired by the Parties.

Metropolitan developed a program called the Dry-Year Yield Program (DYYP) and offered it to its member agencies in the Metropolitan service area. As key feature of the DYYP, Metropolitan offered funding to construct and operate new facilities that would enable Metropolitan to store imported water in a groundwater basin and recover it when needed. In 2003, Metropolitan, the IEUA, Watermaster, and the TVMWD entered into an agreement to implement a 100,000 af DYYP in the Chino Basin that was consistent with the DYYP parameters required by Metropolitan. The DYYP is the only Storage and Recovery Program that has been implemented within the Chino Basin since 2000, and the DYYP agreement expires in 2028. As part of the DYYP, the Parties received compensation from Metropolitan for the construction and operation of numerous facilities across Chino Basin that are used for recovery operations during "take" cycles of the DYYP. The Parties can use these facilities for their own purposes at all other times. In 2010, Metropolitan, the IEUA, Watermaster, and the TVMWD began discussions to expand the DYYP to 150,000 af of storage but decided against expansion. The Parties have expressed that the DYYP presented an opportunity to fund certain capital improvement projects that added groundwater

[11] WEI. (2019). *Storage Framework Investigation – Final Report*. Prepared for the Chino Basin Watermaster. October 2018, revised January 2019.

pumping capacity; however, the anticipated long-term benefits, such as improved water-supply reliability through dry periods, were not sufficiently planned for and agreed upon during the development of DYYP and ultimately were not realized by the Parties.

Currently, there are two new efforts underway to develop Storage and Recovery Programs: (1) the Chino Basin Water Bank being developed by some of the Parties and the IEUA and (2) the Chino Basin Program (CBP) being led by the IEUA. The latter is in response to a $207 million conditional funding opportunity awarded to IEUA under Proposition 1 for the construction and operation of storage programs that create environmental benefits in the Sacramento-San Joaquin Delta, while providing local water quality benefits.

Summary

What is common to all past efforts to develop and implement Storage and Recovery Programs is the belief that Chino Basin storage is a valuable resource that can and should be leveraged to benefit the Parties. What was missing in past efforts was an initial effort to clearly articulate the objectives of the Parties and the required benefits to be realized from Storage and Recovery Programs.

Activity B should follow a more deliberate planning process that will enable the Parties and their storing partners to select and implement Storage and Recovery Programs that achieve the objectives of the Parties and the desired benefits. To do this, the planning process should answer the following questions:

(1) Why do the Parties want to conduct Storage and Recovery Programs? And, what are the Parties' objectives for Storage and Recovery Programs?

(2) What were the obstacles to implementing Storage and Recovery Programs in the past? How do we avoid or overcome them in the future?

(3) What are the benefits desired by the Parties? How can such benefits be quantified?

(4) What are the potential source waters for Storage and Recovery Programs in the Chino Basin? What is the availability and what are the volumes of these potential source waters?

(5) Who are the entities that would be interested in obtaining water from a Storage and Recovery Programs? How would they take delivery of the stored water?

(6) How could put and take operations be performed to match the availability of the source waters with the demand for the stored water and be consistent with the *2020 Storage Management Plan*?

(7) How can existing infrastructure be used to perform put and take operations? Are new facilities required? What are the capital and O&M costs associated with the use of existing and new facilities?

(8) What are the practical alternatives for implementing Storage and Recovery Programs?

(9) What institutional arrangements are necessary to implement Storage and Recovery Programs?

The Watermaster should convene a Storage and Recovery Program Committee for the purposes of answering these questions and ultimately developing and implementing a *Storage and Recovery Program Master Plan*. The *Storage and Recovery Program Master Plan* will enable the Parties and other potential storing partners: (1) to reference a common set of objectives for Storage and Recovery Programs and align the objectives with requirements in grant applications and other funding opportunities, (2) to assess the potential for implementing Storage and Recovery Programs in the Chino Basin at various scales, (3) to solicit interest in participation in Storage and Recovery Programs, and (4) to develop Storage and Recovery Programs that are consistent with the *2020 Storage Management Plan*.

Scope of Work for Activity B

The scope of work to achieve the objectives of Activity B—*Develop, implement, and optimize Storage and Recovery Programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality*—is designed to answer the questions listed above and will consist of the following four tasks:

- Task 1 – Convene the Storage and Recovery Program Committee and articulate the program objectives
- Task 2 – Develop conceptual alternatives for Storage and Recovery Programs at various scales
- Task 3 – Describe and evaluate reconnaissance-level facility plans and costs for Storage and Recovery Program alternatives
- Task 4 – Prepare *Storage and Recovery Program Master Plan*

Prior work has been performed for the *Storage Framework Investigation*, the Chino Basin Water Bank, and the Chino Basin Program. These past efforts can be leveraged after Watermaster completes Task 1. At the end of Task 4, Watermaster and the Parties will have a master plan for Storage and Recovery Programs, know what is reasonably possible, know what is a "stretch" program, and know how to subsequently implement the master plan.

The scope of work described below for Task 1 is a necessary first step. If the Parties cannot agree upon the objectives for Storage and Recovery Programs, Tasks 2 through 4 will not be executed. If the process moves beyond Task 1, the precise scope and level of effort required to perform Tasks 2 through 4 will greatly depend on the outcomes of Task 1. Tasks 2 through 4 are generally described below, but the cost to perform these tasks is not estimated herein. The precise scope of work for Tasks 2 through 4 will be developed in detail as part of Task 1.

Task 1 – Convene the Storage and Recovery Program Committee, define objectives, and refine scope of work. In this task, the Storage and Recovery Program Committee will be convened. The Committee's initial task is to obtain consensus on the objectives and desired benefits of Storage and Recovery Programs and, if consensus is achieved, scope the effort to prepare a *Storage and Recovery Program Master Plan*. To execute this task, the Committee will address the following questions:

(1) Why do the Parties want to conduct Storage and Recovery Programs and what should be their objectives?

(2) What were the obstacles to implementing Storage and Recovery Programs in the past, what are the current objectives, and how we can overcome them in the future?

(3) What are the benefits desired by the Parties and how should they be quantified?

Four Committee meetings will be conducted (1) to define the objectives and impediments, (2) to define a set of mutual benefits that are expected/required from Storage and Recovery Programs, and (3) to develop the preliminary scope, cost, and schedule for the work (Tasks 2 through 4 below) to develop the *Storage and Recovery Program Master Plan*.

Task 2 – Develop conceptual alternatives for Storage and Recovery Programs at various scales. The objective of this task is to describe a set of conceptual alternatives for Storage and Recovery Programs at various scales that will achieve the objectives defined in Task 1. The set of conceptual alternatives will be described and evaluated in greater detail in Task 3.

To execute this task, the Committee will address the following questions:

(4) What are the potential source waters for Storage and Recovery Programs in the Chino Basin? What is the availability and what are the volumes of these potential source waters?

(5) What entities are interested in obtaining water from a Storage and Recovery Program? How would they take delivery of the stored water?

(6) How could put and take operations be performed to match the availability of the source waters with the demand for the stored water and be consistent with the 2020 Storage Management Plan?

Five to six Committee meetings will be needed to answer these questions, describe various conceptual alternatives for Storage and Recovery Programs, and evaluate and select a set of these alternatives for further development, evaluation, and ranking in Task 3.

Work involved in this task will likely include: (1) collecting, compiling, and reviewing existing and new information; (2) identifying potential source waters for Storage and Recovery Programs in the Chino Basin; (3) characterizing the availability and volumes of these potential source waters; (4) identifying the entities that would be interested in obtaining water from a Storage and Recovery Programs; (5) characterizing how the entities would take delivery of the stored water; (6) identifying and characterizing institutional challenges to program implementation; (7) developing planning criteria to formulate and rank the conceptual Storage and Recovery Program alternatives; (8) describing several conceptual alternatives for Storage and Recovery Programs of various scales; and (9) selecting a set of alternatives for further development, evaluation, and ranking in Task 3.

Each alternative will describe, at a conceptual level, the operating parameters for put and take operations in the Chino Basin that match the available source waters with the demand for stored water. The alternatives must be consistent with the Watermaster's 2020 Storage Management Plan and the objectives for Storage and Recovery Programs defined in Task 1.

Task 3 – Describe and evaluate reconnaissance-level facility plans and costs for Storage and Recovery Program alternatives. The objective of this task is to describe and evaluate reconnaissance-level facility plans, operational plans, and cost opinions to implement the various Storage and Recovery Program alternatives described in Task 2.

To execute this task, the Committee will need to answer the following questions:

(7) How can existing infrastructure be used to perform put and take operations? Are new facilities required? What are the capital and O&M costs associated with the use of existing and new facilities?

(8) What are the practical alternatives for implementing Storage and Recovery Programs?

Three to four Committee meetings will be needed to answer these questions and to describe, evaluate, and rank the various Storage and Recovery Program alternatives.

For each alternative, two sub-alternatives will be developed: one alternative that uses both existing and new facilities and one that is based only on new facilities. Potential implementation barriers will be described. Capital and O&M cost opinions will be prepared for each alternative, utilizing criteria developed in Task 2.

To characterize the performance of the Storage and Recovery Program alternatives: (1) the Watermaster's groundwater model will be utilized to estimate the physical response of the basin and to assess the potential for MPI, and (2) the benefits of the Storage and Recovery Program will be quantified and assessed. Each alternative will be ranked using this and any other criteria developed in Task 2.

Task 4 – Prepare Storage and Recovery Program Master Plan. The objective of this task is to prepare a *Storage and Recovery Program Master Plan* that will enable the Parties and other potential storing partners: (1) to reference a common set of objectives for Storage and Recovery Programs and align the objectives with requirements in grant applications and other funding opportunities, (2) to assess the potential for implementing Storage and Recovery Programs in the Chino Basin at various scales, (3) to solicit interest in participation in Storage and Recovery Programs, and (4) to develop storage and recovery programs that are consistent with the *2020 Storage Management Plan*.

The plan will describe the results and recommendations of Tasks 1 through 3 and will include a discussion of the institutional arrangements required to implement Storage and Recovery Programs in the Chino Basin. Three to four Committee meetings will be needed (1) to finalize the discussion on what was learned in prior tasks, (2) to gain consensus on the recommendations, and (3) to review, revise, and finalize the *Storage and Recovery Program Master Plan*.

Cooperative Efforts with Appropriate Entities to Implement Activity B

This is a basin-wide activity that involves the Parties, IEUA, TVMWD, and WMWD. Potential storing partners located outside of the Chino Basin will need to be consulted but need not participate on the Storage and Recovery Program Committee. Watermaster's role will be to convene the Storage and Recovery Program Committee, coordinate and administer its activities and meetings, and ensure that the recommendations derived from this effort are consistent with the Judgment, Peace Agreements and other agreements, the 2020 Storage Management Plan, and the Watermaster Rules and Regulations.

Implementation Actions, Schedule, and Costs for Activity B

The recommended schedule to complete the scope of work described herein is described below:

Year one:

- Convene Storage and Recovery Program Committee and articulate the program objectives (Task 1).

Year two:

- Develop conceptual alternatives for Storage and Recovery Program s at various scales (Task 2).

Year three:

- Describe and evaluate reconnaissance-level facility plans and costs for Storage and Recovery Program alternatives (Task 3).
- Prepare *Storage and Recovery Program Master Plan* (Task 4).

Year four and thereafter:

- Develop and implement Storage and Recovery Program with guidance and assistance from the *Storage and Recovery Program Master Plan*.
- Update the *Storage and Recovery Program Master Plan* as needed to be consistent with periodic updates to the Storage Management Plan.

Exhibit B-1 shows the estimated budget-level cost opinion to complete Task 1, which is about $105,000. The cost of Tasks 2 through 4 cannot be estimated until the completion of Task 1. Exhibit B-1 also shows how Tasks 1 through 4 will be scheduled over the first three years of implementation.

Activity D

Description of Activity D

Activity D defined by the stakeholders is:

> *Maximize the reuse of recycled water produced by IEUA and others.*

The objective of Activity D is to maximize the reuse of recycled water produced by the IEUA and other publicly owned treatment works (POTWs) in proximity to the Chino Basin to meet future demands and improve local water-supply reliability, especially during dry periods. Expanded reuse activities could include direct non-potable reuse (landscape irrigation or industrial uses), artificial recharge by spreading or injection (indirect potable reuse), and direct potable reuse. Increasing recycled water reuse is an integral part of the OBMP's goal to enhance water supplies, and, the Judgment states that Watermaster shall give high priority to maximizing the beneficial use of recycled water for replenishment purposes (Judgment ¶ 49(a)). The direct use of recycled water increases the availability of native and imported waters for higher-priority beneficial uses.

Through the listening session process, the stakeholders identified the following as potential outcomes of performing Activity D:

- Provide a new, reliable volume of in-lieu and/or wet water recharge that could:
  - Protect or enhance Safe Yield,
  - reduce dependence on imported water,
  - improve water-supply reliability, especially during dry periods, and
  - increase pumping capacity in areas of low groundwater levels and areas of subsidence concern.
- Provide for alternative sources of recycled water that can be used to satisfy the IEUA's requirement to discharge a minimum of 17,000 afy of water to the Santa Ana River pursuant to the Santa Ana River Judgment and associated agreements with the Western Municipal Water District (WMWD).

Activity D has similar objectives to those of PE 5 of the 2000 OBMP—*Develop and Implement Regional Supplemental Water Program*. Recognizing that growth in the Chino Basin was going to result in a more than 30 percent increase in then-current water demands, PE 5 was included in the 2000 OBMP to improve regional conveyance and availability of imported and recycled waters throughout the basin. Recycled water is more reliable than imported water, and using it in lieu of imported water improves the sustainability of Chino Basin and water supply reliability. The implementation plan for PE 5 was combined with PE 3—*Develop and Implement Water Supply Plan for the Impaired Areas of the Basin* in the OBMP and Peace Agreement.

The PE 3/PE 5 implementation action defined in the Peace Agreement related to recycled water reuse was for the IEUA to construct recycled water facilities to meet recycled water demands for direct use and for groundwater recharge. Since 2000, the IEUA has constructed and operated a recycled water conveyance system throughout the basin, enabling it to provide recycled water to its member agencies. Recycled water deliveries grew from about 3,400 afy in 2000 to about 34,000 afy in 2017 and have replaced a like amount of groundwater and imported water that would have otherwise been used for non-potable purposes.

The expansion of the recycled water reuse program was made possible—and economically feasible—through the SNMP activities performed pursuant to PE 7—*Develop and Implement Salt Management Plan*.

The SNMP, discussed as part of Activity K, will be an integral management tool to enable the maximization of recycled water reuse pursuant to Activity D.

Need and Function of Activity D

History of Recycled Water Discharge and Reuse in the Chino Basin

The IEUA owns and operates four wastewater treatment facilities: Regional Plant No. 1 (RP-1), Regional Plant No. 4 (RP-4), Regional Plant No. 5 (RP-5), and the Carbon Canyon Water Reclamation Facility (CCWRF). Recycled water produced by these plants is reused for direct uses, groundwater recharge, and discharged to Chino Creek or Cucamonga Creek, which are tributaries to the Santa Ana River. Exhibit D-1 shows the location of the IEUA's treatment plants, discharge points to surface water, recharge facilities receiving recycled water, and recycled water distribution pipelines for direct use deliveries. Historically, the IEUA's operating plan has prioritized the use of recycled water as follows: (1) to meet the IEUA's discharge obligation to the Santa Ana River (17,000 afy), (2) to meet direct reuse demands for recycled water, and (3) to recharge the remaining recycled water.

Exhibit D-2 shows the time history of the IEUA's annual discharges to the Santa Ana River since FY 1977/78. The increase in recycled water discharges from 20,000 afy in FY 1977/78 to about 60,000 afy by FY 1996/97 is illustrative of the population growth in the Chino Basin over this period. Although recycled water had been reused since the 1970s, the growth of IEUA's recycled water reuse programs started in 1997. Total recycled water discharge remained at 60,000 afy through 2005 after which it declined as a result of OBMP implementation. Specifically, the incorporation of Watermaster and the IEUA's maximum benefit SNMP into the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) in 2004, triggered the ability to rapidly increase recycled water reuse. Since 2014, recycled water discharge has been less than 20,000 afy and has averaged about 18,600 afy over the last five years.

Exhibit D-3 characterizes the total reuse of recycled water for direct use and recharge in the Chino Basin from FY 1996/97 through FY 2017/18. When the OBMP was completed in 2000, the IEUA was recharging about 500 afy of recycled water and utilizing about 3,200 afy for non-potable direct uses. Recycled water reuse peaked at about 38,200 af in FY 2013/14. Total recycled water reuse in the Chino Basin declined about 5,600 to 32,700 af in FY 2017/18.

Direct Reuse. Recycled water from the IEUA's facilities is reused directly for: irrigation of crops, animal pastures, freeway landscape, parks, schools, and golf courses; commercial laundry and car washes; outdoor cleaning and construction; toilet plumbing; and industrial processes. The direct use of recycled water increased from about 3,500 af in FY 1999/00 to about 24,600 af in FY 2013/2014 and has since declined to about 19,400 af as of FY 2017/18. The recent decline is due to the mindful reduction in use by the City of Chino to accommodate changes in IEUA policy related to the use of recycled water base entitlements and conversions of land from agricultural to urban uses. Exhibit D-4 is a map of IEUA's recycled water deliveries for direct use in FY 2017/18.

Recharge. In 2005, the IEUA initiated its recycled water recharge program and recycled water has since become an important component of annual recharge to the Chino Basin. In FY 2017/18, recycled water recharge was 13,200 af and has averaged about 13,000 afy over the past five years. The locations of the recharge facilities receiving recycled water are shown in Exhibit D-4.

Recycled Water Reuse Projections and the Availability of Additional Recycled Water for Reuse

The IEUA is continuing to expand its recycled-water distribution system and recharge facilities throughout the Chino Basin for direct non-potable uses and recharge. Growth is still occurring in the Chino Basin and will result in additional wastewater flows to the IEUA's treatment plants. Much of this supply will be used to meet increasing non-potable demands as the currently remaining agricultural land uses convert to urban uses. The increasing demand for recycled water reuse will constrain the IEUA's ability to continue to use recycled water to meet its discharge obligations pursuant to the Santa Ana River Judgment.

Projected Recycled Water Supplies and Demands. Exhibit D-5 shows the IEUA's latest projections of recycled water production, expressed as a range (low and high) and projections of direct reuse and recharge through 2040.[12] Also shown in Exhibit D-5 is the calculation of surplus supply available for expanded reuse and/or discharge. Under the "high" recycled water production projections, there is sufficient surplus supply to meet the Santa Ana River discharge obligations and expand recycled water reuse. Under the "low" recycled water production projections, there is insufficient supply to meet the Santa Ana River discharge obligations through at least 2025, suggesting that the IEUA may need to find supplemental supplies to meet both recycled water demands and its discharge obligations.

Supplemental recycled water supply. In addition to the recycled water available from the IEUA, other nearby POTWs are not currently reusing recycled water and may have surplus recycled water that could be acquired and conveyed to the Chino Basin. The surplus recycled water from these POTWs could be utilized to increase reuse in the Chino Basin if it is economical to convey the water to the desired end uses or used to meet discharge obligations. The nearby POTWs with potential surplus supply include the Pomona Water Reclamation Facility (WRF), the Western Riverside County Regional Wastewater Authority (WRCRWA), the City of Rialto, RIX, and the City of Riverside. The locations of these facilities are shown in Exhibit D-1. Currently, the availability of recycled water from these or other POTWs is not precisely known.

Capacity for Expanded Recycled Water Recharge at Existing Facilities. As described for Activity A, Watermaster and the IEUA operate a set of recharge facilities in the Chino Basin to conduct storm, recycled, and imported water recharge. The IEUA and Watermaster prioritize[13] the use of these facilities as follows: (1) maximize stormwater capture and recharge, (2) meet Watermaster's replenishment and recharge obligations as required by the Judgment and Peace Agreements, and (3) recharge other supplemental water for groundwater storage and management. Exhibit D-6 shows the theoretical maximum supplemental water recharge capacity[14] that can be used for recycled water recharge, subject to Watermaster's priority need for recharge and replenishment.[15] The table also shows actual FY 2017/18 recycled water recharge (13,200 af) and planned recycled water recharge for FY 2019/20 through FY 2029/30.[16] As the table shows, the planned volume of recycled water recharge of 16,400 af is less than one-half of the theoretical maximum supplemental water recharge capacity. This suggests that there is sufficient capacity to recharge future surplus recycled water supply that will not be used for direct non-potable uses, subject to Watermaster's need for recharge and replenishment and the ability to comply with the dilution requirements defined in Watermaster and the IEUA's maximum benefit SNMP.

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[12] These projections are based on information published by the IEUA to support the development of the Chino Basin Program: *Sources of Water Supply for the Chino Basin Program.* Memo to Member Agencies. February 20, 2019. These projections differ slightly from the latest water supply planning projections published in Watermaster's *Storage Framework Investigation* and the *2018 RMPU*, both of which were published in 2018.

[13] Note that the primary goal of multipurpose facilities is to attenuate flood peak discharge.

[14] There are two estimates of theoretical supplemental water recharge capacity. The first is corresponds to the 10-month period directly after a cleaning. The second corresponds to continuous use between maintenance periods and is less than the recharge capacity that would occur if the recharge basins are used less frequently.

[15] WEI, (2019). *2018 Recharge Master Plan Update*. Prepared for the Chino Basin Watermaster. September 2018.

[16] The projection cited here is based on the recycled water projection included in the 2018 RMPU, which was published before the CBP planning memo projection of 18,700 afy.

Considerations and Challenges for Maximizing Recycled Water Reuse

There are various factors that should be considered in determining how to maximize the reuse of recycled water produced by the IEUA and other POTWs. These are summarized as follows.

Existing Planning Efforts. The IEUA is currently performing planning efforts for the CBP, which is a large Storage and Recovery Program to provide for regional, dry-year water supplies and associated infrastructure. The CBP was conditionally awarded approximately $207 million of Proposition 1 Water Storage Investment Program funding. Over its 25-year project life, the CBP would increase recycled water recharge in the Chino Basin by 15,000 afy, and during dry years, the water in storage would subsequently be recovered and pumped into Metropolitan's system for use in Southern California in lieu of imported water from the State Water Project. The planned sources of recycled water for the CBP are currently being evaluated by the IEUA, but it is certain additional supplies beyond those produced by the IEUA will be needed. The CBP is still undergoing planning and evaluation, and its implementation is not certain. Regardless of whether the CBP is implemented, the significant body of work being led by the IEUA together with regional agencies can be leveraged to accomplish Activity D.

Timing of Recycled Water Availability. A common challenge with maximizing recycled water reuse is the mismatch in the timing of non-potable water demands and recycled water supply availability. It will be important to characterize in detail the seasonality of outdoor water demands and availability of recharge capacity given that surplus recycled water may only be available in winter months when outdoor demand is low and recharge capacity is otherwise being utilized for stormwater recharge. These relationships will also vary based on climate conditions (wet versus dry periods). Fully maximizing recycled water supplies will require an understanding of these complex relationships to optimize the design and operation of projects. Fully maximizing recycled water reuse may require storage facilities.

Salt and Nutrient Management. Watermaster and the IEUA have an existing maximum benefit SNMP that enables the reuse and recharge of IEUA recycled water in the Chino Basin (refer to Activity K for more details). This SNMP, which is incorporated into the Basin Plan for the Santa Ana Region, did not contemplate the use of non-IEUA sources of recycled water in the Chino Basin. Some of the available recycled water sources have TDS and/or nitrate concentrations that are numerically higher than those of IEUA's current or permitted TDS and nitrate limits, which could impact compliance with the SNMP or trigger additional mitigation measures to protect beneficial uses. Detailed water quality projections would be required to demonstrate the impacts of reuse of non-IEUA sources of recycled water in the Chino Basin. The existing SNMP contains provisions for mitigation at such time that the TDS and/or nitrate concentration of recycled water or groundwater exceeds the regulatory limits defined in the Basin Plan.

Water Quality. Water quality regulations are constantly evolving as new contaminants of potential concern are identified and studied. In recent years, the presence of pharmaceutical and personal care products (PPCPs) in recycled water has been an area of focused research to determine potential health impacts that could result from reuse of recycled water for recharge in groundwater basins. A new set of emerging contaminants of concern is a group of chemicals known as poly- and per-fluorinated compounds (PFAS). PFAS are known to be present in recycled water, and any new regulatory standards for PFAS in drinking water could impact the ability to reuse recycled water without treatment (see discussion in Activity EF for additional details on PFAS).

Direct Potable Reuse (DPR). The direct potable reuse of recycled water, although only currently being done at a very limited pilot scale in California, is emerging as a potential future municipal water supply. The State Board has released a framework for regulating DPR through reservoir and raw water augmentation, but regulatory criteria for DPR projects will not be adopted for many years. The State Board will prioritize developing regulations for reservoir augmentation and will follow with raw water augmentation in the future after more research is completed to determine the criteria necessary to ensure protection of public health. DPR will require advanced treatment of any recycled water source used.

Santa Ana River Judgment. Historically the IEUA has used recycled water to meet its obligations under the Santa Ana River Judgment. As demand for recycled water increases, the IEUA will have to rely on other sources of water to meet this obligation. If the IEUA were able to obtain access to additional water supplies (recycled or other supplemental), alternative plans should be evaluated to optimize which sources are used to ensure that the IEUA meets its annual discharge volume and water quality requirements pursuant to the Judgment.

Summary

The process to achieve the objective of Activity D to maximize the reuse of recycled water produced by IEUA and others should include: (1) a characterization of the availability of all recycled water supplies, (2) a characterization of the direct recycled water demands of the Parties, (3) identification of project opportunities and the planning and screening criteria to evaluate them, and (4) development of reconnaissance-level engineering design and operating plans. This information could then be used to evaluate, prioritize, and select projects for implementation. To optimize the expansion of recycled water reuse, the Parties should convene a Recycled Water Projects Committee for the purposes of evaluating project opportunities and developing a plan to implement them. The Committee could be comprised of representatives from all interested stakeholders and could be led by IEUA, Watermaster, and/or others. The scope of work to implement such a process is described below.

Scope of Work for Activity D

The scope of work to achieve the objectives of Activity D—*Maximize the reuse of recycled water produced by IEUA and others*—consists of six tasks:

- Task 1 – Convene Recycled Water Projects Committee, define objectives and refine scope of work
- Task 2 – Characterize the availability of all recycled water supplies and demands
- Task 3 – Develop planning, screening, and evaluation criteria
- Task 4 – Describe recycled water reuse project opportunities
- Task 5 – Develop reconnaissance-level engineering design and operating plan
- Task 6 – Plan, design, and construct selected recycled water projects

The IEUA already performs various efforts to characterize recycled water supply and demand within its service area, including the periodic update of its Integrated Resources Plan (IRP). And, as previously noted, the IEUA is performing a significant amount of work to evaluate opportunities to acquire surplus recycled water supplies for recharge as part of the CBP, and this work could be leveraged to reduce the effort required to implement the scope of work for Activity D.

Task 1 – Convene Recycled Water Projects Committee, define objectives and refine scope of work. In this task, a Recycled Water Projects Committee will be convened. The Committee's initial tasks are (1) to obtain consensus on the objectives for maximizing recycled water reuse, (2) to refine the preliminary scope of work defined in the 2020 OBMP Update (Tasks 2-7 below), and (3) to update the schedule and cost to perform the work. Two Committee meetings will be conducted to accomplish these tasks.

Task 2 – Characterize the availability of all recycled water supplies and demands. The objectives of this task are: (1) to characterize the future water demands of the Parties to estimate the IEUA's recycled water production, (2) to prepare updated projections of the direct recycled water reuse demands of the Parties, (3) to identify other available sources of recycled water, (4) to characterize the use and potential availability of each recycled water supply (IEUA and others), and (5) to identify the institutional and physical challenges for acquiring each source of surplus supply. The recycled water availability and direct reuse demands will be characterized on a monthly basis for various climate conditions to enable the characterization of potential storage needs to fully maximize recycled water reuse. One meeting will be conducted to review the characterization of recycled water availability.

Task 3 – Develop planning, screening, and evaluation criteria. The objective of this task is to develop the criteria that will be used to evaluate recycled water reuse projects in Tasks 4 and 5. The types of criteria developed to evaluate potential projects will include:

- Watermaster criteria that include no potential MPI, balance of recharge and discharge; and others;
- regulatory criteria that include compliance with salt and nutrient management plans, DDW regulations, and others;
- qualitative criteria that include institutional complexity, reliability of non-IEUA recycled water sources, overall water supply reliability and others; and
- quantitative criteria that include business case evaluations expressed as net present value, unit cost, and others.

Two meetings will be conducted to review and refine the criteria with the Recycled Water Projects Committee.

Task 4 – Describe recycled water reuse project opportunities. The objectives of this task include identifying potential recycled water project alternatives, screening them using the criteria developed in Task 3, and selecting a set of projects for detailed evaluation. Three meetings will be conducted to develop the list of potential projects that can be implemented, to review the screening of the projects, and to select the projects to evaluate in Task 5.

Task 5 – Develop reconnaissance-level engineering design and operating plan. The objective of this task is to characterize the performance and costs of new recycled water projects for reuse, individually and as a group/system. A reconnaissance-level engineering design and operating plan will be developed for each project. Each project design will include the approximate size, location, and alignment of major recycled water utilities, and will describe any potential implementation barriers for the project. A cost opinion will be determined for each project. This task includes evaluating projects based on the criteria developed in Task 2 and recommending a set of projects for implementation. The deliverable of this task will be a technical report that summarizes the work performed under Tasks 1 through 4, and it will include an implementation plan as well as a plan to finance the preliminary design and CEQA documentation. Five meetings will be conducted to review the design and estimated benefit of the projects; review the evaluation of the projects, based on the criteria developed in Task 2, and review the recommended list of projects for implementation; review the implementation plan; and review the technical report.

Task 6 – Plan, design, and construct selected recycled water projects. The objective of this task is to implement the recommendations of the technical report. This task includes (1) developing and implementing necessary agreements between participating Parties, (2) preparing the preliminary design of the recommended projects, (3) preparing the environmental documentation for the recommended projects that will tier-off the 2020 OBMP Update PEIR, (4) preparing a financial plan for constructing the recommended projects, (5) preparing final designs of the recommended projects, (6) acquiring necessary permits for constructing and operating the recommended projects, and (7) constructing the recommended projects.

Task 7 – Periodically re-evaluate availability of recycled water supplies for reuse. As agencies update water supply and demand projections, project economics change, and other changes occur in the Basin, the ability to maximize the reuse of recycled water may also change. As such, Task 2 should be updated periodically. A first step in this task would be to scope out a process to periodically update the characterization of recycled water supply and demands. Following each future assessment, the Recycled Water Projects Committee would determine the need to perform the steps in Tasks 3 through 6 again.

Cooperative Efforts with Appropriate Entities to Implement Activity D

This is a basin-wide activity that involves the Parties in the IEUA, TVMWD, and WMWD service areas. Given its current efforts, the IEUA would be the logical entity to lead the implementation of Activity D on behalf of all Parties in these service areas, but the process could be led by others. In this role, the agency leading the project on behalf of the Parties would: convene the Recycled Water Projects Committee, characterize recycled water demands, identify additional recycled water supplies and conduct discussions with the owners of those supplies, and contract for planning and engineering services as required. Watermaster's role would be to work with project lead, on the implementation of Activity D (1) to review and evaluate the basin management implications of the recycled water projects, including but not limited to compliance with the maximum benefit SNMP and (2) to ensure that its implementation is consistent with the Judgment, Peace Agreements and other agreements, and the Watermaster Rules and Regulations.

Implementation Actions, Schedule, and Costs for Activity D

The recommended schedule to complete the scope of work described herein is described below:

Year one:

- Convene Recycled Water Projects Committee and refine scope of work, schedule and budget (Task 1).
- Characterize the availability of all recycled water supplies (Task 2).
- Develop planning, screening, and evaluation criteria for recycled water projects (Task 3).
- Conduct five committee meetings to review and refine the work products of Tasks 1 through 3.

Year two:

- Develop list of recycled water projects for evaluation (Task 4).
- Begin reconnaissance-level engineering study for the proposed projects (Task 5).
- Conduct four workshops to review and refine work products of Tasks 4 and 5.

Year three:

- Complete reconnaissance-level engineering study for the proposed projects (Task 5).
- Select project(s) for implementation.
- Prepare final report documenting work performed in Tasks 1 through 5.

Years four through six:

- Watermaster, the IEUA, and other potential partners develop a project implementation agreement. The objective of this agreement is to define the roles of each partner in the planning, permitting, design, and implementation of the projects, and the cost allocations.
- Preliminary design of recommended projects. The level of design will be such that it enables the preparation of environmental documentation pursuant to CEQA, provides information for identifying and acquiring construction and related permits, and produces an updated recycled water capacity benefit.

- Prepare environmental documentation for projects. CEQA will cover the recommended projects at the project level and the deferred projects at a programmatic level (PEIR), based on the project descriptions developed in Task 5. This documentation will tier-off from the 2020 OBMP Update PEIR. Watermaster will conduct an MPI analysis in parallel with the CEQA process.

Years seven and eight:

- Prepare final designs and acquire necessary permits for the selected projects.

Years nine and beyond:

- Construct selected Projects.

Exhibit D-7 shows the estimated budget-level engineering cost to complete Tasks 1 through 5, which is about $620,000. The cost of Tasks 6 and 7 cannot be estimated until the completion of Task 5. Exhibit D-7 also shows how Tasks 1 through 5 and their associated costs will be scheduled over the first three years of implementation.

As previously discussed, because the IEUA performs various efforts to estimate the recycled water supply and demands of its member agencies and is currently developing estimates of recycled water availability in the region and developing a list of project concepts for recycled water reuse as part of the CBP, the cost to perform Activity D may be lower than estimated herein.

Activity EF

Description of Activity EF

Activities E and F defined by the stakeholders are both are intended to address impediments to groundwater management that are related to groundwater quality, specifically contaminants of emerging concern. Activity E of the OBMP Update is:

> *Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses.*

Activity F of the OBMP Update is:

> *Develop strategic regulatory-compliance solutions that achieve multiple benefits in managing water quality.*

The objective of the management plan envisioned for Activity E is to collect and analyze the data and information needed to characterize and proactively plan for the water quality challenges to pumping groundwater for municipal supply in a constantly evolving regulatory environment. The objective of Activity F is to evaluate the treatment and related infrastructure improvements, including the potential for multi-benefit collaborative projects, that can be implemented to ensure groundwater can be pumped for beneficial use as new drinking water regulations are adopted by the State Board's Division of Drinking Water (DDW[17]).

Through the listening session process, the stakeholders identified the following as potential outcomes of performing Activities E and F:

- Proactively address challenges and solutions to comply with new and potential future drinking water regulations.
- Enable the Parties to make informed decisions on infrastructure improvements for water-quality management and regulatory compliance.
- Remove groundwater contaminants from the Chino Basin and thereby improve groundwater quality.
- Enable the Parties to produce or leverage their water rights that may be constrained by water quality.
- Ensure that groundwater is pumped and thereby protect/enhance Safe Yield.

The 2000 OBMP included multiple PEs to protect and enhance water quality. PE 6—*Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management*—was included to assess water quality trends in the basin, to evaluate the impact of OBMP implementation on water quality, to determine whether point and non-point contamination sources are being addressed by water quality regulators, and to collaborate with water quality regulators to identify and facilitate the cleanup of soil and groundwater contamination. PE 7—*Develop and Implement Salt Management Plan*—was included to characterize current and future salt and nutrient conditions in the basin and to subsequently develop and implement a plan to manage them. PE 3—*Develop and Implement a Water Supply Plan for Impaired Areas*—provided for the construction and operation of regional groundwater desalters, the Chino Basin Desalters (Desalters), to pump and treat high-salinity

[17] The DDW regulates public drinking water systems in California; prior to June 2014 it was the California Department of Public Health which was formally known as the Department of Health Services. All references to the actions of DDW herein include its predecessors.

groundwater in the southern part of the basin to maintain and enhance Safe Yield and meet increasing municipal water demands. The 2000 OBMP also recognized that the Desalters would intercept VOC contaminants associated with the Chino Airport and South Archibald plumes and that the Desalters could be used in the future to treat these contaminants (at some additional cost).

Since 2000, under PE 6, Watermaster has assessed groundwater quality in the Chino Basin using data compiled through their own monitoring activities and the efforts of other cooperating entities, reported on the water quality trends and findings, and collaborated with the Regional Board in its efforts to work with dischargers to facilitate the cleanup of groundwater contamination. Watermaster formed the Water Quality Committee to coordinate many of these activities. The Water Quality Committee convened from 2003 through 2010 and reported on its findings, work products, and recommendations to the Watermaster Pools, Advisory Committee, and Board. Since 2009, Watermaster has continued to perform ad-hoc monitoring for contaminants of emerging concern at its monitoring wells and some private agricultural wells and prepares annual or more frequent reports on the status of monitoring and remediation of point-source contamination sites. The opportunities to use the Desalters to assist in the remediation of the Chino Airport and South Archibald plumes envisioned in the 2000 OBMP IP are coming to fruition.

The objectives of Activity E and PE 6 are similar in that they address the management of groundwater quality contaminants from point and non-point sources that threaten the use of groundwater for drinking water supply. Activity E is a refinement on PE 6 in that it seeks a more proactive and basin-wide approach to address contaminants of emerging concern to better prepare the Parties for addressing compliance with new and increasingly stringent drinking water regulations defined by the DDW.

The objective of Activity F is similar to PE 3 in that it seeks to evaluate the feasibility of regional solutions for the treatment of impaired areas that can provide multiple benefits in the management of the basin to achieve the goals of the OBMP. The areas and contaminants that need to and can be addressed with regional, multi-benefit solutions can be determined as part of the process to develop and implement the groundwater quality management plan envisioned in Activity E.

The scope of work defined herein for developing and implementing a *Groundwater Quality Management Plan* will address both Activities E and F and, when implemented, will provide information that will enable municipal water agencies to make informed decisions on how to manage groundwater quality for beneficial uses. The scope of the *Groundwater Quality Management Plan* does not address salinity, which is managed separately under Watermaster and IEUA maximum benefit SNMP.

Need and Function of Activity EF

Throughout most of the Chino Basin, there are contaminants in groundwater that can limit its direct use for drinking water supply if treatment is not implemented. Drinking water is regulated by the DDW. The enforceable drinking water standards to protect the public from potential negative health effects are Primary Maximum Contaminant Levels (MCLs) set by the DDW. Water supplies that exceed MCLs cannot be used for drinking water without treatment (blending is the most common treatment). In addition, the DDW sets Notification Levels (NLs), which are health-based advisory levels for potential contaminants of concern that do not have MCLs established. The level at which DDW recommends removal of a drinking water source from service is called the "Response Level," where the Response Level ranges between ten to 100 times the NL, depending on the toxicological endpoint that is the basis for establishing the NL. Since the 1980s, the DDW has established NLs for 93 contaminants, 40 of which now have MCLs.

Since the implementation of the 2000 OBMP, the DDW has adopted new Primary MCLs that have changed or restricted how and where groundwater is pumped by municipal water agencies. As laboratory analytical technologies to detect contaminants in water advance over time, it can be expected that new contaminants of concern will be identified, and some will ultimately become regulated. In response, municipal water agencies will need to construct treatment facilities or implement changes in existing pumping operations to address the newly regulated contaminants. With each new regulation there are increasing constraints on existing water supply infrastructure that can limit a Parties' ability to pump their groundwater rights and stored water and conflict with other basin management issues that include, but are not limited to, groundwater recharge, maintaining Safe Yield, and maintaining Hydraulic Control.

Occurrence of Contaminants in the Chino Basin

Exhibit EF-1 summarizes the occurrence of drinking water contaminants with a Primary MCL in groundwater pumped from active municipal supply wells in the Chino Basin for the five-year period of 2014 to 2018. For this discussion, "active municipal supply wells" includes the 141 municipal supply wells that pumped groundwater anytime within the two-year period of 2017 to 2018. For comparison, this table also summarizes the number of wells with exceedances of the MCL for: all existing municipal supply wells whether they are recently active or not and all existing wells in the basin, including private agricultural, non-agricultural, municipal supply, and monitoring wells, whether they are recently active or not. The three most common contaminants that exceed a primary MCL in the Chino Basin at active municipal supply wells are nitrate (71 wells), 1,2,3-trichloropropane (1,2,3-TCP) (33 wells), and perchlorate (27 wells).

Exhibit EF-2 shows the locations of active municipal supply wells and symbolizes them based on the number of regulated drinking water contaminants that have been detected in exceedance of their respective primary MCLs. Of the 141 recently active municipal supply wells, 45 have at least one drinking water contaminant, 17 wells have two contaminants, 14 have three contaminants, five have four contaminants, and five have five contaminants. The wells with regulated drinking water contaminants are primarily located in the southern (south of the 60 freeway) and western (west of Euclid Avenue) areas of the Basin. Exhibits EF-3, EF-4, and EF-5 show the spatial distribution of the maximum observed nitrate, 1,2,3-TCP, and perchlorate concentrations at all wells in the Chino Basin for the five-year period of 2014 to 2018.

The occurrence of 1,2,3-TCP in nearly 25 percent of active municipal supply wells is noteworthy. The MCL for 1,2,3-TCP is 0.005 micrograms per liter (µgl), which is 5 parts per trillion (ppt). This is the lowest numerical value for a MCL established to date in the State of California. And, unlike past newly adopted MCLs, the MCL for 1,2,3-TCP became immediately effective upon its adoption in December 2017. As a result, municipal water agencies were immediately required to either cease using active wells that pump groundwater with 1,2,3-TCP concentrations in excess of the new MCL or implement treatment (typically blending) to ensure their water supplies have a 1,2,3-TCP concentration below the MCL. Prior to 2018, municipal water supplies were not routinely tested for 1,2,3-TCP even though there was an existing NL for 1,2,3-TCP of 0.005 µgl. And, when testing occurred it was not always done using the lowest available detection limit that was equal to the NL. For this reason, upon adoption of the MCL, the DDW also required municipal water agencies to perform quarterly compliance monitoring in 2018 using laboratory detection limits low enough to test for concentrations equivalent to the MCL of 0.005 µgl. Exhibit EF-4 includes the quarterly monitoring results from 2018 and represents the most comprehensive characterization of the occurrence of 1,2,3-TCP in the Chino Basin to date. The wells producing groundwater with 1,2,3-TCP concentrations equal to or greater than the MCL are primarily located in the western half of the Basin. The following agencies have had to shut down supply wells or modify operations as a result of the new MCL: the City of Chino Hills, CDA, City of Chino, City of Pomona, Monte Vista Water District (MVWD), and JCSD.

Exhibit EF-6 summarizes the occurrence of drinking water contaminants with a California NL in groundwater pumped from active municipal supply wells in the Chino Basin for the five-year period of 2014 to 2018. For comparison, this table also summarizes the number of wells with exceedances of the NLs for: all existing municipal supply wells whether recently active or not and all existing wells in the basin, including private agricultural, non-agricultural, municipal supply, and monitoring wells whether they are recently active or not. Exhibit EF-7 shows the location of the active municipal supply wells and symbolizes them based on the number of contaminants that have been detected in exceedance of a NL. Of the 141 recently active municipal supply wells, only two wells show an exceedance of an NL for one contaminant: groundwater sampled from both wells exceed the NL for 1,4-dioxane. It is likely there are more occurrences of NL exceedances for 1,4- dioxane and other contaminants in the Chino Basin, but because the DDW does not require monitoring for contaminants with an NL and/or testing is not performed using analytical methods with the numerically lowest detection limits that are equal to or lower than the NLs, the potential impact to the Parties posed by the adoption of MCLs based on existing NLs cannot be characterized.

Readiness to Address Future Drinking Water Regulations

Since the implementation of the 2000 OBMP, the DDW has adopted three new Primary MCLs that have impacted municipal water agencies the Chino Basin, including perchlorate, hexavalent chromium, and 1,2,3-TCP. And, as demonstrated by the newest MCL for 1,2,3-TCP, the timeline for complying with new drinking water quality regulations is becoming more restrictive. To prepare for the challenges of complying with potential future MCLs, it will be increasingly important for municipal supply agencies to understand which emerging contaminants of concern are candidates for regulation, potential regulatory limits, and the occurrence of those contaminants in local and regional water supplies. Tracking emerging contaminants that are being considered for regulation and performing monitoring to characterize their occurrence in the Chino Basin will help to identify and plan for optimal solutions to manage groundwater quality for drinking water supply.

Since 2000, under PE 6, Watermaster has assessed groundwater quality in the Chino Basin using data compiled through its own monitoring activities and the efforts of other cooperating entities, and has reported on the water quality trends and findings related to regulated contaminants and contaminants of emerging concern in its biannual State of the Basin reports. For the municipal water agencies, monitoring groundwater for emerging contaminants is, for the most part, a voluntary activity. There are periodic monitoring requirements under the Federal Environmental Protection Agency's (EPA) Unregulated Contaminant Monitoring Rule (UCMR), which is implemented to collect occurrence data for selected contaminants of emerging concern that have documented potential public health effects. Monitoring under the UCMR program is performed every five years and the results are used, in part, to support determinations of whether or not to regulate a contaminant in drinking water to protect public health. For each UCMR cycle, the EPA defines the municipal water agencies that must perform monitoring and the analytical methods and detection limits that should be used for each contaminant on the UCMR list. Generally, the UCMR does not require municipal water agencies to test all of their water supply sources and, as to groundwater, may only require a subset of wells be sampled. And, the UCMR does not always require the use of analytical methods with the numerically lowest detection limits, which in some cases means that analysis is done using detection limits for reporting (DLR) that are above potential regulatory limits, as was the case for UCMR monitoring of 1,2,3-TCP. Once a UCMR monitoring event is over, no additional requirements for testing for the contaminants of emerging concern are required. In the State of California, the monitoring of unregulated contaminants with established NLs is recommended but not required. And as with UCMR monitoring, the use of analytical methods with the numerically lowest detection limits are often not used. Because monitoring for unregulated contaminants is voluntary and there are various analytical methods used, it is generally difficult to characterize the basin-wide occurrence of contaminants of emerging concern.

The occurrence of three contaminants in the Chino Basin that are subject to revised or new drinking water regulations are discussed below.

Perchlorate and Hexavalent Chromium

Currently, in the State of California, there are two drinking water contaminants with primary MCLs that are well characterized in the Chino Basin that are undergoing review and consideration by the DDW for an MCL revision: perchlorate and hexavalent chromium.

Perchlorate. As previously described, perchlorate is one of the top three drinking water contaminants in the Chino Basin. An MCL of 6 µgl was established in 2007. In 2015, the Office of Environmental Health Hazard Assessment (OEHHA) revised the Public Health Goal (PHG[18]) for perchlorate from 6 µgl to 1 µgl, based on new scientific literature that indicates possible health effects to infants from exposure to perchlorate in drinking water. This revision prompted the DDW to review the current MCL and determine if it should be lowered to a value closer to the revised PHG. To support its review and decision, the DDW has recommended that the required DLR for analysis of municipal drinking water supplies be lowered from the current DLR of 4 µgl to equal to or less than 1 µgl and occurrence data be collected across the state.

Exhibit EF-8 shows the spatial distribution of the maximum observed perchlorate concentration for all wells in the Chino Basin for the five-year period of 2014 through 2018 along with the locations of the 141 active municipal supply wells. Exhibit EF-8 differs from Exhibit EF-5 in that the symbology of the perchlorate concentration at wells is based on the PHG of 1 µgl and not the MCL of 6 µgl. Exhibit EF-8 also indicates which of the wells in the basin characterized as having “non-detect” concentrations have not been tested using detection limits that are less than or equal to the PHG of 1 µgl (DLR = 4 µgl). Most of the wells that have not been tested at the lower DLR are private wells south of the 60 freeway. Exhibit EF-8 shows that 95 percent of the of the detectable concentrations of perchlorate in the basin are above the PHG of 1 µgl and that perchlorate is prevalent throughout the entire Chino Basin. As such, compliance with the drinking water standard could require treatment facilities across most of the Chino Basin if the MCL is lowered from 6 µgl.

Hexavalent Chromium. The PHG for hexavalent chromium is 0.02 µgl. In 2014, the DDW established an MCL of 10 µgl, which was subsequently challenged in court. In 2017, the Superior Court of Sacramento County issued a judgment invalidating the Primary MCL for drinking water because the DDW failed to properly consider the economic feasibility of complying with it. The court ordered the DDW to conduct an economic evaluation and establish and adopt a new MCL, which could be the same or different from the prior and now invalidated MCL of 10 µgl. Exhibit EF-9 shows the spatial distribution of the maximum observed hexavalent chromium concentration for all wells in the Chino Basin for the five-year period of 2014 through 2018. The symbology of the observed hexavalent chromium concentrations is based on the prior MCL of 10 µgl. Seven percent of all wells sampled have a concentration above 10 µgl: 127 of the 141 active municipal supply wells have a detectable concentration of hexavalent chromium, and nine of the 141 active municipal wells exceeded 10 µgl. Hexavalent chromium is not a widespread compliance issue

[18] A PHG is the level of a chemical contaminant in drinking water that does not pose a significant risk to health. PHGs are not regulatory standards, but State of California law requires the DDW to set MCLs for a contaminant as close as technologically and economically possible to the PHG.

based on the old 10 µgl MCL, but compliance could be problematic in the future if the DDW establishes a new MCL less than 10 µgl.

Poly- and Per-fluorinated Compounds. An example of emerging contaminants that were part of the UCMR and are currently receiving notable regulatory attention on both State and Federal levels include two PFAS compounds: — perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). In 2009, the EPA published provisional Health Advisory Levels (HAL) for PFOA and PFOS of 400 nanograms per liter (ngl) and 200 ngl, respectively (or 400 and 200 parts per trillion [ppt]). The 2012 UCMR 3 contaminant monitoring list included six PFAS, including PFOA and PFOS. The required DLRs for PFOA and PFOS were 20 and 40 ngl, respectively. In 2016, following the UCMR 3 monitoring, the EPA significantly lowered the HAL for PFOA and PFOS to a combined 70 ngl, a 90 percent reduction. And, in 2018, the DDW established NLs for PFOA and PFOS of 14 and 13 ngl, respectively. That same year, laboratory methods with detection limits numerically less than these NLs became available. As part of the NL guidelines, the DDW established an interim Response Level of 70 ngl for PFOA and PFOS combined, consistent with the EPA's interim HAL. If the DDW recommends that the water source be removed from service or that treatment be implemented to get levels below the Response Level. The PFOA and PFOS Response Level is five times the NL for one of them individually; this is more stringent than other Response Levels established by the DDW, which as previously noted are typically ten to 100 times the NL.

Exhibit EF-10 shows the occurrence of PFOA and PFOS in groundwater and some blending sources for the recycled water recharge in the Chino Basin as of March 2019, based on all monitoring performed since 1998. The exhibit shows that the majority of wells in the Chino Basin have not been sampled for PFOA and/or PFOS. The 30 wells in the Chino Basin that have been sampled for PFOA and PFOS were tested during UCMR 3 using the laboratory detection limits of 20 and 40 ngl, which are higher than the current NLs. Monitoring of recycled water recharge blending sources shows that many of the sources sampled have detectable concentrations of PFOA and PFOS, and some are above the NLs. The EPA and the DDW have both indicated that they are moving forward with the process to adopt MCLs for PFOA and PFOS in the near future. The occurrence of PFOA and PFOS in Chino Basin groundwater as of March 2019 is not well characterized at concentrations equivalent to or below the current NLs, and there are recharge water sources with concentrations of PFOA and PFOS above the NLs. Widespread monitoring for PFOA and PFOS using lower-detection limit laboratory methods is necessary to understand the occurrence of PFOA and PFOS in the basin in order to plan for compliance with potential new drinking water regulations.

Basin Management and Water Rights Implications of More Stringent Water Quality Regulations

To maintain yield and limit losses to the Santa Ana River, the Chino Basin is managed as hydrologically closed: the primary discharge of groundwater from the Chino Basin is groundwater pumping. Maintaining Hydraulic Control in this way is also a requirement of the maximum benefit SNMP. Operating the Chino Basin as a closed system contributes to the accumulation of salts, nutrients, and other contaminants in groundwater, which are primarily removed by groundwater pumping. The constantly evolving regulatory environment described above threatens the ability of the Parties to pump groundwater, and some Parties are not or will not be able to pump their groundwater rights due to the presence of contaminants and the lack of treatment facilities to comply with drinking water quality standards.

As is currently occurring in response to the immediate enforcement of the new MCL for 1,2,3-TCP, it is likely that the initial response actions for compliance with new MCLs will be to shut-down pumping at wells with concentrations that exceed the MCL until a treatment plan is developed and implemented, which for some agencies could take years. Prolonged reductions in groundwater pumping due to groundwater contamination have the effect of reducing Safe Yield and potentially contributing to the loss of Hydraulic Control and the spread of contamination. Therefore, it will become increasingly necessary to pump and treat groundwater to comply with drinking water standards and maintain Safe Yield and Hydraulic Control of the Chino Basin.

With the exception of the Desalters, groundwater treatment facilities in the Chino Basin have been constructed and operated by individual municipal water supply agencies, and the construction and operations and maintenance costs are borne by the agency alone. There is potential for cost savings and other benefits to basin management, such as protecting Safe Yield, and maintaining Hydraulic Control, if regional groundwater treatment and conveyance systems are implemented to address groundwater contamination.

Summary

In order to achieve the objectives of Activities E and F to effectively plan for compliance with future water quality regulations, a *Groundwater Quality Management Plan* should be developed (1) to continually track the UCMR monitoring program, DDW regulatory activities, and others to stay informed of which groundwater contaminants are potential candidates for future MCLs; (2) to implement a long-term basin-wide monitoring plan—including protocols for the use of consistent laboratory methods by all agencies—to collect data on the occurrence of the contaminants of emerging concern; (3) to periodically characterize the potential for compliance challenges on a basin-wide scale; and (4) to develop and evaluate individual and regional compliance solutions to address these challenges. Such a process will enable the Parties to prioritize the most cost-effective compliance solutions that provide for multiple benefits in achieving the goals of the OBMP. The *Groundwater Quality Management Plan* could be developed and implemented by reconvening the Water Quality Committee. The scope of work to develop the *Groundwater Quality Management Plan* is described below.

Scope of Work for Activity EF

The scope of work to develop and implement a *Groundwater Quality Management Plan* consistent with the objectives of Activity EF consists of eight tasks.

- Task 1 – Convene the Water Quality Committee, define objectives, and refine scope of work
- Task 2 – Develop and implement an initial emerging-contaminants monitoring plan
- Task 3 – Perform a water quality assessment and prepare a scope to develop and implement a Groundwater Quality Management Plan
- Task 4 – Develop planning, screening, and evaluation criteria
- Task 5 – Identify and describe potential projects for evaluation
- Task 6 – Conduct a reconnaissance-level study for the proposed projects
- Task 7 – Prepare the *Groundwater Quality Management Plan*
- Task 8 – Plan, design, and build water quality management projects

Task 1 will develop the administrative and stakeholder process and refine the objectives and scope for developing the *Groundwater Quality Management Plan*. Tasks 2 and 3 will include an initial monitoring program and the characterization of current water quality conditions to determine the appropriate long-term monitoring and assessment program and to support the development and implementation of the groundwater quality management plan. Tasks 4 through 8 contain the efforts to fully develop and implement a groundwater quality management plan. The precise scope and level of effort required to perform Tasks 4 through 8 will greatly depend on the assessment in Task 3. At present, there is not enough information to fully scope out these later tasks. The activities for Tasks 4 through 8 are generally described below, but the cost estimate to perform these tasks is not estimated herein. For completeness, a scoping effort to perform Tasks 4 through 7 will be included as a work-product of Task 3. The scoping effort for Task 8 cannot be completed until Task 7 is completed.

Task 1 – Convene the Water Quality Committee, define objectives, and refine scope of work. The objective of this task is to reestablish the Water Quality Committee, which will be comprised of representatives from all interested stakeholders for the purposes of developing and implementing a groundwater quality management plan. The Committee will precisely articulate the objectives of a groundwater quality management plan and refine the scope of work described below in Tasks 2 and 3 to develop and implement an initial monitoring plan, to perform an assessment of the current water quality condition, and to scope the remaining tasks to develop a groundwater quality management plan. After the scope of work has been refined, the cost and implementation schedule will be updated. Four Committee meetings will be conducted to obtain consensus on the objectives and scope of work.

Task 2 – Develop and implement an initial emerging-contaminants monitoring plan. The objective of this task is to develop a monitoring plan to support the initial assessment of water quality conditions related to contaminants of emerging concern in the Chino Basin. The intent is to conduct monitoring using consistent laboratory methods and detection limits at all wells (including those sampled by Watermaster and municipal water agencies) and to use methods with detection limits that are capable of quantifying concentrations at levels equal to relevant regulatory criteria such as PHGs, NLs, or MCLs.

The initial emerging contaminants monitoring plan will include: a list of wells to be sampled, the list of contaminants to analyze, and a quality assurance project plan (QAPP) that defines the monitoring procedures, quality assurance and quality control (QAQC) protocols for data collection and review, and other requirements. The list of wells will include all municipal supply wells and all monitoring and private wells that are in the capture zone of the municipal supply wells. The QAPP will ensure that Watermaster and each municipal water agency that tests its own wells will collect and analyze samples in a consistent manner. The monitoring plan may include the collection and analysis of groundwater in adjacent groundwater basins that are tributary to the Chino Basin and other sources of recharge to the groundwater basin. At a minimum, the initial emerging contaminants monitoring plan should consist of a one-time sampling event at each well identified in the plan. Two Committee meetings will be conducted to obtain consensus on the scope, cost, and schedule to perform the initial monitoring.

Once consensus is achieved, the initial emerging contaminants monitoring plan will be executed by Watermaster and all participating agencies at the selected wells. The labor and laboratory costs to conduct the initial monitoring at municipal wells will be incurred by the well owners. The labor and laboratory cost to conduct the initial monitoring at monitoring wells or private wells in the capture zone of municipal supply wells will be incurred by Watermaster.[19] All monitoring data will be collected, processed, reviewed for QA/QC, and uploaded to a centralized database maintained by Watermaster for the Chino Basin. The Committee will use the data collected for the initial emerging contaminants monitoring plan, along with other groundwater quality data collected and maintained by Watermaster for the basin-wide groundwater quality monitoring program, to perform the initial water quality assessment in Task 3.

Task 3 – Perform a water quality assessment and prepare a scope to develop and implement a Groundwater Quality Management Plan. The objectives of this task are to prepare a comprehensive assessment of current water quality conditions related to contaminants of emerging concern in the Chino Basin and perform a scoping effort to develop and implement a groundwater quality management plan. Task 3 will begin once the initial emerging contaminants monitoring plan developed in Task 2 has been completed.

The water quality assessment will characterize:

[19] This scope of work assumes 40 monitoring and private wells will be sampled by Watermaster.

- basin-wide concentrations of constituents analyzed pursuant to the initial emerging contaminants monitoring plan;
- current and foreseeable challenges to pumping groundwater for municipal supply based on the results of initial monitoring and other data;
- actions currently being implemented by the Parties to mitigate and/or adapt to current or foreseeable water quality challenges; and
- areas where there are no actions being implemented or planned to mitigate and/or adapt to current or foreseeable water quality challenges.

The water quality assessment will support the scoping effort (1) to implement a long-term monitoring and assessment program and (2) to complete the *Groundwater Quality Management Plan* (e.g. perform Tasks 4 through 7 to identify, evaluate, and select projects to address groundwater quality).

The long-term monitoring and assessment program should be adaptive and include a process to update it at a selected frequency and/or when triggered, based on the needs of the Water Quality Committee, observed trends in water quality, or new or potential regulations.

The deliverable of this task will be a technical report that documents the initial monitoring program, the basin-wide characterization of water quality, the recommended scope of work, schedule and cost to implement a long-term monitoring and assessment program, and the scope of work, schedule, and cost to complete the groundwater quality management plan (Tasks 4 through 7). Four Committee meetings will be conducted to complete the work necessary for Task 3.

Task 4 – Develop planning, screening, and evaluation criteria. The objectives of this task are to develop criteria to evaluate water quality improvement projects. The types of criteria developed to evaluate potential projects in Task 4 will include:

- Watermaster criteria that include no potential MPI, balance of recharge and discharge, and others;
- regulatory criteria that include compliance with DDW regulations and others;
- qualitative criteria that include institutional complexity, overall water supply reliability, and others; and
- quantitative criteria that include business case evaluations expressed as net present value, unit cost, and others.

Task 5 – Identify and describe potential projects for evaluation. The objectives of this task are to identify groundwater quality treatment projects using existing and new facilities, to screen them using the criteria developed in Task 4, and to select a final list of projects for detailed evaluation in Task 6. The list of potential projects should include concepts using existing infrastructure and new infrastructure, solutions for individual agencies, and collaborative solutions.

Task 6 – Conduct a reconnaissance-level study for the proposed projects. The objective of this task is to characterize the performance and the groundwater treatment projects selected for evaluation in Task 5, individually and as a group/system. A reconnaissance-level engineering design and operating plan will be developed for each project. Each project design will include the approximate location, target contaminants, treated volumes, and conveyance systems, and will describe any potential implementation barriers. A cost opinion will be determined for each project. The cost opinion will include a comparison of the cost to implement treatment projects by individual municipal agencies to those of collaborative projects. This task will include a recommended set of projects for implementation, based on the criteria developed under Task 4. The final deliverable of this task will be an implementation plan that includes a schedule and plan to finance preliminary design and CEQA documentation of the projects selected for implementation.

Task 7 – Prepare the Groundwater Quality Management Plan. The objective of this task is to prepare the *Groundwater Quality Management Plan*, which will document the most current water quality assessment, the long-term monitoring and analysis plan, the reconnaissance-level engineering design plan, the selected projects for implementation, and an implementation plan. New regulatory requirements and the compliance challenges that result can occur at random, so the groundwater quality management plan should include a strategy to trigger an update to address pending or newly adopted regulations. Water quality results reported out of the long-term monitoring and assessment program could also trigger the need to update the management plan. The implementation plan will include a process to initiate the development and implementation of an update to the *Groundwater Quality Management Plan*.

Task 8 – Plan, design, and build water quality management projects. The objective of this task is to implement the recommended projects in the *Groundwater Quality Management Plan*. This task includes (1) developing and implementing necessary agreements between participating Parties, (2) preparing preliminary designs of the recommended projects, (3) preparing the environmental documentation for the recommended projects (this will tier-off from the 2020 OBMP Update PEIR), (4) preparing financial plans to construct the recommended projects, (5) preparing final designs of the recommended projects, (6) acquiring necessary permits for constructing and operating the recommended projects, and (7) constructing the recommended projects.

Cooperative Efforts with Appropriate Entities to Implement Activity EF

Watermaster and the IEUA will collaborate to support the development of the *Groundwater Quality Management Plan*. Based on the scope of work described above, the following is a description of the recommended roles of each agency:

- ***Watermaster.*** Convenes the Water Quality Committee, leads the stakeholder process to define the initial emerging contaminants monitoring plan, performs monitoring at Watermaster monitoring wells and private wells pursuant to the initial and long-term monitoring plans, collects and maintains the data collected by the municipal agencies and other stakeholders as part of the initial and long-term monitoring plans, performs water quality assessments of the Chino Basin, and prepares the final groundwater quality management plan.
- ***IEUA.*** Leads stakeholders in the process of identifying and describing potential projects, conducting a reconnaissance-level engineering study for the proposed projects, and project implementation.

Implementation Actions, Schedule, and Costs for Activity EF

The recommended schedule to complete the scope of work described herein is described below:

Year one:

- Convene the Water Quality Committee, define objectives, and refine scope of work for Tasks 2 and 3 (Task 1).
- Develop initial emerging contaminants monitoring plan (Task 2).

Year two:

- Implement initial emerging contaminants monitoring plan (Task 2).
- Begin preparing the water quality assessment of the Chino Basin (Task 3).

Year three:

- Complete the water quality assessment of the Chino Basin, recommendations for a long-term monitoring and assessment program, and the scoping effort for Tasks 4 through 7 (Task 3).

Year four:

- Implement long-term monitoring and assessment program (continues every year thereafter, subject to periodic modifications).
- Develop planning, screening, and evaluation criteria to review potential projects (Task 4).
- Identify and describe potential projects for evaluation (Task 5).
- Begin the reconnaissance-level study of selected projects (Task 6).

Year five:

- Complete the reconnaissance-level study of selected projects (Task 6).
- Select project/s for implementation (Task 6).
- Begin to prepare the *Groundwater Quality Management Plan* (Task 7).
- Conduct the long-term monitoring and assessment plan as defined in Task 3.

Years six and seven:

- Complete the final *Groundwater Quality Management Plan* (Task 7).
- Prepare necessary agreements to implement selected projects.
- Prepare preliminary design reports for the recommended projects. The level of design will be such that it enables the preparation of environmental documentation pursuant to CEQA, provides information for identifying and acquiring construction and related permits, and produces updated cost estimates (Task 8).
- Conduct the long-term monitoring and assessment plan as defined in Task 3.

Years eight to ten:

- Prepare final designs and acquire necessary permits for the selected projects (Task 8).
- Construct selected projects.
- Conduct the long-term monitoring and assessment plan as defined in Task 3.

Exhibit EF-11 shows the estimated budget-level engineering cost to complete Tasks 1 through 3, which is about $295,000. The cost of Tasks 4 through 7 cannot be estimated until the completion of Task 3, and the cost of Task 8 cannot be estimated until the completion of Task 7. Exhibit EF-11 also shows how Tasks 1 through 3 and their associated costs will be scheduled over the first three years of implementation.

Activity CG

Description of Activity CG

Activities C and G, defined by the stakeholders, are both intended to address the need for infrastructure to optimize the use of water supplies. Activity C defined by the stakeholders is:

> *Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence.*

Activity G defined by the stakeholders is:

> *Optimize the use of all sources of water supply by improving the ability to move water across the basin and amongst stakeholders, prioritizing the use of existing infrastructure.*

The two activities were combined into Activity CG.

The Parties have identified that there are basin management challenges, such as land subsidence and poor water quality, that could limit the ability to fully exercise their pumping rights using existing infrastructure. The intent of Activity CG is to optimize the use of all sources of water available to the Parties to meet their demands despite these basin management challenges and potentially help to mitigate them.

Through the listening session process, the stakeholders identified the following as potential outcomes of performing Activity CG:

- Enable producers with infrastructure in MZ1 and MZ2 to obtain water through regional conveyance, which supports the management of groundwater levels to reduce the potential for land subsidence and ground fissuring.
- Enable the Parties to increase pumping in areas currently constrained by poor water quality.
- Remove groundwater contaminants from the Chino Basin and thereby improve water quality.
- Protect and/or enhance Safe Yield.
- Maximize the use of existing infrastructure, which will minimize investments in new facilities.
- Provide infrastructure that can also be used to implement Storage and Recovery Programs.

Activity CG has similar objectives to those of PE 5 of the 2000 OBMP – *Develop and Implement Regional Supplemental Water Program*. Recognizing that growth in the Chino Basin was going to result in a more than 30 percent increase in then-current water demands, PE 5 was included in the 2000 OBMP to improve regional conveyance and the availability of imported and recycled waters throughout the basin. The implementation plan for PE 5 was combined with PE 3 – *Develop and Implement Water Supply Plan for the Impaired Areas of the Basin* in the OBMP and Peace Agreement.

Early in the development of the PE 3/5 implementation plan, the stakeholders discussed the development of a regional water facilities plan that, when implemented, would enable the Parties to maximize the use of imported water in years when Metropolitan has surplus water and to be able to rely completely on local supplies during years when Metropolitan supplies are low or completely interrupted due to planned or catastrophic outages. This plan involved the construction of new wells and groundwater treatment and regional conveyance improvements; the water produced in this plan would be used exclusively by the Parties. The stakeholders ultimately did not include this plan in the 2000 OBMP IP, preferring at that time to focus on expanding groundwater desalting in the lower Chino Basin, increasing stormwater recharge, and implementing a large-scale recycled water program to maximize its reuse.

The IEUA and its member agencies are currently preparing the *2020 Integrated Water Resources Plan* (IRP), which will serve as a regional implementation strategy for long-term water resources management within IEUA's service area. The objective of the IRP is to ensure that the IEUA's water supplies over the next 25 years are reliable, cost-effective, and environmentally responsible. The 2020 IRP is in development, and there is a significant body of engineering planning being performed that can be leveraged to accomplish the objectives of Activity CG for all Chino Basin Parties.

Need and Function of Activity CG

In addition to Chino Basin groundwater, the sources of water available to the Parties include:

- Imported water purchased from Metropolitan (through the IEUA and TVMWD) and the San Bernardino Valley Municipal Water District (Valley District).
- Non-Chino Basin groundwater from adjacent groundwater basins, including the Six, Spadra, Cucamonga, Rialto, Lytle, and Riverside Basins.
- Local surface water from San Antonio, Cucamonga, Day, Etiwanda, East Canyon, and Lytle Creeks, and some tunnels and springs located in the San Gabriel Mountains.
- Recycled water from the IEUA and the Los Angeles Sanitation District.

Watermaster periodically compiles the Parties' future water supply plans. The data collected as part of that process represent the Parties' best estimates of their demands and associated water supply plans. The most recent effort by Watermaster to characterize the water supply plans was during the development of the *Storage Framework Investigation.*[20,21] Exhibit CG-1 shows the historical (2015) and projected aggregate water demand and supply plan for all Parties. Total water demand is projected to grow from about 290,000 afy in 2015 to about 420,000 afy by 2040, and increase of about 130,000 afy. The projected growth in water demand by the Appropriative Pool Parties drives the increase in aggregate water demand as some Appropriative Pool Parties are projected to serve new urban water demands created by the conversion of agricultural and vacant land uses to urban uses. Chino Basin groundwater and imported water together make up about 70 percent of the aggregate water supplies of the Parties.

Each of the water sources shown in Exhibit CG-1 has its limitations; they are described below.

Chino Basin groundwater and basin management issues

Chino Basin groundwater is the largest source of supply used to meet the demands of the Watermaster Parties. Exhibit CG-1 shows that Chino Basin groundwater makes up about 40 to 50 percent of the total aggregate supply. Groundwater pumping was about 147,000 afy in 2015 and is projected to increase to about 177,000 afy by 2040, an increase of about 30,000 afy. The ability to produce groundwater from the Chino Basin is limited by current basin management issues, such as ongoing land subsidence in MZ1 and parts of MZ2, pumping sustainability issues in the JCSD and CDA well field areas, and water quality.

Land subsidence. One of the earliest indications of land subsidence in the Chino Basin was the appearance of ground fissures within the City of Chino in MZ1. These fissures appeared as early as 1973, but an accelerated occurrence of ground fissuring ensued after 1991 and resulted in damage to existing infrastructure. The OBMP IP called for a management plan to reduce or abate the subsidence and fissuring problems to the extent that it may be caused by pumping in MZ1. Watermaster has been conducting land

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[20] The water demand and supply plans developed in 2017 were based in part on 2015 Urban Water Management Plans and updated to 2017 conditions. The Storage Framework Investigation can be found on Watermaster's website. This document is available on Watermaster's FTP site at http://www.cbwm.org/

[21] Watermaster is currently compiling future water supply plans for the Safe Yield Recalculation.

subsidence investigations in the Chino Basin since September 2000 to implement PE 4 of the OBMP IP.[22] The results of the investigations have indicated that the potential occurrence of pumping-induced land subsidence and ground fissuring is confined to MZ1 and MZ2. Watermaster has defined five specific Areas of Subsidence Concern within MZ1 and MZ2: the Managed Area, Northwest MZ1, Central MZ1, the Northeast Area, and the Southeast Area. Exhibit CG-2 shows the locations of the Areas of Subsidence Concern and recent measurements of land subsidence from 2011 to 2019.

For the Managed Area, Watermaster utilized the results of the land subsidence investigations to develop and implement a Subsidence Management Plan (SMP)[23] to minimize the potential for future subsidence and ground fissuring. The SMP established a specific groundwater level at a monitoring well in the Managed Area (the "Guidance Level" at well PA-7 at the Ayala Park Extensometer facility) and recommended that the pumpers with wells in the Managed Area manage their groundwater production such that the groundwater levels at PA-7 remain above the Guidance Level. The main pumpers in the Managed Area are the City of Chino Hills, City of Chino, and State of California. They have voluntarily managed their pumping as recommended in the SMP, and as a result, the rate of land subsidence has declined to de minimis levels within the Managed Area.

Exhibit CG-2 shows that the maximum rate of recent land subsidence from 2011-2019 has occurred in Northwest MZ1. Of particular concern is that the subsidence in Northwest MZ1 has occurred in a pattern of concentrated differential subsidence across the San Jose Fault—the same pattern of differential subsidence that occurred in the Managed Area during the time of ground fissuring in the 1990s. Ground fissuring is the main subsidence-related threat to infrastructure. Exhibit CG-2 also shows the occurrence of subsidence across broad areas in Central MZ1 and the Northeast Area during 2011-2019. Watermaster is monitoring and investigating the relationships between pumping, recharge, groundwater levels and land subsidence in Northwest MZ1, and investigating pumping and recharge strategies to minimize or abate the occurrence of the differential land subsidence. These efforts are being implemented pursuant to the *Work Plan to Develop a Subsidence-Management Plan for the Northwest MZ-1 Area*,[24] which is an appendix to the SMP.

The main groundwater producers in Northwest MZ1, Central MZ1, and the Northeast Area are the City of Pomona, the MVWD, Golden State Water Company (GSWC), the City of Chino, and the City of Ontario. Interim work performed in Northwest MZ1 to support the development of a subsidence management plan for this area suggests that land subsidence could be reduced or abated if recharge in Northwest MZ1 is increased by at least 20,000 afy, pumping is decreased by at least 20,000 afy, or some combination of both totaling about 20,000 afy.[25] Exhibit CG-3 is a time-series chart of groundwater pumping, wet-water recharge, and land subsidence (represented as negative vertical ground motion) in Northwest MZ1 from

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[2] Detailed information on Watermaster's land subsidence investigations, the causes of subsidence and ground fissuring, Watermaster's subsidence management plan for the so-called "Managed Area" in the City of Chino, annual monitoring reports, and ongoing investigations to develop a subsidence management plan for Northwest MZ1 can be found on Watermaster's website at: http://www.cbwm.org/

[23] Chino Basin Watermaster. 2015. *Chino Basin Subsidence Management Plan*. July 2015. This document is available on Watermaster's FTP site at http://www.cbwm.org/

[24] Chino Basin Watermaster. 2015. *Work Plan to Develop a Subsidence Management Plan for the Northwest MZ-1 Area*. This document is available on Watermaster's FTP site at http://www.cbwm.org/

[25] Chino Basin Watermaster. 2017. *Task 3 and Task 4 of the Work Plan to Develop a Subsidence Management Plan for the Northwest MZ-1 Area: Development and Evaluation of Baseline and Initial Subsidence-Management Alternatives*.

1978-2019. Recent pumping in Northwest MZ1 has decreased significantly: 2017-2019 pumping averaged about 12,000 afy compared to about 19,000 afy since the implementation of the OBMP (2001-2016), a reduction of about 7,000 afy. The reduced pumping is mainly due to water quality issues. Additionally, recent wet-water recharge in Northwest MZ1 has increased: 2017-2019 recharge averaged about 15,000 afy compared to about 9,000 afy since the implementation of the OBMP (2001-2016), an increase of about 6,000 afy. Exhibit CG-3 shows that these recent decreases in pumping and increases in recharge, totaling about 13,000 afy, appear to coincide with reduced rates of land subsidence in Northwest MZ1. This suggests that reduced pumping and/or increased recharge can abate land subsidence in Northwest MZ1. If the subsidence management plan for the Northwest MZ1 area recommends a combination of reduced pumping and wet-water recharge to minimize and abate the ongoing land subsidence, the pumpers in this area who elect to reduce pumping in accordance with the plan may have difficulty in fully utilizing their water rights with existing infrastructure.

Pursuant to the Peace Agreement, new land subsidence is considered MPI and would require mitigation. New land subsidence refers to additional land subsidence caused by the reduction of pressure head in the coarse-grain sediments to levels lower than historical lows. Through the Watermaster's recent *Storage Framework Investigation*, a groundwater-elevation metric was defined as a minimum threshold for the occurrence of new land subsidence in MZ1.[26] Based on the modeling results of the *Storage Framework Investigation*, new land subsidence is not projected to occur through 2050 in MZ1 under Scenario 1A, which is based on the Parties' best estimates of how future supplies would be used to meet demands. However, the investigation is limited to new land subsidence and does not address ongoing land subsidence in Northwest MZ1.

Pumping sustainability. The term *pumping sustainability*, as used herein, refers specifically to the ability to pump water from a specific well at a desired pumping rate, given the groundwater level at that well and its specific well construction and equipment details. The pumping sustainability metrics for all Appropriator wells were recently updated as part of the *Storage Framework Investigation*. Groundwater pumping at a well is presumed to be sustainable if the groundwater level at that well is greater than the sustainability metric. If the groundwater level falls below the sustainability metric, the owner will either need to lower the pumping equipment in their well or reduce the well's pumping rate. Groundwater levels at wells in the JCSD and CDA well fields and a part of the FWC service area are currently below the pumping sustainability metric and therefore have limited pumping capacity. Exhibit CG-4 shows the projected difference between the groundwater levels and the pumping sustainability metric in FY 2030 for Scenario 1A. Groundwater levels in Scenario 1A are projected to be above the pumping sustainability metric in 2030 over the entire basin except for the areas with existing pumping sustainability issues, identified by the red circles in Exhibit CG-4. This suggests that projected basin operations will not improve nor exacerbate pumping sustainability issues that currently exist in these areas and that the JCSD and CDA well fields and one well in the FWC service area will continue to have limitations on pumping due to groundwater levels.

Water quality. As described for Activity EF, throughout most of the Chino Basin, there are contaminants in groundwater that can limit its direct use for drinking water supply in the absence of treatment. The constantly evolving regulatory environment described under Activity EF, threatens the ability of the

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[26] The metric is based on historical groundwater levels and is represented as a groundwater level control surface throughout MZ1 that defines the likelihood of initiating new subsidence: if groundwater levels are higher than the metric, then new land subsidence would not occur; if groundwater levels fall below the metric, then new land subsidence could occur and cause MPI.

Parties to pump groundwater. Some Parties are not, or will not be, able to pump their groundwater rights due to the presence of contaminants and the lack of treatment facilities to comply with drinking water standards. For example, the regulatory-required response action for compliance with the new MCL for 1,2,3-TCP is to shut-down pumping at wells with concentrations that exceed the MCL until a treatment plan is implemented.

Exhibit EF-2 shows the locations of active municipal supply wells, symbolized by the number of regulated drinking water contaminants that have been detected in exceedance of their respective primary MCLs. A subset of these wells is currently offline due to these exceedances. According to the interim results from Based on the 2020 IRP, the Parties in the IEUA service area that are impacted by water quality such that some of their production capacity is offline or requires blending are the Cities of Chino, Chino Hills, Upland, and Ontario; the CVWD; the MWVD; and Fontana Water Company. Based on Exhibit EF-2, other Parties that are impacted by water quality and have wells with one or more constituents that exceed an MCL are the City of Pomona, GSWC, JCSD, and Marygold Mutual Water Company. As new drinking water regulations come into effect, additional wells and/or Parties will be impacted if there is no plan to address the contaminants.

Imported water.

Imported water is projected to account for about 20 to 30 percent of the aggregate water supplies of the Parties, as shown in Exhibit CG-1. Imported water demand was about 63,000 afy in 2015 and is projected to increase to about 120,000 afy by 2040, an increase of about 58,000 af. The challenges to imported water include reliability of its supply and infrastructure and the local capacity to treat it for municipal supply.

Supply reliability. In January 2016, Metropolitan completed its *2015 Integrated Resources Plan Update* (2015 IRP)[27], which reported that, if the plan is fully implemented, shortages of imported water supplies will occur about nine percent of the time under 2020 conditions, four percent of the time under 2025 conditions, and zero percent under 2030 conditions. “Shortage” is defined herein as Metropolitan’s inability to fully meet its demands. If Metropolitan does not fully implement its 2015 IRP, shortages in Metropolitan supplies are projected to occur about 12 percent of the time under 2020 conditions, and the occurrence of a shortage is projected to increase to 80 percent under 2040 conditions. Therefore, by 2040, Metropolitan is assumed to be able to fully meet its demands 90 percent of the time (nine out of ten years) with the full implementation of its 2015 IRP and 20 percent of the time (one out five years) without it. As of this writing, the implementation of some projects identified in the 2015 IRP, such as the California WaterFix tunnel project, are uncertain. Failure to fully implement the 2015 IRP in a timely manner will result in less imported water available to the Parties.

Infrastructure reliability. Metropolitan is planning to rehabilitate the Rialto Feeder pipeline, and according to its draft schedule, construction will occur from 2029 to 2033. During construction, continuous six- to nine-month shutdowns are planned to occur. Because the Rialto Feeder pipeline is the main source of imported water deliveries to the IEUA and TVMWD, long-term shutdowns will cause significant reductions in water supplies to the Parties and will require them to rely more heavily on Chino Basin groundwater or other supplies during this period.

In addition to planned infrastructure shutdowns, catastrophic events, such as earthquakes, can cause unplanned outages. Metropolitan recently published its three primary goals to contribute to seismic

[27] Metropolitan. (2016). *Integrated Water Resources Plan: 2015 Update*. January 2016.

resilience: (1) conducting a Rialto Feeder pipeline alternative supply needs study, (2) completing a re-evaluation of its emergency storage needs, and (3) completing a comprehensive evaluation of its storage programs.[28] According to Metropolitan, the latest projections for the worst case scenario under a seismic catastrophic event suggest that the Metropolitan's East Branch of the SWP, which includes the Rialto Feeder pipeline, can be repaired within 12 to 24 months. This means, that under such an event, the Parties would be required to find alternative sources of water to meet 20 to 30 percent of their total demands for up to two consecutive years.

Capacity limitations. The capacity to treat imported water to meet future municipal supply demands is limited for some Parties in the Chino Basin. The Water Facilities Authority (WFA) treats imported water purchased from the IEUA at the Agua de Lejos treatment plant (WFA plant) and delivers it to the Cities of Chino, Chino Hills, Ontario, and Upland, and the MVWD. Each of these WFA member agencies has a contracted share of the plant's total capacity of 81 million gallons per day (mgd), which is equivalent to 90,700 afy. The WFA plant's current capacity is less than its rated capacity of 81 mgd due to solids handling limitations.[29] According to the WFA, the current capacity of the WFA plant is about 40 mgd in the summer months and about 20 mgd in the winter months. This suggests that even when imported water is available to the WFA, there is a limitation in the ability to treat the water and deliver it for municipal use.

Other supply reliability issues

Other reliability issues that can affect the Parties include:

- Non-Chino-Basin groundwater supplies. Non-Chino-Basin groundwater is projected to account for 16 to 18 percent of the Parties' aggregate water supplies. This source of water is not available to all the Parties. The reliability of non-Chino-Basin groundwater depends on water quality, water rights, and infrastructure to convey it to a Parties' water systems.
- Local surface water supplies. Local surface water is projected to account for 3 to 5 percent of the aggregate water supplies of the Parties. This water source is not available to all Parties. The reliability of local surface water depends on the hydrologic characteristics of the individual supplies, water quality, water rights, and infrastructure to convey it from points of diversion to a Party's water system.
- Recycled water supply. Recycled water is projected to account for about 7 to 8 percent of the aggregate water supplies of the Parties. The challenges to maximizing the reuse of recycled water are described under Activity D and include: timing of recycled water availability, salt and nutrient management, water quality regulations, and the Santa Ana River Judgment.
- Climate change. Climate change is likely to result in higher temperatures, longer dry periods, and shorter more intense wet periods, which can ultimately affect the availability and management of all water supply sources. For example, shorter more intense precipitation periods are expected to result in reduced recharge, and longer dry periods are expected to result in reduced imported water supplies (as occurred with SWP supplies in the recent drought from 2013 to 2016).

Summary

The water demands of the Chino Basin Parties are expected to increase by 44 percent by 2040, and as illustrated above, there are numerous challenges to the reliability of the supplies and the infrastructure that deliver them. Many of the challenges are interrelated and compounding. And, the impacts to individual Parties and associated costs to manage them are not equal. For example, the reliability of

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[28] Metropolitan. (2018). *Seismic Resilience, First Biennial Report*. February 2018.

[29] Email from Terry Catlin, April 10, 2018.

imported water (and other non-groundwater supplies) not only affects the imported water supply but also the groundwater supplies that are dependent on imported water for blending. According to draft results from IEUA's 2020 IRP, the Parties that require blending are: the MVWD, CVWD, FWC, and the Cities of Pomona, Upland, Chino, Chino Hills, Ontario.

In the Chino Basin, prolonged reductions in groundwater pumping due to land subsidence, groundwater sustainability, or groundwater contamination have the effect of reducing Safe Yield, potentially contributing to the loss of Hydraulic Control and the spread of contamination. The ability to convey water from areas that are not subject to these limitations to areas that may provide flexibility to the Parties to pump their respective Chino Basin groundwater rights.

Activity CG will require a planning process that will ensure that the recommended infrastructure that results from it will meet the Parties' needs. To do this, the planning process should answer the following questions:

1) How do the Parties define reliability? How can this be quantified?
2) What is the desired level of reliability? How is it articulated at the regional and individual Party levels? For example, the level of reliability could be articulated as: the ability to meet all or a percentage of the potable water demands of the Parties under a full interruption of SWP supplies delivered by Metropolitan.
3) What are the other benefits of optimization desired by the Parties? How can such benefits be quantified?
4) What existing/planned infrastructure could be used to optimize the use of all sources of water and how would it be used?
5) What new infrastructure would be required to achieve the desired level of reliability and other benefits?
6) How would the existing/planned/new infrastructure be operated to achieve the desired level of reliability and other benefits?
7) Are the capital and O&M costs of optimization less than the cost to agencies to manage the supply and infrastructure challenges on their own?
8) What institutional arrangements are necessary to operate the facilities to achieve the benefits?

As previously mentioned, the IEUA is currently developing the 2020 IRP, which will serve as a regional implementation strategy for long-term water resources management within IEUA's service area. As part of this work, the IEUA retained INTERA to model the existing major infrastructure of the IEUA's service area and develop scenarios to identify opportunities and vulnerabilities in the existing infrastructure of its member agencies. The IRP is in development, and there is a significant body of work being performed by the IEUA and its member agencies that can be leveraged to accomplish the objectives of Activity CG for all of the Parties. The IEUA is also currently conducting preliminary engineering and planning for the CBP, which is a large Storage and Recovery Program to provide regional, dry-year water supplies and associated infrastructure. The project concepts envisioned in the CBP could meet, at least in part, the objectives of Activity CG. Regardless, the work currently in development can be leveraged to reduce the cost of implementing Activity CG.

In order to optimize the use of all sources of water and identify and implement water supply reliability projects, the Parties should convene a Water Supply Reliability Committee for the purposes of accomplishing the objectives of Activity CG for all Parties. The scope of work is described below.

Scope of Work for Activity CG

The scope of work to develop and implement Activity CG consists of six tasks.

- Task 1 – Form the Water Supply Reliability Committee, define objectives, and refine scope
- Task 2 – Characterize water demands, water supply plans, and existing/planned infrastructure and its limitations
- Task 3 – Develop planning, screening, and evaluation criteria
- Task 4 – Describe water supply reliability opportunities
- Task 5 – Develop reconnaissance-level engineering design and operating plan
- Task 6 – Plan, design, build water reliability alternatives

The tasks are described below.

Task 1 – Form the Water Supply Reliability Committee, define objectives, and refine scope. In this task, a Water Supply Reliability Committee will be convened. The Committee's initial tasks are: (1) to clearly articulate and obtain consensus on the objectives for optimizing the use of all sources of water; (2) to define reliability, benefits, and performance criteria for the Parties; and (3) to refine the preliminary scope of work, schedule, and cost defined for Tasks 2 through 6 to fully leverage the existing data and planning efforts of Watermaster, the IEUA, and others. Four Committee meetings will be conducted to accomplish these tasks. In step (2), the Committee will address the following questions:

1) How do the Parties define reliability? How can this be quantified?
2) What is the desired level of reliability? How is it articulated at the regional and the individual Party levels?
3) What are the other benefits of optimization desired by the Parties? How can such benefits be quantified?

Task 2 – Characterize water demands, water supply plans, and existing/planned infrastructure and their limitations. The objectives of this task are: (1) to characterize the water demands and supply plans of the Parties; (2) to characterize existing/planned infrastructure to convey, treat, and distribute the supplies to meet demands; and (3) to identify opportunities and limitations in the existing/planned infrastructure consistent with the objectives of Activity CG defined in Task 1. The water demands and supply plans will be characterized on a monthly basis for various climate conditions. One committee meeting and one individual meeting with each participating Party will be conducted to review the characterization of water demands and supply plans and existing/planned infrastructure. Two additional meetings will be conducted to identify opportunities and limitations in the existing/planned infrastructure consistent with the objectives of Activity CG defined in Task 1.

Task 3 – Develop planning, screening, and evaluation criteria. The objective of this task is to develop the criteria that will be used to evaluate water reliability projects in Tasks 4 and 5. Criteria to evaluate potential projects will include:

- Watermaster criteria that include no potential MPI, balance of recharge and discharge, and others;
- qualitative criteria that include institutional complexity and others; and
- quantitative criteria that include business case evaluations, expressed as net present value, unit cost, and others.

Task 4 – Describe water supply reliability opportunities. The objectives of this task include identifying potential water supply reliability project alternatives, screening them using the screening criteria developed in Task 3, and developing project alternatives for detailed evaluation. Three meetings will be conducted to develop a list of potential projects that can be implemented, to review the screening of these projects, and to select projects to evaluate in Task 5. In executing this task, the Committee will address the following questions:

4) What existing/planned infrastructure could be used to optimize the use of all sources of water and how would it be used?
5) What new infrastructure would be required to achieve the desired level of reliability and other benefits?

Task 5 – Develop reconnaissance-level engineering design and operating plan. The objective of this task is to characterize the performance and costs of the water supply reliability alternatives developed in Task 4. A reconnaissance-level engineering design and operating plan will be developed for each alternative. Each alternative design will include the approximate size, location, and alignment of major infrastructure, and will describe any potential implementation barriers for the project. A cost opinion will be determined for each alternative. This task includes evaluating alternatives based on the alternative evaluation criteria developed in Task 3, describing how the alternative could be implemented and financed, and recommending an alternative for implementation. The deliverable of this task will be a technical report that summarizes the work performed under Tasks 1 through 5, and it will include a plan to pay for the preliminary design and CEQA documentation of the recommended alternative. Five meetings will be conducted to review the design and estimated benefit of the recommended alternative; review the evaluation of the projects, based on the criteria developed in Task 3; and review the recommended list of projects for implementation; review the implementation plan; and review the technical report. In executing this task, the Committee will address the following questions:

6) How would the existing/planned/new infrastructure be operated to achieve the desired level of reliability and other benefits?
7) Are the capital and O&M costs of optimization less than the cost to agencies to manage supply and infrastructure challenges on their own?
8) What institutional arrangements are necessary to operate the facilities to achieve the benefits?

Task 6 – Plan, design, build water reliability alternatives. The objective of this task is to implement the recommendations of the technical report. This task includes (1) developing and implementing necessary agreements between participating Parties, (2) preparing the preliminary design of the recommended alternative, (3) preparing the environmental documentation for the recommended alternative and other alternatives that will tier-off the 2020 OBMP Update PEIR, (4) preparing a financial plan for constructing the recommended alternative, (5) preparing final design of the recommended alternative, (6) acquiring permits for constructing and operating the recommended alternative, and (7) constructing the recommended alternative.

Cooperative Efforts with Appropriate Entities to Implement Activity CG

This is a basin-wide activity that involves the Parties, the IEUA, the TVMWD, and the WMWD. Given its current efforts, the IEUA would be the logical entity to lead the implementation of Activity D on behalf of all Parties in these service areas, but the process could be led by others. In this role, the agency leading the project on behalf of the Parties would contract for planning and engineering services as required. Watermaster, TVMWD and WMWD would work with IEUA as needed to support the expansion of the planning efforts to cover non-IEUA member agencies. Watermaster would also participate in the process to ensure that Activity CG implementation is consistent with the Judgment, Peace Agreements and other agreements, and the Watermaster Rules and Regulations.

Implementation Actions, Schedule, and Costs for Activity CG

The recommended schedule to complete the scope of work described herein is described below:

Year one:

- Convene Water Supply Reliability Committee, define reliability and other benefits, and refine scope of work, schedule, and budget (Task 1).

Year two:

- Characterize the water demand, water supply plans, and existing/planned infrastructure and its limitations; and identify conceptual facilities and operational improvements that achieve reliability and other benefits defined in Task 1 (Task 2).
- Develop planning, screening, and evaluation criteria for water supply reliability projects (Task 3).
- Develop water reliability alternatives for evaluation (Task 4).

Year three:

- Conduct reconnaissance-level engineering study for the alternatives (Task 5).

Years four through seven:

- Recommend alternative for implementation (Task 5).
- Prepare final report, documenting work performed in Tasks 1 through 5 (Task 5).
- Watermaster, the IEUA, and other potential partners develop a project implementation agreement. The objective of this agreement is to define the roles of each partner in the planning, permitting, design, and implementation of the projects, and the cost allocations.
- Preliminary design of recommended projects. The level of design will be such that it enables the preparation of environmental documentation pursuant to CEQA and provides information for identifying the permits required for construction and operation.
- Prepare environmental documentation for alternatives. CEQA will cover the recommended alternative and other alternatives at the project level, based on the project descriptions developed in Task 5. This documentation will tier-off from the 2020 OBMP Update PEIR. Watermaster will conduct an MPI analysis in parallel with the CEQA process.

Years eight and nine:

- Prepare final designs and acquire permits for the selected alternative.

Years ten and beyond:

- Construct recommended alternative.

Exhibit CG-5 shows the estimated budget-level engineering cost to complete Tasks 1 and 2 which is about $305,000. The cost of Tasks 3 through 6 cannot be estimated until the completion of Task 2. And, because the IEUA is currently conducting its 2020 IRP (the scope of work for which overlaps with scope recommended herein), the cost may be lower than estimated if its work is leveraged.

Some of the facilities and associated operating plans identified under this activity may overlap with those envisioned in Activity EF and/or Activity B. If Activity EF and/or B and CG move forward, there will be cost savings related to facilities planning.

Activity K

Description of Activity K

Activity K defined by the stakeholders is:

> *Develop a management strategy within the salt and nutrient management plan to ensure the ability to comply with the dilution requirements for recycled water recharge.*

The objective of Activity K is to determine if compliance with recycled water recharge dilution requirements, defined in Watermaster and the IEUA's maximum benefit SNMP, can be achieved under existing management plans, and if not, to develop a plan to achieve compliance.

Through the listening session process, the stakeholders identified the following as potential outcomes of performing Activity K:

- Enable the continued and expanded recharge of recycled water, which will:
  - protect water quality,
  - improve water-supply reliability, especially during dry periods, and
  - protect/enhance Safe Yield.

The 2000 OBMP included PE 7—*Develop and Implement Salt Management Plan*—to characterize current and future salt and nutrient conditions in the basin and to subsequently develop and implement a plan to manage them. Such a management strategy was necessary to address historical salt and nutrient accumulation from agricultural operations and to support the aggressive expansion of recycled water recharge and reuse envisioned in PE 2 and PE 3/5. Recognizing that implementing the recycled water reuse program would require large scale treatment and mitigation of salt loading under the then-current antidegradation objectives for total dissolved solids (TDS) and nitrate, defined in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan), Watermaster and the IEUA petitioned the Regional Board to establish a maximum benefit-based salt and nutrient management plan (maximum benefit SNMP) that involved (1) increasing the TDS and nitrate objectives for the Chino-North groundwater management zone[30] (GMZ) to numerically higher values to enable recycled water reuse without mitigation or treatment and (2) committing to a program of salt and nutrient management activities and projects ("maximum benefit commitments") that ensure the protection of the beneficial uses of the Chino-North GMZ and downgradient water resources (the Santa Ana River and the Orange County GMZ). The maximum benefit commitments included the implementation of a monitoring, analysis, and reporting program to track TDS and nitrate trends; the construction and future expansion of the Chino Basin Desalters to attain Hydraulic Control of the Chino-North GMZ to protect the Santa Ana River; the construction of recharge facilities to increase storm and recycled water recharge; and a commitment to future treatment of recycled water and/or groundwater, as needed, to protect beneficial uses and comply with the maximum benefit TDS and nitrate objectives. These are all activities that were planned to be implemented under the OBMP. The maximum benefit SNMP was incorporated into the Basin Plan in January 2004.

Activity K, as envisioned by the stakeholders, would entail an expansion on the existing analysis requirements in the maximum benefit SNMP to incorporate a forward-looking assessment of the ability to comply with the maximum benefit commitments. It would set up Watermaster and the IEUA to more

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[30] The Chino-North GMZ has a maximum-benefit TDS objective of 420 mgl and is a combination of the Chino-1, Chino-2, and Chino-3 antidegradation GMZs that have lower TDS objectives ranging from 250 to 280 mgl.

proactively prepare a compliance plan as opposed to reacting to a trigger event that requires short-term, time-certain response actions.

Need and Function of Activity K

Maximum benefit SNMP commitments

Implementation of the maximum benefit SNMP is a regulatory requirement of the Basin Plan. It's also incorporated into Watermaster and the IEUA's recycled water recharge program permit (R8-2007-0039) and the IEUA's recycled water discharge and direct reuse permit (R8-2015-0021; NPDES No. CA 8000409). There are nine maximum benefit commitments included in the Basin Plan and recycled water permits:

1. The development and implementation of a surface-water monitoring program
2. The development and implementation of a groundwater monitoring program
3. The expansion of the Chino-I Desalter to 10 million gallons per day (mgd) and the construction of the Chino-II Desalter with a design capacity of 10 mgd
4. The additional expansion of desalter capacity to a total capacity of 40 mgd pursuant to the OBMP and the Peace Agreement
5. The construction of the recharge facilities included in the Chino Basin Facilities Improvement Program
6. The management of recycled water quality to ensure that the IEUA agency-wide, 12-month running average wastewater effluent quality does not exceed 550 mgl for TDS and 8 mgl for total inorganic nitrogen (TIN)
7. The management of the basin-wide, volume-weighted TDS and nitrate concentrations of artificial recycled, storm, and imported waters to concentrations that are less than or equal to the maximum benefit objectives as a five-year rolling average
8. The achievement and maintenance of Hydraulic Control of groundwater outflow from the Chino Basin, specifically from the Chino-North GMZ, to protect the water quality of the Santa Ana River and downstream beneficial uses
9. The periodic redetermination of "current" ambient TDS and nitrate concentrations of the Chino Basin GMZs (every three years).

Additionally, Watermaster and the IEUA are required to prepare an annual report to the Regional Board on the status of compliance with the maximum benefit commitments. If the maximum benefit commitments are not met to the Regional Board's satisfaction, the antidegradation objectives would apply for regulatory purposes. The application of the antidegradation objectives would result in a finding of no assimilative capacity for TDS and nitrate in the Chino-North GMZ, and the Regional Board would require mitigation for recycled water discharges to Chino-North that exceed the antidegradation objectives. Furthermore, the Regional Board would require that Watermaster and the IEUA mitigate the effects of discharges of recycled water that took place in excess of the antidegradation objectives under the maximum benefit objectives retroactively to January 2004. The mitigation for past discharges would be required to be completed within a ten-year period following the Regional Board's finding that the maximum benefit commitments were not met.

Current compliance with the recycled water dilution requirements of the maximum benefit SNMP

Commitment number 7 of the maximum benefit SNMP is the stakeholders' stated focus of Activity K. This commitment defines a compliance limit that if met, allows for the continued recharge of recycled water without mitigation. Hereafter, the limit will be referred to as the "dilution limit." Commitment number 7 requires that recycled water recharge be limited to the amount that can be blended, on a basin-wide, volume-weighted basis, with other sources of supplemental recharge to achieve five-year running-average concentrations that are less than or equal to the dilution limits. The dilution limits are the maximum benefit objectives: 420 mgl for TDS and 5 mgl for nitrate (as nitrogen). If the five-year, volume-weighted TDS or nitrate concentrations (hereafter, dilution metrics) exceeds the dilution limits, then Watermaster and the IEUA must develop a plan to come into compliance. Compliance options could include, but are not limited to, increasing the recharge of low-salinity supply sources (storm or imported waters), desalting recycled water to reduce salinity, or desalting groundwater as a salt offset.

Watermaster and the IEUA annually analyze and report on "current" compliance with the dilution limit as part of the *Chino Basin Maximum Benefit Annual Report*. The most recent annual report was submitted to the Regional Board in April 2019 and reported on compliance through December 2018.[31] Exhibits K-1 and K-2 are time-series charts that characterize compliance with the dilution limit since the recycled water recharge program began in 2005. The exhibits show the monthly recharge volumes and TDS and nitrate concentrations of each recharge source, the dilution metrics, and the dilution limits. Note that because recycled water recharge began in July 2005, the first five-year period for which the dilution metric was computed was July 2005 through June 2010.

Exhibits K-1 and K-2 illustrate that the TDS and nitrate dilution limits have never been exceeded. From June 2010 to December 2016, the TDS dilution metric increased from about 203 to 354 mgl. During the same period the nitrate dilution metric increased from 1.1 to 3.0 mgl. After December 2016, the TDS and nitrate dilution metrics decreased to 281 mgl and 2.0 mgl, respectively. As of 2018, the five-year, volume-weighted TDS dilution metric was 139 mgl less than the dilution limit, and the nitrate dilution metric was 3 mgl below the dilution limit.

Threats to compliance with the dilution limits

As suggested by Exhibit K-1, the primary threats to compliance with the TDS dilution limit are the availability of imported and storm waters for recharge. Increases in the TDS concentration of recycled water are also a threat to compliance. The threat of exceeding the nitrate dilution limit is far less given that the nitrate concentration of the recycled water recharge is typically less than the nitrate dilution limit of 5 mgl.

Imported water is a low-TDS source of recharge and has an important influence on the dilution metric. As shown in Exhibit K-1, the TDS concentration of imported water used for recharge ranged from 87 to 367 mgl. In mid-2016, the rate of increase of the TDS dilution metric rose significantly from about 1.3 mgl per month to 12 mgl per month through October 2016 when the metric peaked at 354 mgl. In October 2016, the five-year dilution metric calculation included almost no imported water recharge: the last significant period of imported water recharge occurred in May through September of 2011 (3,700 to 7,800 af). After peaking in October 2016, the dilution metric for TDS began to decrease and stabilize due to a large imported water recharge event that occurred from October 2016 through January 2018 (46,000 total af).

[31] WEI. (2019). *Optimum Basin Management Program Chino Basin Maximum Benefit Annual Report 2018*. April 2019.

A similar trend was observed for the dilution metric for nitrate, as shown in Exhibit K-2. These observations demonstrate the importance of imported water recharge to compliance with the dilution metric.

Stormwater is a more consistent source of recharge, but it occurs in smaller volumes than imported water recharge. Over the most recent five-year period (January 2014 to December 2018), the total volume of stormwater recharge was 39,000 af compared to 47,000 af of imported water. And, while stormwater TDS concentrations are typically low in the wet winter months (50 to 150 mgl), the TDS of dry-weather flows diverted to recharge in summer months are typically greater than 300 mgl. The implementation of the 2013 RMPU is expected to increase the annual average stormwater recharge volume, but even with increased recharge capacity, multiyear drought conditions with limited stormwater recharge opportunities could lead to compliance challenges.

During drought conditions there is: a reduction in the amount of high-quality stormwater recharge; limited or no availability of imported water for recharge; an increase in the TDS concentrations of imported water, if it is available for recharge; and a concomitant increase in the TDS concentrations of the recycled water. Not only are the two primary sources of low-TDS water less available during drought periods, but the source water quality of municipal water supplies is also higher in TDS due to increases in imported water TDS and indoor water conservation practices. Exhibit K-1 shows the influence of the most recent statewide drought, which occurred over 2013 to 2016, on the dilution metric. During this time the dilution metric for TDS steadily increased from about 210 mgl to 350 mgl. This analysis demonstrates the meaningful impact that drought has on compliance with the dilution metric and indicates that climate change, which is expected to result in longer, drier droughts, could potentially threaten future compliance with the dilution limit.

Other maximum benefit SNMP compliance challenges

There are other metrics in the maximum benefit SNMP commitments that would require the evaluation of potential salt offset projects to achieve compliance. Commitment number 6 requires that when the IEUA's agency-wide, 12-month, running-average recycled water effluent TDS concentrations exceeds 545 mgl for three consecutive months or the TIN concentrations exceeds 8 mgl in any one month, Watermaster and the IEUA must submit a water quality improvement plan and schedule to the Regional Board. The plan must demonstrate how the 12-month running-average IEUA agency-wide recycled water effluent will remain in compliance with its discharge permit limits of 550 mgl and 8 mgl for TDS and TIN, respectively.

Exhibit K-3 shows the monthly and 12-month running-average IEUA agency-wide effluent TDS and TIN concentrations for 2005 through 2018. In 2015, the 12-month running-average IEUA agency-wide TDS concentration in recycled water approached the 545 mgl action limit that would require the IEUA and Watermaster to submit a water quality improvement plan and schedule. In analyzing the available data, the IEUA determined that the primary drivers for the increasing recycled water TDS concentration were the increase in the TDS concentration of the water supplies used by its member agencies and an increase of the TDS waste increment from indoor water conservation.

Although the 12-month running-average IEUA agency-wide TDS concentration declined from the 2015 peak before reaching the 545 mgl action limit, it was an important indicator that the TDS concentration of recycled water is likely to approach or exceed the recycled water compliance limit during the next prolonged dry period and require the planning for recycled water quality improvements. In May 2017, recognizing the potential cost of implementing recycled water quality improvements for what might be only short-term exceedances of the 545 mgl action limit, Watermaster and the IEUA petitioned the Regional Board to consider updating the maximum benefit SNMP to incorporate a revised 12-month compliance metric for recycled water effluent (commitment number 6) specifically to allow a longer-term averaging period. The Regional Board agreed that an evaluation of the recycled water compliance metric is warranted and directed Watermaster and the IEUA to develop a technical scope of work to demonstrate the potential impacts of the revised compliance metric. The work began in September 2017 and is ongoing as of the writing of this Scoping Report. If the investigation finds that changing the recycled water compliance metric will not impact beneficial uses in the Chino Basin or cause downgradient water supplies to exceed water quality objectives, then it is likely that the alternative recycled water compliance metric will be approved. If approved, the Regional Board would amend the Basin Plan and the IEUA's permits to incorporate the revised maximum benefit commitments.

The primary objectives of the technical work to support the maximum benefit SNMP and permit updates are: to develop and use an updated groundwater solute transport model to evaluate the TDS and nitrate concentrations of the Chino Basin, to define alternative salinity management scenarios, and to project the future TDS and nitrate concentrations of the Chino Basin for each scenario. The results will be used to develop a regulatory compliance strategy that includes a longer-term average period for recycled water TDS concentrations that is acceptable to the Regional Board. The Regional Board has indicated that in accepting a proposal to modify the recycled water compliance limit, it will require Watermaster and the IEUA to add a new maximum benefit commitment to the Basin Plan that involves updating the TDS and nitrate projections every five years.

The compliance approach being pursued by Watermaster, the IEUA, and the Regional Board illustrates that the Regional Board may be willing to consider adopting an alternative dilution metric—e.g. a longer averaging period—for recycled and supplemental water recharge so long as there are no unmitigated impacts to beneficial uses. The work that is being performed to support the maximum benefit SNMP update can be directly leveraged to achieve the objective of Activity K.

Process required to evaluate potential future dilution compliance challenges

To achieve the objective of Activity K, it is necessary to prepare projections of the dilution metric to evaluate potential compliance challenges and to determine if and when it will be necessary to develop a plan to achieve compliance. The table below summarizes the planning data that are needed to prepare such projections and the existing Watermaster or IEUA programs that produce the planning data.[32]

Planning Data	Existing Watermaster and IEUA Efforts that Compile or Produce the Required Planning Data
Recycled water recharge volumes	Projections prepared through the RMPU process, the Recycled Water Program Strategy, and other efforts.
Recycled water quality	There is no current effort to prepare this projection at the requisite level of detail on a regular basis, but it can be calculated from projections of water supply quality; such a projection was just completed to support the maximum benefit SNMP update.
Imported water recharge volumes	Projections prepared through the RMPU process.

[32] Some additional planning data not listed here would also be required to run the Chino Basin Groundwater Model, which is updated and recalibrated at least every five years.

Planning Data	Existing Watermaster and IEUA Efforts that Compile or Produce the Required Planning Data
Imported water recharge quality	There is no current effort to prepare this projection at the requisite level of detail, but it can be estimated based on historical data; such a projection was just completed to support the maximum benefit SNMP update.
Stormwater recharge volumes	Projections prepared through the RMPU process.
Stormwater recharge quality	Estimates can easily be produced based on historical data.
Groundwater supply volumes	Water supply plans of the Parties are compiled at least once every five years for various Watermaster and IEUA efforts.
Groundwater supply quality	There is no current effort to prepare this projection at the requisite level of detail, which requires the use of a numerical groundwater solute transport model; such a model was just built to support the maximum benefit SNMP update and is being used to prepare groundwater quality projections.
Other water supply volumes	Water supply plans of the Parties are compiled at least once every five years for various Watermaster and IEUA efforts.
Other water supply quality	There is no current effort to prepare this projection at the requisite level of detail, but it can be estimated based on historical data; such a projection was just completed to support the maximum benefit SNMP update.

The planning data would be used to prepare projections of: municipal water supply and quality, imported water quality, recycled water quality, groundwater quality, and ultimately the TDS and nitrate dilution metrics. The projections would be done assuming a range of future cultural conditions (land use changes, population growth, etc.) and climate conditions. These projections would be analyzed to produce best-case and worst-case five-year, ten-year, 15-year, and 20-year recharge projections for imported and storm waters. The best- and worst-case projections of the dilution metric would be appended to the historical record to produce a bracketed series of dilution metric time histories to evaluate the risk of exceeding the dilution metric over a range of potential climate conditions in the short (5-year) and long (20-year) term.

If there is no projected compliance challenge in the next five to ten years, then no additional work would be needed to develop a compliance plan. It would be necessary to update the planning data and modeling tools to evaluate projections at a minimum of every five years. A five-year frequency is consistent with the State Board's 2018 amendments to the SNMP guidelines within its Recycled Water Policy.[33]

If a compliance challenge is projected, then it will be necessary to develop a plan to ensure compliance with the blending metric in the future. As previously noted, the compliance plan could include treatment

[33] The *Water Quality Control Policy for Recycled Water* is available at: https://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/

of the recycled water, increased recharge of high-quality imported water and/or stormwater, increase in groundwater desalting as a salt offset, or an update to the maximum benefit SNMP to change the compliance metric to a longer averaging period. For the latter, it would first be necessary to demonstrate to the Regional Board that a change to the compliance metric will not harm beneficial uses.

Alignment of Activity K with the current investigation to support the update to the maximum benefit *SNMP*

All of the above steps to analyze compliance challenges with the dilution metric are currently being performed in support of the update to the maximum benefit SNMP. Watermaster and the IEUA anticipate that the compliance strategy for the SNMP update will be finalized during FY 2020/2021. When completed the potential compliance challenges with the dilution limit will be known and a range of compliance plans will have been evaluated at a conceptual level. Thus, it may not be necessary to perform any work pursuant to Activity K, unless it is determined that some form salt offset is required. If no compliance challenges arise, or remain at the completion of the SNMP update, no significant work would need to be performed pursuant to Activity K for at least five years. If a salt offset is required, Watermaster and the IEUA would need to begin reconnaissance-level engineering planning in FY 2021/22.

Summary

In order to achieve the objectives of Activity K to ensure the ability to comply with the maximum benefit SNMP dilution metric in the future, Watermaster and the IEUA should expand the existing analysis and reporting efforts to periodically (every five-years), prepare future projections of recharge volumes and quality to determine if there is a compliance challenge, and if necessary, evaluate compliance alternatives. Projections of the dilution metric and an evaluation of compliance challenges in the future are currently being developed for the investigation to support the update to the maximum benefit SNMP described above. The scope of work to implement Activity K can leverage that work.

Scope of Work for Activity K

The scope of work to achieve the objectives of Activity K—*Develop a management strategy within the salt and nutrient management plan to ensure the ability to comply with the dilution requirements for recycled water recharge*—consists of five tasks:

- Task 1 – Prepare projection to evaluate compliance with recycled water dilution requirements
- Task 2 – Identify alternative compliance strategies
- Task 3 – Evaluate alternative compliance strategies
- Task 4 – Implement the alternative compliance strategy
- Task 5 – Periodically reevaluate compliance with dilution requirements

Task 1 – Prepare projection to evaluate compliance with recycled water recharge dilution requirements. The objective of this task is to prepare projections of compliance with the dilution metric for TDS and nitrate in the maximum benefit SNMP and determine if there is a compliance challenge in the future. In this task, all planning data will be compiled, Watermaster's groundwater solute transport model will be updated and used to estimate future groundwater and recycled water quality, and projections of the dilution metric will be prepared. The planning data will be used to evaluate the dilution metric for best-case and worst-case recharge conditions over a twenty-year period. If there are no projected compliance challenges within the next five years, then Tasks 2 through 4 will not need to be performed. If there is a compliance challenge within the next five years, then Tasks 2 through 4 will need to be performed. Task 5 would be performed regardless of the outcome.

Task 2 – Identify alternative compliance strategies. The objective of this task is to identify potential alternative compliance strategies to address foreseeable challenges with complying with the dilution limit in the future. This task includes the following subtasks:

- Develop planning, screening, and evaluation criteria for projects to comply with the maximum benefit SNMP dilution limit.
- Identify potential alternative compliance strategies.
- Perform initial screening of the alternative compliance strategies based on the evaluation criteria.
- Select alternative compliance strategies to evaluate in Task 3.

Task 3 – Evaluate alternative compliance strategies. The objective of this task is to characterize the performance and costs of the alternative compliance strategies defined in Task 2. A reconnaissance-level engineering design and operations will be developed for each alternative. The reconnaissance-level engineering work will include a description of the activity, description of facilities (if required), its ability to comply with the dilution limits, its impact on the TDS and nitrate concentrations of the Chino Basin, and the estimated cost to implement the project alternatives. The projects will be evaluated and ranked based on the criteria developed in Task 2, and an alternative compliance strategy will be selected. The deliverable for this task will include a technical document that describes the reconnaissance-level engineering design and operations, the selected alternative compliance strategy, and the scope of work and cost estimate to implement the selected alternative compliance strategy.

Task 4 – Implement the alternative compliance strategy. The objective of this task is to implement the selected alternative compliance strategy. This task includes (1) developing and implementing necessary agreements between participating Parties; (2) preparing a Basin Plan amendment, if necessary; (3) preparing preliminary designs of the recommended projects; (4) preparing the environmental documentation for the recommended projects (this will tier-off from the 2020 OBMP Update PEIR); (5) preparing financial plans to construct the recommended projects; (6) preparing final designs of the recommended projects; (7) acquiring necessary permits for constructing and operating the recommended projects; and (8) constructing the recommended projects.

Task 5 – Periodically re-evaluate compliance with dilution requirements. The objective of this task is to proactively evaluate future compliance with the maximum benefit SNMP recycled water dilution limit to address any foreseen compliance challenges. The task includes two efforts:

(1) Prepare projections of the dilution metric on a five-year frequency. This includes updating the model, collecting planning data, preparing the requisite projections (see Task 1), and evaluating if there is a compliance challenge. If it is determined that there is a compliance challenge, then Tasks 2 through 4 will be performed. If it is determined that there is not a compliance challenge, this evaluation will be redone in another five years.

(2) Annually report on current and future compliance with the dilution limit. Annual reporting of current compliance with the dilution metric is already done in the Chino Basin Maximum Benefit Annual Reports. This task would simply involve expanding that reporting discussion to include a comparison of the current dilution metric to the bracketed projections of the dilution metric prepared in Task 1. If the current dilution metric suggests there is a potential compliance challenge that was not predicted by Task 1, Watermaster and the IEUA would initiate a process to determine if additional evaluation of compliance alternatives is warranted.

Cooperative Efforts with Appropriate Entities to Implement Activity K

As co-permittees to the maximum benefit SNMP and recycled water recharge program, this activity involves Watermaster and the IEUA. Similar to the existing implementation of the maximum benefit

SNMP, Watermaster would lead the technical and reporting efforts, and any engineering planning work would be led by IEUA.

Implementation Actions, Schedule, and Costs for Activity K

As previously described, all the work required in Task 1 is currently being performed as part of Watermaster and the IEUA's investigation to support an update to the maximum benefit SNMP to change the recycled water TDS compliance metric to a longer averaging period. Watermaster and the IEUA anticipate that the work to update the compliance strategy for the maximum benefit SNMP will be completed during FY 2020/21. When completed the potential compliance challenges with the dilution limit will be known, and a range of compliance plans will have been evaluated at a conceptual level. Thus, it may not be necessary to perform any work pursuant to Activity K unless it is determined that some form salt offset project is required to address near-term compliance challenges. If no compliance challenges are identified or are resolved through the completion of the SNMP update, no significant work would need to be performed pursuant to Activity K for at least five years. If a salt offset project is required to address anticipated near-term compliance challenges, Watermaster and the IEUA will need to begin reconnaissance-level engineering planning in FY 2021/22 (Tasks 2 through 4).

The recommended schedule to complete the scope of work described herein is described below:

Year one:

- Wait for Watermaster and the IEUA to complete the maximum benefit SNMP update.

Year two:

- Identify alternative compliance strategies, if needed (Task 2).
- Start the evaluation of alternative compliance strategies, if needed (Task 3).
- Report the annual dilution metric compared to dilution limits and projections (Task 5).

Year three:

- Complete the evaluation of alternative compliance strategies, if needed (Task 3).
- Select preferred compliance plan and begin preparing implementation agreements, if needed (Task 4).
- Report the annual dilution metric compared to dilution limits and projections (Task 5).

Year four:

- Begin implementation the of compliance plan, if needed (Task 4).
- Report the annual dilution metric compared to dilution limits and projections (Task 5).

Year five and beyond:

- Reevaluate compliance with dilution requirements every five years (Task 5).

Exhibit K-4 shows the estimated budget-level engineering cost to complete Tasks 1 through 5. Given the ability to leverage the existing work being performed by Watermaster and the IEUA, there is no cost ($0) to perform Task 1. A cost estimate for Task 2 through 4 cannot be prepared because the outcome of the SNMP update is not yet known. It is premature to estimate the cost for performing the five-year update of the projections in Task 5, and there is no increased cost to performing the additional recommended annual reporting.

Activity L

Description of Activity L

Activity L defined by the stakeholders is:

> *Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance.*

The objective of Activity L is to refine the monitoring and reporting requirements of Watermaster to ensure that the objectives of each requirement are being met efficiently at a minimum cost. Through the listening session process, the stakeholders identified the following desired outcomes for Activity L:

- Ensure full compliance with regulatory requirements.
- Ensure full support of basin management initiatives.
- Enable the Parties to monitor the performance of the OBMP IP and related Court orders and regulatory obligations.
- Ensure cost efficiency.

The OBMP IP included PE 1 – *Develop and Implement Comprehensive Monitoring Program*. PE 1 was included in the OBMP to provide the information necessary to support the implementation of all other OBMP program elements and to evaluate their performance. The types of monitoring programs called for by PE 1 in the OBMP IP included:

- Groundwater-level monitoring
- Groundwater-quality monitoring
- Groundwater-production monitoring
- Surface-water discharge and quality monitoring (including managed artificial recharge)
- Ground-level monitoring
- Well construction, abandonment, and destruction

Activity L has identical objectives and desired outcomes to those of PE 1 because Watermaster continues to need data and information to comply with regulations, to fulfill its obligations under its agreements and Court orders, to comply with its requirements under CEQA, and to assess the performance of the evolving OBMP IP, including the 2020 OBMP Update. Financial resources to conduct these monitoring and reporting programs are limited, so through Activity L, the Parties desire to ensure cost efficiency in Watermaster's monitoring and reporting programs.

Need and Function of Activity L

Watermaster monitoring and reporting programs

Data and information acquired in Watermaster's monitoring and data-collection programs are used to prepare reports and data deliverables that are required by regulations and Watermaster's obligations under its agreements, Court orders, and CEQA. The table below is a list of each Watermaster monitoring and reporting requirement and the regulatory entities that require the monitoring and reporting.

Monitoring and Reporting Requirement	Regulatory Entity					
	Court	State Board	Regional Board	California DFW	California DWR	CEQA
Water Rights Compliance Annual Report		X		X		
SGMA Annual Report for Adjudicated Basins					X	
Biannual Evaluation of the Cumulative Effect of Transfers	X					
Biannual Evaluation of the Balance of Recharge and Discharge	X					
Annual Finding of Substantial Compliance with the Recharge Master Plan	X					
Annual Report of Compliance with SB 88 and SWRCB Regulations for Measurement and Reporting of Diverted Surface Water		X				
Safe Yield Recalculation	X					
Recharge Master Plan Update (RMPU)	X					
State of the Basin Report	X					
California Statewide Groundwater Elevation Monitoring Program (CASGEM)					X	
Chino Basin Maximum Benefit Annual Report			X			
Annual Report of the Prado Basin Habitat Sustainability Committee						X
Water Recycling Requirements for the Chino Basin Recycled Water Groundwater Recharge Program			X			
Annual Report of the Ground-Level Monitoring Committee	X					
OBMP Semi-Annual Status Reports	X					

Exhibit L-1 is a comprehensive description of each monitoring and reporting requirement listed in the table above, the associated data types required to meet the reporting requirement, the data analyses performed, the reporting content, and past efforts by Watermaster to reduce the scope and cost of the monitoring and/or reporting requirements.

The scope of the monitoring programs under PE 1 have evolved over time to satisfy new requirements associated with regulations and Watermaster obligations under its agreements, Court orders, and CEQA. In some instances, the monitoring programs have expanded to satisfy new basin-management initiatives and regulations. In some instances, the scope of the monitoring programs has been reduced with periodic reevaluation and redesign to achieve the monitoring objectives with reduced cost.

The following summarizes each of Watermaster's existing monitoring and data-collection programs. Watermaster compiles, checks, and stores the data collected under most of these programs in a centralized environmental database. The database and the database-management procedures ensure the quality and accuracy of the data, allow for efficient data exploration and analysis, and include standardized reports and data exports in formats for regulatory data deliverables or further analysis (e.g. creation of model input files).

Groundwater-production monitoring. Since 1978, Watermaster has collected information to estimate total groundwater production from the Chino Basin. Watermaster uses groundwater-production data to quantify and levy assessments pursuant to the Judgment. Estimates of production are also essential inputs to recalibrate Watermaster's groundwater flow model, which is used to inform redeterminations of the Safe Yield of the Chino Basin, evaluate the state of Hydraulic Control, perform MPI assessments, and support many other Watermaster initiatives. The Watermaster Rules and Regulations require groundwater producers that produce in excess of 10 afy to install and maintain meters on their well(s). Well owners that pump less than 10 afy are considered "Minimal Producers" and are not required to meter or report to the Watermaster. Exhibit L-2 depicts the groundwater-production monitoring program as of 2018. Members of the Appropriative and Overlying Non-Agricultural Pools and CDA record their own meter data and submit them to Watermaster staff on a quarterly basis. For Agricultural Pool wells, Watermaster performed a well-metering program to equip Agricultural Pool wells with in-line flow meters, where feasible. Watermaster staff visit and record production data from the meters at these wells on a quarterly basis. For the remaining unmetered Agricultural Pool wells, including Minimal Producer wells, Watermaster applies a "water duty" method to estimate their production on an annual basis. Watermaster continues its efforts to implement the well-metering program and improve its methods to estimate pumping at un-metered wells.

Groundwater-level monitoring. Watermaster's groundwater-level monitoring program supports many Watermaster management functions, including: the periodic assessment of Safe Yield, groundwater model development and recalibration, evaluating the cumulative impacts of transfers and the balance of recharge and discharge, subsidence management, MPI assessments, estimation of storage change, other scientific demonstrations required for groundwater management, and many regulatory requirements, such as the demonstration of Hydraulic Control and the triennial recomputation of ambient water quality. The wells within the southern portion of the basin were selected for inclusion in the monitoring program to assist in Watermaster's analyses of Hydraulic Control, land subsidence, desalter impacts to private well owners, and riparian vegetation in the Prado Basin. The density of groundwater-level monitoring near the CDA well fields is greater than in outlying areas because hydraulic gradients are expected to be steeper near the CDA well fields, and these data are needed to assess the state of Hydraulic Control. In FY 2017/2018, about 1,300 wells comprised Watermaster's groundwater-level monitoring program. Exhibit L-3 depicts the groundwater-level monitoring network of wells. At about 1,050 of these wells, well owners measure water levels and provide data to Watermaster. These well owners include municipal water agencies, private water companies, the California Department of Toxic Substance Control (DTSC), the County of San Bernardino, and various private consulting firms. The remaining 250 wells are private or dedicated monitoring wells that are mostly located in the southern portion of the Basin. Watermaster staff measures water levels at these wells once a month or with pressure transducers that record water levels once every 15 minutes. Wells monitored by transducers were preferentially selected to support Watermaster's monitoring programs for Hydraulic Control, Prado Basin habitat sustainability, land subsidence, and others where such high-frequency data are necessary to fulfill program objectives. To continue to support assessments of Hydraulic Control, and other analyses, it is anticipated that new monitoring wells will need to be constructed to replace the currently monitored private wells that will be lost as land is converted from agricultural uses to urban uses.

Groundwater-quality monitoring. The Watermaster's groundwater-quality monitoring program supports compliance for two maximum benefit commitments: the triennial ambient water quality recomputation and the analysis of Hydraulic Control. Groundwater-quality data are also used for Watermaster's biennial State of the Basin report, to support ground-water modeling, to characterize non-point source contamination and plumes associated with point-source discharges, to characterize groundwater/surface-water interactions in the Prado Basin area, and to characterize basin-wide trends in groundwater quality. Exhibit L-4 depicts the groundwater-quality monitoring network of wells. The groundwater-quality monitoring program relies on municipal producers, government agencies, and others to supply groundwater-quality data on a cooperative basis. Watermaster supplements these data through its own sampling and analysis program at private wells and monitoring wells in the area generally south of State Route 60. These wells include:

- *Private Wells*: Watermaster collects groundwater quality samples at about 85 private wells, located predominantly in the southern portion of the Basin. The wells are sampled at various frequencies based on their proximity to known point-source contamination plumes. 77 wells are sampled on a triennial basis, and eight wells near contaminant plumes are sampled on an annual basis.
- *Watermaster/IEUA Monitoring Wells*: Watermaster collects groundwater quality samples at 22 multi-nested monitoring sites located throughout the southern Chino Basin. There is a total of 53 well casings at these sites. These include nine HCMP monitoring sites constructed to support the demonstration of Hydraulic Control, nine sites constructed to support the Prado Basin Habitat Sustainability Program (PBHSP), and four sites that fill spatial data gaps near contamination plumes in MZ3. Each nested well site contains up to three wells in the borehole. The HCMP and MZ3 wells are sampled annually. The PBHSP wells are sampled quarterly to triennially.
- *Other Wells*: Watermaster collects samples from four near-river wells quarterly. The data are used to characterize the interaction of the Santa Ana River and groundwater in this area. These shallow monitoring wells along the Santa Ana River consist of two former USGS wells and two Santa Ana River Water Company wells.

For the period 2013 to 2018, water quality data were obtained from a total of 1,357 wells within and adjacent to the Chino Basin. Of those, 650 wells were sampled during FY 2017/2018. To continue to support the triennial ambient water quality recomputation, and other analyses, it is anticipated that new monitoring wells will need to be constructed to replace the currently monitored private wells that will be lost as land is converted from agricultural uses to urban uses.

Surface-water and climate monitoring. Watermaster's surface-water and climate monitoring program supports many Watermaster management functions, including: groundwater model development and recalibration, the periodic assessment of Safe Yield, evaluating the cumulative impacts of transfers and the balance of recharge and discharge, MPI assessments, recharge master planning, the PBHSP, compliance with the recycled-water recharge permit, and the maximum benefit program, among others. Exhibit L-5 depicts the surface-water and climate monitoring network of surface-water discharge sites and atmospheric monitoring stations. Much of these data are collected from publicly available datasets, including POTW discharge data, USGS stream gaging station data, and precipitation and temperature data measured at public weather stations or downloaded from spatially gridded datasets. Watermaster collects stormwater, imported water, and recycled water recharge data from the IEUA. Watermaster also collects quarterly surface-water quality samples from two sites along the Santa Ana River to support the Maximum Benefit program.

Ground level monitoring. The Watermaster's ground-level monitoring program is conducted pursuant to the Chino Basin Subsidence Management Plan. The objective of the plan is to minimize or abate the occurrence of land subsidence and groundwater fissuring within the Chino Basin. Exhibit L-6 depicts the ground-level monitoring program, which is focused across the western portion of Chino Basin within defined Areas of Subsidence Concern—areas of Chino Basin that are susceptible to land subsidence. The ground-level monitoring program consists of the following:

- Watermaster conducts high-frequency, piezometric level monitoring at about 60 wells as part of its ground-level monitoring program. A pressure-transducer/data-logger is installed at each of these wells and records one water-level measurement every 15 minutes. Data loggers also record depth-specific piezometric levels at the piezometers located at Watermaster's Ayala Park Extensometer and Chino Creek Extensometer facilities once every 15 minutes.
- Watermaster installed two extensometers in the MZ1 Managed Area to support the MZ1 Interim Monitoring Program and two extensometers in the Southeast Area understand the effects of pumping at the newly constructed Chino Creek Well Field. Both extensometer facilities record the vertical component of aquifer system compression and expansion once every 15 minutes, synchronized with the piezometric measurements, to understand the relationships between piezometric changes and aquifer-system deformation.
- Watermaster monitors vertical ground-motion via traditional elevation surveys at benchmark monuments and via remote sensing (InSAR) techniques established during the IMP. Elevation surveys are typically conducted in the MZ1 Managed Area, Northwest MZ1 Area, Northeast Area, and Southeast Area once per year. Vertical ground-motion data, based on InSAR, are collected about every two months and analyzed once per year.
- Watermaster monitors horizontal ground-surface deformation across areas that are experiencing differential land subsidence to understand the potential threats and locations of ground fissuring. These data are obtained by electronic distance measurements (EDMs) between benchmark monuments in two areas: across the historical zone of ground fissuring in the MZ1 Managed Area and across the San Jose Fault Zone in Northwest MZ1.

Watermaster convenes a Ground-Level Monitoring Committee (GLMC) annually to review and interpret data from the ground-level monitoring program. The GLMC prepares annual reports that include recommendations for changes to the monitoring program and/or the Subsidence Management Plan, if such changes are demonstrated to be necessary to achieve the objectives of the plan.

Biological monitoring. The Watermaster's biological monitoring program is conducted pursuant to the adaptive monitoring program (AMP) for the Prado Basin Habitat Sustainability Program (PBHSP). The objective of the PBHSP is to ensure that groundwater-dependent riparian habitat in Prado Basin will not incur unforeseeable significant adverse effects due to implementation of the Peace II Agreement. Exhibit L-7 depicts the Riparian Habitat Monitoring Program (RHMP) for the PBHSP. It produces a time series of data and information on the extent and quality of the riparian habitat in the Prado Basin over a historical period that includes both pre- and post-Peace II implementation. Two types of monitoring and assessment are performed: regional and site-specific. Regional monitoring and assessment are appropriate because the main potential stress associated with Peace II activities is the regional drawdown of groundwater levels. The intent of site-specific monitoring and assessment is to verify and complement the results of the regional monitoring.

- Regional monitoring of riparian habitat: Regional monitoring and assessment of the riparian habitat is performed by mapping the extent and quality of riparian habitat over time using: (i)

multi-spectral remote-sensing data, Normalized Difference Vegetation Index (NDVI), and (ii) air photos.
- Site-specific monitoring of riparian habitat: Site-specific monitoring performed in the Prado Basin includes field vegetation surveys and seasonal ground-based photo monitoring. The most current vegetation survey conducted for the PBHSP was performed by the United State Bureau of Reclamation (USBR) in 2016, consisting of 38 sites in the Prado Basin: 24 previously established USBR sites and 14 new sites primarily located near the PBHSP monitoring wells.

Watermaster convenes the Prado Basin Habitat Suitability Committee (PBHSC) annually to review and interpret data from the RHMP. The PBHSC prepares annual reports that include recommendations for RHMP and other monitoring for the PBHSP, if such changes are demonstrated to be necessary to achieve the objectives of the PBHSP.

Water-supply and water-use monitoring. Watermaster compiles water supply and use data from the Parties to support two required reporting efforts: the Watermaster Annual Report to the Court and annual reporting requirements for adjudicated basins pursuant to the Sustainable Groundwater Management Act (SGMA). Monthly water use volumes for supply sources other than Chino Basin groundwater are collected from the Parties; this includes groundwater from other basins, recycled water, imported water, and native surface water. This data is collected and compiled twice per year to support fiscal year reporting for the Annual Report and water year reporting for the SGMA.

Planning information. Watermaster periodically compiles future water supply plans from the Parties. The data collected as part of that process represents the Parties' best estimates of their demands and associated water supply plans and are used for future planning investigations (e.g. Safe Yield recalculations and recharge master plan updates). The data collected includes:

- Water supply plans of the Watermaster Parties, including:
    i. Projected total water demand
    ii. Projected amount of each water supply by source to meet the projected water demand
    iii. Monthly distribution of demand and water supplies used to meet the demand
    iv. Projected groundwater pumping at each currently active well and future planned wells
    v. Groundwater pumping schedules (well use priorities and capacities)
    vi. Pumping capacities, required pumping combinations, and sustainable pumping levels (pumping sustainability metric) at each well
- Assumptions for how:
    vii. Managed storage will be used to meet Replenishment Obligations.
    viii. Lands currently in agricultural uses will be converted to urban uses.
    ix. Additional potential conservation above that currently required for new land development will occur.
- Future projections of location and magnitude of storm and Supplemental Water recharge

Well construction, abandonment, and destruction. Watermaster maintains a database on wells in the basin and Watermaster staff makes periodic well inspections. Watermaster staff sometimes finds a new well while implementing its monitoring programs. Watermaster needs to know when new wells are constructed as part of its administration of the Judgment. Valuable information for use in managing the Chino Basin is developed when wells are constructed, including: well design, lithologic and geophysical logs, groundwater level and quality data, and aquifer stress test data. Well owners must obtain permits from the appropriate county and state agencies to drill a well and to put the well in use. Watermaster has developed cooperative agreements with the Counties of Los Angeles, Orange, Riverside, and San Bernardino, and DDW to ensure that the appropriate entities know that a new well has been constructed. Watermaster staff makes best efforts to obtain well design, lithologic and geophysical logs, groundwater level and quality data, and aquifer stress test data. The presence of abandoned wells is a threat to groundwater supply and a physical hazard. Watermaster staff periodically reviews its database, makes appropriate inspections, consults with well owners, maintains a list of abandoned wells in the Chino Basin, and provides this list to the counties for follow-up and enforcement. The owners of the abandoned wells are requested to properly destroy their wells following the ordinances developed by the county in which the abandoned well is located.

Considerations for updating the monitoring and reporting programs

Financial resources are limited, and the Parties desire to conduct these monitoring and reporting programs to satisfy each requirement efficiently at minimum cost. As documented in Exhibit L-1, the scope of Watermaster's monitoring and reporting programs has evolved over time with new or changing regulations, obligations, and management initiatives.

Watermaster staff and its engineer continually review and revise the monitoring programs to collect the minimum data necessary to meet the objectives of the monitoring and reporting requirements. In some instances, Watermaster convenes special committees to analyze monitoring data and develop recommendations for revisions to the programs. What has not been performed by Watermaster in the recent past is a comprehensive review of all monitoring and reporting programs in an open stakeholder process.

To achieve the Parties' desire to satisfy all monitoring and reporting requirements at minimum cost, Activity L should begin with a comprehensive review of each of Watermaster's requirements for monitoring and reporting and a discussion of if and how the programs could be revised. The review should be performed in an open stakeholder process should consider:

- the objectives of the monitoring and reporting program,
- the minimum datasets required to meet the objectives,
- the prospective loss of private (or other) wells that are currently used in the Watermaster's monitoring programs and how they can be cost-effectively replaced over time,
- the methods used to analyze the data, and
- the reporting frequency and content.

In some cases, revision of the monitoring and reporting programs will require Court approvals, regulatory approvals, or modification/amendment to CEQA documents.

Ultimately, Activity L will produce a *Monitoring and Reporting Work Plan* that documents the programs and will be used to define the Watermaster's annual monitoring scope and budget. The *Monitoring and Reporting Work Plan* will be updated as needed to respond to changed conditions within any of the programs with opportunity for input and feedback from the Parties.

Scope of Work for Activity L

The scope of work for Activity L – *Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance* consists of the following tasks:

- Task 1 – Convene Monitoring and Reporting Committee and prepare the *Monitoring and Reporting Work Plan*
- Task 2 – Implement recommendations in *Monitoring and Reporting Work Plan*

- Task 3 (recurring future task) – Conduct monitoring and reporting programs and prepare annual updates to Monitoring and Reporting Work Plan

Task 1 – Convene Monitoring and Reporting Committee and prepare the Monitoring and Reporting Work Plan. The objectives of this task are to:

- Update the Parties on all Watermaster monitoring and reporting requirements associated with regulations and obligations under its agreements, Court orders, and CEQA.
- Review the current monitoring and reporting programs that are designed to satisfy all Watermaster requirements.
- Develop recommendations for a revised monitoring and reporting program, including a scope of work and cost estimates to implement the recommendations.
- Document all Watermaster monitoring and reporting programs in a *Monitoring and Reporting Work Plan*. For each monitoring program, the work plan will include: a statement of objectives/requirements, the monitoring program to satisfy the requirements, the methods for evaluating data, the frequency for data analysis and reporting, and a schedule for initiating future updates to the plan, including construction of new monitoring wells (if needed).
- Prepare a technical memorandum to document the recommendations and a proposed process to revise the monitoring and reporting programs that require specific regulatory and/or Court approvals for modification. The memorandum will describe the anticipated cost savings that the Parties will realize if the revisions to the monitoring and reporting programs are approved. The memorandum will be titled: *Recommended Revisions to Watermaster's Non-Discretionary Monitoring and Reporting Programs*.

A series of six committee meetings will be conducted over an 18-month period to achieve these objectives.

Task 2 – Implement recommended revisions to Watermaster's non-discretionary monitoring and reporting programs. In this task, the plan described in the *Recommended Revisions to Watermaster's Non-Discretionary Monitoring and Reporting Programs* will be implemented. This task will likely require technical demonstrations to the appropriate regulatory body (e.g. Regional Board, the Court, etc.) to gain approval for revisions to the monitoring program, report content, and/or report frequency. This task may be a multi-step, multi-year process to implement all recommended revisions. The results of this task will result in future updates to the *Monitoring and Reporting Work Plan*. Updates will be incorporated as they are approved.

Task 3 (recurring future task) – Bi-Annual review of scope of work and cost to implement the Monitoring and Reporting Work Plan in the subsequent fiscal year. In the first quarter of every other calendar year, the Monitoring and Reporting Committee will meet to review any changes to the *Monitoring and Reporting Work Plan* and the scope of work and budget for the subsequent fiscal year. The work plan updates and subsequent fiscal year budget will incorporate the recommendations made by special committees (such as the Ground-Level Monitoring Committee), any approved changes resulting from work performed in Task 2, and other changed conditions of the monitoring and reporting programs. The annual review can also include discussion and consideration of additional recommendations for efficiencies suggested by the Parties.

Cooperative Efforts with Appropriate Entities to Implement Activity L

This is a basin-wide activity that involves the Parties. Watermaster's role will be to convene the Monitoring and Reporting Committee; to coordinate and administer its activities and meetings; to ensure that the recommendations derived from this effort are consistent with the Judgment, Peace Agreements and other agreements, Court orders, state and federal regulations, and CEQA requirements; and to execute the *Recommended Revisions to Watermaster's Non-Discretionary Monitoring and Reporting Programs*.

Implementation Actions, Schedule, and Costs for Activity L

The recommended schedule to complete the scope of work is described below:

Year one and two:

- Convene Monitoring and Reporting Committee and prepare the *Monitoring and Reporting Work Plan*.
- Prepare memorandum: *Recommended Revisions to Watermaster's Non-Discretionary Monitoring and Reporting Programs*.

Year three and beyond:

- Implement *Recommended Revisions to Watermaster's Non-Discretionary Monitoring and Reporting Programs*.
- Perform bi-annual review of scope of work and cost to implement the *Monitoring and Reporting Work Plan*.

Exhibit L-8 shows the estimated budget-level cost opinion to complete Task 1, which is about $165,000. The cost of Tasks 2 and 3 cannot be estimated until the completion of Task 1.

Activities H, I, and J

Description of Activities H, I, and J

Activities H, I, and J as defined by the stakeholders are intended to equitably allocate and minimize the cost of OBMP implementation. The fourth goal of the 2000 OBMP and the 2020 OBMP Update is to *Equitably Finance the OBMP*. As described in Section 3 of this Scoping Report, the intent of this goal is to identify and use efficient and equitable methods to fund OBMP implementation. Three of the activities defined by the stakeholders address equity and cost.

Activity H is to:

> *Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP Update agreements*

Activity I is to:

> *Develop regional partnerships to implement the OBMP Update and reduce costs and include in the OBMP Update agreements*

Activity J is to:

> *Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update*

Through the listening session process, the stakeholders identified the following desired outcomes from Activities H, I, and J:

- Provide transparency as to the benefits of the OBMP Update activities, including identification of who benefits.
- Clearly identify Watermaster's roles in OBMP implementation and the associated future assessment costs to the Parties.
- Provide information needed to plan financial resources, such as cost projections similar to a Master Plan process.
- A formal process to revisit the OBMP implementation plan and adjust priorities and schedules as necessary to address changed conditions.
- Improve readiness to apply for grants as they become available.
- Increase the likelihood that the OBMP will be implemented.
- Keep the cost of OBMP implementation as low as possible by obtaining grants and low-interest loans.

As noted above, the fourth goal of the 2000 OBMP is to equitably finance the OBMP, however there were no PEs in the OBMP IP related to this goal. The Peace and Peace II Agreements and OBMP project implementation agreements established cost allocations for certain activities. The benefit and cost allocations included in these agreements were based on negotiations among the Parties and encouraged the use of grant funding to build projects. These funding agreements were deemed equitable when they were developed, and they are in use today.

Together, the management framework of the OBMP IP and implementation agreements enabled the Parties to obtain tens of millions of dollars in grants and other outside funding to implement the 2000 OBMP, including for the Chino Basin Desalters, RMPU recharge facilities, and the recycled water recharge program. In 2018, a contingent grant in the amount of $200 million was awarded to IEUA for the regional CBP Storage and Recovery Program.

Need and Function of Activities of H, I, and J

Benefits of the OBMP

To support the Parties' consideration of the Peace II Agreement, Watermaster contracted with Dr. David L. Sunding to prepare the *Report on the Distribution of Benefits to Basin Agencies from the Major Program Elements Encompassed by the Peace Agreement and Non-Binding Term Sheet*. The economic analysis estimated the costs and benefits of the implementation of the PEs encompassed by the Peace I and Peace II Agreements to the ten Chino Basin appropriator Parties with the largest water rights in the Judgment (they are listed in the table below). These ten Parties account for 91.2 percent of the Operating Safe Yield. The allocation of aggregate costs and benefits to the individual agencies in the basin was computed based on a complex set of legal rules (such as share of Operating Safe Yield), cost-sharing arrangements for implementation, and market forces. The estimated net present value benefits, expressed in 2007 dollars (2007$), to the Parties were primarily based on the value of (1) the gains in pumping created by implementation of the agreements and (2) the offset of the purchase of Tier 2 supplies from Metropolitan for replenishment. The study estimated that together the Peace I and Peace II Agreements would provide over $904 million dollars in net present value benefits to the Parties (2007$) for the implementation period of 2007 to 2030. The following table summarizes the net benefits to the ten agencies, as reported by Sunding:

Party	Net Benefit (2007$)
Chino	$95,966,000
Chino Hills	$73,537,000
Ontario	$232,271,000
Upland	$44,086,000
CVWD	$278,128,000
Fontana	$30,268,000
MVWD	$40,480,000
SAWCo	$7,136,000
Jurupa	$35,254,000
Pomona	$67,537,000
Total	$904,663,000
Average	$90,466,300

Based, at least in part, on these expected benefits, the Parties executed the Peace II Agreement.

During the listening session process, some stakeholders expressed opinions that the distribution of benefits projected by the Sunding work had not come to fruition, that there is a lack of clarity as to the distribution of benefits of the various PEs in the OBMP IP, and that the allocation of the cost of OBMP implementation may not be equitable. And, some stakeholders have expressed concern about participating in new or expanded efforts without first understanding the benefits received to date, performing an analysis of potential future benefits, and assessing the equitable allocation of benefits and costs.

Since the Sunding report was published, no additional work has been done to quantify the benefits that have resulted from OBMP implementation or to update the projection of benefits based on changed conditions. In 2013, the Appropriative Pool Parties discussed performing an updated economic analysis, but ultimately, they elected not to do it.

Costs of the OBMP

The costs of OBMP implementation include, among others:

- Watermaster expenses for engineering work to implement the OBMP IP, including implementation costs of certain projects (e.g. monitoring/reporting and construction of extensometers and monitoring wells)
- Watermaster expenses for other project costs, including recharge debt payments, improvement projects, recharge operations and maintenance costs, recharge, and the Pomona Credit
- Desalter replenishment and related monitoring expenses
- IEUA recycled water recharge costs
- Individual agency costs for water management activities impacted by the OBMP

As previously noted, the Peace and Peace II Agreements and OBMP project implementation agreements established cost allocations for certain activities. Watermaster-related costs for OBMP implementation are assessed annually as part of the Assessment Package. No calculation of the total OBMP costs incurred to date has been performed.

Benefits and costs of the 2020 OBMP Update

Some of the tasks within the 2020 OBMP Update activities provide broad benefit to the Parties and are essential to the Watermaster to do its job to implement the Physical Solution. Some 2020 OBMP Update activities could result in the construction of projects that will provide benefits to all stakeholders or may only provide benefits to a subset of stakeholders.

Based on the scopes of work described herein for the 2020 OBMP Update activities (A, B, CG, D, EF, K and L), there are at least 2-4 years of scoping and preliminary engineering work that would need to be performed to evaluate and select projects envisioned by the 2020 OBMP Update activities and to develop the level of detail required to quantify the benefits and costs from project implementation. Exhibit HIJ-1 illustrates the four phases of work and associated schedule for each of the 2020 OBMP Update activities, assuming that all activities would be initiated in July 2020.[34] The phases shown are: (1) scoping, (2) evaluation of the need for projects, (3) project alternatives evaluation, and (4) project implementation. The exhibit also illustrates the go-no-go decision points to proceed with the activity.

The detail required to quantify the benefits and costs of projects (including ongoing needs for monitoring and assessment) would be developed during the project alternatives evaluation phase. Once the benefits and costs for projects are quantified, the Parties will be able to review them, consider whether or not they want to participate in projects that provide benefits to participants only, and establish equitable cost allocations for the implementation actions that provide specific benefits.

[34] This exhibit is for demonstrative purposes as the parties have yet to finalize the activities for inclusion in the OBMP Update or define a scheduled to implement them.

Grant funding and regional partnerships to minimize the costs of OBMP implementation

In the future, it is anticipated that it will become increasingly difficult to secure grants and low-interest loans due to increased competition. Most grant and low-interest loan programs require, or heavily favor, projects that are within watersheds and groundwater basins with adopted integrated regional management plans, groundwater sustainability plans, or their equivalents. The 2020 OBMP Update is equivalent to a regional water resources and groundwater management plan. The first three phases of each activity described in the prior subsection and shown in Exhibit HIJ-1 should be completed to maximize the ability to be competitive when applying for grants and low-interest loans, or in securing regional funding partners. Assessing cost/benefit at a level of detail appropriate to meet the needs of the stakeholders in establishing equitable cost allocations during the project alternatives evaluation phase will enable the Parties (1) to evaluate projects in a manner that is comprehensive and clear and (2) to enter into regional partnerships and apply for grant opportunities with greater certainty as to the expected benefits and costs.

Scope of Work for Activities H, I, and J

The objectives for Activities H, I, and J can be efficiently met by incorporating tasks within the other activities to characterize the benefits and costs of the projects produced by the activities. This section describes how the scopes of work of the other 2020 OBMP Update activities can accomplish the objectives of Activities H, I, and J.

As described throughout this Scoping Report, each activity has tasks related to identifying and evaluating project alternatives to achieve the activity's objectives (e.g. project evaluation). The project evaluation phase includes the following generalized steps:

1. Develop planning, screening, and evaluation criteria for projects
2. Identify the potential project alternatives
3. Develop reconnaissance-level engineering design and operating plans for each alternative
4. Develop an engineering cost opinion for each alternative
5. Describe how each alternative could be implemented and financed
6. Evaluate project alternatives based on the evaluation criteria
7. Select the preferred project alternative

At such time that each activity reaches the project evaluation phase, the scope of work for project evaluation should include a process to articulate and value the benefits of interest to the stakeholders in establishing equitable cost allocations, considering whether a project has broad basin management benefits and the benefits to specific Parties. Examples of benefits include new yield, water supply reliability, and water quality improvements. The project benefits to analyze and value would be defined during the first step to develop criteria for selecting projects. In step five, the alternative evaluation would include a characterization of implementation benefits and costs (Watermaster expenses and other costs) and their allocation to participants under various levels of participation and cost allocation methods. The benefit and cost projections, together with the other engineering analyses, could then be used by the Parties to select a cost allocation method, prepare projections of costs to support planning of financial resources for implementation, and develop a project implementation agreement that will clearly establish the allocation of benefits and costs to each Party. With regard to the identification and valuation of benefits, the Parties could address this on a case-by-case (project-by-project) basis, or by developing and agreeing to a standard set of benefits to analyze and quantify for every project to achieve equitable cost allocations.

The steps to achieve an equitable allocation of benefits and costs should be addressed in the agreement that will be developed by the Parties to implement the 2020 OBMP Update. The 2020 OBMP implementation agreement could be designed to ensure that the desired extent of cost/benefit assessments are performed to support equitable cost allocations in the implementation of activity scopes of work, to anticipate and accommodate the development of project implementation agreements that define the project-specific cost/benefit allocation, and to periodically update cost projections for implementation of the 2020 OBMP Update activities and associated projects to support planning of financial resources.

Cooperative Efforts with Appropriate Entities to Implement Activities H, I, and J

The Parties that will participate in projects developed through the implementation of the 2020 OBMP Update activities would need to agree to an allocation of costs for the implementation of the projects and document the allocation in the project implementation agreements. Watermaster's role will be to assess certain costs associated with implementation. Watermaster will continue to assess the costs of ongoing OBMP implementation efforts that provide broad benefits to the Parties pursuant to existing agreements and would allocate costs of the implementation of new activities/projects based on the new implementation agreements developed for the 2020 OBMP Update.

Implementation Actions, Schedule, and Costs for Activities H, I, J

Other than the performance of tasks associated with the assessment of benefits and costs within each 2020OBMP Update activity, there are no separate implementation actions associated with this activity as the future implementation agreements will make such considerations. Depending on the types of benefits that need to be quantified and valued to define equitable cost allocations, the project evaluation costs estimated herein for Activities A and D could be higher. (Note that these are the only two activities that have budget-level cost-estimates for project evaluation).

The *2020 OBMP Update: Implementation Plan Report*, which is the next work product of the 2020 Update, will include an implementation plan and schedule for each of the 2020 OBMP Update activities selected for implementation by the stakeholders and a projection of associated Watermaster costs to support the planning of financial resources for implementation.

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Reductions in Chino Basin Safe Yield																						
Develop a storage management plan to optimize the use of unused storage space in the basin, avoid undesirable results, and encourage Storage and Recovery Programs	🔴	🔴		🔴	🔴			🔴	🔴	🔴	🔴		●		🔴		🔴				B, C	1, 2, 3
Design storage management and storage & recovery programs that maintain or enhance Safe Yield	🔴	●						🔴	🔴	●			🔴		●		●			●	B, C	1, 3
Maintain or enhance the Safe Yield of the basin without causing undesirable results	🔴	●		🔴	🔴			🔴	🔴	🔴	●				●		●			🔴	B, D	1, 3
Manage the basin Safe Yield for the long-term viability and reliability of groundwater supply	🔴	●						🔴	🔴	🔴	🔴			🔴			●	●		🔴	A, B, C	1, 3
Reassess the frequency of the Safe Yield recalculation	●				●												●				I	3
Continue to model and track Safe Yield, but utilize other management strategies to address a decline.																	●				B	1, 3
Develop recharge programs that maintain or enhance Safe Yield	🔴	●					●	●	🔴	●					●		●			●	A, B	1, 3
Develop more facilities to capture, store, and recharge water	●	🔴					🔴			●	●				●		●				A, B, D	1, 2
Enhance recharge in northeast MZ-3	●		●						🔴								●				A, C	1, 3
Maximize use of existing recharge facilities	●	●						●	🔴	●											A, C, F, G	3
Establish incentives to encourage recharge of high-quality imported water	●		●																		H, I	2, 3
Develop an OBMP Update that is consistent with the Physical Solution and allows access to the basin for users to meet their requirements	🔴	●				🔴		🔴													C, E	3
Engage with regional water management planning efforts in the Upper Santa Ana River Watershed that have the potential to impact Chino Basin operations or Safe Yield	●														🔴		●			🔴	I, D	3

Appendix C

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Inability to Pump Groundwater with Existing Infrastructure																						
Pursue collaborative, regional partnerships to implement regional solutions to water management challenges	⚫			⚫	⚫			⚫							🔴	⚫	⚫	⚫	🔴	🔴	B, E, F, G, I	3
Ensure that sufficient, reliable water supplies will be available to meet current and future water demands	🔴	🔴	🔴	🔴			⚫	🔴	⚫	⚫	⚫				🔴	⚫	⚫	🔴	⚫		A, B, D, G	1, 3
Develop conjunctive use agreements that provide certainty in the ability to perform during put and take years by clearly defining facilities/infrastructure and operating plans, and that leverage the lessons learned from obstacles encountered during the implementation of the current Dry Year Yield program	⚫						⚫	⚫	⚫						⚫		⚫	⚫			B, G, I	1, 2, 3
Develop management strategies that enable the Parties to produce or leverage their respective water rights that may be impacted by physical basin challenges like land subsidence or water quality	🔴						⚫	🔴							⚫		⚫				A, C, D, E, F, G, I	3
Design storage management and storage & recovery programs to raise funding to build infrastructure	⚫			⚫											⚫		⚫				B, D, I, J	3, 4
Develop process to support/facilitate project implementation	⚫																				F, H, J	4
Design subsidence management plans to allow flexibility in the location and volume of groundwater production in MZ-1 and MZ-2	⚫						⚫	🔴		🔴				⚫	⚫						A, C, G	3

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Increased Cost of Groundwater Use																						
Seek supplemental financial resources to support the implementation of the OBMP Update	🔴	🔴		●			●	🔴	🔴	●					●	🔴	●		●		D, F, G, I, J	4
Develop regional partnerships to help reduce costs	●			●			●	●	🔴						🔴	●	●			●	F, G, I, J	4
Monetize agencies' unused water rights for equitable balance of basin assets			●																		G, H	4
Decrease Watermaster assessment costs	●				●			●													I, J	4
Support to develop a justification for increases in water rates and developer fees to invest in needed water infrastructure	🔴	●							●								●				F, G, H	
Develop an equitable distribution of costs/benefits of the OBMP	●	●		●		🔴	●	🔴	🔴	●				🔴	●						H, J	4
Watermaster assessments for implementation of the OBMP should be allocated based on benefits received	●				●																H	4
Continue or enhance incentives to pump groundwater from the Chino Basin			🔴																		G, I	3, 4
Improve flexibility for Parties to execute water rights transfers														🔴							G, I	4

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Chino Basin Water Quality Degradation																						
Develop a water quality management plan to ensure ability to produce groundwater rights	🔴	●		●			●	●	●	●				🔴	●		●	●			E, F, G, J	2, 3
Develop regional infrastructure to address water quality contamination and treatment				●	●			●													A, B, C, E, F, G, I, J	2
Plan for and be prepared for new drinking water quality regulations that may result in an increase in groundwater treatment and costs	●	●	🔴	🔴			🔴	●	🔴	●					🔴		●				E, F	2
Be more proactive and engaged in the process to develop new drinking water quality regulations								●													A, B, D, E, G, J	2
Recycled Water Quality Degradation																						
Maintain compliance with recycled water and dilution requirements pursuant to the Chino Basin groundwater recharge permit		●					●	●	🔴	🔴				🔴	🔴						A, B, D, E, G, J	2
Increased Cost of Basin Plan Compliance																						
Develop management strategy to ensure sufficient supplies to blend with recycled water and comply with Salt and Nutrient Management Plan	●	●									🔴				●		●				G, K	2
Perform the minimum amount of monitoring/reporting that is required for basin management and regulatory compliance	●			●			●	●													L	3, 4

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Reduced Recycled Water Availability and Increased Cost																						
Fully utilize IEUA recycled water resources		🔴		●			●	●		🔴					●						A, D, E, F, G	1
Maximize the use of recycled water for direct use or recharge	●	🔴		🔴			●	🔴	🔴	🔴					●						A, D, E, F, G	1
Evaluate the potential for direct potable reuse of recycled water	●								●						●						D, E, F	1
Develop alternative management strategies to comply with the recycled water discharge obligations to the Santa Ana River	●	●		●			●	●		●					●		●				D, E, F	1, 3
Utilize non-IEUA sources of recycled water that are not being put to beneficial use	🔴	●					●	●	🔴	🔴					●		●				D, E, F	1
Other																						
Coordinate timing of agreements, grants, etc. to ensure implementation of the OBMP Update	●							●	🔴	●					●	●	●				F, G, H, I, J	
Improve communication between the Parties	🔴			🔴				●						🔴	●		●				F, H, I	
Educate elected officials and decision makers on the need and urgency to address the water management challenges	●	🔴							🔴						●	●	●				F, G, H, I, J	
Consider a long-term planning horizon of up to 50 years	●								●	●					●						F, G, H, I, J	3

Appendix C

Table 1

Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Reduced Imported Water Availability and Increased Cost																						
Ensure that there is a reliable local water supply to replace imported water during shut down of imported water delivery infrastructure for maintenance and longer-term emergency outages	🔴	●	●	🔴			●	🔴	●	●					🔴	🔴	🔴	🔴			B, C, G	1, 3
Identify and utilize new sources of supplemental water	🔴	●		●			🔴	●	●	●					●	●	●				A, B	1, 3
Construct inter-basin and intra-basin connections for the benefit of regional water supply and conjunctive use	●	●		🔴			●	●	🔴			🔴			●	🔴	●	🔴			C, G	1, 3
Understand how imported water reliability from Metropolitan Water District will be affected with and without the California Water Fix	●							●	🔴						●	●	●				-	1, 3
Develop management strategies that ensure Parties will meet future Chino Basin Desalter Replenishment Obligation and have the money to fund it	●	●		🔴			🔴		●								●			🔴	H, I, J	3
Increase water-supply reliability at the lowest possible cost	🔴			●			●	●				🔴		🔴	●		●				A, B, D, J	3
Need a better understanding of the water management plans of the Parties to be able to better plan for imported water needs and to assure reliability of Metropolitan Water District water supply	●			●					🔴			🔴			●	●	●	🔴			A	3
Analyze water management scenarios that plan for unexpected challenges and emergencies	●							●	🔴	●					●	●	●				E, G	3
Ensure that sufficient supplemental water supplies will be available to meet future replenishment requirements							●		🔴	●		🔴			●					🔴	A	1, 3
Despite the best efforts of the Parties to decrease reliance on imported water, the cost of the total water supply continues to increase	●																				-	3
Use more recycled water for Replenishment Obligation	●			🔴			🔴		🔴								●				A, D, E, F	3
Continue to build collaborative programs between the Metropolitan Water District and Chino Basin	🔴						●	●	●						●		●	●			B, I	3

Appendix C

Table 2
Activities for Consideration in the 2020 OBMP Update

ID	Activity
A	Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge
B	Develop, implement, and optimize Storage-and-Recovery Programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality.
C	Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence.
D	Maximize the reuse of recycled water produced by IEUA and others
E	Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses
F	Develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits in managing water quality
G	Optimize the use of all sources of water supply by improving the ability to move water across the basin and amongst stakeholders, prioritizing the use of existing infrastructure.
H	Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements
I	Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement
J	Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update
K	Develop management strategy within the Salt and Nutrient Management Plan to ensure ability to comply with dilution requirements for recycled water recharge
L	Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance

Appendix C

Table 3
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
			Reductions in Chino Basin Safe Yield	Inability to Pump Groundwater with Existing Infrastructure	Increased Cost of Groundwater Use	Chino Basin Water Quality Degradation	Recycled Water Quality Degradation	Increased Cost of Basin Plan Compliance	Reduced Recycled Water Availability and Increased Cost	Reduced Imported Water Availability and Increased Cost
Goal 1 - Enhance Basin Water Supplies										
1a • Not all of the stormwater runoff available to the Chino Basin is diverted and recharged; failure to divert and recharge stormwater is a permanently lost opportunity. • The existing methodology to select recharge projects for implementation is based on the cost of imported water. There are currently no known projects with a unit cost lower than the cost of imported water, hindering expansion of stormwater capture and recharge • Pumping capacity in some areas of the basin is limited due to low groundwater levels, land subsidence, and water quality	A Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge	• Increases recharge of high-quality stormwater that will: • protect/enhance the Safe Yield, • improve water quality, • reduce dependence on imported water, • increase pumping capacity in areas of low groundwater levels and areas of subsidence concern, and • provide new supply of blending water to support the recycled-water recharge program. • Provides additional supplemental-water recharge capacity for replenishment and implementation of Storage and Recovery Programs. • Provides additional surface water storage capacity. • Revised economic criteria for selecting recharge projects for implementation.	✓	✓	✓	✓	✓	✓		✓

Appendix C

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Goal 1 - Enhance Basin Water Supplies										
1b • There is a surplus of recycled water potentially available to the Chino Basin Parties that is not being put to beneficial use. • Existing infrastructure limits the expansion or reuse and recharge of recycled water in the Chino Basin. • Existing requirements to discharge recycled water to the Santa Ana River limit the amount of IEUA recycled water available for reuse and recharge •The Department of Drinking Water and the Regional Board blending requirements for recycled water recharge could limit expanded recharge opportunities	D Maximize the reuse of recycled water produced by IEUA and others	• Results in a new, consistent volume of in-lieu and/or wet water recharge that will: • protect/enhance the Safe Yield, • reduce dependence on imported water, • improve water-supply reliability, especially during dry periods, and • increase pumping capacity in areas of low groundwater levels and areas of subsidence concern. • Identify additional sources of water to satisfy IEUA discharge requirements pursuant to the Santa Ana River Judgment.	✓	✓					✓	✓

Appendix C

Table 3
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Goal 2 - Protect and Enhance Water Quality										
2a • Areas of the basin are contaminated with VOCs, nitrate, perchlorate and other contaminants of emerging concern (CECs). • Water-quality regulations are evolving and becoming more restrictive, which limits the beneficial uses of groundwater. • Groundwater treatment may be necessary to meet beneficial uses, but can be expensive to build and operate. • The basin is hydrologically closed, which causes accumulation and concentration of salts, nutrients, and other contaminants. • Some stored water in the Chino Basin cannot be used due to water quality and insufficient treatment capacity • Recharge sources may contribute CECs to the groundwater basin	E Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses F Develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits in managing water quality	• Proactively addresses new and near-future drinking water regulations. • Enables the Parties to make informed decisions on infrastructure improvements for water-quality management and regulatory compliance. • Removes groundwater contaminants from the Chino Basin and thereby improves groundwater quality. • Enables the Parties to produce or leverage their water rights that may be constrained by water quality. • Ensures that groundwater is pumped and thereby protects/enhances the Safe Yield.	✓	✓	✓	✓				✓
2b • Water-quality regulations are evolving and generally becoming more stringent, which could limit the reuse and recharge of recycled water.	K Develop management strategy within the Salt and Nutrient Management Plan to ensure ability to comply with dilution requirements for recycled water recharge	• Enables the continued and expanded recharge of recycled water, which will: • protect water quality, • improve water-supply reliability, especially during dry periods, and • protect/enhance the Safe Yield.	✓			✓	✓	✓		✓

Appendix C

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Goal 3 - Enhance Management of the Basin										
3a • Existing infrastructure (pumping and treatment capacity and conveyance) is insufficient to conduct puts and takes under proposed storage programs. • There is unused storage space in the Basin the use of which is constrained by the storage limits defined in existing CEQA documentation. • Watermaster's current storage management plan is not optimized to protect/enhance basin yield, improve water quality, avoid new land subsidence, ensure balance of recharge and discharge, maintain Hydraulic Control, etc. • Storage and recovery operations could be limited by contaminant plumes or other CECs in groundwater	B Develop, implement, and optimize Storage and Recovery Programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality.	• Storage programs that protect/enhance basin yield, improve water quality, avoid new land subsidence, ensure balance of recharge and discharge, maintain Hydraulic Control, etc. • New regional infrastructure to optimize put and take operations • Leverages unused storage space in the Basin. • Reduces reliance on imported water, especially during dry periods. • Potentially provides outside funding sources to implement the OBMP Update. • Improves water quality through the recharge of high quality water.	✓	✓	✓	✓				✓

Appendix C

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Goal 3 - Enhance Management of the Basin										
3b • Land subsidence in northwest MZ1 may limit the ability for Parties to pump their respective rights in this area. • Poor water quality and increasingly restricting water quality regulations limits the ability for some Parties to pump their respective rights. • Low groundwater levels impact pumping capacity	C Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence. G Optimize the use of all sources of water supply by improving the ability to move water across the basin and amongst stakeholders, prioritizing the use of existing infrastructure.	• Enables producers in MZ1 and MZ2 to obtain water through regional conveyance, which supports management of groundwater levels to reduce the potential for subsidence and ground fissuring. • Enables the Parties to increase production in areas currently constrained by poor water quality. • Removes groundwater contaminants from the Chino Basin and thereby improves water quality. • Protects/enhances the Safe Yield. • Maximizes the use of existing infrastructure, which will minimize costs. • Provides infrastructure that can also be used to implement Storage and Recovery Programs.	✓	✓	✓	✓				✓
3c • Watermaster needs information to comply with regulations and its obligations under its agreements and Court orders, yet financial resources to collect this information are limited.	L Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance	• Ensures full compliance with regulatory requirements. • Ensures full support of basin management initiatives. • Enables Parties to monitor the performance of the OBMP Update. • Continual review and revision of requirements and monitoring program to ensure cost efficiency	✓	✓	✓	✓	✓	✓	✓	✓

Appendix C

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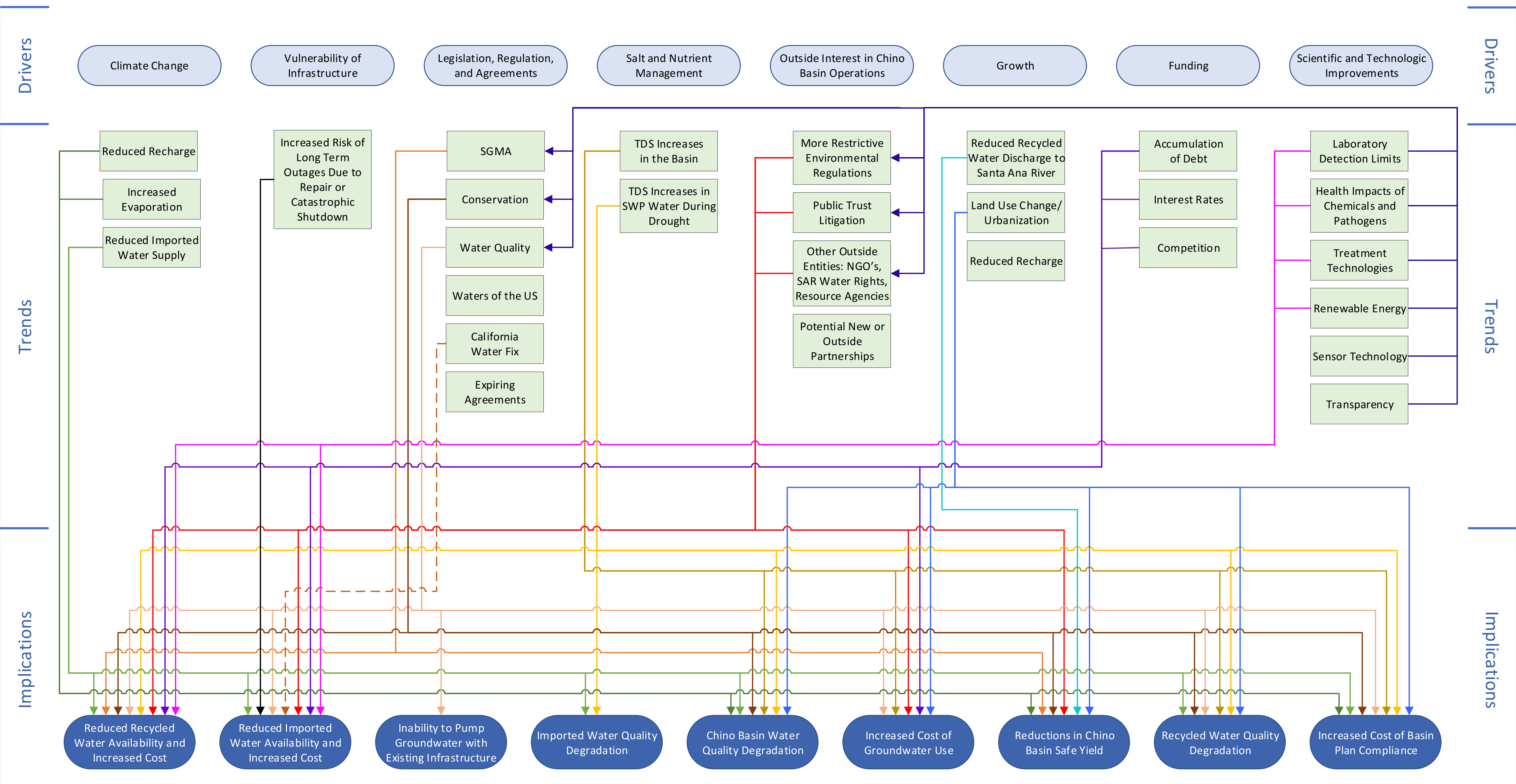
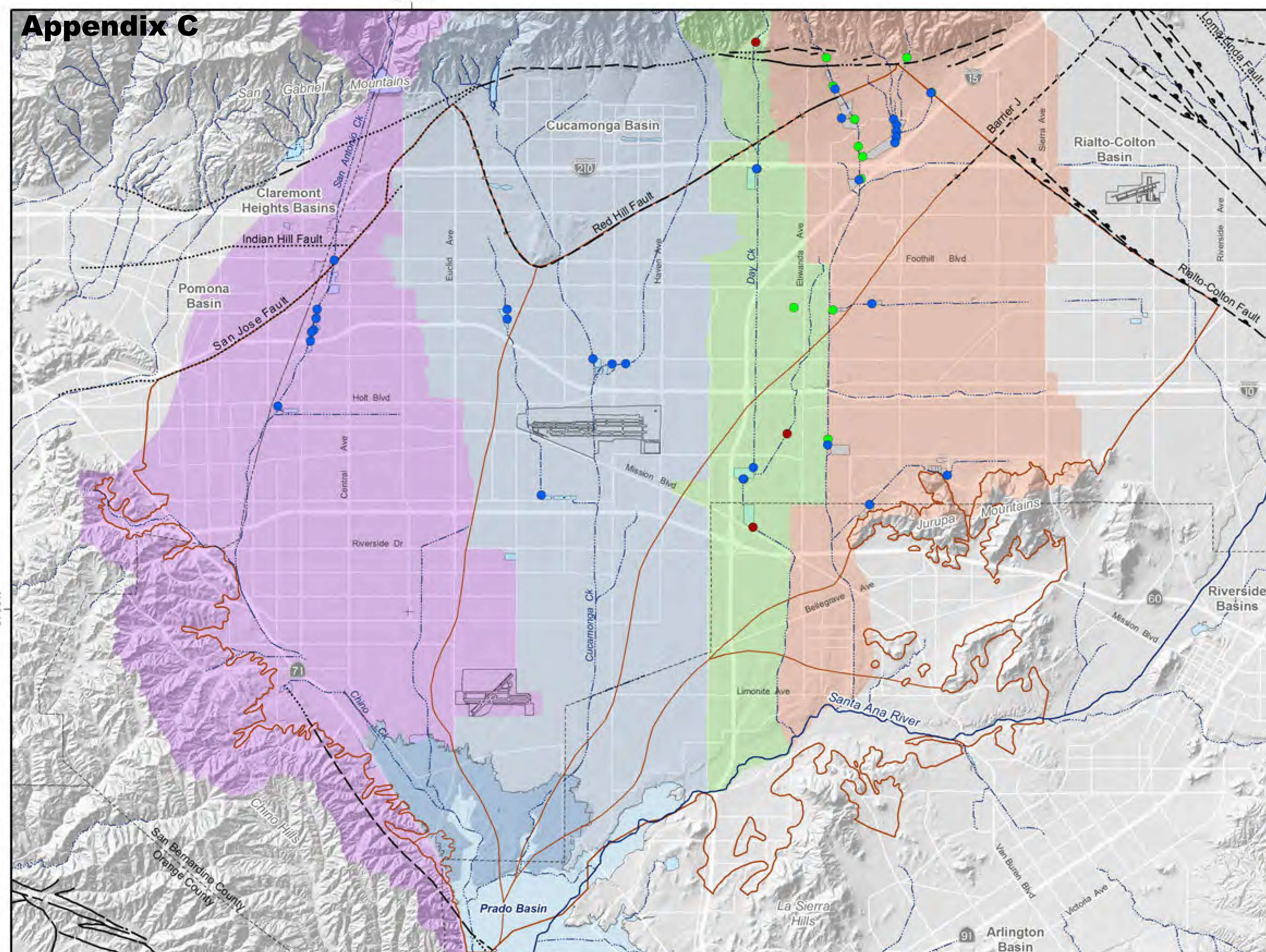
Goal 4 - Equitably Finance the OBMP										
4a • The distribution of benefits associated with the OBMP Update is not defined. • Funding needed for the OBMP implementation activities of the Watermaster is not projected beyond the current year budget, which limits Parties ability to plan required funding for the future. • There is currently no formal process to evaluate and adapt the OBMP implementation plan, schedule and cost.	H Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements	• Provides transparency as to the benefits of the OBMP Update activities • Identifies Watermaster roles and costs to the Parties • Formal process to revisit implementation plan and adjust priorities and schedule as necessary to address changed conditions • Periodic updates of cost projections for OBMP implementation needed to plan financial resources. • Improves readiness to apply for grants as they become available • Improves the likelihood that the OBMP will be implemented.			✓			✓	✓	✓
4b • Limited financial resources constraint the implementation of the OBMP. • Future reliability of grant funding is uncertain	I Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement	• Lowers the cost of OBMP implementation. • Improves the likelihood that the OBMP will be implemented.			✓			✓	✓	✓
	J Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update				✓			✓	✓	✓

Appendix C

Figure 1 – Drivers and Trends and Their Implications
2020 OBMP Update



Appendix C



Points of Diversion
(Symbolized by Permit)

- 19895
- 20753
- 21225

Watersheds in Creek Systems in Chino Basin

- San Antonio/Chino Creek
- Cucamonga Creek
- Day Creek
- San Sevaine Creek
- Prado Basin Headlands

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Faults

- Location Certain
- Location Approximate
- Approximate Location of Groundwater Barrier
- Location Concealed
- Location Uncertain

Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 11/22/2019
File: Exhibit_A-1_PODs.mxd

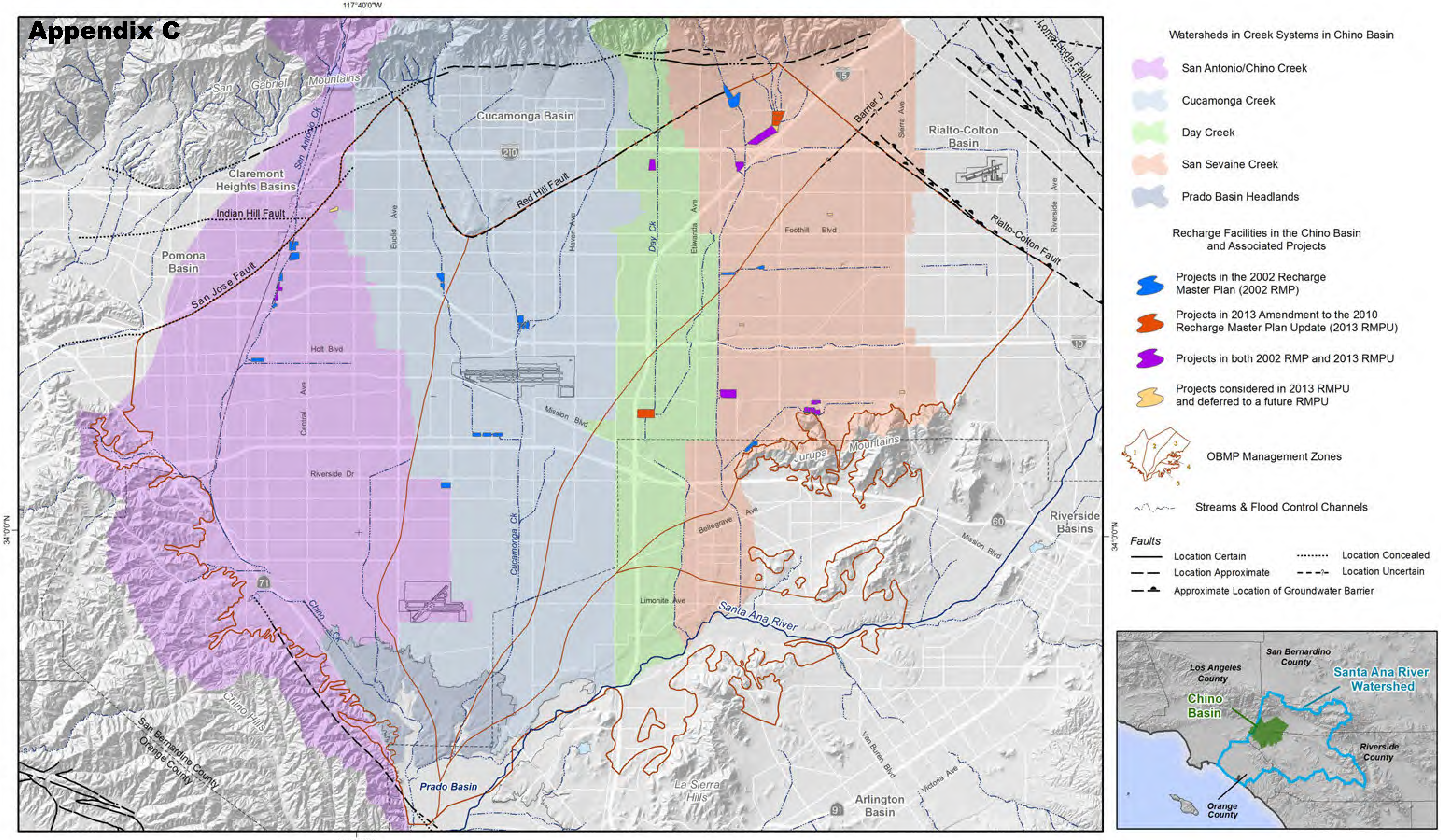
0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

Watermaster Points of Diversion
Permits 19895, 20753, 21225

Exhibit A-1

Appendix C



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 11/22/2019
File: Exhibit_A-2_RMPUprojects.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

CHINO BASIN WATERMASTER — Partners in Basin Management

Recharge Improvements in the Chino Basin Since Implementation of the OBMP

Exhibit A-2

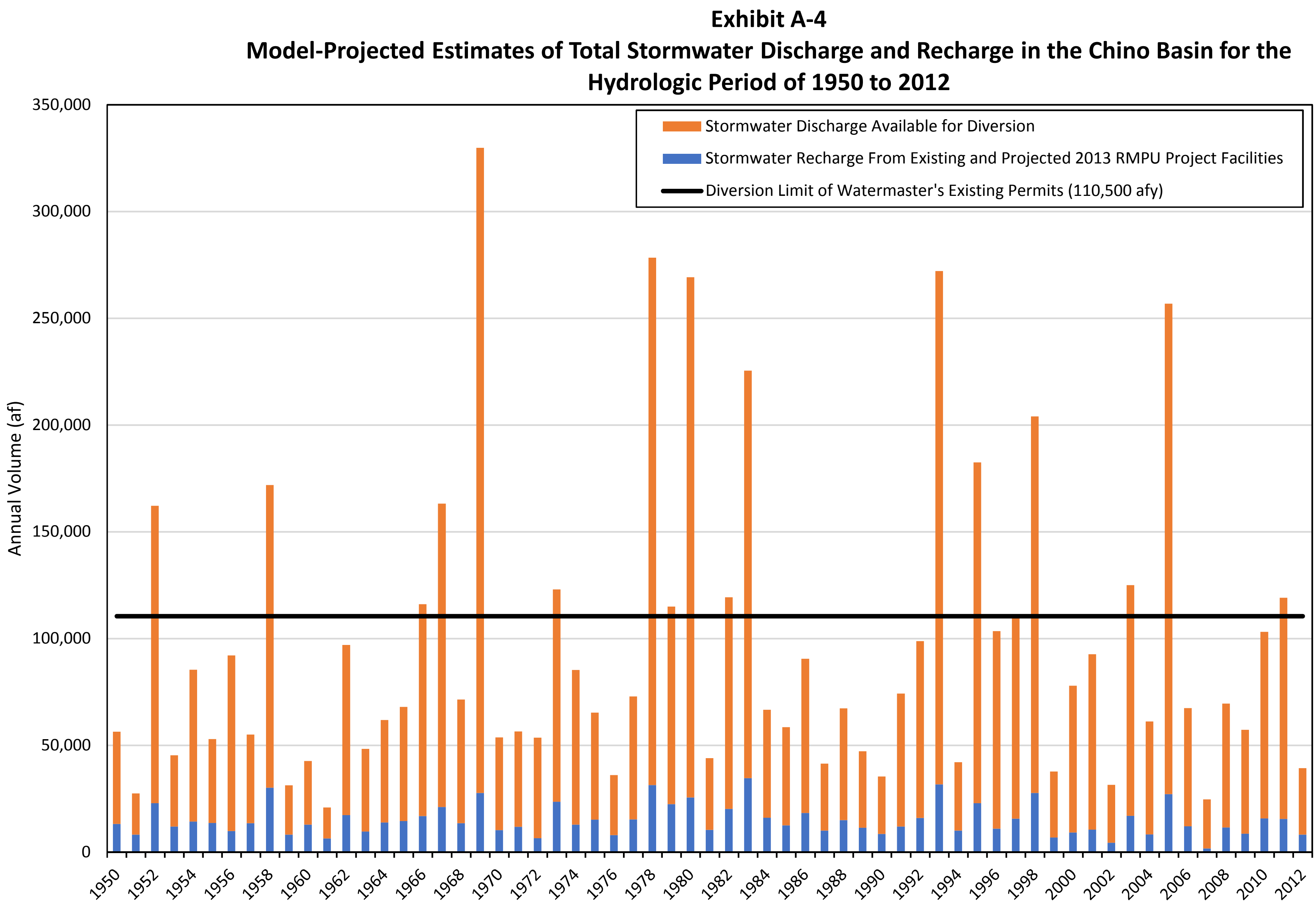
Appendix C

Exhibit A-3
Average Stormwater Recharge and Supplemental Water Recharge Capacity Estimates

Recharge Facility	Average Stormwater Recharge FY 2004/05 through FY 2016/17 (afy)	Theoretical Maximum Supplemental Water Recharge Capacity (afy)	Theoretical Maximum Recharge Capacity (afy)
Brooks Street Basin	489	1,658	2,147
College Heights Basin - East	78	5,816	7,958
College Heights Basin - West		2,064	
Montclair Basin 1	953	409	5,617
Montclair Basin 2		2,940	
Montclair Basin 3		400	
Montclair Basin 4		915	
Eighth Street Basin	1,069	3,426	5,665
Seventh Street Basin		1,170	
Upland Basin	430	891	1,321
Subtotal Management Zone 1	*3,019*	*19,689*	*22,708*
Ely	1,120	4,501	5,621
Grove Basin	305	-	305
Etiwanda Debris Basin	212	2,908	3,120
Hickory Basin East	361	856	2,637
Hickory Basin West		1,420	
Lower Day Basin Cell 1	513	983	1,496
Lower Day Basin Cell 2			
Lower Day Basin Cell 3			
San Sevaine No. 1	816	114	6,025
San Sevaine No. 2		2,869	
San Sevaine No. 3		2,226	
Turner Basin No. 1	1,527	577	4,084
Turner Basin No. 2		227	
Turner Basin No. 3		418	
Turner Basin No. 4A		981	
Turner Basin No. 4B		164	
Turner Basin No. 4C		191	
Victoria Basin	309	2,279	2,588
Subtotal Management Zone 2	*5,163*	*20,713*	*25,876*
Banana Basin	258	1,790	2,048
Declez Basin Cell 1	582	1,235	3,409
Declez Basin Cell 2		823	
Declez Basin Cell 3		770	
IEUA RP3 Basin Cell 1	1,129	4,653	12,716
IEUA RP3 Basin Cell 3		3,266	
IEUA RP3 Basin Cell 4		3,669	
Subtotal Management Zone 3	*1,969*	*16,204*	*18,173*
Total	**10,151**	**56,606**	**66,757**

Source: 2018 Recharge Master Plan (WEI 2018)

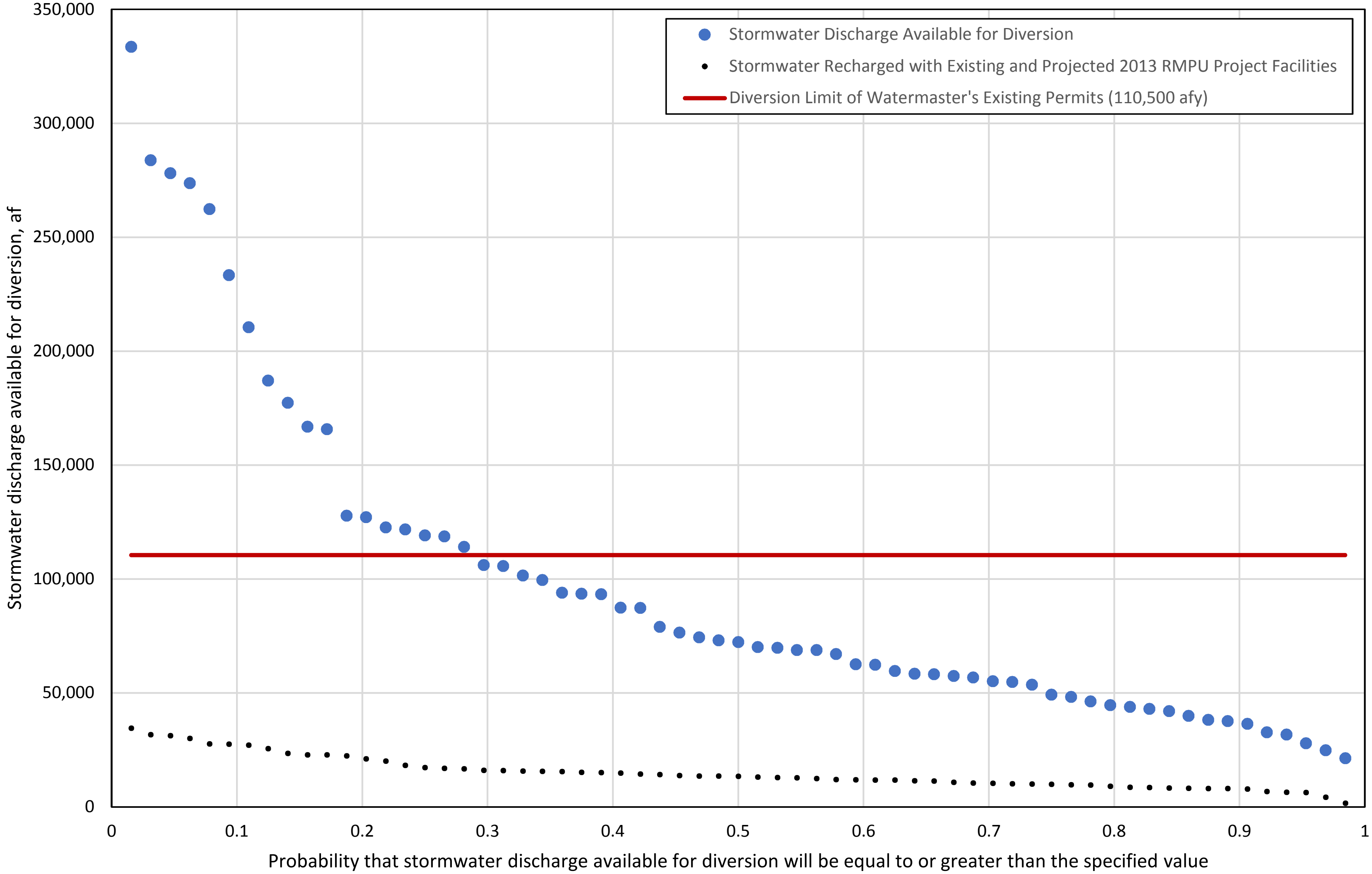
Appendix C



Exhibit_A-4_A-5_Annual_Flow_Available--Figure_3-3
Created on 6/11/2019
Printed on 7/5/2019

Appendix C

Exhibit A-5
Exceedance Frequency Curve of Stormwater Discharge Available for Diversion in the Chino Basin for the Hydrologic Period of 1950-2012



Exhibit_A-4_A-5_Annual_Flow_Available--Figure_3-4
Created on 6/11/2019
Printed on 7/5/2019

Appendix C

Exhibit A-6

Projects Considered and Not Recommended Due to Cost in the 2013 RMPU and New Conceptual Recharge Projects Considered and Not Recommended in the 2018 RMPU[1]

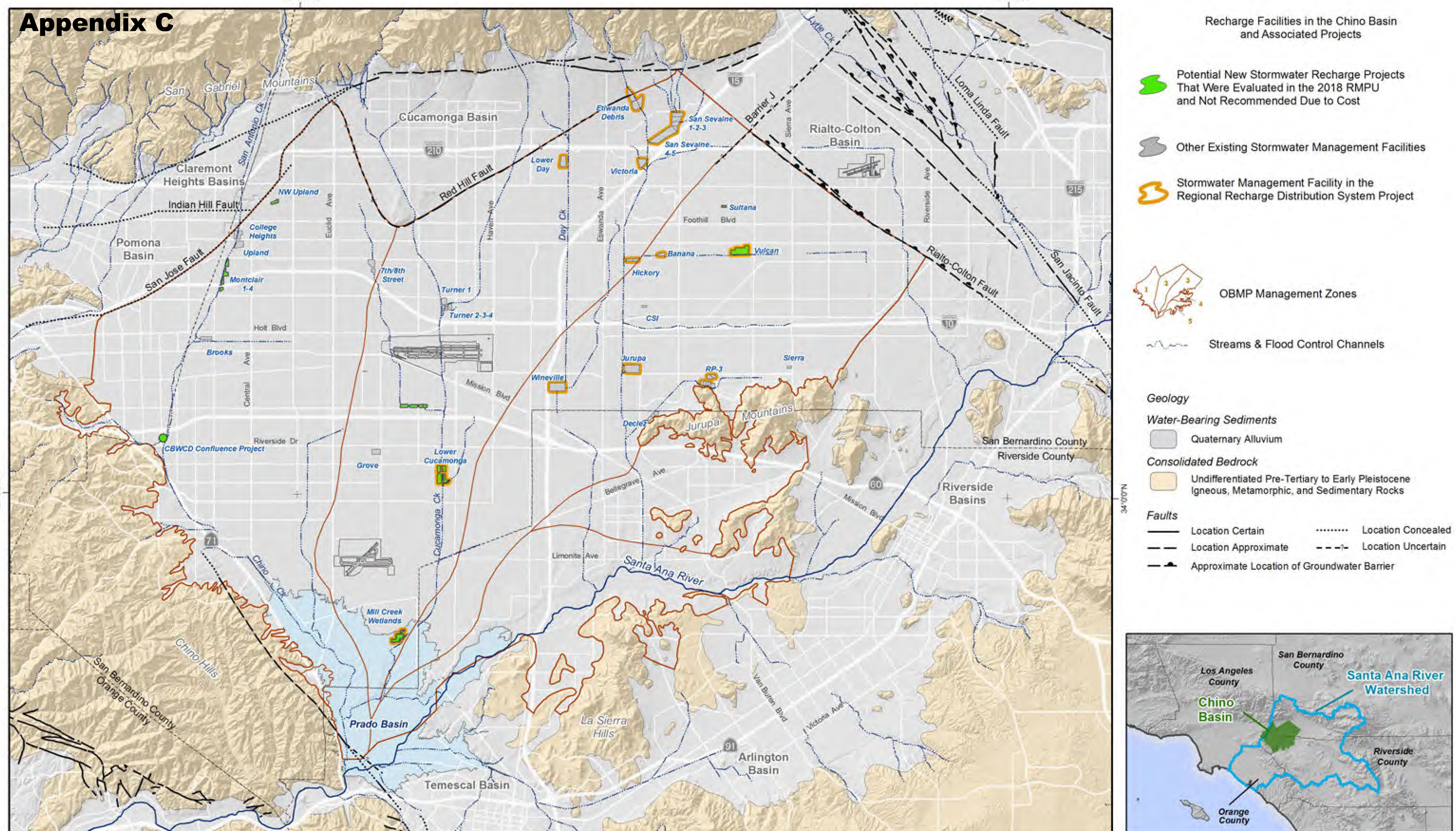
PID[2]	Project	Source	New Stormwater Recharge (afy)	Projected Costs in 2023	
				2018 RMPU Estimated Unit Stormwater Recharge Cost ($/af)	2018 RMPU Estimated Capital Cost
1a	Montclair Basins - Transfer water between Montclair Basins and deepen MC 4	2013 RMPU	71	$5,980	$6,526,000
5	North West Upland Basin - Increase drainage area and basin enlargement	2013 RMPU	93	$4,620	$6,574,000
15	Ely Basin - Basin enlargement and increased drainage area	2013 RMPU	101	$1,990	$3,017,000
24	Vulcan Basin - Construct new inflow and outflow structures	2013 RMPU	857	$2,560	$33 million
26	Sultana Avenue - Deepen basin by 10 feet	2013 RMPU	7	$5,620	$601,000
n/a	Regional Recharge Distribution System	2013 RMPU	5,000	$2,810	$184 million
n/a	Vineyard Managed Aquifer Recharge	2018 RMPU	n/a	n/a	n/a
n/a	CBWCD Confluence Project[3]	2018 RMPU	n/a	n/a	n/a

[1] With the exception of the last two projects listed, projects in this table were included in the 2013 RMPU and were considered in the 2018 RMPU based on the following criteria: projected yield is greater than zero (excluding projects for which yield was not quantified); project was not already implemented; project was determined to be technically and institutionally feasible; project was not recommended for final implementation in the 2013 RMPU

[2] 2013 Project Identification (PID) number; n/a - No PID assigned.

[3] Per an email from Steve Sentes at CBWCD dated August 16, 2018, the potential new stormwater recharge for the Confluence Project is 2,940 afy at a cost of about $17 million (excluding land acquisition costs). The estimated unit stormwater recharge cost is $650/af. This information was not vetted through the CBWM Steering Committee process during the development of the 2018 RMPU.

Appendix C



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 11/22/2019
File: Exhibit_A-7_Potential new facilities.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

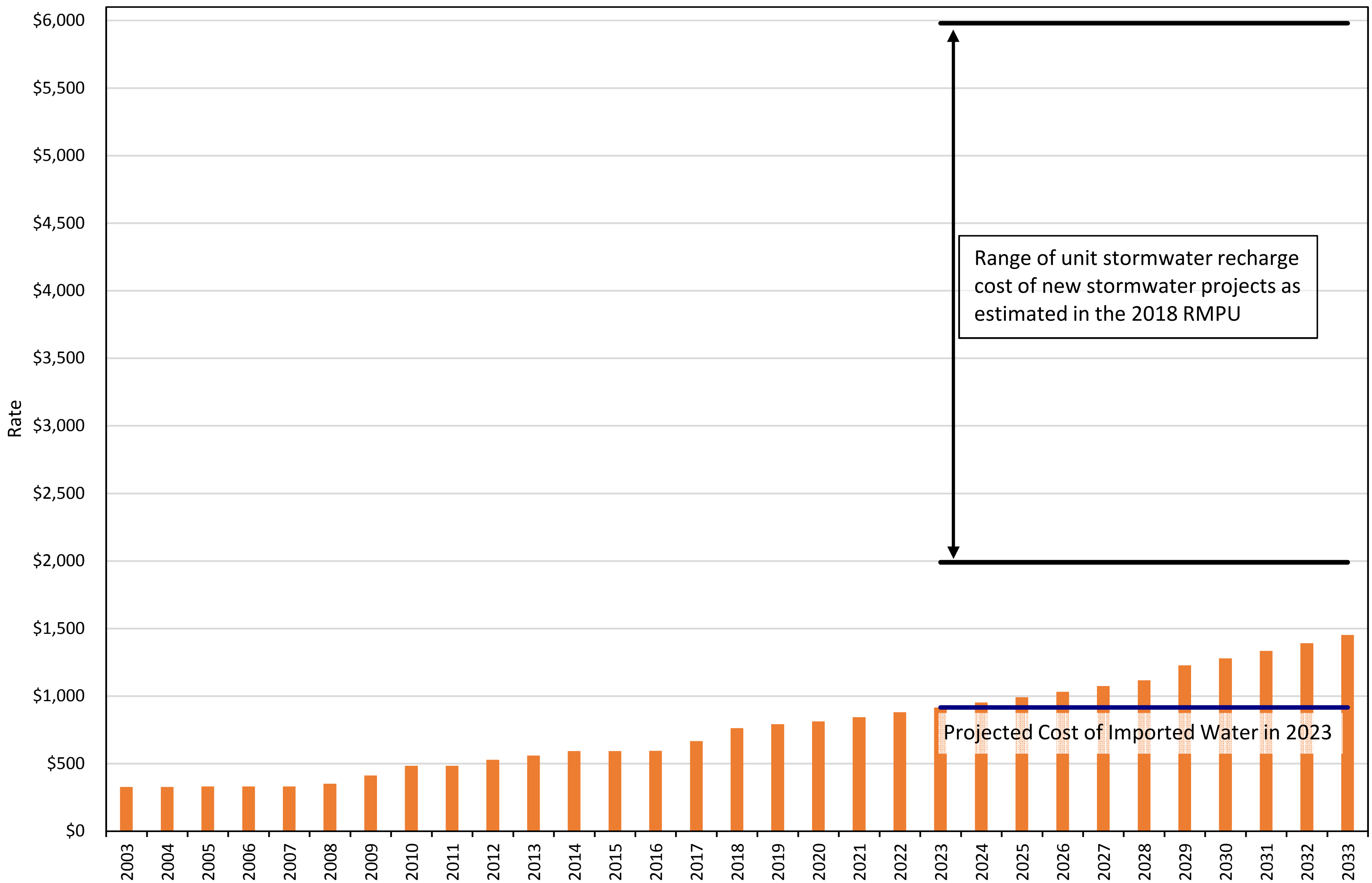
CHINO BASIN WATERMASTER

Potential New Stormwater Recharge Projects Considered in the 2018 RMPU

Exhibit A-7

Appendix C

Exhbit A-8
Projected Imported Water Rates
Compared to Estimated Unit Cost of New Stormwater Recharge Projects



Exhibit_A-8_IW_Costs--Exhibit A-8
Created on 3/15/2019
Printed on 7/5/2019

Appendix C

Exhibit A-9
Cost-Estimate and Schedule to Implement Activity A

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Define objectives and refine scope of work · Define objectives of Activity A · Refine scope described in TM1 · Refine detailed cost and schedule	$45,000	$45,000												
Task 2 Develop planning, screening, and evaluation criteria · Develop criteria on how and where to conduct recharge · Develop criteria to evaluate project cost and benefit · Review and finalize criteria	$125,000		$125,000											
Task 3 Describe recharge enhancement opportunities · Identify potential stormwater recharge projects · Select projects for reconnaissance level recharge study	$80,000					$80,000								
Task 4 Develop reconnaissance-level engineering design and operating plan · Characterize potential recharge alternatives · Rank Alternatives · Prepare finance plan for soft-costs · Prepare report	$325,000						$220,000			$105,000				
Task 5 Plan, design, and construct selected recharge projects · Prepare preliminary design report and CEQA documentation · Prepare finance plan for project implementation · Obtain permits and agreements and prepare final design · Construct selected projects	$ TBD													$ TBD
Total Cost and Cost by FY	**$575,000**	**$170,000**				**$300,000**				**$105,000**				**$ TBD**

TBD -- To be determined

20190610_ActivityA_Cost.xlsx--Summary_TM1
Created on 6/10/2019
Printed on 7/23/2019

Appendix C

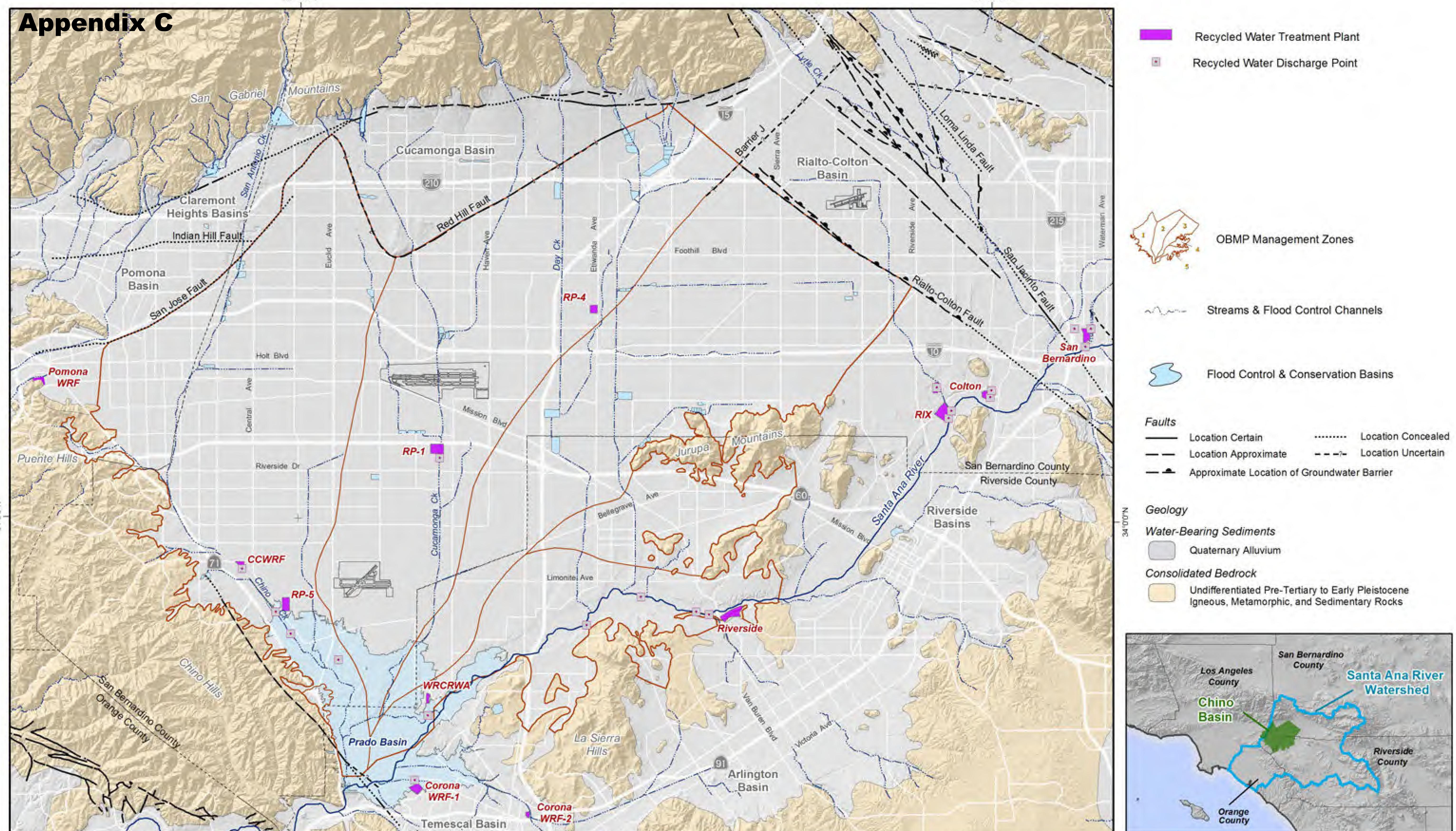
Exhibit B-1
Cost-Estimate and Schedule to Implement Activity B

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Convene the Storage and Recovery Program Committee, define objectives, and refine scope of work · Convene Storage and Recovery Program Committee · Define objectives and impediments for developing Storage and Recovery Programs · Define mutual benefits expected from Storage and Recovery Programs · Develop scope, schedule, and cost to prepare a *Storage and Recovery Program Master Plan*	$105,000	$105,000												
Task 2 Develop conceptual alternatives for Storage and Recovery Programs at various scales · Identify and characterize potential source waters · Identify potential storing partners and delivery methods · Identify and characterize institutional challenges · Develop planning criteria · Describe several conceptual Storage and Recovery Programs alternatives · Evaluate and select alternatives for Task 3	$ TBD					$ TBD								
Task 3 Describe and evaluate reconnaissance-level facility plans and costs for Storage and Recovery Program alternatives · Describe alternative facility plans, operations, and costs · Characterize basin response, potential MPI, benefits · Describe potential implementation barriers · Assess feasibility and rank alternatives	$ TBD									$ TBD				
Task 4 Prepare *Storage and Recovery Program Master Plan* · Describe results and recommendations of Tasks 1 through 3 · Achieve consensus on the recommendations · Prepare *Storage and Recovery Program Master Plan*	$ TBD												$ TBD	$ TBD
Total Cost and Cost by FY	**$105,000**	**$105,000**				**$ TBD**				**$ TBD**				**$ TBD**

TBD -- To be determined

ActivityB_Cost.xlsx--Summary_TM1
Created on 6/10/2019
Printed on 11/21/2019

Appendix C



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: SO
Date: 11/22/2019
File: Exhibit D-1_RWTreatment Plants.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

Recycled Water Treatment Plants and Discharge Points

Exhibit D-1

Appendix C

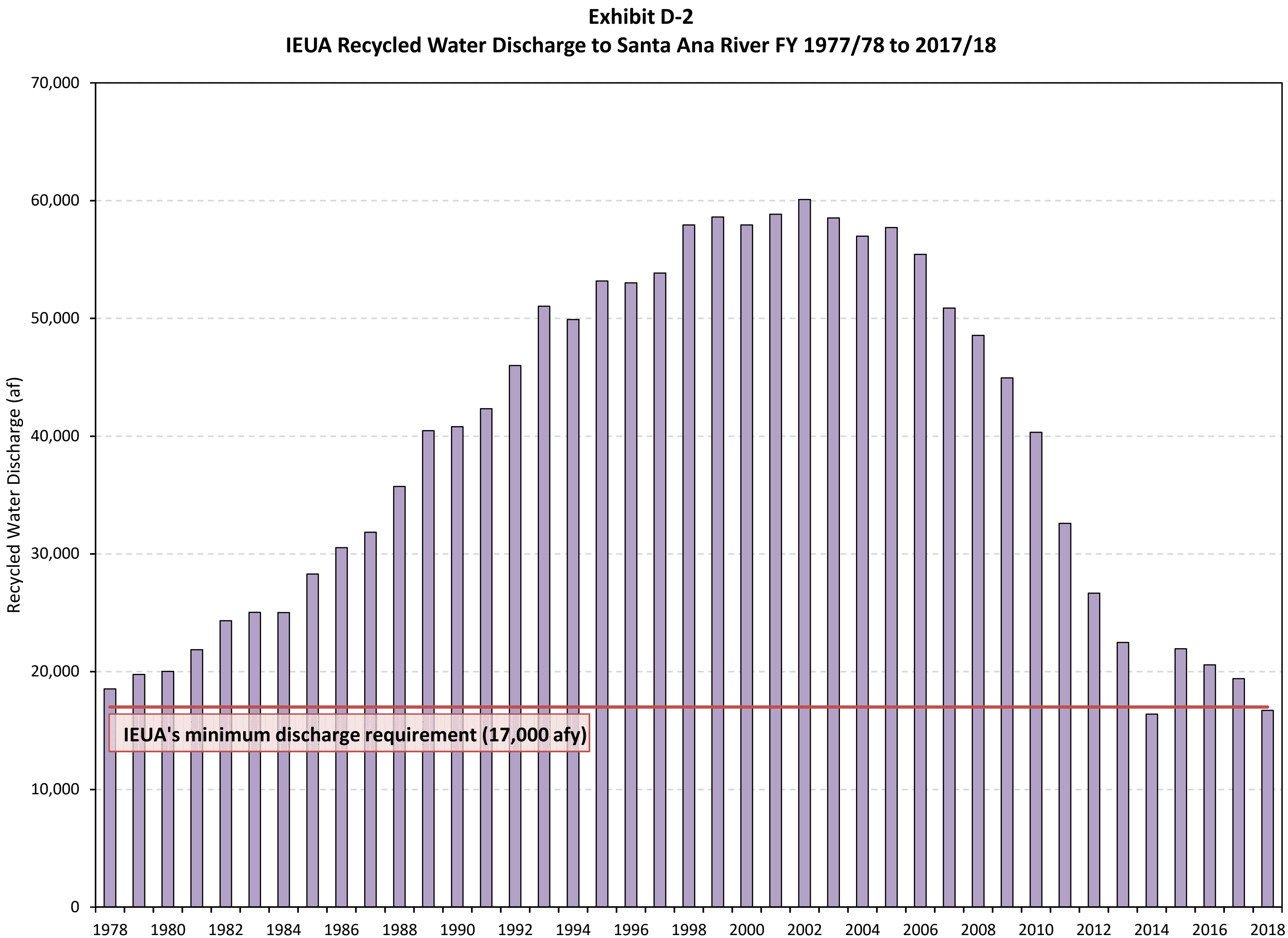


Exhibit D-2_RW Discharge.xlsx -- Exhibit D-2
7/23/2019

Appendix C

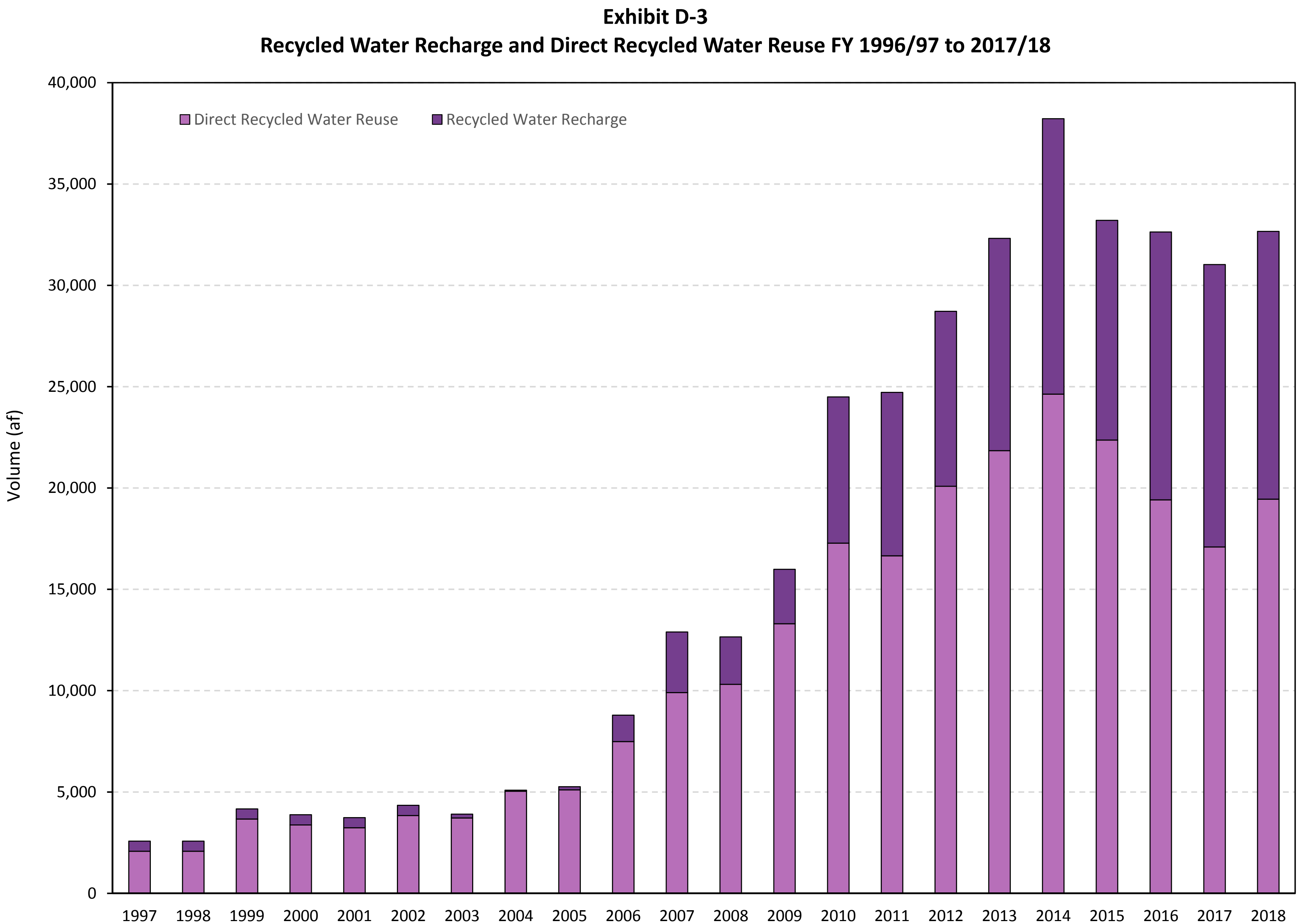
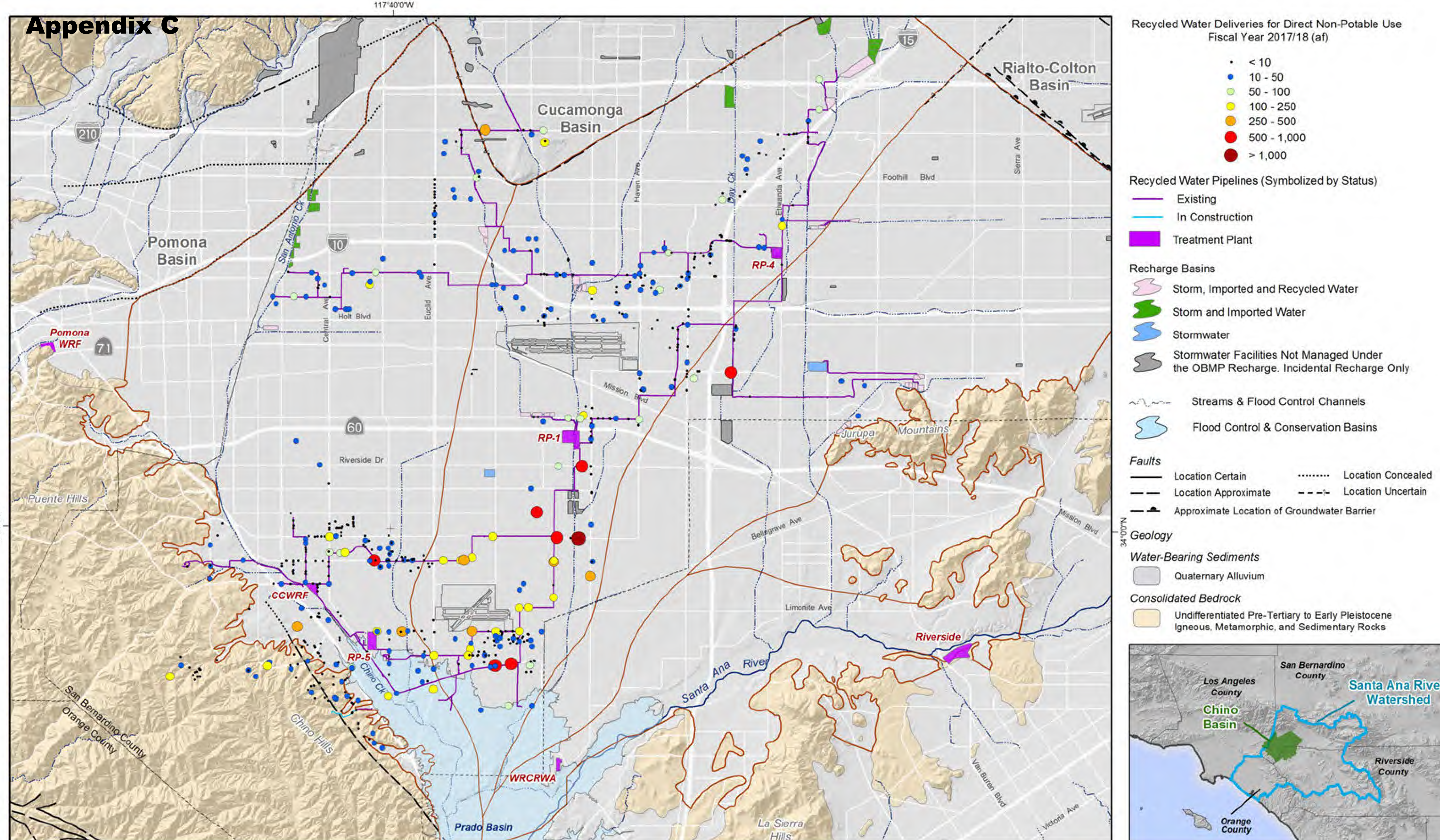


Exhibit D-3
Recycled Water Recharge and Direct Recycled Water Reuse FY 1996/97 to 2017/18
Direct Recycled Water Reuse
Recycled Water Recharge
Volume (af)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

Appendix C



Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 20170215
File: Exhibit D-4_RW Deliveries

Prepared for:
OBMP 2020 Update
Scoping Report

Chino Basin Watermaster

IEUA Recycled Water Delivery System for Direct Reuse
FY 2017/18

Exhibit D-4

Appendix C

Exhibit D-5
IEUA Projections of Recycled Water Production and Reuse through 2040

Recycled Water (af)		FY 2017/18 (Actual)	2020	2025	2030	2040
Production - High*	a	49,369	64,400	70,400	75,200	83,000
Production - Low*			54,400	61,000	67,700	74,700
Direct Reuse*	b	19,450	24,000	27,500	30,000	30,000
Recharge*	c	13,212	16,900	18,700	18,700	18,700
Surplus Supply Available for Reuse and/or Discharge - High	d = a - (b + c)	16,708	23,500	24,200	26,500	34,300
Surplus Supply Available for Reuse and/or Discharge - Low			13,500	14,800	19,000	26,000

* Source: Inland Empire Utilities Agency. *Sources of Water Supply for the Chino Basin Program* . Memo to Member Agencies. February 20, 2019.

Appendix C

Exhibit D-6
Actual and Projected[1] Annual Recycled Water Recharge
(afy)

Basin Permitted for Recycled Water Recharge	Theoretical Maximum Supplemental Water Recharge Capacity[2]		Actual FY 2017/18 Recharge	Projected Annual Recharge for FY 2019/20 to FY 2029/30
	Directly After Cleaning[3]	Average Between Maintenance Periods[4]		
Brooks Street Basin	2,825	1,658	1,268	2,000 [5]
Seventh and Eighth Street Basins	5,045	4,596	1,037	1,490
Subtotal Management Zone 1			*2,305*	*3,490*
Ely Basins	7,375	4,501	1,511	1,100
Hickory Basin	2,433	2,276	1,399	1,650
San Sevaine Basins 1-5	9,637	5,209	0	840
Turner Basins 1-4	3,674	2,557	1,526	1,110
Victoria Basin	2,436	2,279	793	1,530
Subtotal Management Zone 2			*5,228*	*6,230*
Banana Basin	1,913	1,790	2,131	1,050
Declez Basin	3,032	2,827	588	1,250
IEUA RP3 Ponds	12,389	11,587	2,960	4,400
Subtotal Management Zone 3			*5,679*	*6,700*
Total	**50,760**	**39,280**	**13,212**	**16,420**

n/a - not applicable

[1] Source - Andy Campbell, IEUA, June 2016

[2] Subject to Watermaster needs for recharge and replenishment

[3] Total recharge from the 10-month period directly after a cleaning.

[4] Average annual recharge over the span between maintenance. The average cleaning frequency of each recharge facility was provided by the IEUA. This estimate corresponds to continuous use between maintenance periods and is less than the recharge capacity that would occur if the recharge basins are used less frequently.

[5] The projected recharge at Brooks Basin is larger than the theoretical maximum average supplemental water recharge capacity between maintenance periods, but the capacity can increase up to 2,825 afy if the maintenance frequency is increased.

Appendix C

Exhibit D-7
Cost-Estimate and Schedule to Implement Activity D

Task and Subtask Description	Engineering Cost	FY 2020/21 Q1	FY 2020/21 Q2	FY 2020/21 Q3	FY 2020/21 Q4	FY 2021/22 Q1	FY 2021/22 Q2	FY 2021/22 Q3	FY 2021/22 Q4	FY 2022/23 Q1	FY 2022/23 Q2	FY 2022/23 Q3	FY 2022/23 Q4	FY 2023/24 and beyond
Task 1 Convene Recycled Water Projects Committee, define objectives and refine scope of work · Convene Recycled Water Projects Committee · Define objectives of Activity D · Refine scope described in TM1 · Refine detailed cost and schedule	$50,000	$50,000												
Task 2 Characterize the availability of all recycled water supplies and demands · Review 2020 Urban Water Management Plans · Develop water supply and demand projections · Characterize timing and magnitude of recycled water available	$135,000		$135,000											
Task 3 Develop planning, screening, and evaluation criteria · Develop Watermaster criteria · Develop regulatory criteria · Develop criteria to evaluate project cost and benefit · Review and finalize criteria	$40,000				$40,000									
Task 4 Describe recycled water reuse project opportunities · Identify potential recycled water reuse projects · Select projects for reconnaissance level recharge study	$85,000					$85,000								
Task 5 Develop reconnaissance-level engineering design and operating plan · Characterize potential project alternatives · Rank alternatives · Prepare finance plan for soft-costs · Prepare report	$310,000						$130,000			$180,000				
Task 6 Plan, design, and construct selected recycled water projects · Prepare preliminary design report and CEQA documentation · Prepare finance plan for project implementation · Obtain permits and agreements and prepare final design · Construct selected projects	$ TBD													$ TBD
Total Cost and Cost by FY	**$620,000**	**$225,000**				**$215,000**				**$180,000**				**$ TBD**

TBD -- To be determined

20190626_ActivityD_Cost.xlsx--Summary_TM1
Created on 6/10/2019
Printed on 7/23/2019

Appendix C

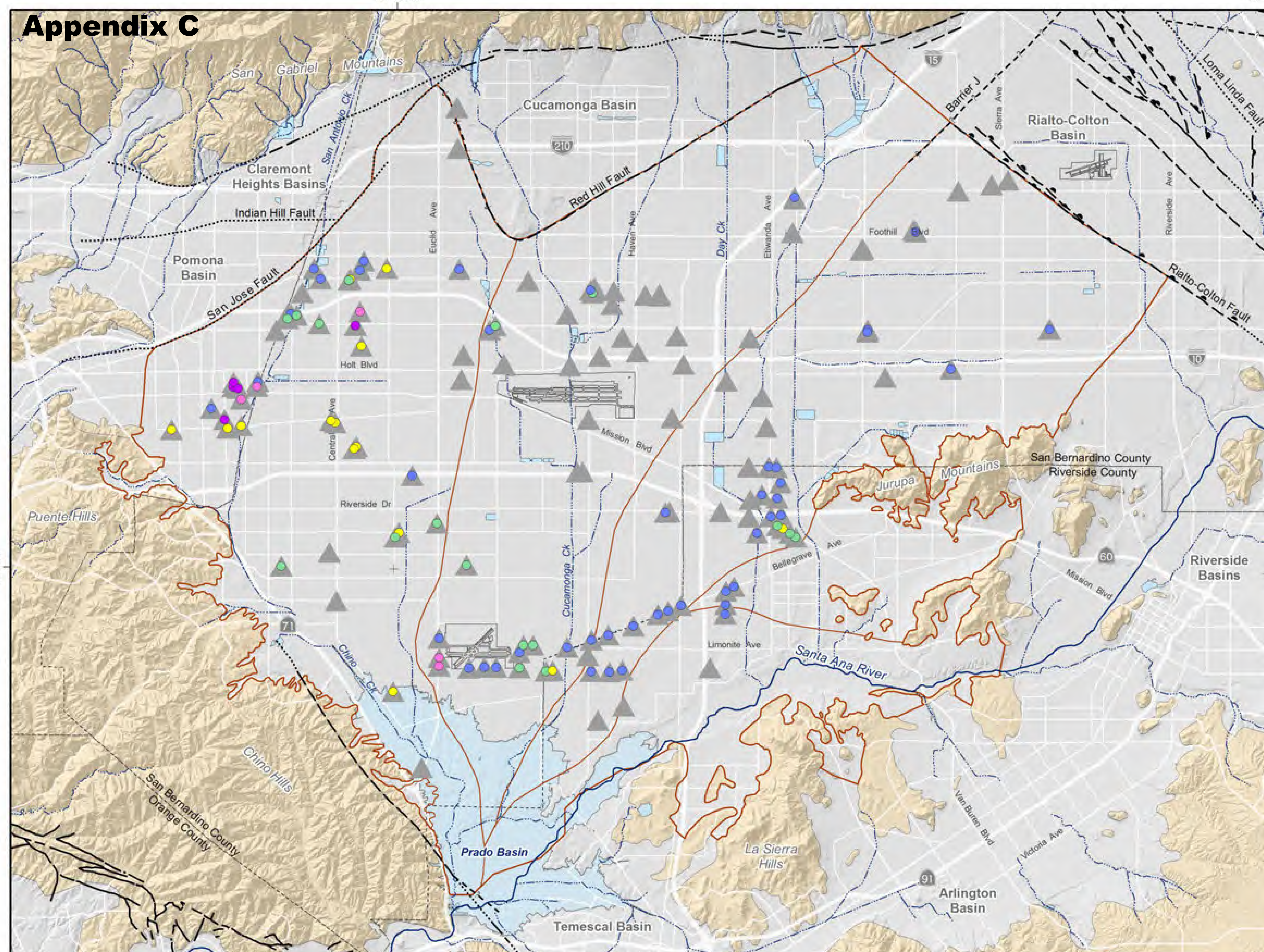
Exhibit EF-1

Summary of Drinking Water Contaminants with Primary MCLs in Municipal Supply Wells

FY 2013/14 - 2017/18

Analyte	Primary CA MCL	Number of Active Municipal Supply Wells with Exceedance of MCL	Number of Municipal Supply Wells with Exceedance of MCL	Number of Total Wells in the Chino Basin with Exceedance of MCL
Nitrate-Nitrogen	10 mgl	71	80	555
1,2,3-Trichloropropane	0.005 µgl	33	36	111
Perchlorate	6 µgl	27	30	387
Trichloroethylene (TCE)	5 µgl	11	14	269
Gross Alpha	15 pCi/L	6	7	14
Chromium	50 µgl	4	4	4
Arsenic	0.01 mgl	3	5	74
1,2-Dibromo-3-chloropropane	0.2 µgl	3	3	4
Tetrachloroethene (PCE)	5 µgl	3	3	96
Trihalomethanes	10 µgl	2	3	2
Nitrite-Nitrogen	1 mgl	2	2	17
1,1-Dichloroethene (1,1-DCE)	5 µgl	1	1	13
Dichloromethane (Freon 30)	5 µgl	1	1	91
Uranium	20 pCi/L	1	1	1

Appendix C



Active Municipal Supply Well

Number of Contaminants that Exceed a MCL

- 1
- 2
- 3
- 4
- 5

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Approximate Location of Groundwater Barrier
- Location Concealed
- Location Uncertain

Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 11/22/2019
File: Exhibit_EF-2_Exceedance_Count.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

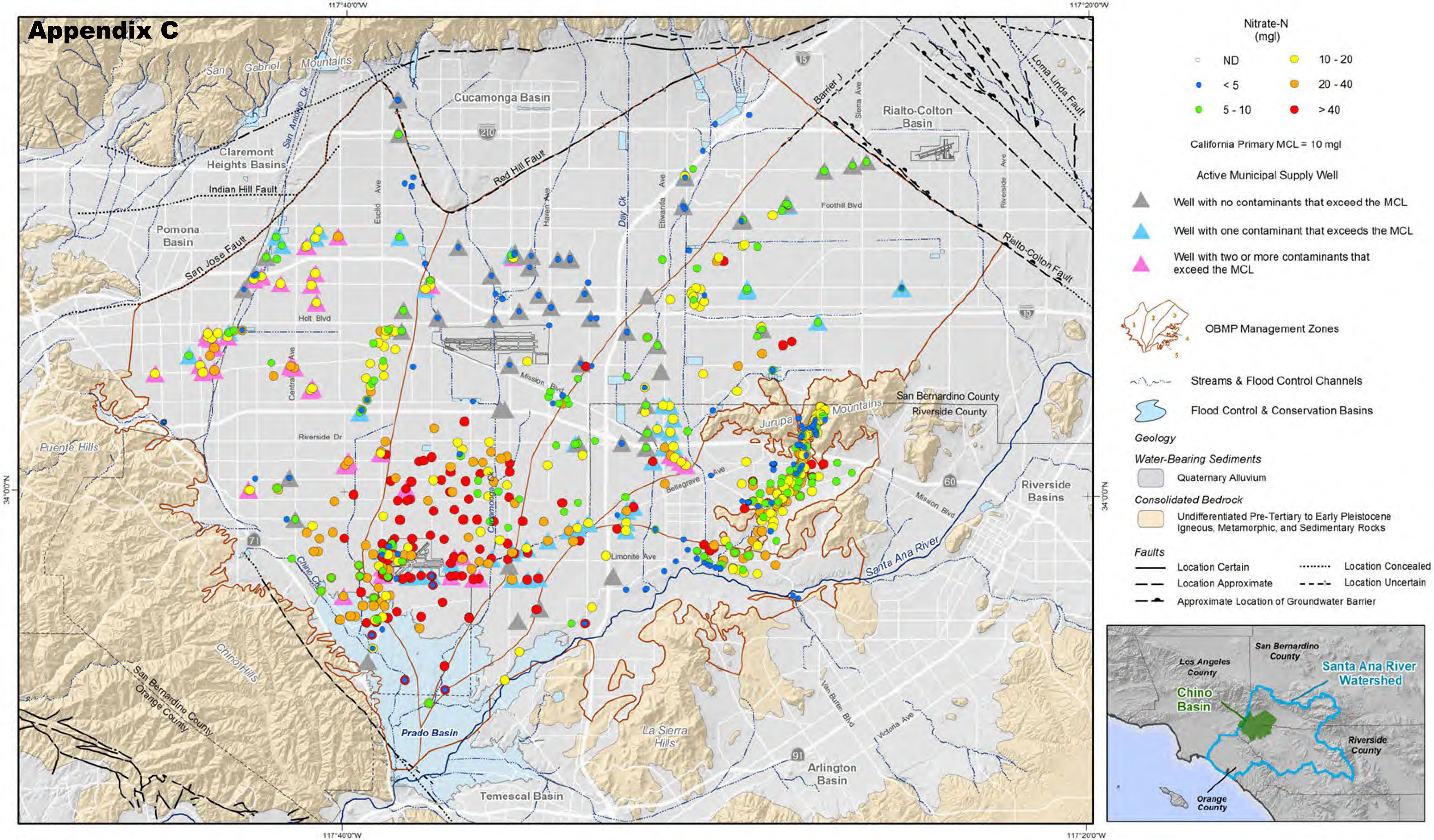
Chino Basin Watermaster

Occurrence of Drinking Water Contaminants in Active Municipal Supply Wells in Chino Basin

2014-2018

Exhibit EF-2

Appendix C



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 11/22/2019
File: Exhibit_EF-3_NO3_2014-2018.mxd

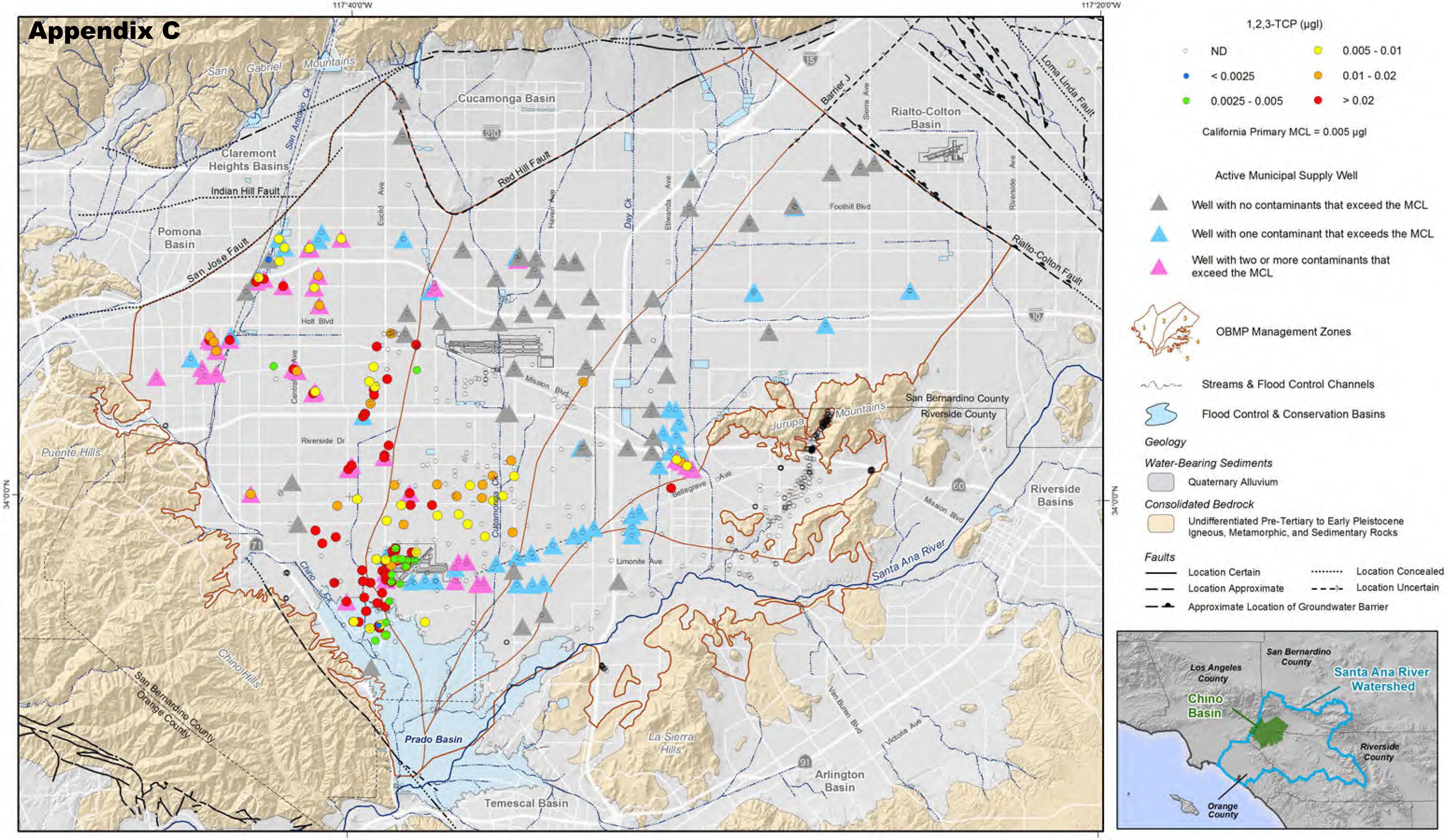
0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

CHINO BASIN WATERMASTER

Maximum Nitrate Concentration
2014-2018

Exhibit EF-3



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 11/22/2019
File: Exhibit_EF-4_1,2,3-TCP_2014-2018.mxd

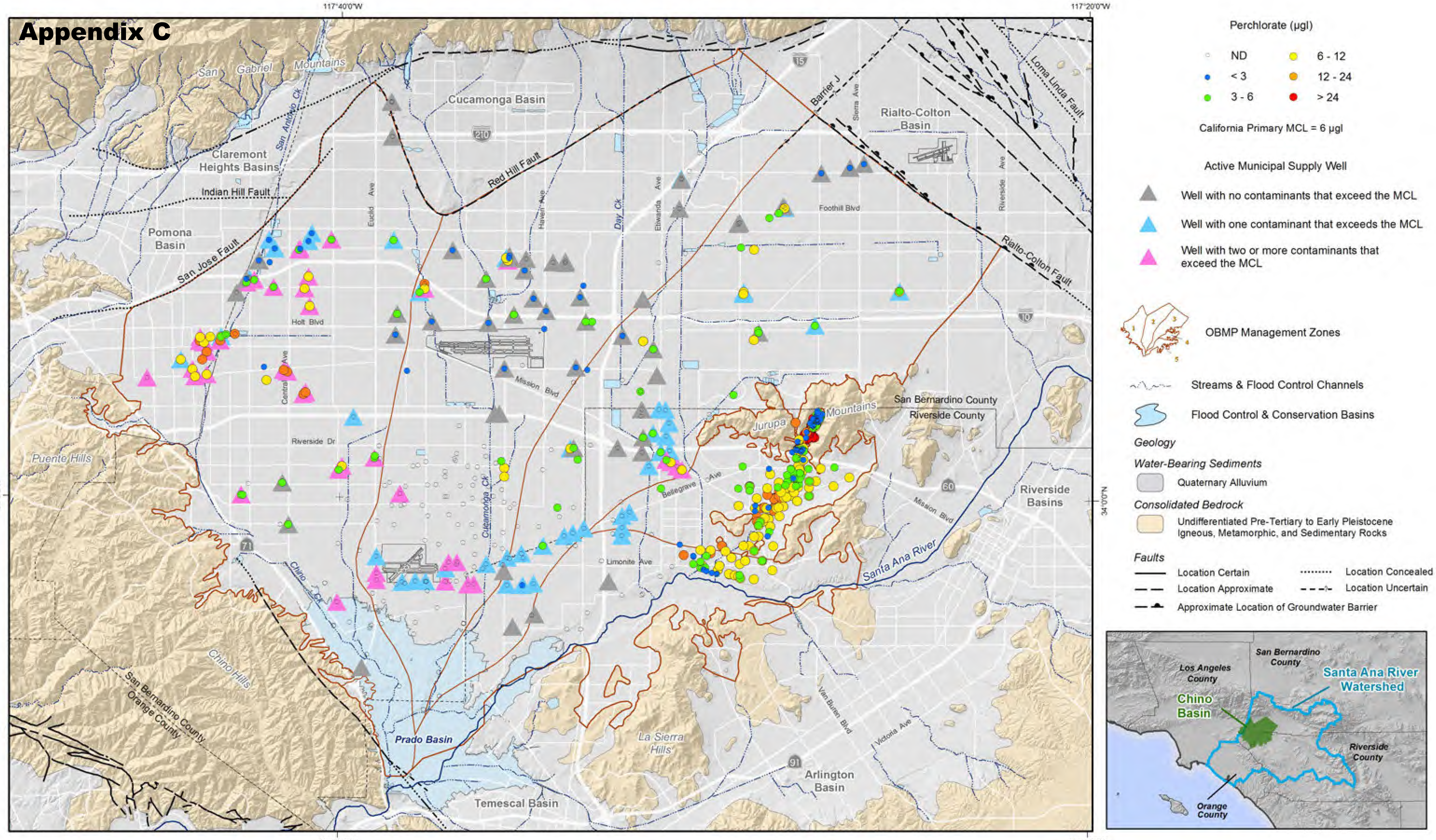
0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

CHINO BASIN WATERMASTER
Partners in Basin Management

Maximum 1,2,3-Trichloropropane (1,2,3-TCP) Concentration
2014-2018

Exhibit EF-4



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 11/22/2019
File: Exhibit_EF-5_CLO4_MCL_2014-2018.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

CHINO BASIN WATERMASTER
Partners in Basin Management

Maximum Perchlorate Concentration
2014-2018

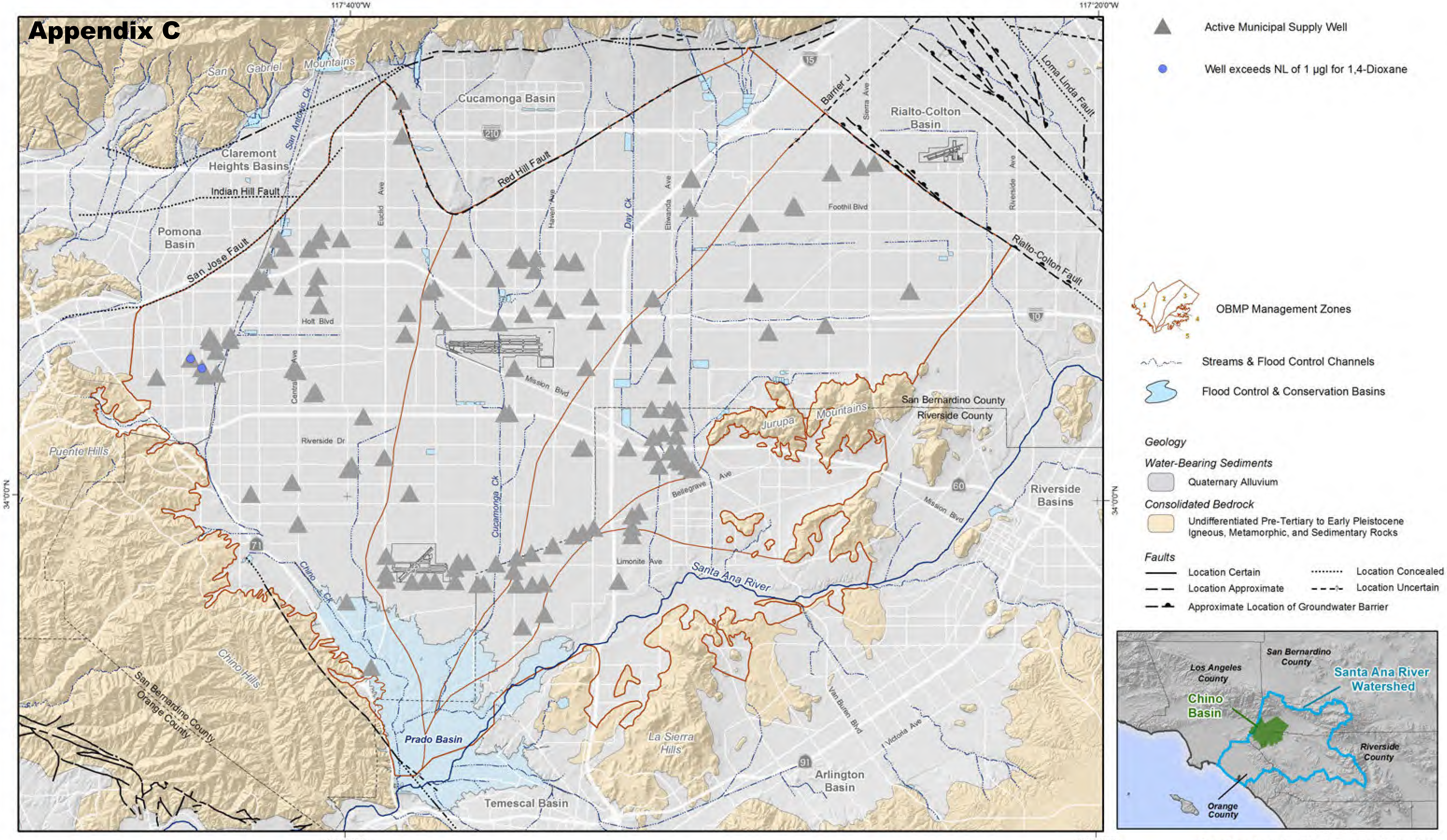
Exhibit EF-5

Appendix C

Exhibit EF-6
Summary of Drinking Water Contaminants with Notification Levels in Municipal Supply Wells
FY 2013/14 - 2017/18

Analyte	CA Drinking Water NL	Number of Active Municipal Supply Wells with Exceedance of NL	Number of Municipal Supply Wells with Exceedance of NL	Number of Total Wells in the Chino Basin with Exceedance of NL
1,4-Dioxane	1 µgl	2	2	133
Manganese	0.5 mgl	0	0	118
N-Nitrosodimethylamine (NDMA)	0.01 µgl	0	0	60
Vanadium	0.05 mgl	0	0	55
Naphthalene	0.017 mgl	0	0	48
1,2,4-Trimethylbenzene	0.33 mgl	0	0	26
1,3,5-Trimethylbenzene	0.33 mgl	0	0	19
Methyl Isobutyl Ketone	0.12 mgl	0	0	11
n-Propylbenzene	0.26 mgl	0	0	11
HMX (Octogen)	0.35 mgl	0	0	11
Chlorate	0.8 mgl	0	0	4
Formaldehyde	0.1 mgl	0	0	3
N-Nitrosodiethylamine (NDEA)	0.01 µgl	0	0	3
Ethylene Glycol	14 mgl	0	0	1
n-Butylbenzene	0.26 mgl	0	0	1

Appendix C



Prepared by:

WEI
Wildermuth Environmental, Inc.

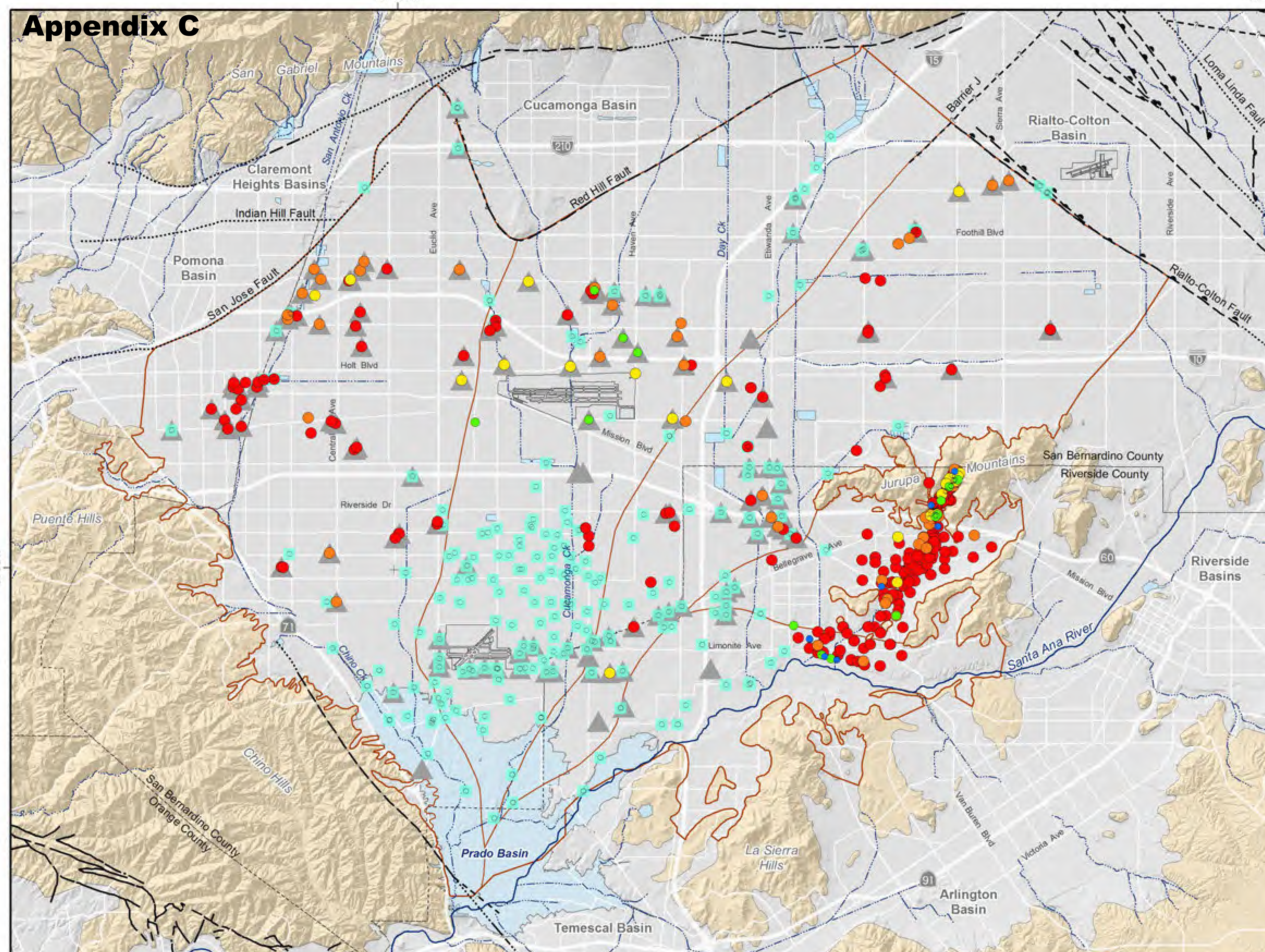
Author: CS
Date: 11/22/2019
File: Exhibit_EF-7_Exceedance_Count_NL.mxd

Prepared for:
OBMP 2020 Update
Scoping Report

Contaminants that Exceed the NL in Active Municipal Supply Wells in Chino Basin
2014-2018

Exhibit EF-7

Appendix C



Perchlorate (µgl)

- ND
- < 0.5
- 0.5 - 1
- 1 - 2
- 2 - 4
- > 4

California MCL = 6 µgl

California PHG = 1 µgl

Well Sampled for Perchlorate but the Method Detection Limit was Greater than the PHG of 1 µgl

Active Municipal Supply Well

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Location Concealed
- Location Uncertain
- Approximate Location of Groundwater Barrier

Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 11/22/2019
File: Exhibit_EF-8_CLO4_PHG_2014-2018.mxd

0 1 2 3 4 5 Miles

0 2 4 6 8 Km

Prepared for:

OBMP 2020 Update

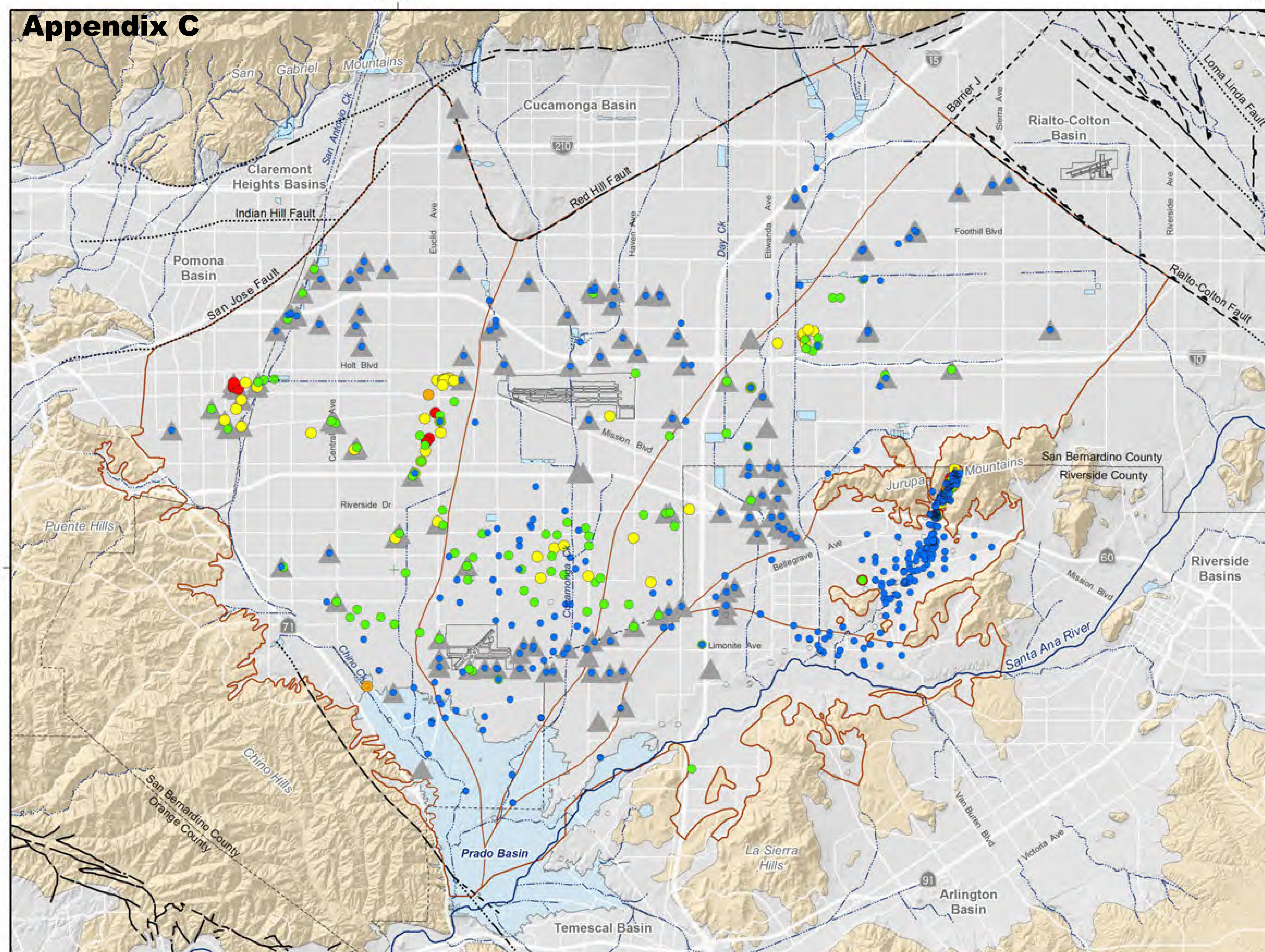
Scoping Report

Maximum Perchlorate Concentration

2014-2018

Exhibit EF-8

Appendix C



Hexavalent Chromium (µgl)

- ND
- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

A MCL for Hexavalent Chromium of 10 µgl was established in 2014, and later invalidated by the court in 2017

Active Municipal Supply Well

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Approximate Location of Groundwater Barrier
- Location Concealed
- Location Uncertain

Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 11/22/2019
File: Exhibit_EF-9_HexCr_2014-2018.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

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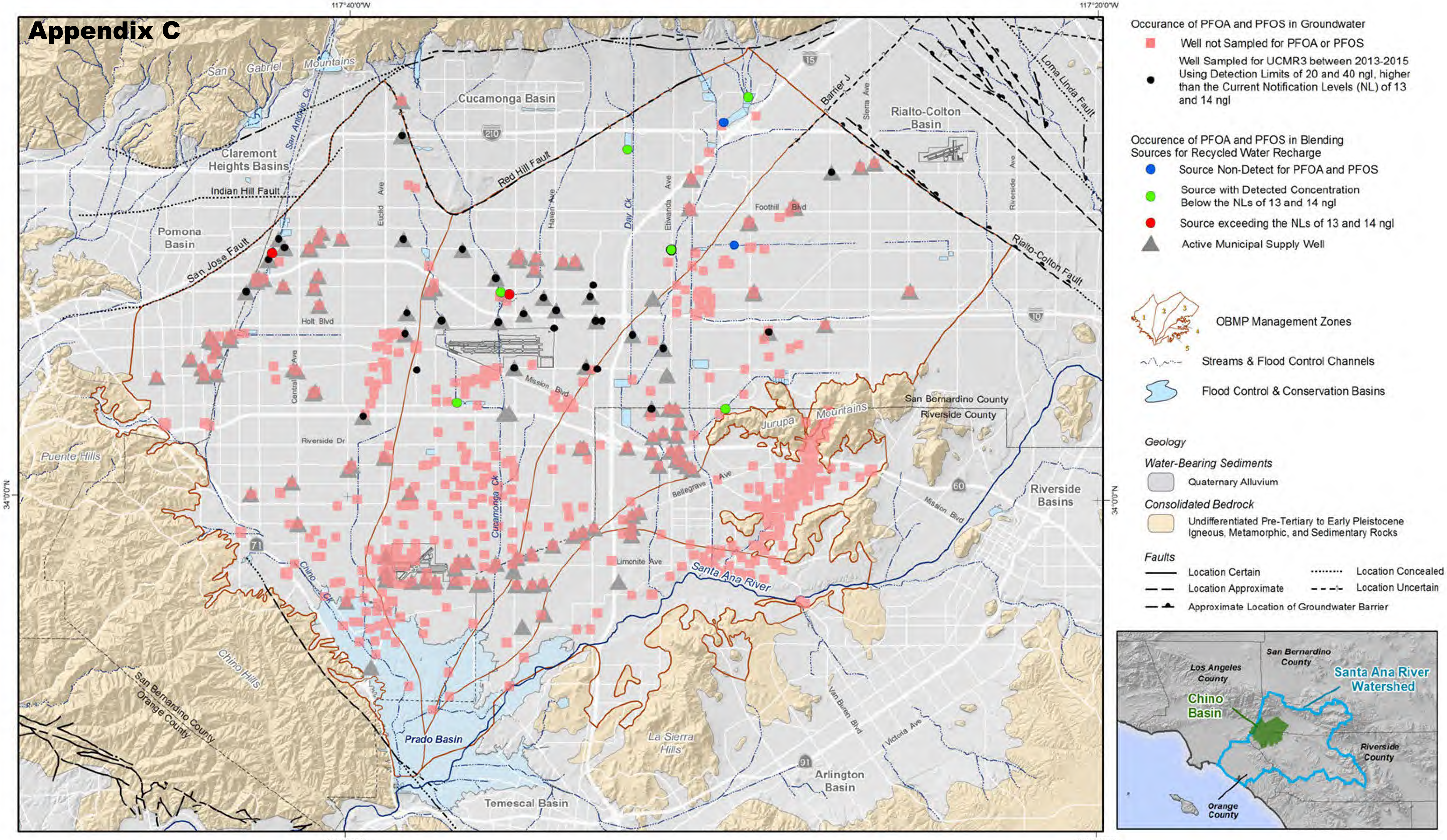
OBMP 2020 Update
Scoping Report

Chino Basin Watermaster

Maximum Hexavalent Chromium
2014-2018

Exhibit EF-9



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 11/22/2019
File: Exhibit_EF-10_PFAS_1998-2019.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

PFOA and PFOS Concentrations
Through March 2019

Exhibit EF-10

Appendix C

Exhibit EF-11
Cost-Estimate and Schedule to Implement Activity EF

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Convene the Water Quality Committee, define objectives, and refine scope of work · Convene Water Quality Committee · Define objectives of Activity EF · Refine scope described in TM1 · Refine detailed cost and schedule	$65,000	$65,000												
Task 2 Develop and implement an initial emerging-contaminants monitoring plan · Determine contaminants of interest · Develop initial monitoring plan · Implement initial monitoring plan	$95,000			$50,000		$45,000								
Task 3 Perform a water quality assessment and prepare a scope to develop and implement a Groundwater Quality Management Plan · Describe current and future challenges and solutions · Develop recommendations for long-term monitoring and assessment · Prepare scope to develop and implement a groundwater quality management plan · Prepare final assessment	$135,000						$80,000			$55,000				
Task 4 Develop planning, screening, and evaluation criteria · Develop criteria to evaluate project cost and benefit · Review and finalize criteria	$ TBD												$ TBD	$ TBD
Task 5 Identify and describe potential projects for evaluation · Identify potential projects · Select projects for reconnaissance level study	$ TBD													$ TBD
Task 6 Conduct a reconnaissance-level study for the proposed projects · Characterize potential treatment projects · Evaluate Projects · Prepare finance plan for soft-costs · Prepare implementation plan	$ TBD													$ TBD
Task 7 Prepare the *Groundwater Quality Management Plan* · Prepare draft plan · Prepare final plan	$ TBD													$ TBD
Task 8 Plan, design, and build water quality management projects · Prepare preliminary design report and CEQA documentation · Prepare finance plan for project implementation · Obtain permits and agreements and prepare final design · Construct selected projects	$ TBD													$ TBD
Total Cost and Cost by FY	**$295,000**	**$115,000**				**$125,000**				**$55,000**				**$ TBD**

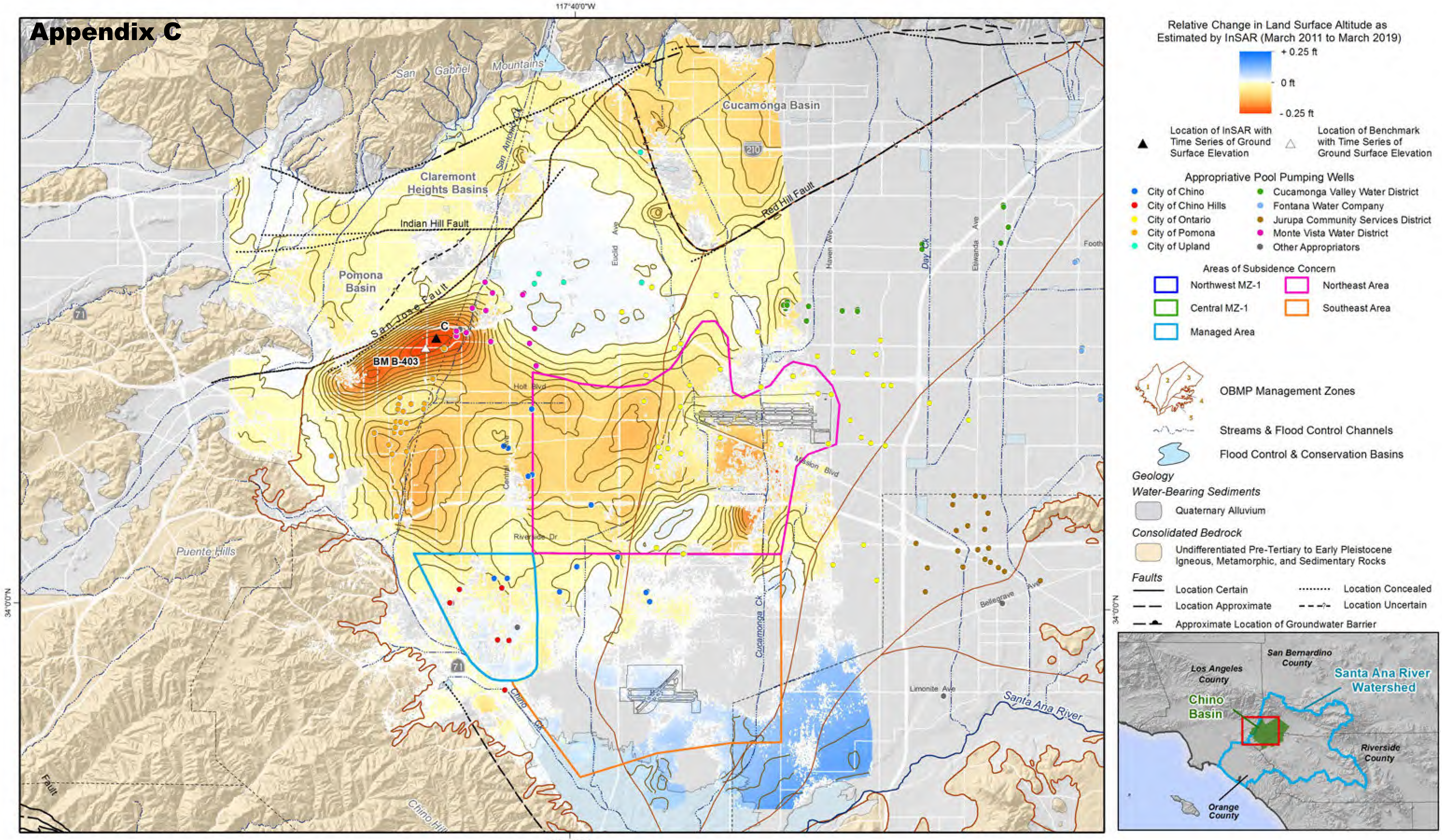
TBD -- To be determined

Exhibit CG-1
Aggregate Water Supply Plan for Watermaster Parties

Water Source	2015	2020	2025	2030	2035	2040
Volume (af)						
Chino Basin Groundwater	147,238	145,904	153,804	157,716	168,987	176,652
Non-Chino Basin Groundwater	51,398	55,755	63,441	64,999	66,691	68,483
Local Surface Water	8,108	15,932	15,932	18,953	18,953	18,953
Imported Water from Metropolitan	53,784	86,524	93,738	100,196	102,166	109,492
Other Imported Water	8,861	9,484	10,095	10,975	11,000	11,000
Recycled Water for Direct Reuse	20,903	24,008	24,285	26,583	29,836	33,223
Total	290,292	337,607	361,295	379,422	397,633	417,803
Percentage						
Chino Basin Groundwater	51%	43%	43%	42%	42%	42%
Non-Chino Basin Groundwater	18%	17%	18%	17%	17%	16%
Local Surface Water	3%	5%	4%	5%	5%	5%
Imported Water from Metropolitan	19%	26%	26%	26%	26%	26%
Other Imported Water	3%	3%	3%	3%	3%	3%
Recycled Water for Direct Reuse	7%	7%	7%	7%	8%	8%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Storage Framework Investigation - WEI, 2018

Appendix C



Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 8/20/2019
File: Exhibit_CG-2_Land_Subsidence.mxd

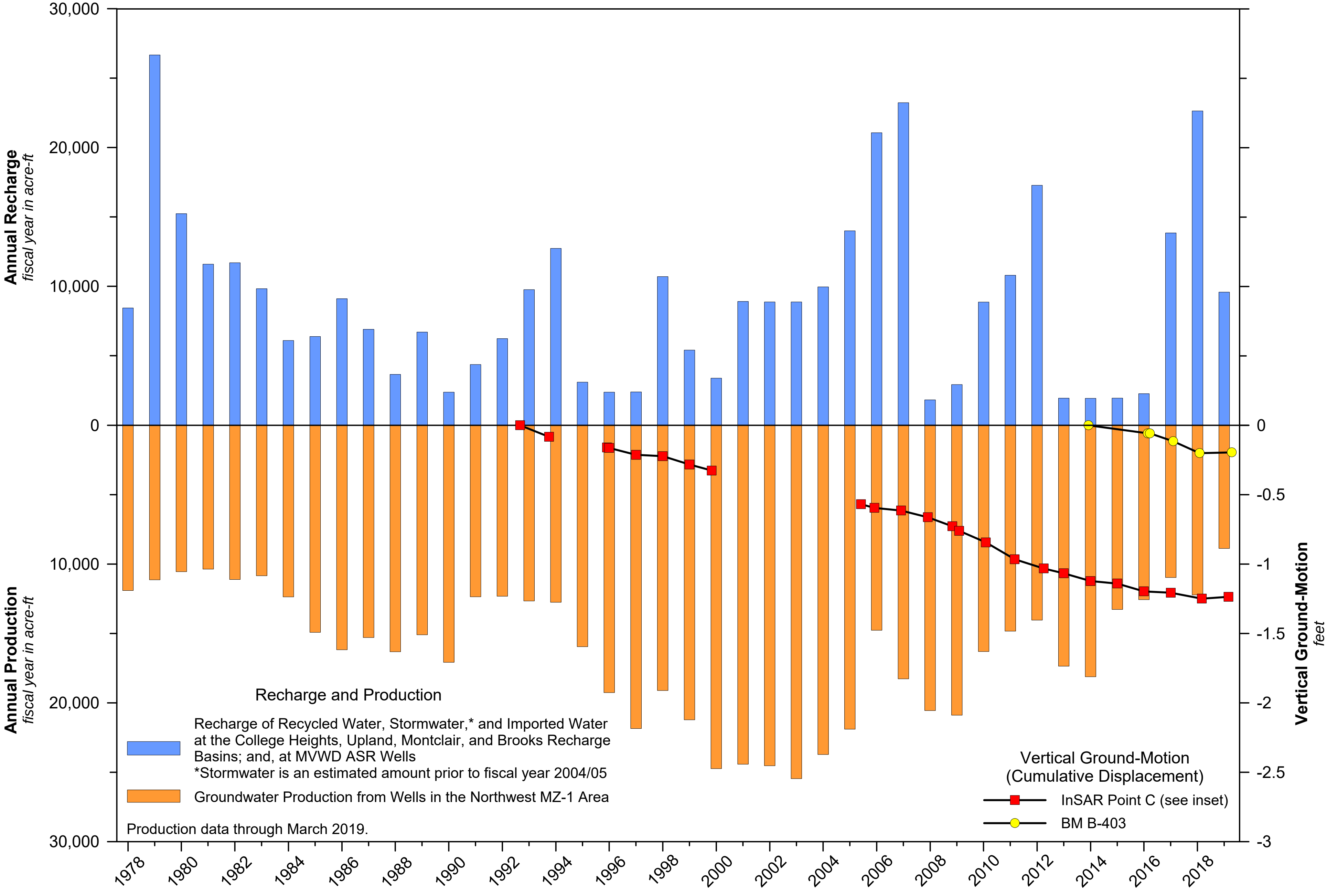
0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

Areas of Land Subsidence
2011-2019

Exhibit CG-2

Appendix C



WEI
Wildermuth Environmental, Inc.

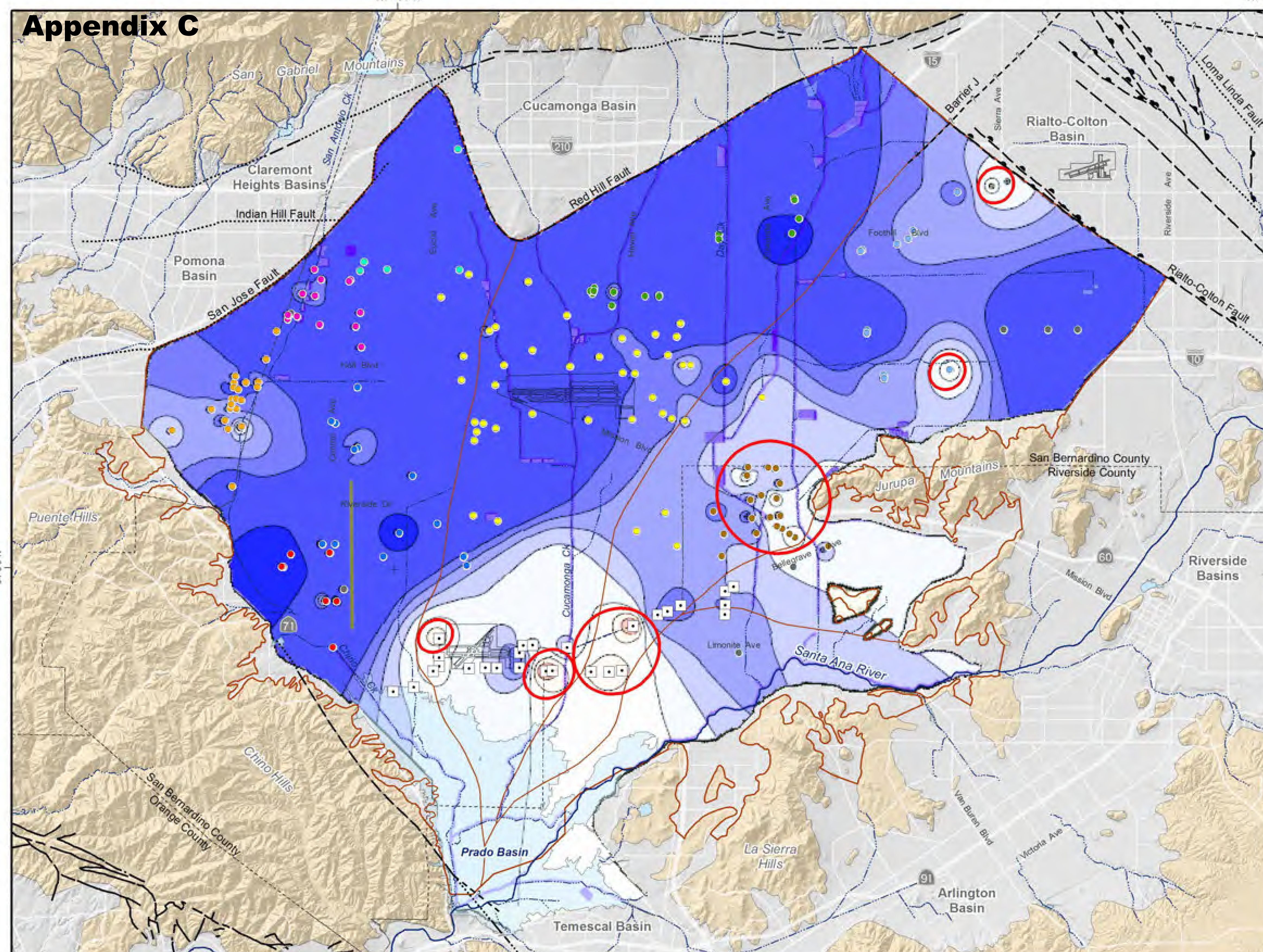
Prepared for:
OBMP 2020 Update
Scoping Report

Chino Basin Watermaster

Pumping, Recharge and Land Subsidence in the Northwest MZ-1 Area

Exhibit CG-3

Appendix C



Projected Groundwater Level Minus Sustainability Metric (ft)

- 200 - 400
- 100 - 200
- 80 - 100
- 60 - 80
- 40 - 60
- 20 - 40
- 0 - 20
- -20 - 0
- -40 - -20

Area below pumping sustainability metric

Appropriative Pool Pumping Wells

- City of Chino
- City of Chino Hills
- City of Ontario
- City of Pomona
- City of Upland
- Cucamonga Valley Water District
- Fontana Water Company
- Jurupa Community Services District
- Monte Vista Water District
- Other Appropriators

Chino Desalter Well

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Concealed
- Location Approximate
- Location Uncertain
- Approximate Location of Groundwater Barrier

Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 8/20/2019
File: Exhibit_CG-4_Prj_Difference_in_GWLs.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Scoping Report

Projected Difference between Groundwater Levels and the Pumping Sustainability Metric
Scenario 1A - FY 2029/30

Exhibit CG-4

Appendix C

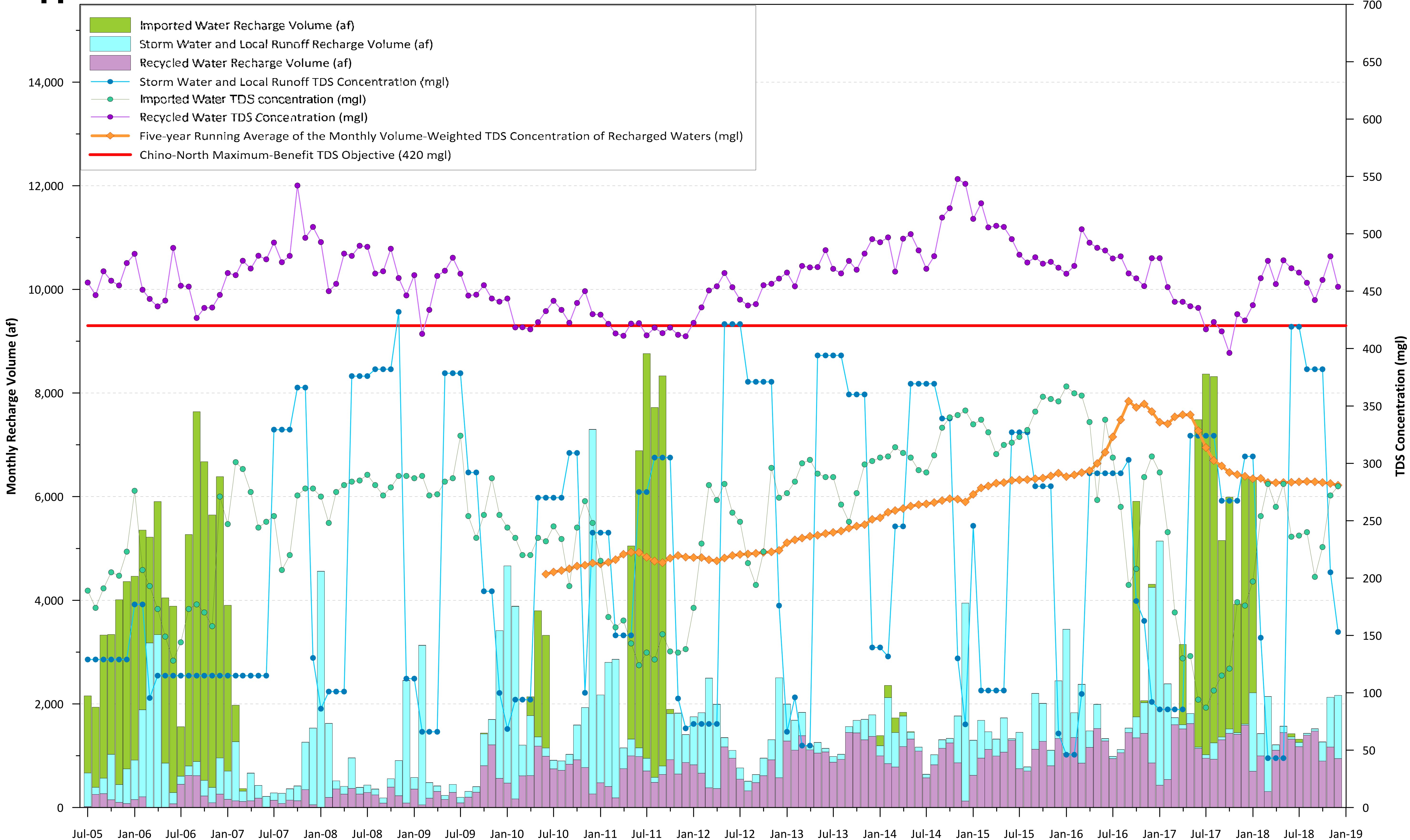
Exhibit CG-5
Cost-Estimate and Schedule to Implement Activity CG

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Convene the Water Supply Reliability Committee, define objectives, and refine scope of · Convene Water Supply Reliability Committee · Define objectives of Activity CG · Define reliability and other benefits expected from Activity CG · Refine scope described in TM1 · Refine detailed cost and schedule	$95,000	$95,000												
Task 2 Characterize water demands, water supply plans and existing/planned infrastructure and their · Characterize the water supplies and future water demands · Characterize exiting infrastructure to convey, treat, and distribute the supplies to meet the demands · Identify limitations to the existing infrastructure	$210,000				$70,000	$140,000								
Task 3 Develop planning, screening, and evaluation · Develop criteria to evaluate project cost and benefit · Review and finalize criteria	$ TBD							$ TBD						
Task 4 Describe water supply reliability opportunities · Identify potential projects · Select projects for reconnaissance level study	$ TBD								$ TBD					
Task 5 Develop reconnaissance-level engineering design and operating plan · Characterize potential water supply reliability projects · Evaluate Projects · Prepare finance plan for soft-costs · Prepare implementation plan	$ TBD									$ TBD				$ TBD
Task 6 Plan, design, and build water supply reliability alternatives · Prepare preliminary design report and CEQA documentation · Prepare finance plan for project implementation · Obtain permits and agreements and prepare final design · Construct selected projects	$ TBD													$ TBD
Total Cost and Cost by FY	**$305,000**	**$165,000**				**$140,000**				**$TBD**				**$ TBD**

TBD -- To be determined

Exhibit_CG-5_Cost.xlsx--Summary_TM1
Created on: 7/3/2019
Printed on: 11/21/2019

Appendix C



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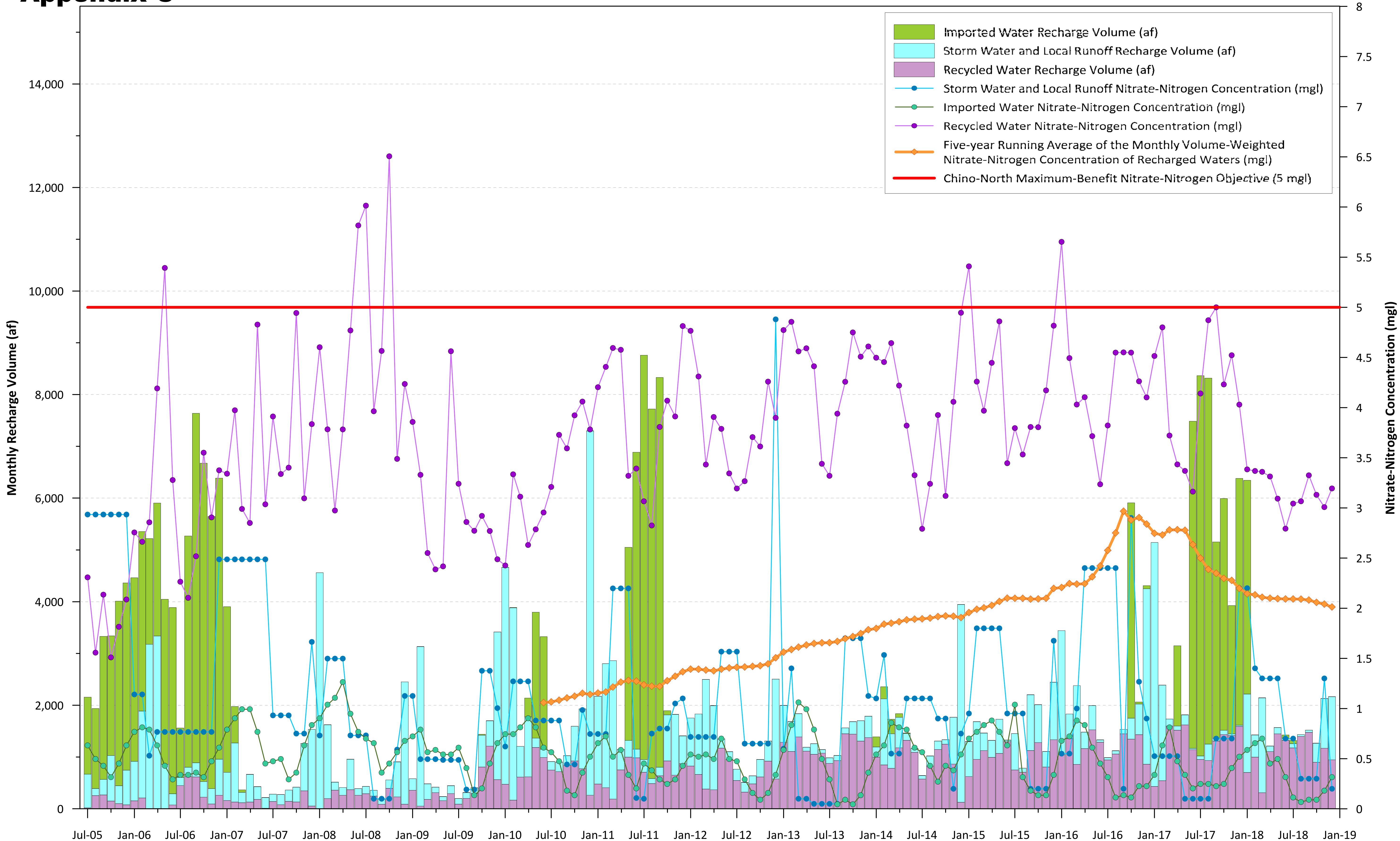
WILDERMUTH ENVIRONMENTAL, INC.

Prepared for:
OBMP 2020 Update
Scoping Report

Volume and Total Dissolved Solids (TDS) Concentrations of Recharge Water Sources in the Chino Basin
2005-2018

Exhibit K-1

Appendix C



Prepared for:
OBMP 2020 Update
Scoping Report

Volume and Nitrate-Nitrogen Concentrations of Recharge Water Sources in the Chino Basin
2005-2018

Exhibit K-2

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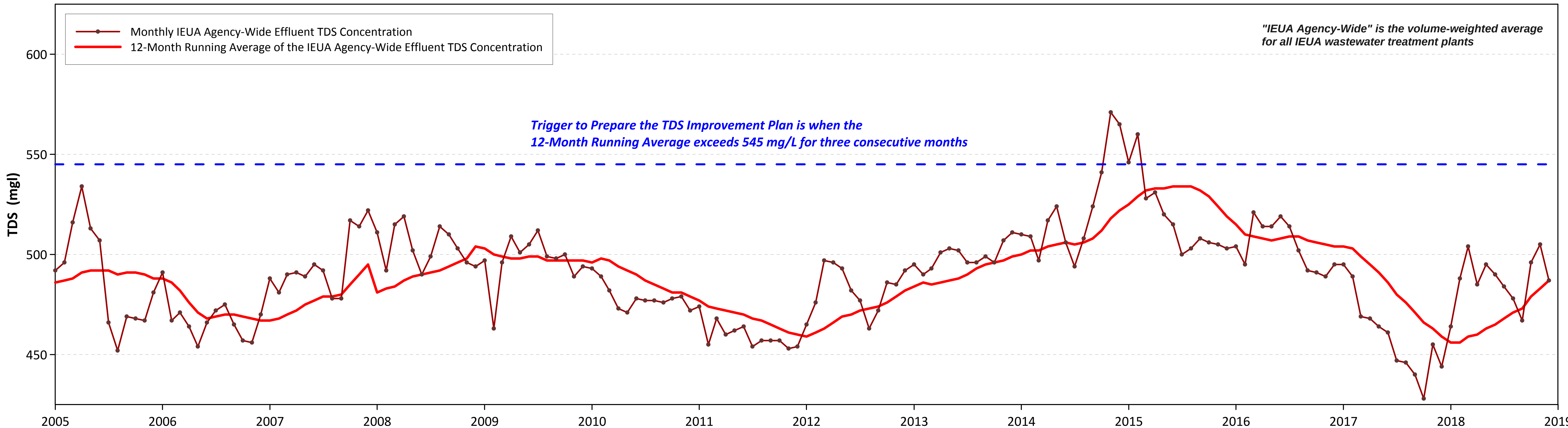

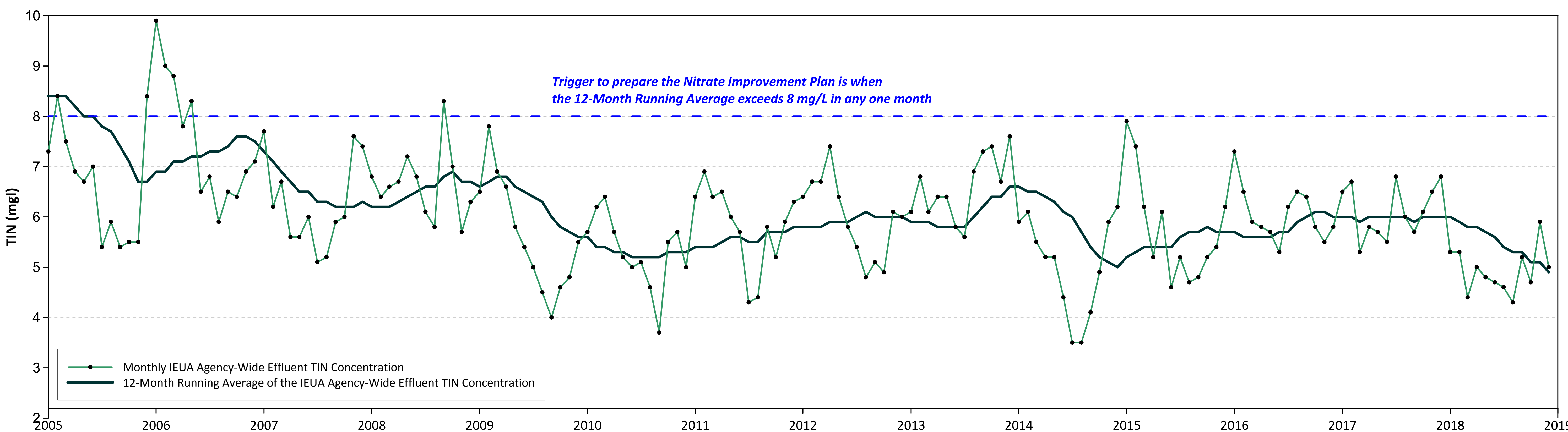

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Monthly and 12-Month Running Average of the IEUA Agency-Wide Effluent Total Dissolved Solids (TDS) and Total Inorganic Nitrogen (TIN) Concentrations
2005-2018

Exhibit K-3

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Exhibit K-4
Cost Estimate and Schedule to Implement Activity K

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Prepare projection to evaluate compliance with recycled water recharge dilution requirements. · Prepare projections · Evaluate projections for future wet and dry periods within 5 and 10 years · Determine the if there is a compliance challenge	$0	$0												
Task 2 Identify alternative compliance strategies · Identify potential compliance strategies · Select projects for reconnaissance level study	$ TBD					$ TBD								
Task 3 Evaluate alternative compliance strategies · Characterize alternative compliance startegies · Rank alternatives · Prepare finance plan for soft-costs · Prepare report	$ TBD								$ TBD	$ TBD				$ TBD
Task 4 Implement the alternative compliance strategy · Prepare preliminary design report and CEQA documentation · Prepare finance plan for project implementation · Obtain permits and agreements and prepare final design · Construct selected projects	$ TBD													$ TBD
Task 5 Periodically re-evaluate compliance with dilution requirements · Prepare projections of the dilution metric on a five-year frequency · Annually report current and future compliance with the dilution limit	$ TBD													$ TBD
Total Cost and Cost by FY	**$0**	**$0**				**$ TBD**				**$ TBD**				**$ TBD**

TBD -- To be determined

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Exhibit L-1

Chino Basin Watermaster -- Monitoring and Reporting Requirements, Data Types, Analyses Performed, Report Contents, and Past Efforts to Reduce Scope/Cost

Purpose/Requirement/Schedule	Data Types									Analyses Performed	Report Content	Past Efforts to Reduce Scope and Cost
	GWP	GWL	GWQ	SW	GL	GEOL	BIO	WS/WU	PLAN			
Water Rights Compliance Monitoring. Pursuant to Term 20 of Watermaster's Water Rights Permit 21225 and an agreement with the California Department of Fish and Wildlife (DFW), Watermaster must prepare an annual report of estimates of monthly changes in discharge in each tributary to the Santa Ana River that resulted from diversions of storm water and dry-weather flow for recharge in the Chino Basin. The annual report covers the 12-month period of July 1 through June 30, and is submitted to the DFW by October 1 of each year.				X						Watermaster Engineer prepares the report with review and input from Watermaster Counsel, which includes the following efforts: 1. Measured data and Watermaster's surface-water model are used to estimate the discharge in flood control channels that cross the Chino Basin and the diversions for recharge. 2. To compute the differences in discharge caused by the diversions for recharge, the discharge from the tributaries to the Santa Ana River is estimated with and without the Watermaster diversions.	A letter report is prepared, including text and exhibits, that describes the data, methods, and results of the analysis.	This report has become standardized and the scope has been reduced to the minimum required for compliance. The cost to complete this work has not increased over the last four years.
Sustainable Groundwater Management Act (SGMA). The SGMA requires that the Watermaster of an adjudicated basin identified in WC Section 10720.8(a) submit specific data, information, and annual reports for the previous water year to the California Department of Water Resources (DWR) by April 1. Pursuant to SGMA WC Section 10720.8(f), Watermaster is required to submit: (A) Groundwater elevation data unless otherwise submitted pursuant to WC Section 10932 (B) Annual aggregated data identifying groundwater extraction (C) Surface water supply used for or available for use for groundwater recharge or in-lieu use (D) Total water use (E) Change in groundwater storage (F) The annual report submitted to the court	X	X		X				X		Watermaster Engineer prepares a technical memorandum, which includes the following efforts: Item (A) is already submitted for the California Statewide Groundwater Elevation Monitoring (CASGEM) Program, so no further data is reported pursuant to SGMA. Items (B), (C), (D) and (F) are compiled from the appropriators, the IEUA, and Watermaster. Item (E) is completed using the Chino Basin groundwater model to simulate storage change over the past water year.	A technical memorandum explicitly documenting the information for required items (A) through (F). The memorandum is included in the agenda packets for review by the Watermaster Pools, Advisory Committee, and Board. The memorandum and its contents are then submitted to the DWR via its online Adjudicated Basin Annual Reporting System.	Watermaster provides the minimum information required by DWR
Biannual Evaluation of the Cumulative Effect of Transfers. Pursuant to the Peace Agreement, page 20, Section 5.1 (e) (iv); the OBMP Implementation Plan, page 21, paragraph 11 (d); and the Rules and Regulations, page 51, Section 9.3, Watermaster will evaluate for the potential for any Material Physical Injury that may result from the cumulative effects of transfers of water in storage or any water rights proposed in place of physical recharge of water to the Chino Basin. The purpose of this evaluation is to provide guidance to Watermaster for future recharge activities. Reporting on this evaluation is required biannually beginning on July 1, 2003.	X	X		X				X		Watermaster Engineer performs this evaluation: 1. If necessary, re-calibrate the Chino Basin groundwater-flow model for the prior two years. 2. Evaluate Watermaster assessment packages to determine which transfers resulted in an avoided wet-water replenishment and prepare a hypothetical historical model scenario that replaces transfers with wet-water replenishment. 3. Simulate the hypothetical historical model scenario with the groundwater-flow model over the period of the Peace Agreement (since 2000). 4. Compare the results of the new model simulation with the calibrated model results to characterize the cumulative effects of transfers since the Peace Agreement.	Watermaster's Engineer prepares one report that documents: (i) any model updates that were performed, (ii) the evaluation of the Balance of Recharge and Discharge, and (iii) the evaluation of the Cumulative Effects of Transfers. The evaluation of the Cumulative Effects of Transfers characterizes the differences in: water levels (especially in areas where low water levels and subsidence are a concern); storage; the achievement and maintenance of Hydraulic Control; Santa Ana River discharge at Prado Dam; and the developed yield of the Chino Basin.	
Biannual Evaluation of the Balance of Recharge and Discharge. Pursuant to Section 7 of the Rules and Regulations, page 35, 7.1 (b) (iii) and (iv) and the Peace Agreement, page 20, Section 5.1 (e) (iii), Watermaster will conduct an evaluation of the Hydrologic Balance of recharge and discharge in the Chino Basin. The purpose of this evaluation is to provide guidance to Watermaster for future recharge activities to promote the goal of equal access to groundwater in each area and sub-area of the Chino Basin. Reporting on this evaluation is required biannually beginning on July 1, 2003.									X	Watermaster Engineer performs this evaluation: 1. Use the same version of the groundwater-flow model that is used for the evaluate of the Cumulative Effect of Transfers. 2. Prepare an updated planning scenario that includes groundwater production projections to comport with the latest Urban Water Management Plans, the IEUA-TVMWD-WMWD planning projections, state mandated water conservation, and climate change projections. 3. Simulate the updated planning scenario with the groundwater-flow model over long-term future period. 4. Evaluate the model results with respect to changes in water levels, the areal balance of recharge and discharge and provide Watermaster with recommendations on the future locations and magnitudes of supplemental water recharge necessary to improve the balance of recharge and discharge.	Watermaster's Engineer prepares one report that documents: (i) any model updates that were performed, (ii) the evaluation of the Balance of Recharge and Discharge, and (iii) the evaluation of the Cumulative Effects of Transfers. The evaluation of the Balance of Recharge and Discharge characterizes long-term changes in water levels across the Chino Basin under the plans of the Parties and the Watermaster, and characterizes the balance of recharge and discharge.	Watermaster completed this work in 2003, 2005 and 2015 -- four reports were skipped. Watermaster evaluates the balance of recharge and discharge in other efforts that include 2007 Peace II engineering work, 2009 Production Optimization investigation, 2013 RMPU, Safe Yield reset, Storage Framework Investigation and the forthcoming 2020 Safe Yield reset.

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Exhibit L-1

Chino Basin Watermaster -- Monitoring and Reporting Requirements, Data Types, Analyses Performed, Report Contents, and Past Efforts to Reduce Scope/Cost

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	GWP	GWL	GWQ	SW	GL	GEOL	BIO	WS/WU	PLAN			
Annual Finding of Substantial Compliance with the Recharge Master Plan. Pursuant to Sections 7.3 and 8.1 of the Peace II Agreement, Watermaster must make an annual finding that it is in substantial compliance with a Court-approved Recharge Master Plan, particularly regarding the sufficiency of Replenishment capability to satisfy reasonable projections of future Desalter Replenishment Obligations following the completion of Basin Re-Operation and its associated forgiveness of Desalter Replenishment Obligations.				X					X	Watermaster Engineer performs this work: 1. Describe Watermaster's projections of future Replenishment Obligations based on the most recent production plans of the Parties. These production plans are typically extracted from Watermaster's most current groundwater modeling efforts. 2. Describe Watermaster's projections of future Replenishment capacity as documented in the Recharge Master Plan and/or current RMP implementation efforts. 3. Compare the projections of Replenishment Obligations vs. Replenishment capacity to assess compliance with the Recharge Master Plan.	A letter report is prepared to document the data, methods, and findings of the evaluation of substantial compliance with the Recharge Master Plan.	This report has become standardized, updated content derived from other Watermaster work resulting in reduced scope and reduced cost.
Annual Report of Compliance with SB 88 and SWRCB Regulations for Measurement and Reporting of Diverted Surface Water. Watermaster holds three diversion permits, issued by the SWRCB, that provide authorization to Watermaster to divert and recharge storm and dry-weather discharge. Watermaster reports annually on the amount of water diverted for recharged to the SWRCB pursuant to its permits and SWRCB regulations in Title 23, Chapter 2.7. SB 88 was signed into law by Governor Brown on June 24, 2015. Sections 15 through 18 of that law add new measurement and reporting requirements for a substantial number of diverters, including the Chino Basin Watermaster. Watermaster must demonstrate to the SWRCB its compliance with SB88. Reports are due annually by April 1, the reporting period is calendar year.				X						Watermaster Engineer performs this work: 1. Collect, compile, and summarize estimates of diversion and recharge volumes for the calendar year for each point of diversion for each permit. Much of these data and information are borrowed from the data collected and analyzed for Watermaster's *Water Rights Compliance Reporting* report. 2. Collect information from IEUA on the measurement scheme for each point of diversion (device, accuracy, methods of measurement and calculation, recording frequency). Evaluate each point of diversion for compliance with SB88. If any point of diversion is not in compliance with SB88, develop and document a plan to comply.	1. Prepare a progress report of the estimates of diversion and recharge volumes for the calendar year for each point of diversion, and submit the estimates to the SWRCB electronically on its website. 2. To comply with SB 88, Watermaster must annually report the following in addition to (1.) above: • Information on the device or method used to calculate the amount of water diverted. • Water diversion measurement, either direct diversion or diversion to storage, including the type of device(s) used, additional technology used, who installed the device(s), and any alternative method(s) used in measuring water diversion.	As to the progress report, this work has been reduced to filling out a form on SWRCB water rights portal. As to SB88 compliance, this is a new regulation and Watermaster staff has approached regulations in a way to minimize compliance cost.
Safe Yield Recalculation. Pursuant to the OBMP Implementation Plan and Section 6.5 of Watermaster's Rules and Regulations, Watermaster is required to recalculate and reset the Safe Yield of the Chino Basin in fiscal year 2010/11 and every ten years thereafter. The purpose of the recalculation and reset is to prevent Overdraft, and continue to operate the Chino Basin pursuant to the Physical Solution of the Judgment.	X	X	X	X	X	X		X	X	Watermaster Engineer performs the analysis, and prepares the report. Pursuant to the Safe Yield Reset Technical Memorandum, the methodology to recalculate Safe Yield is: 1. Collect new hydrogeologic information collected since the last model calibration and all the historical hydrologic and water use data, revise conceptual and numerical models and recalibrate groundwater model. 2. Update existing and projected cultural conditions and determine if future projections will based on: (a) long-term historical record of precipitation falling or (b) precipitation projections based on Global System Models to estimate the long-term average net recharge to the Basin. 3. Update pumping projections and all recharge and discharge components that are input to the models. 4. With the information generated in [1] through [3] above, use the groundwater-flow model to project the net recharge for existing current and projected future cultural conditions. 5. Qualitatively evaluate whether the groundwater production at the net recharge rate estimated in [4] above will cause or threaten to cause "undesirable results" or "Material Physical Injury". If so, identify mitigation measures or an alternative Safe Yield to prevent "undesirable results" or "Material Physical Injury."	The report documents the data collected, the model re-calibration, and the analyses performed to calculate net recharge and Safe Yield.	Watermaster developed a task memorandum in 2015 entitled Methodology to Reset Safe Yield Using Long-Term Average Hydrology and Current and Projected Future Cultural Conditions that defines the methodology for the recently approved Safe Yield. This methodology was used to develop the scope and budget for the 2020 Safe Yield reset work and reduces the cost of the 2020 Safe Yield reset relative to the past effort.

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Recharge Master Plan Update (RMPU). The 2010 RMPU was prepared pursuant to requirements of the Peace II Agreement and the December 2007 Court Order that approved and directed Watermaster to implement the Peace II Agreement. The Court directed Watermaster to amend the 2010 RMPU to include updated information on water demands and future replenishment projections. Watermaster completed this amendment on time in September 2013. In approving the 2013 RMPU amendment, the Court directed Watermaster to prepare recharge master plan updates on a five-year cycle. Subsequently, the 2018 RMPU was completed in October 2018 and the next report due in 2023 and every five years thereafter.				X					X	The requirements of the work to be performed in the RMPU are defined in the Peace Agreements and the 2007 report of the Special Referee (see the introduction to the 2013 RMPU amendment) Watermaster Engineer conducts the assessment, which includes: 1. Collect data related to basin management including future groundwater pumping plans, stormwater management, planned supplemental water recharge, legislation and regulations that affect recharge and prepare an assessment of how the water management has changed since the last RMP. 2. Prepare an assessment of the future Replenishment Obligations. 3. Inventory all existing recharge facilities, update their performance information, estimate the supplemental water recharge capacity of each facility and assess: (a) the adequacy of existing recharge facilities to meet future Replenishment Obligations and recharge goals and (b) the adequacy of existing recharge facilities to enable Watermaster to balance recharge and discharge. 4. Develop and analyze new projects to mitigate deficits identified in 3 above and identify new stormwater projects to increase basin yield. 5. Develop and apply criteria to screen and prioritize the recharge projects identified in 4 above and make recommendations for their implementation. 6. Prepare implementation plan.	The report documents the RMPU requirements, the data collected and planning assumption, the existing recharge capabilities, the need for additional supplemental water recharge capacity, project alternatives, screening and prioritization of alternatives and recommendations on project implementation..	This report has become standardized and the scope has been reduced to the minimum required for compliance, resulting in reduced cost relative to the 2010 and 2013 reports.
State of the Basin Report. Pursuant to Section 2.21 of the Rules and Regulations and the November 15, 2001 Court Order, Watermaster prepares a State of the Basin report every two years to describe the status of individual OBMP related activities and document how the basin has physically responded during OBMP implementation (i.e. since September 2000). The report is typically finalized by June 30.	X	X	X	X	X			X		Watermaster Engineer prepares this report. Most of the data and information utilized to prepare the report are acquired from other Watermaster monitoring and reporting efforts. Text, tables, charts, and maps are prepared to characterize: hydrology, production, recharge (replenishment and other recharge), groundwater levels and quality, point-source groundwater contamination, land subsidence, Hydraulic Control, desalter planning and engineering, and production meter installation.	The report includes annotated maps, charts, and tables that characterize the physical state of the basin and how it has changed since 2000. The report is published as a tabloid-sized map atlas and a PDF file for online viewing.	This report has evolved over time from a complex engineering report to simpler, graphically-intense and more readable report. In this process the scope and cost to produce the report was reduced.
California Statewide Groundwater Elevation Monitoring Program (CASGEM). Pursuant to Water Code section 10920, Watermaster must measure and report groundwater-elevation data from a subset of wells to the Department of Water Resources' CASGEM website twice per year (January 1 and July 1) for the Chino (8-2.01) and Cucamonga (8-2.02) Groundwater Subbasins of the Upper Santa Ana Valley Groundwater Basin (8-2).		X								Watermaster Engineer reviews time-series charts of groundwater elevations from a defined set of 37 wells in the Chino Basin and nine (9) wells in the Cucamonga Basin, and selects and compiles monthly measurements for a six-month period (summer/fall and winter/spring) that are representative of non-pumping water levels. This effort is performed in HydroDaVE Explorer. The selected data is exported from HydroDaVE in a file format for seamless upload to the CASGEM website.	The selected groundwater elevations for summer/fall and winter/spring are uploaded to the CASGEM website twice per year.	Watermaster staff reports the required groundwater-elevation data directly from its database to minimize effort and cost.

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Chino Basin Maximum Benefit Annual Report. This annual report is required by the Regional Board pursuant to Chapter 5 of the Basin Plan and Order No R8-2012-0026. There are a total of nine (9) maximum benefit commitments required of the Watermaster and IEUA in exchange for obtaining elevated TDS and nitrate objectives for the Chino-North Groundwater Management Zone. The Maximum Benefit commitments are: 1. The implementation of a surface-water monitoring program. 2. The implementation of a groundwater monitoring program. 3. The expansion of the Chino-I Desalter to 10 million gallons per day (mgd) and the construction of the Chino-II Desalter with a design capacity of 10 mgd. 4. The additional expansion of desalter capacity (20 mgd) pursuant to the OBMP and the Peace Agreement. 5. The completion of the recharge facilities included in the Chino Basin Facilities Improvement Program. 6. The management of recycled water quality to ensure that the agency-wide, 12-month running average wastewater effluent quality does not exceed 550 mg/L and 8 mg/L for TDS and total inorganic nitrogen (TIN), respectively. 7. The management of basin-wide, volume-weighted TDS and nitrogen concentrations in artificial recharge to less than or equal to the maximum-benefit objectives. 8. The achievement and maintenance of the “Hydraulic Control” of groundwater outflow from the Chino Basin to protect Santa Ana River water quality. 9. The determination of ambient TDS and nitrogen concentrations of Chino Basin groundwater every three years. The purpose of the annual report is to describe and document compliance with the Maximum Benefit commitments. The report is due by April 15th, and the reporting period is the calendar year.	X	X	X	X					X	Watermaster Engineer prepares the report, including the following efforts: 1. Collect, check, and upload groundwater-level, groundwater-quality, and surface water-quality data to Watermaster databases. These data are used in the analyses required to demonstrate Hydraulic Control and compute ambient water quality. 2. Review and summarize CDA progress reports on completion of the desalter well fields to achieve 40,000 afy of groundwater-production. 3. Calculate: (i) the 12-month running average of IEUA's effluent TDS concentration to determine whether it has exceeded 545 mg/L for 3 consecutive months, and (ii) the 12-month running average of IEUA's effluent TIN concentration to determine whether it has exceeded 8 mg/L in any one month. 4. Calculate: the 5-year running volume-weighted concentration of TDS and nitrate in recharged recycled water, supplemental water, and new storm water, and determine if the average is less than the TDS and nitrate Maximum Benefit objectives of the Chino-North GMZ. 5. Use groundwater-elevation contours prepared in the State of the Basin Report (every 2 years) to show the extent of Hydraulic Control. 6. Use Watermaster's groundwater-flow model (updated and recalibrated every five years) to determine if the volume of groundwater flowing past the desalter well field is *de minimis* (<1,000 afy). 7. Report on the status of the Recomputation of ambient groundwater quality for the Chino Basin groundwater management zones, which is performed once every three years (for TDS and nitrate-nitrogen). 8. Utilize data from the Santa Ana River Watermaster's Annual Reports to characterize the influence of rising groundwater from the Chino Basin on the flow and quality of the Santa Ana River.	Text and exhibits that describe the status of compliance with the Maximum Benefit commitments. The data collected each calendar year are submitted to the Regional Board as an attachment to the report.	In 2012 Watermaster staff took the lead to substantially reduce the monitoring and reporting effort required under Maximum Benefit. In particular, the surface-water monitoring and quarterly reporting components of the program were virtually eliminated and the scope of annual reporting was reduced to eliminate redundancies. These efforts resulted in an estimated $250,000 per year in cost savings (2012$).
Annual Report of the Prado Basin Habitat Sustainability Committee. The monitoring and mitigation requirements of the Peace II CEQA SEIR (Biological Resources/Land Use & Planning—Section 4.4-3) call for the IEUA, Watermaster, and the Orange County Water District to form the Prado Basin Habitat Sustainability Committee (PBHSC) to ensure that the Peace II Agreement actions will not significantly or adversely impact the Prado Basin riparian habitat. One of the responsibilities of the PBHSC is to prepare annual reports by June 30 of each year.	X	X	X	X		X	X		X	Watermaster Engineer prepares the annual report, which includes the following efforts: 1. Preparation of maps and data graphics that characterize the extent and quality of the riparian habitat in Prado Basin. 2. Preparation of maps and data graphics that characterize the trends in groundwater levels, climate and weather, surface water, and other factors that can affect the riparian habitat. This information is compared to the changes in the extent and quality of the riparian habitat to identity cause-and-effect relationships. 3. Groundwater-level change maps from existing results of Watermaster's groundwater-flow modeling are used to identify prospective areas of concern for the riparian habitat.	Summary of activities conducted for the PBHSC. Documentation of measured loss or prospective loss of riparian habitat (if any) with attribution of cause. Recommendations for ongoing monitoring and a scope of work and budget for the following fiscal year. Recommended adaptive management actions, if any, required to mitigate any measured loss or prospective loss of riparian habitat that is attributable to the Peace II activities.	After the completion of the first report in 2016, Watermaster identified efficiencies in monitoring and reporting, reducing the cost by almost 50 percent.

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Water Recycling Requirements for the Chino Basin Recycled Water Groundwater Recharge Program. IEUA and Watermaster have a permit from the Regional Water Quality Control Board (Order R8-2007-0039, amended as R8-2009-0057) for recycled water recharge at 13 sites in the Chino Basin (Phase I and Phase II). The permit requires implementation of a monitoring and reporting program, and the submittal of the following reports: Quarterly and Annual Groundwater Recharge (GWR) Monitoring Reports, five-year Engineering Reports, and Basin Start-up Period Reports.	X	X	X	X						IEUA staff performs the analyses and prepares the reports. The analyses include the following efforts: Collect recycled water, diluent water, and groundwater data and compare to regulatory limits and specifications in the permit; report on recharge operations and any non-compliance events due to water quality, including records of any operational problems, plant upset and equipment breakdowns or malfunctions, and any diversions of off specification recycled water and the locations of final disposal; report of corrective or preventive action(s) taken; certification that no groundwater has been pumped for domestic water supply use from the buffer zone that extends 500 feet and 6-months underground travel time from the recharge basin(s) where recycled water is applied; mass balance calculations to ensure bleeding is occurring in the aquifer; and estimates of approximate travel times of recharged recycled water in the aquifer at each basin. Watermaster, as the co-permittee, has its Engineer provide technical support and review and comment on all reports before they are submitted to the permitting agencies.	Quarterly GWR Monitoring Reports: Summaries of the data in tabular form to demonstrate compliance with permit limits and specifications. Summary of recharge operations and any operational problems and preventive and/or corrective actions taken. Annual GWR Reports: Summaries of recycled water and groundwater monitoring efforts for the year. Demonstration of recycled water recharge and diluent water in-aquifer blending by 120-month mass-balance calculations presented in Recycled Water Contribution (RWC) Management Plans and analysis of monitoring well water quality data. Estimates of approximate travel times of recharged recycled water in the aquifer. Five-year Engineering Reports: Address all project changes over the last five years. Basin Start-up Period Reports: Determination of percolation rates, soil aquifer treatment efficiency, lysimeter monitoring program, and initial maximum average RWC limits.	This report has become standardized and the scope has been reduced to the minimum require for compliance, resulting in reduced cost.
Annual Report of the Ground-Level Monitoring Committee. The MZ-1 Subsidence Management Plan (MZ-1 Plan) was developed by the MZ-1 Technical Committee (now named the Ground-Level Monitoring Committee) and approved by Watermaster in October 2007. In November 2007, the Court approved the MZ-1 Plan and ordered its implementation. The MZ-1 Plan was updated in 2015 and is now called the Chino Basin Subsidence Management Plan (SMP). Pursuant to the SMP, Watermaster prepares an annual report that includes the results of ongoing monitoring efforts, interpretations of the data, and recommended adjustment to the SMP, if any.	X	X		X	X	X			X	Watermaster Engineer prepares the annual report, which includes the following efforts: Preparation and interpretation of maps and graphics of data generated from the Ground-Level Monitoring Program including: the basin stresses of groundwater pumping and recharge, and the basin responses of changes in groundwater levels, aquifer-system deformation, and ground motion.	Background information on the program. Summary of activities conducted for the Ground-Level Monitoring Program. Analysis and interpretation of data. Conclusions and recommendations for ongoing monitoring and a scope of work and budget for the following fiscal year. Recommended updates to the SMP, if any.	The GLMC meets annually to review data and develop an appropriate scope of work for the monitoring program for the subsequent year. The monitoring program has continually evolved to identify and implement efficiencies, address the concerns of the GLMC, and meet the requirements of the SMP.
OBMP Semi-Annual Status Reports. Pursuant to the July 13, 2000 Court Order that approves Watermaster's adoption of the Peace Agreement and the OBMP Implementation Plan, Watermaster is required to prepare semi-annual status reports to the Court on OBMP implementation. The purpose of the report is to provide the Court with updates on progress in implementing the OBMP.	X	X	X	X	X	X	X	X	X	Watermaster staff, with the assistance of Watermaster Engineer and Counsel, prepare text descriptions of activities that were conducted to implement the OBMP for the prior six months.	Descriptions of activities that implement the OBMP program elements for the prior six months.	This report has become standardized and the scope has been reduced to the minimum required for compliance, resulting in reduced cost.
Semi-Annual Reports to the Watermaster Pools, Advisory Committee, and Board meetings. The Parties have requested semi-annual reports that summarize the status of: (i) the groundwater contaminant plumes in the Chino Basin and (ii) the activities of the Ground-Level Monitoring Committee.	X	X	X		X					Watermaster Engineer prepares text descriptions of activities performed during the previous quarter.	A text description of status of each of the known plumes within the Chino Basin and the activities of the Ground-Level Monitoring Committee.	This report has become standardized and the scope has been reduced to the minimum required for compliance, resulting in reduced cost.

Key for Data Types:
- GWP -- Groundwater-production monitoring
- GWL -- Groundwater-level monitoring
- GWQ -- Groundwater-quality monitoring
- SW -- Surface-water and climate monitoring
- GL -- Ground-level (subsidence) monitoring
- GEOL -- Well construction, abandonment, and destruction monitoring
- BIO -- Biological monitoring
- WS/WU -- Water-supply and water use monitoring
- PLAN -- Planning information

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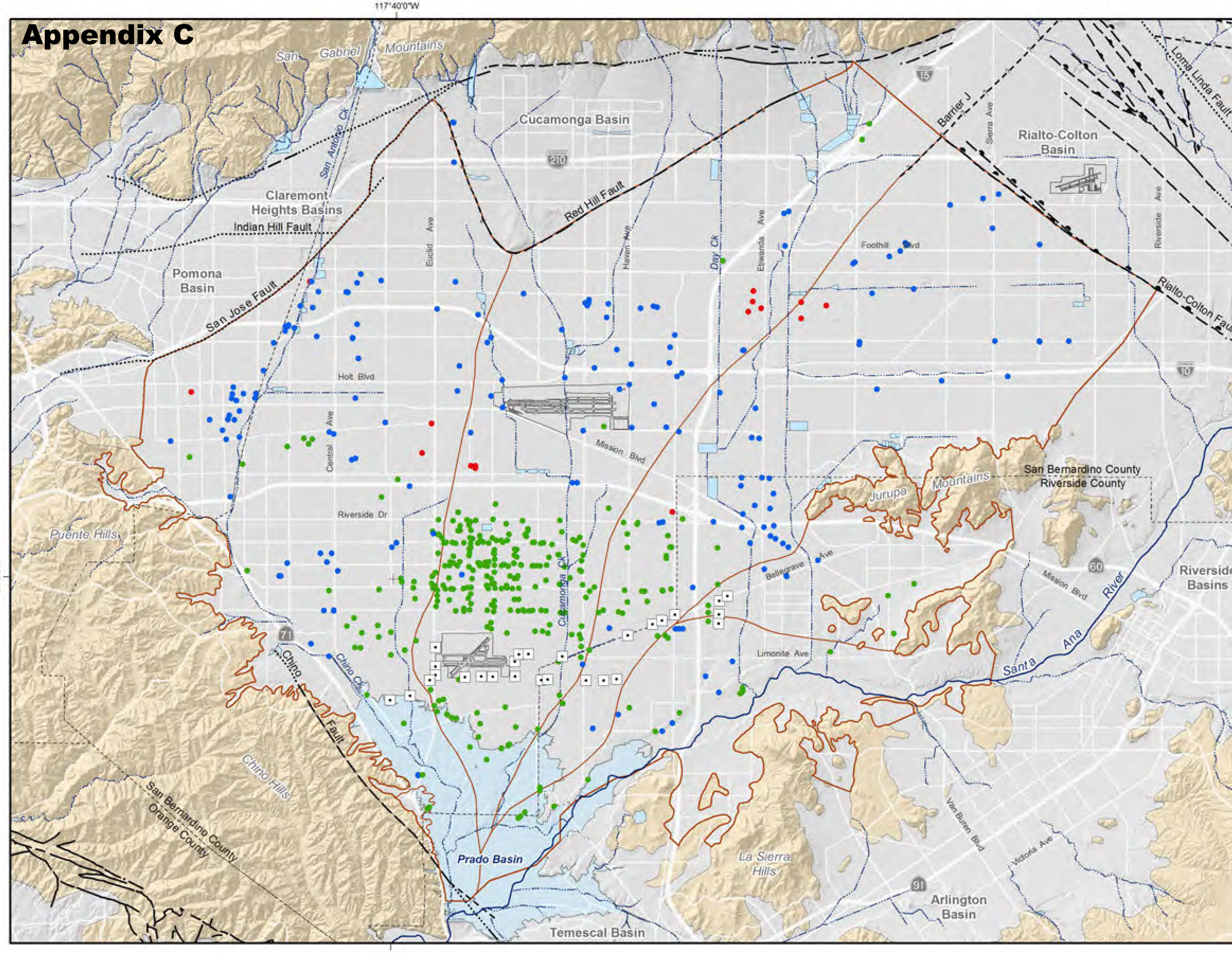

Groundwater Production Wells by Pool

- Agricultural Pool (Pool 1 - 276 Wells)
- Overlying Non-Agricultural Pool (Pool 2 - 13 Wells)
- Appropriative Pool (Pool 3 - 143 Wells)
- Chino Basin Desalter Authority (25 Wells)

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Approximate Location of Groundwater Barrier
- Location Concealed
- Location Uncertain

Prepared by:

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Wildermuth Environmental, Inc.

Author: SO
Date: 11/21/2019
File: Exhibit_L2_Groundwater Prod_.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

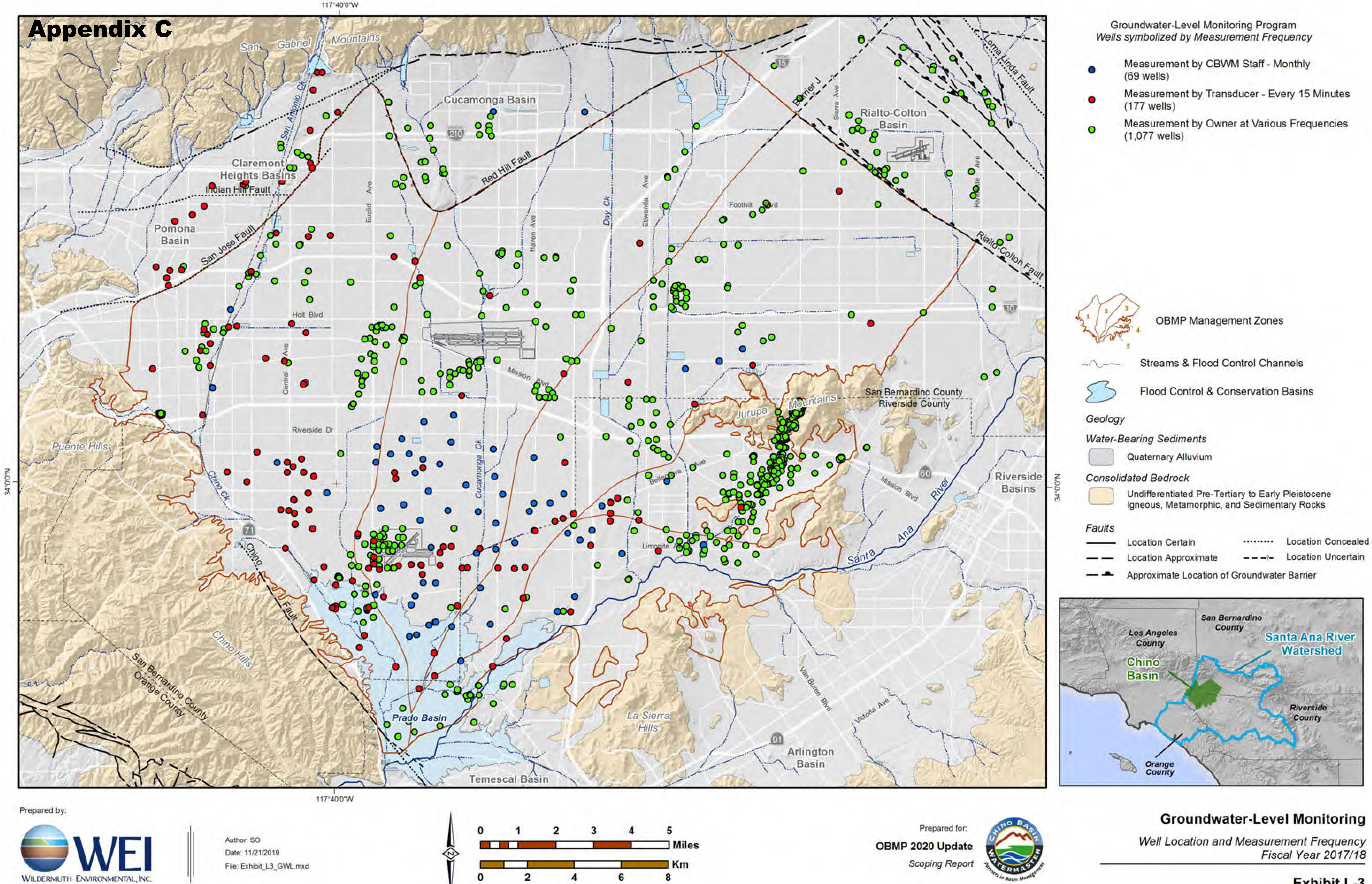
Prepared for:

OBMP 2020 Update
Scoping Report

Groundwater-Production Monitoring
Fiscal Year 2017/18

Exhibit L-2

Appendix C



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: SO
Date: 11/21/2019
File: Exhibit_L3_GWL.mxd

Prepared for:
OBMP 2020 Update
Scoping Report

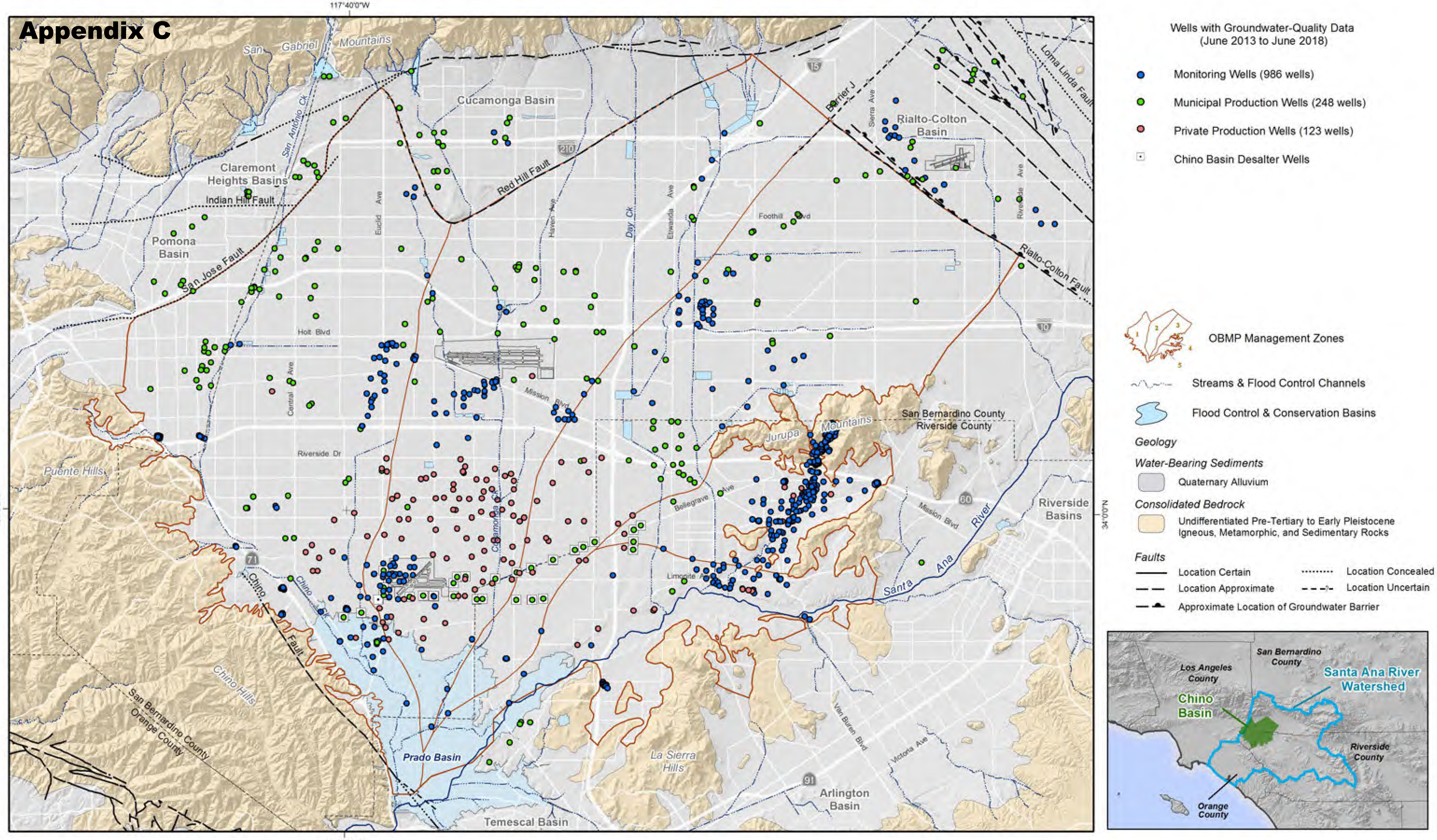
CHINO BASIN WATERMASTER

Groundwater-Level Monitoring

Well Location and Measurement Frequency
Fiscal Year 2017/18

Exhibit L-3

Appendix C



Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: SO
Date: 8/22/2019
File: Exhibit_L4_GWQ.mxd

Prepared for:

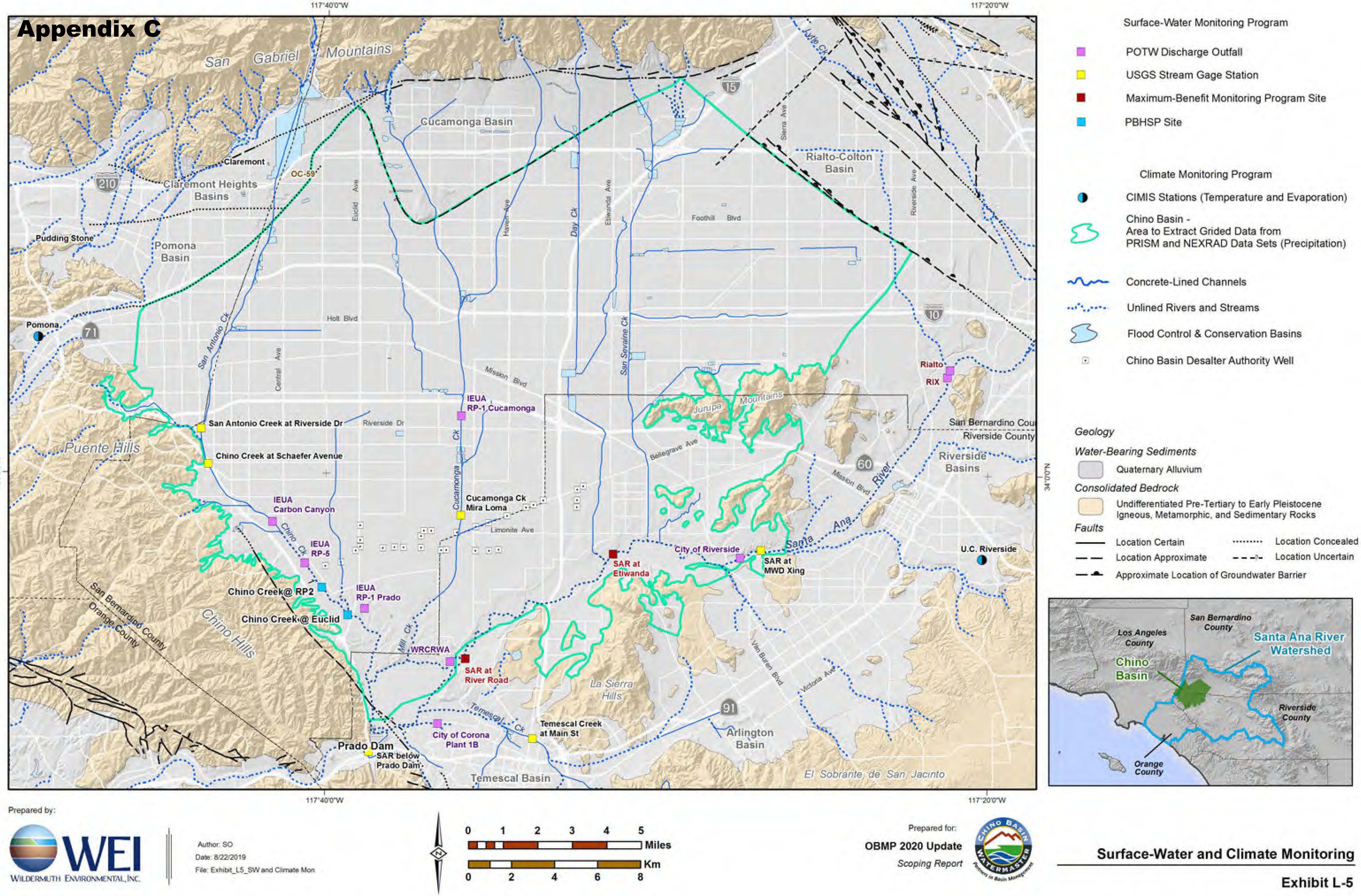
OBMP 2020 Update
Scoping Report

Chino Basin Watermaster — Partners in Basin Management

Groundwater-Quality Monitoring
July 2013 to June 2018

Exhibit L-4

Appendix C



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

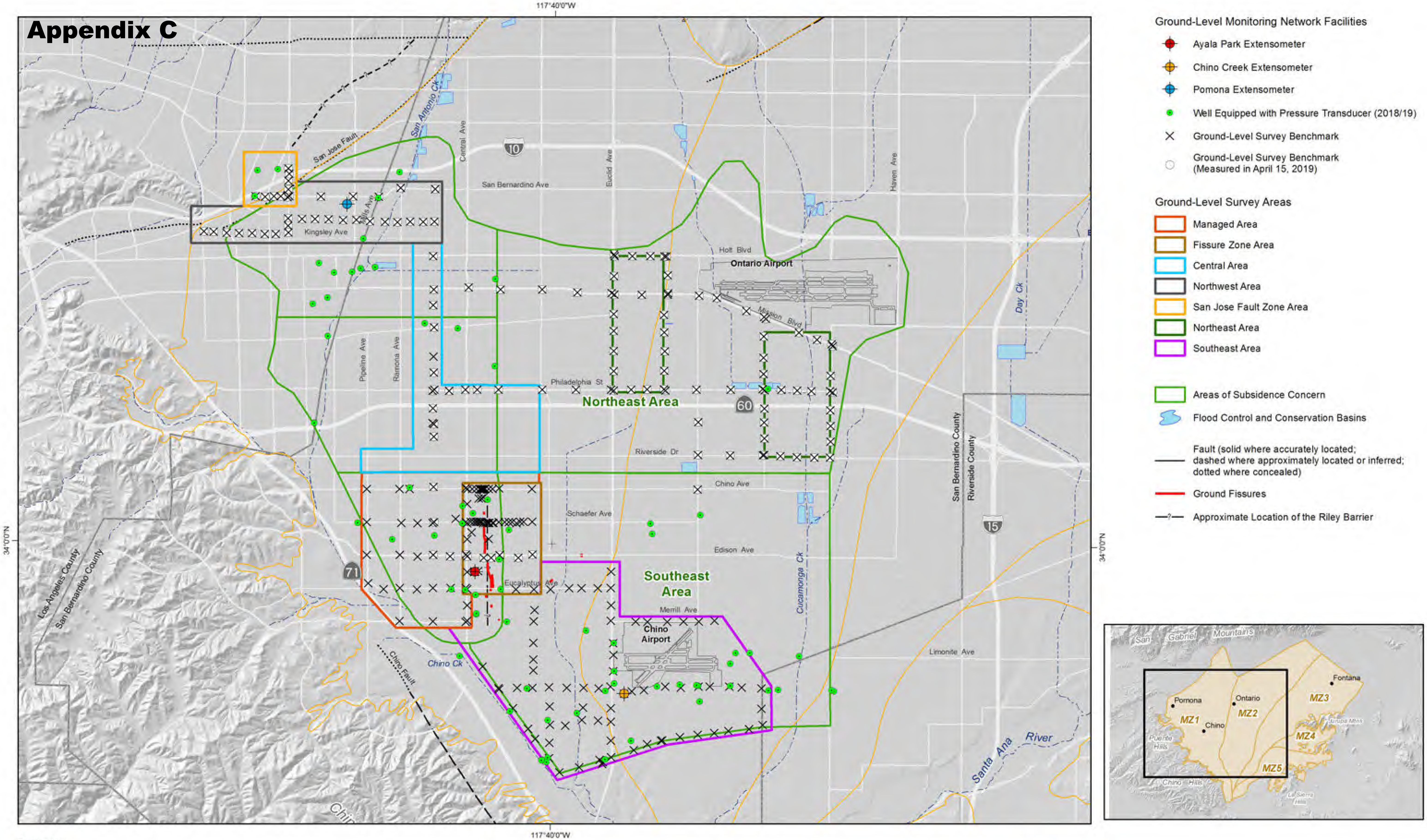
Author: SO
Date: 8/22/2019
File: Exhibit_L5_SW and Climate Mon

Prepared for:

OBMP 2020 Update
Scoping Report

Surface-Water and Climate Monitoring

Exhibit L-5



Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: NWS
Date: 8/22/2019
File: Exhibit_L6_Ground-Level Mon..mxd

Prepared for:

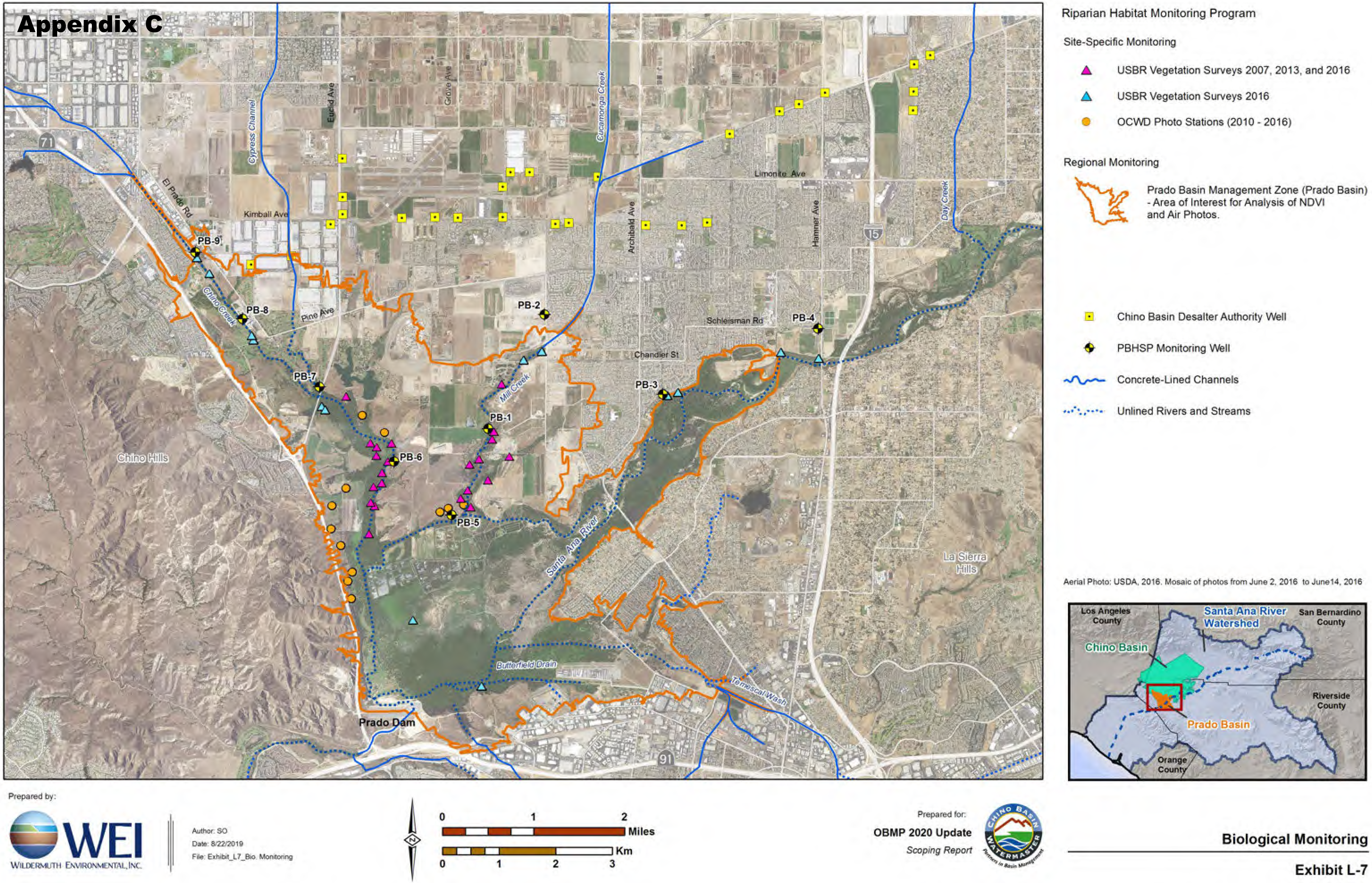
OBMP 2020 Update
Scoping Report

Chino Basin Watermaster

Ground-Level Monitoring Network
Western Chino Basin

Exhibit L-6

Appendix C



Aerial Photo: USDA, 2016. Mosaic of photos from June 2, 2016 to June14, 2016

Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: SO
Date: 8/22/2019
File: Exhibit_L7_Bio. Monitoring

Prepared for:
OBMP 2020 Update
Scoping Report

CHINO BASIN WATERMASTER

Biological Monitoring

Exhibit L-7

Appendix C

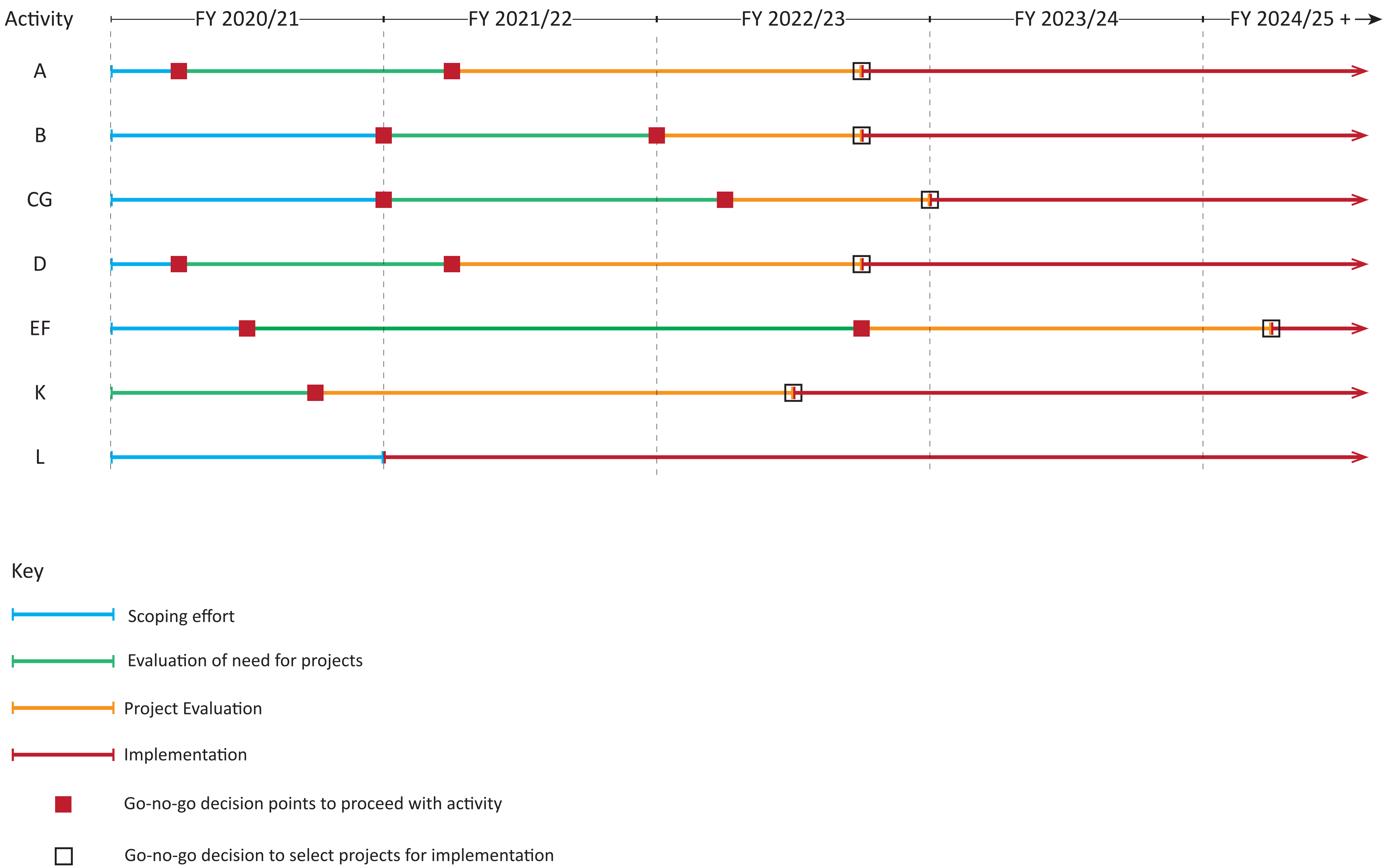
Exhibit L-8
Cost Estimate and Schedule to Implement Activity L

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Convene Monitoring and Reporting Committee and prepare the Monitoring and Reporting Work Plan · Convene Monitoring and Reporting Committee · Conduct (5) meetings to prepare Work Plan and develop recommended revisions · Prepare Monitoring and Reporting Work Plan · Prepare memorandum: Recommended Revisions to Watermaster's Non-Discretionary Monitoring and Reporting Programs	$125,000	$60,000				$65,000								
Task 2 Implement Recommended Revisions to Watermaster's Non-Discretionary Monitoring and Reporting Programs	$ TBD									$ TBD				$ TBD
Task 3 Annual review of scope of work and cost to implement the Monitoring and Reporting Work Plan in the Subsequent Fiscal Year	$ TBD									$ TBD				$ TBD
Total Cost and Cost by FY	**$125,000**	**$60,000**				**$65,000**				**$ TBD**				**$ TBD**

TBD -- To be determined

Appendix C

Exhibit HIJ-1
Process and Schedule to Implement the OBMP Update Activities



Appendix A

Appendix C

To: Chino Basin Watermaster Stakeholders
From: Watermaster 2020 OBMP Update Team
Subject: 2020 OBMP Update -- Listening Session #1 Memorandum
Date: February 5, 2019

The objectives of this memorandum are to summarize the information provided by the stakeholders during Listening Session #1 and provide information that will assist the stakeholders in reviewing the work products of Listening Session #1 and preparing for Listening Session #2.

Background

During 1998-2000, the Chino Basin Watermaster (Watermaster) conducted a process to develop the Chino Basin Optimum Basin Management Program (OBMP). The OBMP was developed in a collaborative public process that identified the needs and wants of all stakeholders; described the physical state of the groundwater basin; developed a set of management goals; identified impediments to those goals; described a series of actions that could be taken to remove those impediments and achieve the management goals; developed and executed agreements to implement the OBMP; and certified a programmatic Environmental Impact Report (PEIR) pursuant to CEQA.

By 2019, many of the projects and management programs envisioned in the 2000 OBMP have been implemented, while some have not. The understanding of the hydrology and hydrogeology of the Chino Basin has improved since 2000, and new water-management issues have been identified that necessitate that the plan be adapted to protect the collective interests of the Chino Basin parties and their water supply reliability. For these reasons, the Watermaster parties are updating the 2000 OBMP (2020 OBMP Update) to set the framework for the next 20 to 30 years of basin-management activities.

The 2020 OBMP Update will be conducted using a collaborative process like that employed for the development of the 2000 OBMP. A description of the development of the 2000 OBMP and the rationale for and process to prepare the 2020 OBMP Update is included in a white paper prepared for the Chino Basin stakeholders: *White Paper – 2020 Update to Chino Basin Optimum Basin Management Program* (OBMP White Paper). The OBMP White Paper, and all documents relevant to the 2020 OBMP Update, are available on the Watermaster's ftp site.[1]

A series of eight public listening sessions are being held by the Watermaster throughout 2019 to support the 2020 OBMP Update. The purpose of the listening sessions is to obtain information and feedback from the parties and other Chino Basin stakeholders to define the collective goals of the parties, the impediments to achieving the goals, the management actions required to remove the impediments, and an implementation plan for the management actions. Watermaster staff will provide key information prior to and during each listening session to help the parties and other stakeholders provide their input on each topic discussed. The objective is for the ideas and opinions of every stakeholder to be heard. Participation in the listening sessions is critical to the development of the 2020 OBMP Update. Watermaster held Listening Session #1 on January 15, 2019.

Summary of Listening Session #1

Listening Session #1 was a four-hour workshop broken down into three main agenda topics:

[1] https://cbwm.syncedtool.com/shares/folder/9abb162877b999/?folder_id=670

- History of the 2000 OBMP
- Rationale for the 2020 OBMP Update – Drivers, Trends, and Implications (Breakout Session)
- Rationale for the 2020 OBMP Update – Issues, Needs, and Wants (Group Participation Session)

Prior to Listening Session #1 the following materials were distributed:

- Meeting agenda
- The OBMP White Paper
- An explanation of the assignment to prepare for Listening Session #1

These materials and a copy of the presentation given during Listening Session #1 are available on the Watermaster's ftp site.

History of the 2000 OBMP

The history of the 2000 OBMP and its implementation was provided by Watermaster staff and its legal, engineering, and environmental consultants. The presentation provided detail on why the OBMP was created; the process to develop it and the associated implementation agreements and environmental review documents; the OBMP Program Elements; and the progress and accomplishments in implementing each of the OBMP Program Elements, including a discussion on what was not accomplished.

Rationale for the 2020 OBMP Update – Drivers, Trends, and Implications

As described in the OBMP White Paper, the strategic drivers and trends that shaped the OBMP in the late 1990s have since changed. Exhibit 1 in the OBMP White Paper was a first attempt to summarize the current drivers and trends shaping water management, and their basin management implications for the Chino Basin parties. "Drivers" are external forces that cause changes in the Chino Basin water space. Grouped under each driver are expected trends that emanate from that driver. The relationship of the drivers/trends to the management implications are shown by arcs that connect trends to implications.

A breakout session was held to obtain input on the proposed drivers, trends and implications in Exhibit 1. The listening session attendees were divided into four groups to discuss changes and additions to the drivers, trends and implications. Each group documented its discussion and one member of each group reported out a summary of the group discussion to all attendees. The input provided by each breakout group was used to revise Exhibit 1 (attached to this memorandum). The following are the revised implications for Basin management that form a rationale for the 2020 OBMP Update:

- Reduced recycled water availability and increased cost
- Reduced imported water availability and increased cost
- Inability to pump groundwater with existing infrastructure
- Imported water quality degradation
- Chino Basin water quality degradation
- Increased cost of groundwater use
- Reductions in Chino Basin Safe Yield
- Recycled water quality degradation
- Increased cost of Basin Plan compliance

The final version of Exhibit 1 will be included as a final deliverable of the 2020 OBMP Update. Additional comments on Exhibit 1 can be submitted in writing to Edgar Tellez-Foster (etellezfoster@cbwm.org).

Rationale for the 2020 OBMP Update – Issues, Needs, and Wants

As described in the OBMP White Paper, the issues, needs and wants of the parties will form the basis of the management goals of the 2020 OBMP Update and inform the identification of impediments to the goals and action items to remove the impediments. A full group participation session was led by Watermaster staff to obtain feedback from the listening session attendees on their individual issues, needs and wants related to basin management. The listening session attendees articulated the issues, needs, and wants of their associated party in writing and then verbally shared with the full group. The feedback provided by the attendees was transcribed by Watermaster staff and then the needs and wants were organized into similar classes of issues. The classes of issues identified were effectively the same as the implications for basin management defined in Exhibit 1. Table 1 is a summary of the needs and wants of the parties, organized by the basin management issues. Attribution by party was assigned to each need and want.

Next Steps

The next steps in the process to develop the 2020 OBMP Update are:

1. Finalize the descriptions of issues, needs, and wants for basin management in Table 1.
2. Describe the goals for the 2020 OBMP Update, and impediments to achieving the goals.

OBMP Goals and Impediments

For the 2000 OBMP, the Chino Basin stakeholders established four management goals for the OBMP that addressed the issues, needs, and wants of the parties:

Enhance Basin Water Supplies. The intent of the goal was to increase the volumes and variety of available water supplies. This goal applied not only to local groundwater, but also to all sources of water available to the parties (*e.g.,* recycled, imported).

Protect and Enhance Water Quality. The intent of the goal was to ensure the protection of the long-term beneficial uses of the groundwater basin.

Enhance Management of the Basin. The intent of the goal was to encourage stable, creative, sustainable and fair water resources management for broad mutual benefit to all stakeholders and avoidance of undesirable results.

Equitably Finance the OBMP. The intent of the goal was to identify and use efficient and equitable methods to fund OBMP implementation.

While these general goals are as valid today as they were in 2000, it was apparent from the discussions of issues, needs, and wants at Listening Session #1 that the impediments to achieving the goals have changed and that the stakeholders have more focused goals for basin management. The focus of the next two listening sessions will be to identify the issues/needs/wants that are common to most stakeholders and to define focused goal statements and the impediments to achieving the goals. Listed below are four example goals, based on common issues/needs/wants, for the 2020 OBMP Update. Below each goal are some examples of the impediments to achieving the goals, and actions to remove the impediments. The impediments listed are not exhaustive.

Goal #1: Be able to rely on local supplies to meet potable demands for a [6, 12, 18, 24-month] period in the event of a [short-term, long-term] outage of imported water supply.

Impediments to achieving the goal:

- The current capacity to rely on groundwater during these periods is constrained by insufficient pumping capacity, insufficient conveyance, poor quality, and subsidence.
- Exercising storage in the Chino Basin as a way of enhancing local water-supply reliability can cause undesirable results such as subsidence and loss of yield.

Actions to remove impediments and achieve the goal:

- Develop a Storage Management Plan (SMP) to define how to utilize storage without causing undesirable results.
- Build the production, conveyance and treatment facilities necessary to meet demands and operate in accordance with the SMP.

Goal #2: Avoid shutdown of groundwater production facilities due to existing or potential new water-quality regulations.

Impediment to achieving the goal: Insufficient treatment and brine disposal capacity.

Action to remove impediment and achieve the goal: Build conveyance and regional treatment facilities (with ability to expand, if necessary) to treat current and potential future contaminants of concern.

Goal #3: Optimize the use of unused storage space in the Basin by implementing storage and recovery programs.

Impediment to achieving the goal: Exercising storage in the Chino Basin can cause undesirable results such as subsidence and loss of yield.

Action to remove impediment and achieve the goal: Develop a Storage Management Plan (SMP) to define how to utilize storage without causing undesirable results.

Goal #4: Fund [X%] of the implementation of the OBMP Update with supplemental resources, such as grants, low-interest loans, or outside funding partners.

Impediment to achieving the goal: Competition for future grant funding will be fierce; success in obtaining grant funding is uncertain.

Recommended Preparation for Listening Session #2

1. Review the Issues, Needs, and Wants matrix in Table 1. Ensure that the feedback you reported at Listening Session #1 was accurately captured. Come to Listening Session #2 prepared to provide your feedback and add your party's attribution to the needs or wants identified by others, if you deem appropriate. The intent is to finalize Table 1 and use it to identify the specific concerns shared by most stakeholders. These common concerns will serve as that starting point for defining goals for the 2020 OBMP Update.
2. Based on your review of this memo and Table 1, come prepared to suggest and formulate goals for the 2020 OBMP Update and the impediments to achieving those goals.

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: ● Need ● Want x Unspecified

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others				
	Appropriative										Agricultural			Overlying Non-Ag					
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD
Reductions in Chino Basin Safe Yield																			
Manage the basin safe yield for the long-term viability and reliability of groundwater supply											Need							x	
Develop an OBMP Update that is consistent with the Physical Solution and enables the Parties to leverage their respective water rights						x													
Maintain or enhance the safe yield of the basin without causing undesirable results				Need	Need					Need	x				x				
Reassess the frequency of the safe yield recalculation					x												x		
Develop recharge programs that maintain or enhance safe yield																	x		
Design storage management and storage & recovery programs that maintain or enhance safe yield													Need		Want				
Engage with regional water management planning efforts in the Upper Santa Ana River Watershed that have the potential to impact Chino Basin operations or safe yield	x																x		
Develop more facilities to capture, store, and recharge stormwater	Want	Need									Want								
Enhance recharge in northeast MZ-3			Want																
Maximize use of existing recharge facilities	Want																		
Establish incentives to encourage recharge of high-quality imported water			Want																
Develop a storage management plan to optimize the use of unused storage space in the basin, avoid undesirable results, and encourage storage and recovery programs		Need		Need	Need						Need		Want		x		Need		

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want **x** Unspecified

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others				
	Appropriative										Agricultural			Overlying Non-Ag					
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD
Inability to Pump Groundwater with Existing Infrastructure																			
Design subsidence management plans to allow flexibility in the location and volume of groundwater production in MZ-1 and MZ-2	x					x	x			🔴					x				
Develop management strategies that enable the parties to produce or leverage their respective water rights that may be impacted by physical basin challenges like land subsidence or water quality						x	x												
Ensure that sufficient, reliable water supplies will be available to meet current and future water demands			🔴	🔴				🔴		x	x							🔴	●
Design storage management and storage & recovery programs to raise funding to build infrastructure															●				
Develop conjunctive use agreements that provide certainty in the ability to perform during put and take years by clearly defining facilities/infrastructure and operating plans, and that leverage the lessons learned from obstacles encountered during the implementation of the current Dry Year Yield program.	x																	x	
Develop process to support/facilitate project implementation																🔴			
Pursue collaborative, regional partnerships to implement regional solutions to water management challenges					●												●	●	🔴

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want **x** Unspecified

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others				
	Appropriative										Agricultural			Overlying Non-Ag					
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD
Increased Cost of Groundwater Use																			
Develop an equitable distribution of costs/benefits of the OBMP						x									x				
Watermaster assessments for implementation of the OBMP should be allocated based on benefits received					x														
Decrease Watermaster assessment costs	●				●														
Seek supplemental financial resources to support the implementation of the OBMP Update		🔴		●					🔴						x	🔴			●
Monetize agencies unused water rights for equitable balance of basin assets			●																
Support to develop a justification for increases in water rates and developer fees to invest in needed water infrastructure	🔴	x															x		
Develop regional partnerships to help reduce costs															●				
Continue or enhance incentives to pump groundwater from the Chino Basin			🔴																
Chino Basin Water Quality Degradation																			
Develop a water quality management plan to ensure ability to produce groundwater rights				x											x			x	
Address existing and new drinking water quality regulations that may result in an increase in groundwater treatment and costs	x	x	🔴					x									x		
Develop regional infrastructure to address water quality contamination and treatment					●														
Recycled Water Quality Degradation																			
Maintain compliance with recycled water and dilution requirements pursuant to the Chino Basin groundwater recharge permit															🔴				

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want **x** Unspecified

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others				
	Appropriative										Agricultural			Overlying Non-Ag					
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD
Increased Cost of Basin Plan Compliance																			
Perform the minimum amount of monitoring/reporting that is required for basin management and regulatory compliance							●												
Develop management strategy to ensure sufficient supplies to blend with recycled water and comply with Salt and Nutrient Management Plan											🔴								
Reduced Recycled Water Availability and Increased Cost																			
Maximize the use of recycled water for direct use or recharge	●			🔴					🔴						●				
Utilize non-IEUA sources of recycled water that are not being put to beneficial use	🔴								🔴										
Develop alternative management strategies to comply with the recycled water discharge obligations to the Santa Ana River															x		●		
Evaluate the potential for direct potable reuse of recycled water															●				
Fully utilize IEUA recycled water resources								🔴		🔴									
Reduced Imported Water Availability and Increased Cost																			
Increase water-supply reliability at the lowest possible cost								●											
Despite the best efforts of the Parties to decrease reliance on imported water, the cost of the total water supply continues to increase	x																		
Continue to build collaborative programs between the Metropolitan Water District and Chino Basin																		x	
Identify and utilize new sources of supplemental water															●				
Ensure that sufficient supplemental water supplies will be available to meet future replenishment requirements							x												

Appendix C

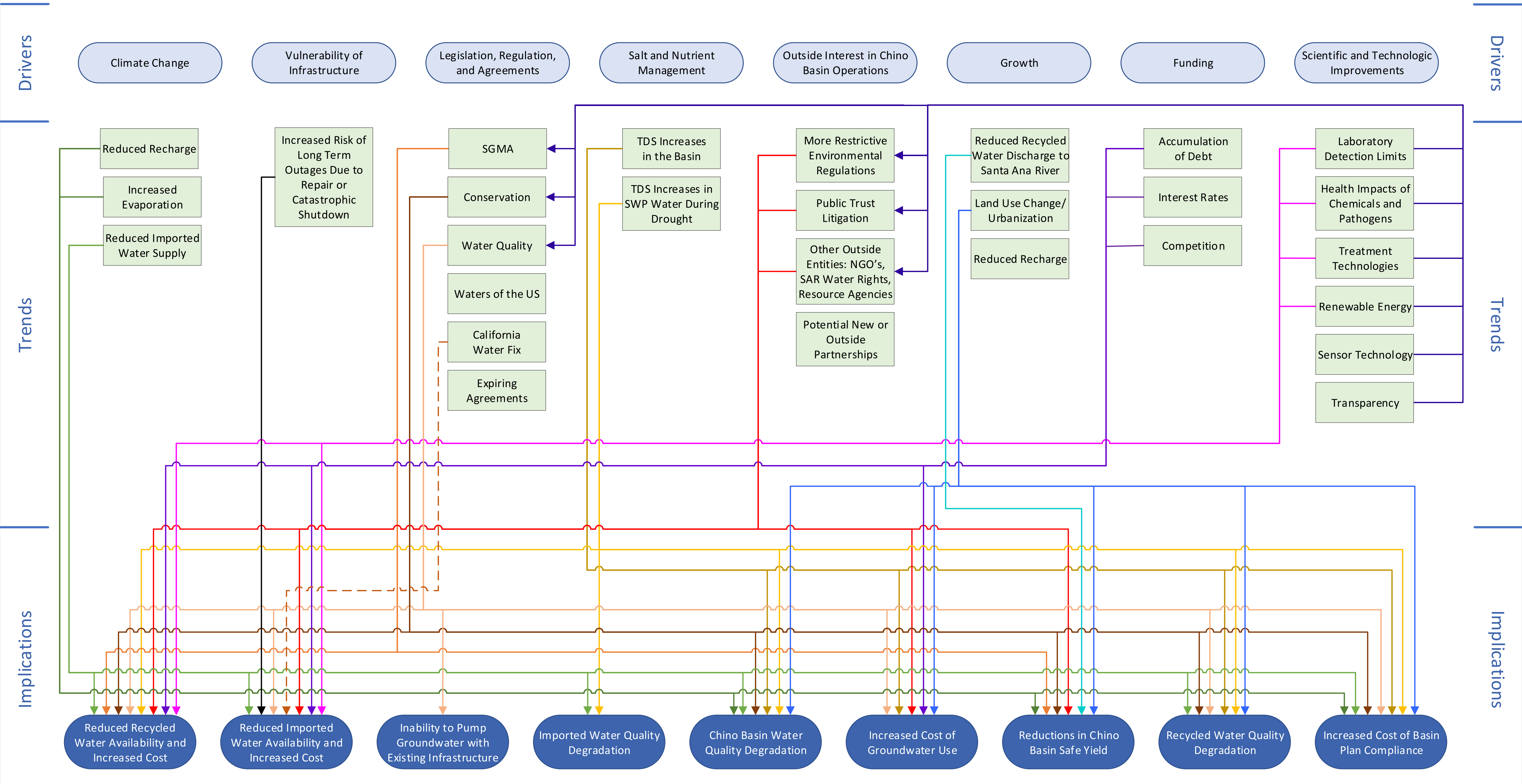
Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: ● Need • Want x Unspecified

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others				
	Appropriative										Agricultural			Overlying Non-Ag					
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD
Reduced Imported Water Availability and Increased Cost																			
Understand how imported water reliability from Metropolitan Water District will be affected with and without the California Water Fix															x				
Need a better understanding of the water management plans of the Parties to be able to better plan for imported water needs and to assure reliability of Metropolitan Water District water supply																		●	
Construct inter-basin and intra-basin connections for the benefit of regional water supply and conjunctive use		●		●				•							•		•	●	
Ensure that there is a reliable local water supply to replace imported water during shut down of imported water delivery infrastructure for maintenance and longer-term emergency outages	●		x	●			x	●	x						x			●	
Analyze water management scenarios that plan for unexpected challenges and emergencies															x				
Use more recycled water for replenishment obligation				●															
Develop management strategies that ensure parties will meet future desalter replenishment obligation and have the money to fund it				●													x		
Other																			
Improve communication between the parties	•																		
Coordinate timing of agreements, grants, etc. to ensure implementation of the OBMP Update															x				
Consider a long-term planning horizon of up to 50 years															•				
Educate elected officials and decision makers on the need and urgency to address the water management challenges		●																	

Appendix C

Exhibit 1 – Drivers and Trends and Their Implications
2020 OBMP Update



To: Chino Basin Watermaster Stakeholders
From: Watermaster 2020 OBMP Update Team
Subject: 2020 OBMP Update -- Listening Session #2 Memorandum
Date: March 14, 2019

The objectives of this memorandum are to summarize the information provided by the stakeholders during Listening Session #2 and provide information that will assist the stakeholders in reviewing the work products of Listening Session #2 and preparing for Listening Session #3.

Background

During 1998-2000, the Chino Basin Watermaster (Watermaster) conducted a process to develop the Chino Basin Optimum Basin Management Program (OBMP). The OBMP was developed in a collaborative public process that identified the needs and wants of all stakeholders; described the physical state of the groundwater basin; developed a set of management goals; identified impediments to those goals; described a series of actions that could be taken to remove those impediments and achieve the management goals; developed and executed agreements to implement the OBMP; and certified a programmatic Environmental Impact Report (PEIR) pursuant to CEQA.

By 2019, many of the projects and management programs envisioned in the 2000 OBMP have been implemented, while some have not. The understanding of the hydrology and hydrogeology of the Chino Basin has improved since 2000, and new water-management issues have been identified that necessitate that the OBMP be updated to protect the collective interests of the Chino Basin stakeholders and their water supply reliability. For these reasons, the Watermaster parties are updating the 2000 OBMP (2020 OBMP Update) to set the framework for the next 20 to 30 years of basin-management activities.

The 2020 OBMP Update is being conducted using a collaborative process like that employed for the development of the 2000 OBMP. A description of the development of the 2000 OBMP and the rationale for and process to prepare the 2020 OBMP Update is included in a white paper prepared for the Chino Basin stakeholders: *White Paper – 2020 Update to Chino Basin Optimum Basin Management Program* (OBMP White Paper). The OBMP White Paper, and all documents relevant to the 2020 OBMP Update, are available on the Watermaster's ftp site.[1]

A series of public listening sessions are being held by the Watermaster throughout 2019 to support the 2020 OBMP Update. The purpose of the listening sessions is to obtain information, ideas, and feedback from the Chino Basin stakeholders to define their collective goals, the impediments to achieving the goals, the management actions required to remove the impediments, and an implementation plan for the management actions. Watermaster staff is providing key information prior to and during each listening session to enable the stakeholders to provide their input on each topic discussed. The objective is for the ideas and opinions of every stakeholder to be heard. Participation in the listening sessions is critical to the development of the 2020 OBMP Update.

Watermaster held Listening Session #2 on February 12, 2019. Prior to Listening Session #2, the *Listening Session #1 Memorandum* was distributed which summarized: the feedback received during Listening Session #1, how the feedback will be used for 2020 OBMP Update, and the recommended preparation for Listening Session #2.

[1] https://cbwm.syncedtool.com/shares/folder/9abb162877b999/?folder_id=670

Summary of Listening Session #2

Listening Session #2 was a three-hour workshop broken down into two main agenda topics:

- Update and refinement of the issues, needs, and wants of the Chino Basin stakeholders (individual breakout activity)
- Development of draft goals for the 2020 OBMP Update (group breakout session)

Update and refinement of the Issues, Needs, and Wants of the Chino Basin Stakeholders

As described in the OBMP White Paper, the issues, needs and wants of the stakeholders form the basis of the management goals of the 2020 OBMP Update and inform the identification of impediments to the goals and action items to remove the impediments. The issues, needs and wants were first discussed in Listening Session #1: the listening session attendees articulated the issues, needs, and wants of their associated party in writing and then verbally shared with the full group. Following Listening Session #1, the 167 individual issues, needs and wants provided by the attendees were transcribed by Watermaster staff and then combined into a list of 55 unique needs and wants. The needs and wants were then reviewed and categorized into nine classes of basin management issues:

- Reductions in Chino Basin Safe Yield
- Inability to pump groundwater with existing infrastructure
- Increased cost of groundwater use
- Chino Basin water quality degradation
- Recycled water quality degradation
- Increased cost of Basin Plan compliance
- Reduced recycled water availability and increased cost
- Reduced imported water availability and increased cost
- Other

A draft matrix was then developed to show attribution of the needs and wants by party/stakeholder. This matrix was circulated for review, editing, and comment as part of the *Listening Session #1 Memorandum*.

The OBMP Update Team gave a presentation to explain the process to develop the draft matrix and explained that the next step is to identify the needs and wants that are common to most stakeholders. These common needs and wants will serve as the starting point for defining goals for the 2020 OBMP Update. Following the presentation, the participants at Listening Session #2 were asked to circulate the room to review poster-sized versions of the matrix to: (1) confirm that attribution for their party's needs and wants were appropriately assigned, (2) revise the needs and want statements as needed to accurately describe their needs and wants, and (3) add their party's attribution to the needs and wants identified by others. Members participating by phone were asked to email their comments and input.

Table 1 (attached) is the revised matrix of the issues, needs and wants of the Chino Basin Stakeholders, inclusive of all feedback provided by stakeholders prior to, during, and following Listening Session #2. Additional edits to the matrix can be submitted via email to Edgar Tellez-Foster (etellezfoster@cbwm.org).

Discussion of Goals for the 2020 OBMP Update

The OBMP Update Team provided an overview of the goals of the 2000 OBMP, which were:

1. ***Enhance Basin Water Supplies***
2. ***Protect and Enhance Water Quality***
3. ***Enhance Management of the Basin***

4. ***Equitably Finance the OBMP***

These goals were based on the then-current issues, needs and wants of the Chino Basin stakeholders and included associated activities that would be needed to achieve the goals. Using a similar transparent process as is being employed now for the 2020 OMPU Update, the stakeholders defined the impediments to the goals and activities and the specific actions required to remove the impediments and achieve the goals. The actions were formed into the 2000 OBMP implementation plan.

During Listening Session #2, a group breakout session was held to obtain input on defining goals for the 2020 OBMP Update based on the issues, needs, and wants of the stakeholders. The meeting attendees were divided into six groups. Each group was assigned to one or multiple of the nine “basin management issues” and their associated needs and wants. Each group was asked to:

1. Identify the needs and wants that are common to most stakeholders.
2. Define one or more goals or activities for the 2020 OBMP Update to address the most common needs and wants.

Following the group breakout session, one member from each group reported on the group’s discussions and ideas for goals and activities. Table 2 (attached) lists the stakeholder input presented by the breakout groups for goals and activities, categorized by basin management issues.

Proposed Goals for the 2020 OBMP Update

The feedback and input provided by the stakeholders during Listening Session #2 was used by The OBMP Update Team to develop proposed goals and their associated activities for the 2020 OBMP Update for review and discussion at Listening Session #3. The process followed to develop the proposed goals and activities included:

- An assessment of alignment of the stakeholder input in Tables 1 and 2 with the goals of the 2000 OBMP.
- An assessment of alignment of the basin management goals and activities in Table 2 with the needs and wants in Table 1.

The stakeholder input shown in Tables 1 and 2 indicates that the 2000 OBMP goals are still relevant today. To illustrate, Tables 1 and 2 each contain a column entitled “Alignment with 2000 OBMP Goal(s).” In both tables, the column indicates which of the four goals from the 2000 OBMP is in alignment with each line item of input provided, if applicable. Every need and want listed in Table 1 can be addressed through activities that are consistent with the 2000 OBMP goals. And, every activity described in Table 2 is in alignment with one or more of the 2000 OBMP goals. For this reason, we recommend that the goals for the 2020 OBMP Update are the same as the goals for the 2000 OBMP. While we propose that the goals for the 2020 OBMP Update are unchanged, the activities and implementation plan defined in 2000 need to be refined for the 2020 OBMP Update.

Our assessment of the stakeholder input for basin management goals and activities in Table 2 indicates that most of the issues, needs and wants described in Table 1 would be addressed by the activities. To illustrate, a column entitled “Addressed by Activities in Table 2” was added to Table 1. This column indicates which of the 17 activities listed in Table 2 have the potential to address each need and want. There are seven needs and wants in Table 1 that may not be addressed by the activities in Table 2 – additional activities may need to be considered to address these needs.

Based on our assessment, we propose the following set of goals and associated activities for the 2020 OBMP Update. For each goal, the following information is described: a statement of intent (relevant to

2000 and 2020), what has been accomplished to achieve the goal during the last 19 years of OBMP implementation, and a list of the proposed new or modified activities for to achieve the goals. The list of activities is based on the input in Table 2 (the number in parentheses following the activity description matches with the identification number shown in the first column the stakeholder input in Table 2).

Goal No. 1 - Enhance Basin Water Supplies. The intent of this goal is to increase available water supplies for all the stakeholders that rely on the Chino Basin and to improve supply reliability. This goal applies to Chino Basin groundwater, to other sources of water available to the OBMP stakeholders, and to the optimized use of Chino Basin storage to regulate the variability of the available water supplies and improve supply reliability.

Since the implementation of the 2000 OBMP, Watermaster and the OBMP stakeholders have completed or are currently implementing the following activities that enhance basin water supplies:

- constructed recharge projects to offset the stormwater recharge lost due to channel lining, increase Safe Yield, and ensure that there will be enough supplemental water recharge capacity to satisfy replenishment obligations;
- expanded the recharge and direct reuse of recycled water;
- constructed the Chino Basin desalters to recover contaminated groundwater in the southern part of the basin and to maintain the Safe Yield that would have otherwise been reduced due to the land use transition from agricultural to urban uses;
- recalculated the Safe Yield for the period 2011 through 2020; and
- started the process to recalculate the Safe Yield for 2021 through 2030.

The proposed new or modified activities to enhance basin water supplies to address the issues, needs and wants identified by the stakeholders in Listening Sessions 1 and 2 are based on the input in Table 2 and include:

- Construct new recharge facilities to increase the capacity for stormwater and recycled water recharge and provide recharge capacity in areas of the basin necessary to ensure long-term balance of recharge and discharge (1, 4 and 9).
- Develop and implement storage-and-recovery programs to increase water supply reliability, increase Safe Yield, and improve water quality (1, 2 and 3).
- Develop and implement regional conveyance and treatment programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence (7, 12 and 13).
- Maximize the reuse of recycled water produced by IEUA and others (10 and 11).

Goal No. 2 - Protect and Enhance Water Quality. The intent of this goal is to ensure the protection of the long-term beneficial uses of Chino Basin groundwater.

Since the implementation of the 2000 OBMP, Watermaster and the OBMP stakeholders have completed or are currently implementing the following activities to protect and enhance water quality:

- initiated a comprehensive basin-wide water-quality monitoring program;
- collaborated with the Regional Board in its efforts to facilitate the cleanup of groundwater contamination in the basin;
- developed an innovative salt and nutrient management plan to enable the use of recycled water that reduced treatment requirements without adversely impacting beneficial uses;
- constructed and operated the Chino Basin desalters to recover high-TDS and high-nitrate groundwater in the southern part of the basin and put it to beneficial use;

- identified opportunities to use the Chino Basin desalters to assist in the remediation of the Chino Airport and South Archibald plumes; and
- constructed new recharge facilities to enhance the recharge of high-quality storm and imported waters.

The proposed new or modified activities to protect and enhance water quality to address the issues, needs and wants identified by the stakeholders in Listening Sessions 1 and 2 are based on the input in Table 2 and include:

- Develop a water-quality management plan to address current and future water-quality issues and ensure the protection of beneficial uses, now and into the future (5).
- Develop strategic regulatory-compliance solutions that achieve multiple benefits in managing water quality (6).

Goal No. 3 - Enhance Management of the Basin. The intent of this goal is to encourage stable, creative, sustainable and fair water-resources management for broad mutual benefit to all stakeholders and avoid undesirable results.

Since the implementation of the 2000 OBMP, Watermaster and the OBMP stakeholders have completed or are currently implementing the following activities to enhance management of the basin:

- initiated a comprehensive basin-wide monitoring program for groundwater levels, recharge and land subsidence;
- developed a subsidence management plan to minimize or abate the occurrence of land subsidence and ground fissuring;
- implemented the OBMP storage management plan and more recently initiated the process to update it;
- developed methods to estimate storage losses;
- entered into the Dry-Year Yield program with Metropolitan; and
- became eligible for a $207 million grant to develop and implement a storage and recovery program.

The proposed new or modified activities to enhance management of the basin to address the issues, needs and wants identified by the stakeholders in Listening Sessions 1 and 2 are based on the input in Table 2 and include:

- Develop and implement storage-and-recovery programs that increase Safe Yield, improve water quality, and provide increased water supply reliability (1, 2, 3).
- Optimize the use of all sources of water supply by developing the ability to move water across the basin and between stakeholders (8 and 12).

Goal No. 4 - Equitably Finance the OBMP. The intent of this goal is to identify and use efficient and equitable methods to fund OBMP implementation.

Since 2000, Watermaster and the OBMP stakeholders have completed or are currently implementing the following activities to equitably finance the OBMP:

- completed the Peace Agreement, Peace II Agreement, and other agreements to provide incentives and funding plans to construct and operate the Chino Basin desalters and recharge improvements;

- entered into an agreement with Metropolitan for a Dry-Year Yield Program to store imported water and provided funding for the construction of new wells and wellhead treatment to produce degraded water when Metropolitan made a call for the water in storage; and
- obtained low-interest loans and grants to construct groundwater treatment, recycled water treatment, conveyance, and recharge facilities to enable the cost-efficient implementation of the OBMP.

The proposed new or modified activities to equitably finance the OBMP to address the issues, needs and wants identified by the stakeholders in Listening Sessions 1 and 2 are based on the input in Table 2 and include:

- Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements (14).
- Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement (16).
- Continue to identify and pursue low-interest loans and grants to support the implementation of the OBMP Update. An example of such an effort is the Chino Basin Project (15).

Next Steps

The next steps in the process to develop the 2020 OBMP Update are:

1. Obtain feedback on the proposal that the goals of the 2020 OBMP Update are the same goals defined in the 2000 OBMP but that continued progress toward these goals requires consideration of new or modified activities in an updated OBMP implementation plan.
2. For each goal, obtain feedback on the proposed list of activities for consideration in the development of the 2020 OBMP Update implementation plan.
3. Identify and describe the impediments to implementing the activities and achieving the goals.
4. Develop an initial set of actions to remove the impediments, including reconnaissance-level cost estimates, for consideration by the stakeholders.

Recommended Preparation for Listening Session #3

1. Review Table 1 and confirm that the feedback you provided at Listening Session #2 was accurately captured in the issues, needs and wants matrix. Please send any edits to Edgar Tellez-Foster (etellezfoster@cbwm.org).
2. Review the assessments of the nexus of the 2000 OBMP Goals with the needs and wants and activities in Tables 1 and 2; and the nexus of the activities in Table 2 to the needs and wants in Table 1. Be prepared to provide feedback (e.g. do the activities in Table 2 address all of the needs and wants? Are there any activities that could be added to the activities in Table 2?).
3. Review the proposed goal statements and associated new/modified activities for the 2020 OBMP Update. Be prepared to provide your feedback on these goals and activities. The intent is to (i) finalize the goals and (ii) have a complete list of potential new or modified activities for consideration as part the 2020 OBMP Update implementation plan.
4. Be prepared to identify impediments to implementing the goals and their associated activities.

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The number in this column matches with the identification number of the stakeholder input in Table 2 (first column)

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 2*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural											
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA	Overlying Non-Ag	IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Reductions in Chino Basin Safe Yield																						
Develop a storage management plan to optimize the use of unused storage space in the basin, avoid undesirable results, and encourage storage and recovery programs	🔴	🔴		🔴	🔴			🔴	🔴	🔴	🔴		●		🔴		🔴				1, 2	1, 2, 3
Design storage management and storage & recovery programs that maintain or enhance safe yield	🔴	●						🔴	🔴	●			🔴		●		●			●	2, 3	1, 3
Maintain or enhance the safe yield of the basin without causing undesirable results	🔴	●		🔴	🔴			🔴	🔴	🔴	●				●		●			🔴	2, 3	1, 3
Manage the basin safe yield for the long-term viability and reliability of groundwater supply	🔴	●						🔴	🔴	🔴	🔴			🔴			●	●		🔴	2, 3	1, 3
Reassess the frequency of the safe yield recalculation	●				●												●				2, 3	3
Continue to model and track safe yield, but utilize other management strategies to address a decline.																	●				2, 3	1, 3
Develop recharge programs that maintain or enhance safe yield	🔴	●					●	●	🔴	●					●		●			●	3, 4, 9	1, 3
Develop more facilities to capture, store, and recharge water	●	🔴					🔴			●	●				●		●				4, 9	1, 2
Enhance recharge in northeast MZ-3	●		●						🔴								●				4, 9	1, 3
Maximize use of existing recharge facilities	●	●							🔴	●											4, 9	3
Establish incentives to encourage recharge of high-quality imported water	●		●																		1, 4, 9	2, 3
Develop an OBMP Update that is consistent with the Physical Solution and allows access to the basin for users to meet their requirements	🔴	●				🔴		🔴														3
Engage with regional water management planning efforts in the Upper Santa Ana River Watershed that have the potential to impact Chino Basin operations or safe yield	●														🔴		●			🔴		3

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Appendix C

Table 1

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Key: 🔴 Need ⚫ Want/Unspecified

*The number in this column matches with the identification number of the stakeholder input in Table 2 (first column)

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 2*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Inability to Pump Groundwater with Existing Infrastructure																						
Pursue collaborative, regional partnerships to implement regional solutions to water management challenges	⚫			⚫	⚫			⚫							🔴	⚫	⚫	⚫	🔴	🔴	6, 7,12 13,16	3
Ensure that sufficient, reliable water supplies will be available to meet current and future water demands	🔴	🔴	🔴	🔴			⚫	🔴	⚫	⚫	⚫				🔴	⚫	⚫	🔴	⚫		7, 9, 12, 13	1, 3
Develop conjunctive use agreements that provide certainty in the ability to perform during put and take years by clearly defining facilities/infrastructure and operating plans, and that leverage the lessons learned from obstacles encountered during the implementation of the current Dry Year Yield program	⚫						⚫		⚫						⚫		⚫	⚫			1, 2	1, 2, 3
Develop management strategies that enable the parties to produce or leverage their respective water rights that may be impacted by physical basin challenges like land subsidence or water quality	🔴						⚫	🔴							⚫		⚫				1, 2, 8, 13	3
Design storage management and storage & recovery programs to raise funding to build infrastructure	⚫			⚫											⚫		⚫				1, 15	3, 4
Develop process to support/facilitate project implementation	⚫																					4
Design subsidence management plans to allow flexibility in the location and volume of groundwater production in MZ-1 and MZ-2	⚫						⚫	🔴		🔴				⚫	⚫							3

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Appendix C

Table 1

Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The number in this column matches with the identification number of the stakeholder input in Table 2 (first column)

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 2*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
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Increased Cost of Groundwater Use																						
Seek supplemental financial resources to support the implementation of the OBMP Update	🔴	🔴		●			●	🔴	🔴	●					●	🔴	●		●		15, 16	4
Develop regional partnerships to help reduce costs	●			●			●		🔴						🔴	●	●			●	15, 16	4
Monetize agencies' unused water rights for equitable balance of basin assets			●																		15, 16	4
Decrease Watermaster assessment costs	●				●			●													15, 16	4
Support to develop a justification for increases in water rates and developer fees to invest in needed water infrastructure	🔴	●							●								●				14, 15	
Develop an equitable distribution of costs/benefits of the OBMP	●	●		●		🔴	●	🔴	🔴	●				🔴	●						14	4
Watermaster assessments for implementation of the OBMP should be allocated based on benefits received	●				●																14	4
Continue or enhance incentives to pump groundwater from the Chino Basin			🔴																		1, 2, 12	3, 4
Improve flexibility for parties to execute water rights transfers														🔴								4

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Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ⚫ Want/Unspecified

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Chino Basin Water Quality Degradation																						
Develop a water quality management plan to ensure ability to produce groundwater rights	🔴	⚫		⚫			⚫	⚫	⚫	⚫				🔴	⚫		⚫	⚫			5, 6	2, 3
Develop regional infrastructure to address water quality contamination and treatment				⚫	⚫			⚫													5, 6	2
Plan for and be prepared for new drinking water quality regulations that may result in an increase in groundwater treatment and costs	⚫	⚫	🔴	🔴			🔴	⚫	🔴	⚫					🔴		⚫				5, 6	2
Be more proactive and engaged in the process to develop new drinking water quality regulations								⚫													5, 6	2
Recycled Water Quality Degradation																						
Maintain compliance with recycled water and dilution requirements pursuant to the Chino Basin groundwater recharge permit		⚫					⚫		🔴	🔴				🔴	🔴						1, 6, 9	2
Increased Cost of Basin Plan Compliance																						
Develop management strategy to ensure sufficient supplies to blend with recycled water and comply with Salt and Nutrient Management Plan	⚫	⚫									🔴				⚫		⚫				1, 6, 9	2
Perform the minimum amount of monitoring/reporting that is required for basin management and regulatory compliance	⚫			⚫			⚫	⚫														3, 4

Appendix C

Table 1

Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The number in this column matches with the identification number of the stakeholder input in Table 2 (first column)

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 2*	Alignment with 2000 OBMP Goals
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	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA	Overlying Non-Ag	IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Reduced Recycled Water Availability and Increased Cost																						
Fully utilize IEUA recycled water resources		🔴		●			●	●		🔴					●						10	1
Maximize the use of recycled water for direct use or recharge	●	🔴		🔴			●	🔴	🔴	🔴					●						10, 11	1
Evaluate the potential for direct potable reuse of recycled water	●								●						●						10, 11	1
Develop alternative management strategies to comply with the recycled water discharge obligations to the Santa Ana River	●	●		●			●	●		●					●		●				10, 11	1, 3
Utilize non-IEUA sources of recycled water that are not being put to beneficial use	🔴	●					●	●	🔴	🔴					●		●				11	1
Other																						
Coordinate timing of agreements, grants, etc. to ensure implementation of the OBMP Update	●							●	🔴	●					●	●	●				17	
Improve communication between the parties	🔴			🔴										🔴	●		●				17	
Educate elected officials and decision makers on the need and urgency to address the water management challenges	●	🔴							🔴						●	●	●				17	
Consider a long-term planning horizon of up to 50 years	●								●	●					●							3

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Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The number in this column matches with the identification number of the stakeholder input in Table 2 (first column)

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 2*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Reduced Imported Water Availability and Increased Cost																						
Ensure that there is a reliable local water supply to replace imported water during shut down of imported water delivery infrastructure for maintenance and longer-term emergency outages	🔴	●	●	🔴			●	🔴	●	●					🔴	🔴	🔴	🔴			7, 12, 13	1, 3
Identify and utilize new sources of supplemental water	🔴	●		●			🔴	●	●	●					●	●	●				7, 8, 11, 13	1, 3
Construct inter-basin and intra-basin connections for the benefit of regional water supply and conjunctive use	●	●		🔴			●	●	🔴			🔴			●	🔴	●	🔴			7, 8	1, 3
Understand how imported water reliability from Metropolitan Water District will be affected with and without the California Water Fix	●								🔴						●	●	●				8, 13, 16	1, 3
Develop management strategies that ensure parties will meet future desalter replenishment obligation and have the money to fund it	●	●		🔴			🔴		●								●			🔴	8, 13, 14	3
Increase water-supply reliability at the lowest possible cost	🔴			●			●	●				🔴		🔴	●		●				8, 9, 13, 14	3
Need a better understanding of the water management plans of the Parties to be able to better plan for imported water needs and to assure reliability of Metropolitan Water District water supply	●			●					🔴			🔴			●	●	●	🔴			8, 9, 13	3
Analyze water management scenarios that plan for unexpected challenges and emergencies	●								🔴	●					●	●	●				8, 9, 13	3
Ensure that sufficient supplemental water supplies will be available to meet future replenishment requirements							●		🔴	●		🔴		?	●					🔴	7, 8, 9, 13	1, 3
Despite the best efforts of the Parties to decrease reliance on imported water, the cost of the total water supply continues to increase	●																				7, 8, 9, 15, 16	3
Use more recycled water for replenishment obligation	●			🔴			🔴		🔴								●				10,11	3
Continue to build collaborative programs between the Metropolitan Water District and Chino Basin	🔴						●	●	●						●		●	●			13, 16	3

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Table 2
Stakeholder Input on Goals and Activities for the 2020 OBMP Update

	Stakeholder Input by Basin Management Issue	Alignment with 2000 OBMP Goal(s)*
Reductions in Chino Basin Safe Yield		
1	Design storage and recovery programs that augment safe yield, improve water quality and enhance recharge	1, 2, 3
2	Optimize management of groundwater storage to enhance/protect safe yield	1, 3
3	Increase safe yield [by 10,000 af by 2030]	1
4	Capture and store all permitted water [by 2040]	1, 2
Chino Basin Water Quality Degradation		
5	Develop a water quality management plan [to address current and future water quality issues] to ensure ability to produce high-quality groundwater [by 2022]. (high quality = readily useable)	2
6	Develop strategic compliance solutions that achieve multiple benefits in managing water quality (OBMP Update, Built in)	2, 3
Reduced Imported Water Availability and Cost		
7	Increase wet-water supplies to meet parties' demands without the need of imported water from Metropolitan	1, 3
8	Optimize [efficient] use of all water supplies sources, with ability to move water across basins/amongst stakeholders	1, 3
9	Enhance ability to capture and store water when it is available [enough to satisfy imported water demands for 3 years (100 - 200k af)]	1, 2
Reduced Recycled Water Availability and Increased Cost		
10	Put 100% of IEUA recycled water to beneficial use in the Chino Basin [x% by 2025; x% by 2030]	1
11	Utilize available non-IEUA sources of recycled water for beneficial use in the Chino Basin [8,000 afy by 2025]	1
Inability to Pump Groundwater with Existing Infrastructure		
12	Leverage existing local infrastructure for the benefit of the region	3
13	Ensure sufficient, reliable water supplies (local, regional, imported) to meet future water demands, without MPI	1, 3
Increased Cost of Groundwater Use		
14	Develop an equitable distribution of costs/benefits of the OBMP and include in the OBMP Update agreements	4
15	Develop a plan to obtain supplemental financial resources to support the implementation of the OBMP Update	4
16	Develop regional partnerships to implement the OBMP Update and reduce costs -- (The "O" in OBMP); include in the OBMP update agreement	3, 4
Other		
17	Approve OBMP update with full support from all stakeholders and elected officials by June 2020	

*The 2000 OBMP Goals are:
(1) - Enhance basin water supplies
(2) - Protect and enhance water quality
(3) - Enhance management of the basin
(4) - Equitably finance the OBMP

Appendix C

To: Chino Basin Watermaster Stakeholders
From: Watermaster 2020 OBMP Update Team
Subject: 2020 OBMP Update -- Listening Session #3 Memorandum
Date: May 9, 2019

The objectives of this memorandum are to summarize the information provided by the stakeholders during Listening Session #3 and provide information that will assist the stakeholders in reviewing the work products of Listening Session #3 and preparing for Listening Session #4.

Background

During 1998-2000, the Chino Basin Watermaster (Watermaster) conducted a process to develop the Chino Basin Optimum Basin Management Program (OBMP). The OBMP was developed in a collaborative public process that identified the needs and wants of all stakeholders; described the physical state of the groundwater basin; developed a set of management goals; identified impediments to those goals; described a series of actions that could be taken to remove those impediments and achieve the management goals; developed and executed agreements to implement the OBMP; and certified a programmatic Environmental Impact Report (PEIR) pursuant to CEQA.

By 2019, many of the projects and management programs envisioned in the 2000 OBMP have been implemented, while some have not. The understanding of the hydrology and hydrogeology of the Chino Basin has improved since 2000, and new water-management issues have been identified that necessitate that the OBMP be updated to protect the collective interests of the Chino Basin stakeholders and their water supply reliability. For these reasons, the Watermaster parties are updating the 2000 OBMP (2020 OBMP Update) to set the framework for the next 20 to 30 years of basin-management activities.

The 2020 OBMP Update is being conducted using a collaborative process like that employed for the development of the 2000 OBMP. A description of the development of the 2000 OBMP and the rationale for and process to prepare the 2020 OBMP Update is included in a white paper prepared for the Chino Basin stakeholders: *White Paper – 2020 Update to Chino Basin Optimum Basin Management Program* (OBMP White Paper). The OBMP White Paper, and all documents relevant to the 2020 OBMP Update, are available on the Watermaster's ftp site.[1]

A series of public listening sessions are being held by the Watermaster throughout 2019 to support the 2020 OBMP Update. The purpose of the listening sessions is to obtain information, ideas, and feedback from the Chino Basin stakeholders to define their collective goals, the impediments to achieving the goals, the management actions required to remove the impediments, and an implementation plan for the management actions. Watermaster staff is providing key information prior to and during each listening session to enable the stakeholders to provide their input on each topic discussed. The objective is for the ideas and opinions of every stakeholder to be heard. Participation in the listening sessions is critical to the development of the 2020 OBMP Update.

Watermaster held Listening Session #3 on March 21, 2019. Prior to Listening Session #3, the *Listening Session #2 Memorandum* was distributed which summarized: the feedback received during Listening Session #2, how the feedback will be used for 2020 OBMP Update, and the recommended preparation for Listening Session #3. The PowerPoint presentation given at the meeting is available on the Watermaster's ftp site.[1]

[1] https://cbwm.syncedtool.com/shares/folder/9abb162877b999/?folder_id=670

Summary of Listening Session #3

Listening Session #3 was a three-hour workshop broken down into two main agenda topics:

- Discussion and feedback on the observation that the 2020 OBMP Update goals are the same as the 2000 OBMP goals
- Update and refinement of the types of activities that will be considered for inclusion in the 2020 OBMP Update

2020 OBMP goals

As discussed in the *Listening Session #2 Memorandum*, the stakeholder input provided in Listening Sessions #1 and #2 indicated that the goals defined in the 2000 OBMP are still relevant today. Based on the assessment of stakeholder input, the 2020 OBMP Update Team proposed maintaining the 2000 OBMP goals in the 2020 OBMP Update and drafted a statement of intent for each goal. During Listening Session #3, the 2020 OBMP Update Team gave a presentation to explain how the stakeholder input was used to conclude the goals remain the same and explained that the next step was to obtain feedback on these recommended goals and intents. The goals and intents presented during Listening Session #3 were:

> ***Goal No. 1 - Enhance Basin Water Supplies.*** The intent of this goal is to increase available water supplies for all the stakeholders that rely on the Chino Basin and to improve supply reliability.
>
> This goal applies to Chino Basin groundwater, to other sources of water available to the OBMP stakeholders, and to the optimized use of Chino Basin storage to regulate the variability of the available water supplies and improve supply reliability.
>
> ***Goal No. 2 - Protect and Enhance Water Quality.*** The intent of this goal is to ensure the protection of the long-term beneficial uses of Chino Basin groundwater.
>
> ***Goal No. 3 - Enhance Management of the Basin.*** The intent of this goal is to encourage stable, creative, sustainable and fair water resources management for broad mutual benefit to all stakeholders and avoidance of undesirable results.
>
> ***Goal No. 4 - Equitably Finance the OBMP***. The intent of this goal is to identify and use efficient and equitable methods to fund OBMP implementation.

Following the presentation, the participants at Listening Session #3 participated in a live web-supported survey on the goals and their intents. There was a total of five questions on the survey. For each of the four goals, the participants were presented the following question and multiple-choice answers:

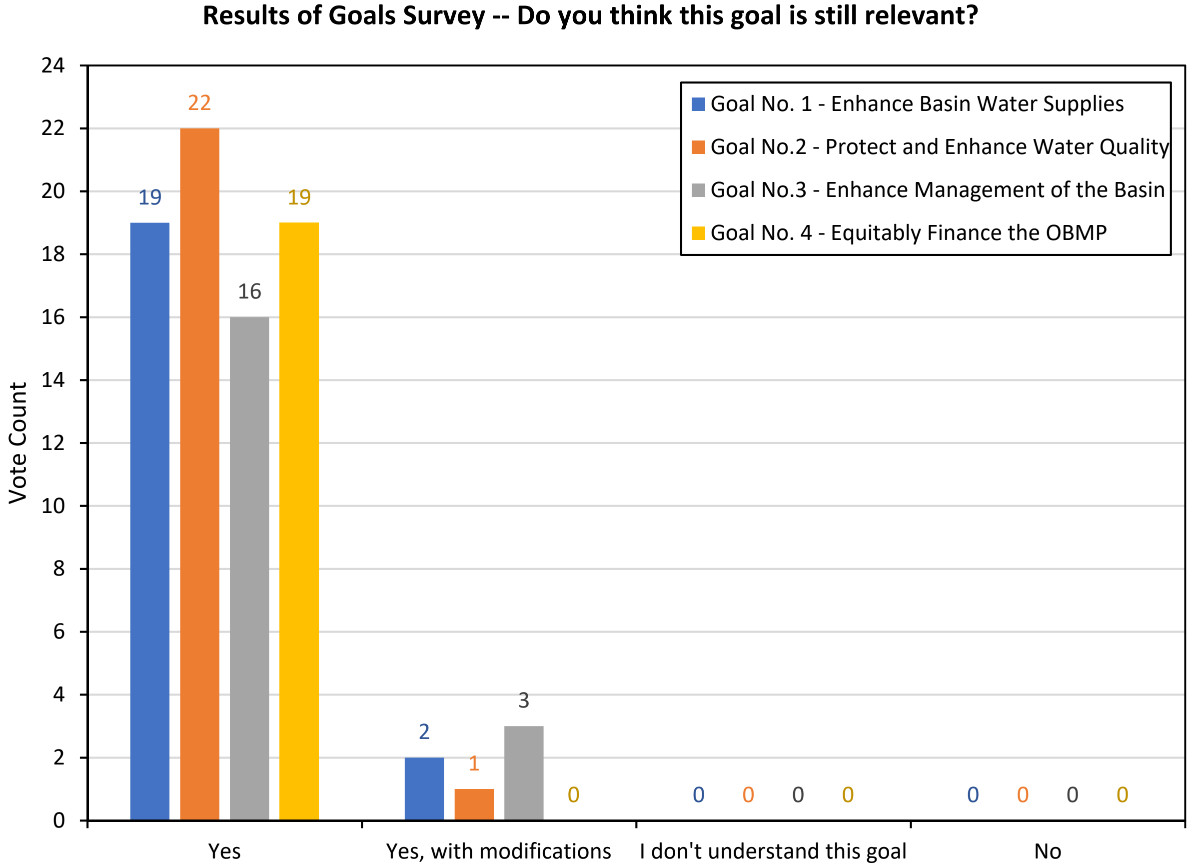
> Do you think this goal is still relevant?
>
> A) Yes B) Yes, with modifications C) No D) I don't understand this activity

The fifth survey question asked:

> Are there more goals that should be added?
>
> A) Yes B) No

Survey Results

The results of the survey for the first four questions are shown in the bar chart below.



As shown in the chart, all survey respondents indicated that the goals are still relevant today, and some respondents thought that Goals No. 1, 2 and 3 were still relevant but should be modified. The latter respondents were asked to explain their suggested modifications, resulting in a group discussion on the goal, the intent statement, and the respondents' concern. A summary of the discussion for each goal is summarized below:

Goal No. 1 - Enhance Basin Water Supplies. The meeting participants that spoke about potential modifications to Goal No. 1 voiced the following suggestions/concerns/questions:

- The goal could be construed as Watermaster attempting to manage water supplies outside Chino Basin groundwater, and therefore acting outside its purview.

Following explanation by two participants as to the consistency of the Watermaster's role in enhancing water supplies in the context of the Judgment and the 2000 OBMP, Watermaster legal counsel explained that Watermaster is responsible for ensuring that (1) the parties are able to meet their demands using Chino Basin groundwater and (2) sufficient water is available for replenishment if these demands result in overproduction; therefore, it is within Watermaster's purview to enhance water supplies outside Chino Basin groundwater. Another participant indicated that the implementation agreement will identify roles and responsibilities for implementing the OBMP activities and that through this agreement it could/will be made clear that Watermaster is not taking on a role that is beyond its purview.

- Should storage be listed as source of supply in the intent goal? It seems management of storage is a function of Goal No. 3.

There was no discussion about this question. Upon reflection and review of the 2000 OBMP, the OBMP Update Team agreed that storage was best highlighted as part of Goal No. 3 for consistency with the 2000 OBMP.

Goal No. 2 - Protect and Enhance Water Quality. The meeting participants who spoke about potential modifications to Goal No. 2 voiced the following suggestions/concerns/questions:

- Should the word "enhance" be added to the intent statement?

During the discussion, participants who spoke indicated that "enhance" was already explicitly used in the goal statement and it did not need to be added to the intent.

Goal No. 3 - Enhance Management of the Basin. The meeting participants who spoke about potential modifications to Goal No. 3 voiced the following suggestions/concerns/questions:

- The descriptors used in the intent statement, such as "fair" and "broad mutual benefit" were unclear and unnecessary.

During the discussion, the participants who spoke suggested: that words with imprecise meaning should not be used; that keeping the goals broader in scope by removing these qualifiers is the best approach; and that the specificity of "benefits" will be addressed in the activities or implementation plans.

Goal No. 4 - Equitably Finance the OBMP. The meeting participants who spoke about potential modifications to Goal No. 4 voiced the following suggestions/concerns/questions:

- Are the terms "efficient" and "equitable" in the intent statement at odds with each other? What is the definition of efficient?

The OBMP Update Team explained that an example of "efficient" method to fund OBMP implementation is partnering with IEUA to obtain grant funding to implement projects, and that this was done successfully in implementing the 2000 OBMP.

Consideration of Additional OBMP Goals. For the survey question regarding addition of new goals for the 2020 OBMP Update, two out of 19 survey respondents voted "Yes." The meeting participants who spoke offered the following input:

- Should we consider integrating the Sustainable Groundwater Management Act (SGMA) regulations with the 2020 OBMP Update goals?

  During the discussion, the participants who spoke suggested that Goal No. 3 is encompassing of the SGMA regulations, but that it may be helpful to include language about "maintaining local control" of the groundwater basin in the intent of Goal No. 3.

- Should there be a goal related to regional collaboration?

  During the discussion, the participants who spoke pointed out that regional collaboration is implied within Goals No. 1 and No. 3, so a separate goal is not needed.

- Participants also provided additional thoughts that should be considered by the stakeholders in the development of the 2020 OBMP Update, but not explicitly written as goals or intents of goals:

- The OBMP Update activities should ensure Watermaster's engagement on issues related to the Santa Ana River, which is a significant source of supply to the Basin.
- The participants should strive for collaboration and openness to avoid conflict.

Recommended 2020 OBMP Update goals

Based on the feedback from the goals survey during Listening Session #3, the recommended 2020 OBMP Update goals and intents are:

Goal No. 1 - Enhance Basin Water Supplies. The intent of this goal is to increase the water supplies available for Chino Basin parties and improve water supply reliability. This goal applies to Chino Basin groundwater and all other sources of water available for beneficial use.

Goal No.2 - Protect and Enhance Water Quality. The intent of this goal is to ensure the protection of the long-term beneficial uses of Chino Basin groundwater.

Goal No.3 - Enhance Management of the Basin. The intent of this goal is to encourage sustainable management of the Chino Basin to avoid material physical injury, promote local control, and improve water-supply reliability for the benefit of all Chino Basin parties.

Goal No. 4 - Equitably Finance the OBMP. The intent of this goal is to identify and use efficient and equitable methods to fund OBMP implementation.

2020 OBMP Update activities

During Listening Session #3, the meeting attendees participated in a breakout activity to review and provide feedback on the list of 10 new and revised activities for potential inclusion in the 2020 OBMP Update. The activities are shown in Table 2b, attached. These activities are based on the input provided by breakout groups during Listening Session #2, as documented in the Listening Session #2 memo. The Listening Session #3 participants were divided into six groups and each group was asked to:

1. Review a subset of the 10 activities (A through J) and suggest modifications to better address the needs and wants of the Chino Basin stakeholders, if necessary.
2. Review a subset of the issues, needs and wants (INWs) of the Chino Basin stakeholders to assess which of the ten activities address each need and want, and if any are not addressed by the activities, to suggest additional activities for consideration in the 2020 OBMP Update.

Table 1 shows the participants' assessment of which activities address each INW. Two new activities were defined by one of the breakout groups:

K. Develop a management strategy within the Salt and Nutrient Management Plan to ensure ability to comply with dilution requirements for recycled water recharge.

L. Perform the appropriate amount of monitoring and reporting required for basin management and regulatory compliance.

The 2020 OBMP Update Team compiled the feedback from the breakout session and revised the list of activities for consideration in the 2020 OBMP Update. The revised list of activities was distributed to the Chino Basin stakeholders in the form of a survey to obtain additional feedback. The results of the survey and the complete list of activities is described below.

Follow-up survey on 2020 OBMP activities

The objective of this survey was to obtain feedback on the revised list of activities for consideration in the 2020 OBMP Update. For each activity, the survey asked:

(1) Do you think this activity should be considered for inclusion in the 2020 OBMP Update?

A) Yes B) Yes, with modifications C) No D) I don't understand this activity

(2) If you answered C or D, please explain

Based on the feedback from the survey as of May 3, 2019, six out of six survey respondents answered "A) Yes" for all activities except Activity F: *Develop strategic regulatory-compliance solutions that achieve multiple benefits in managing water quality.*

For Activity F, five out of six survey respondents thought that it should be included in the 2020 OBMP Update, and one participant responded that they did not understand the meaning of "strategic regulatory compliance solution." Based on the input provided by the parties, the 2020 OBMP Update Team's understanding of the scope of Activity F is to develop solutions to comply with evolving and more stringent drinking-water standards. Specifically, that the 2020 OBMP Update should explore regional, collaborative solutions that have the potential to address multiple water-quality and water-supply issues.

Based on the feedback from the survey as of May 3, 2019, the recommended list of activities is:

A. Construct new facilities and improve existing facilities to increase the capacity to store and recharge surface water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge

B. Develop, implement, and optimize storage-and-recovery programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality

C. Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence

D. Maximize the reuse of recycled water produced by IEUA and others

E. Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses

F. Develop strategic regulatory-compliance solutions that achieve multiple benefits in managing water quality

G. Optimize the use of all sources of water supply by improving the ability to move water across the basin and among stakeholders, prioritizing the use of existing infrastructure

H. Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements

I. Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement

J. Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update. An example of such an effort is the Chino Basin Project

K. Develop a management strategy within the Salt and Nutrient Management Plan to ensure ability to comply with dilution requirements for recycled water recharge

L. Perform the appropriate amount of monitoring and reporting required for basin management and regulatory compliance

Nexus between the 2020 OBMP Update goals, their impediments, and the activities recommended for consideration

Thus far through the Listening Session process, the following has been completed:

- Defined the drivers, trends and implications for Basin management that identify the need for the 2020 OBMP Update (see attached Exhibit 1).
- Defined the needs and wants of the Chino Basin stakeholders, categorized by the Basin management issues derived from the drivers and trends analysis (see attached Table 1).
- Defined the goals of the 2020 OBMP Update, which are the same as the goals of the 2000 OBMP (refer to discussion above in this memo).
- Defined a set of activities for consideration in the 2020 OBMP Update that address the common needs and wants of the Chino Basin stakeholders (refer to discussion above in this memo).

There are physical, institutional, and financial impediments to achieving the goals of the 2020 OBMP. The issues, needs, and wants of the stakeholders shown in Table 1 explicitly recognize these impediments to achieving the goals and the stakeholders have identified the activities that could remove these impediments to achieve the goals.

Based on the feedback obtained from Listening Sessions #1 through #3, the 2020 OBMP Update Team drafted an exhibit to show the nexus of all this information. Table 3 lists the goals, the impediments to achieving these goals, the activities to remove the impediments, and the expected outcome or the implications of implementing those activities. Table 3 also shows the nexus of each activity to the Basin management issues defined in Exhibit 1. The statements of impediments and expected outcomes of the activities were developed by the 2020 OBMP Update Team and are based on the feedback obtained from stakeholders over the last three listening sessions.

Next Steps

The next step in the process to develop the 2020 OBMP Update is to (1) define the action plans required to perform the activities and (2) prepare reconnaissance-level engineering cost estimates of the action plans. This information will be documented in a technical memorandum (OBMP Update Technical Memorandum #1 [OBMP TM1]). OBMP TM1 will be circulated for review and subsequently refined and formulated into a recommended implementation plan (OBMP TM2) over a series of listening sessions with the stakeholders. The draft outline of OBMP TM1 and TM2 is attached herein.

Recommended Preparation for Listening Session #4

1. Review Table 3 and be prepared to provide feedback, specifically to suggest any changes or additions to the articulation of the impediments and expected outcomes of the 2020 OBMP Update activities. There will be a breakout session during Listening Session #4 to document all the feedback. The intent is to ensure that the feedback from the stakeholders over the last three Listening Sessions has been captured and is complete enough to prepare OBMP TM1.

2. Review the draft outline of OBMP TM1/TM2. The 2020 OBMP Update Team will provide an overview of the outline at Listening Session #4 and will provide an example of how the activities will be characterized in OBMP TM1.

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ⚫ Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA	Overlying Non-Ag	IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Reductions in Chino Basin Safe Yield																						
Develop a storage management plan to optimize the use of unused storage space in the basin, avoid undesirable results, and encourage storage and recovery programs	🔴	🔴		🔴	🔴			🔴	🔴	🔴	🔴		⚫		🔴		🔴				B, C	1, 2, 3
Design storage management and storage & recovery programs that maintain or enhance safe yield	🔴	⚫						🔴	🔴	⚫			🔴		⚫		⚫			⚫	B, C	1, 3
Maintain or enhance the safe yield of the basin without causing undesirable results	🔴	⚫		🔴	🔴			🔴	🔴	🔴	⚫				⚫		⚫			🔴	B, D	1, 3
Manage the basin safe yield for the long-term viability and reliability of groundwater supply	🔴	⚫						🔴	🔴	🔴	🔴			🔴			⚫	⚫		🔴	A, B, C	1, 3
Reassess the frequency of the safe yield recalculation	⚫				⚫												⚫				I	3
Continue to model and track safe yield, but utilize other management strategies to address a decline.																	⚫				B	1, 3
Develop recharge programs that maintain or enhance safe yield	🔴	⚫					⚫	⚫	🔴	⚫					⚫		⚫			⚫	A, B	1, 3
Develop more facilities to capture, store, and recharge water	⚫	🔴					🔴			⚫	⚫				⚫		⚫				A, B, D	1, 2
Enhance recharge in northeast MZ-3	⚫		⚫						🔴								⚫				A, C	1, 3
Maximize use of existing recharge facilities	⚫	⚫						⚫	🔴	⚫											A, C, F, G	3
Establish incentives to encourage recharge of high-quality imported water	⚫		⚫																		H, I	2, 3
Develop an OBMP Update that is consistent with the Physical Solution and allows access to the basin for users to meet their requirements	🔴	⚫				🔴		🔴													C, E	3
Engage with regional water management planning efforts in the Upper Santa Ana River Watershed that have the potential to impact Chino Basin operations or safe yield	⚫														🔴		⚫			🔴	I, D	3

Appendix C

Table 1
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	Appropriative										Agricultural											
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA	Overlying Non-Ag	IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Inability to Pump Groundwater with Existing Infrastructure																						
Pursue collaborative, regional partnerships to implement regional solutions to water management challenges	⚫			⚫	⚫			⚫							🔴	⚫	⚫	⚫	🔴	🔴	B, E, F, G, I	3
Ensure that sufficient, reliable water supplies will be available to meet current and future water demands	🔴	🔴	🔴	🔴			⚫	🔴	⚫	⚫	⚫				🔴	⚫	⚫	🔴	⚫		A, B, D, G	1, 3
Develop conjunctive use agreements that provide certainty in the ability to perform during put and take years by clearly defining facilities/infrastructure and operating plans, and that leverage the lessons learned from obstacles encountered during the implementation of the current Dry Year Yield program	⚫						⚫	⚫	⚫						⚫		⚫	⚫			B, G, I	1, 2, 3
Develop management strategies that enable the parties to produce or leverage their respective water rights that may be impacted by physical basin challenges like land subsidence or water quality	🔴						⚫	🔴							⚫		⚫				A, C, D, E, F, G, I	3
Design storage management and storage & recovery programs to raise funding to build infrastructure	⚫			⚫											⚫		⚫				B, D, I, J	3, 4
Develop process to support/facilitate project implementation	⚫																				F, H, J	4
Design subsidence management plans to allow flexibility in the location and volume of groundwater production in MZ-1 and MZ-2	⚫						⚫	🔴		🔴				⚫	⚫						A, C, G	3

Appendix C

Table 1

Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Increased Cost of Groundwater Use																						
Seek supplemental financial resources to support the implementation of the OBMP Update	🔴	🔴		●			●	🔴	🔴	●					●	🔴	●		●		D, F, G, I, J	4
Develop regional partnerships to help reduce costs	●			●			●	●	🔴						🔴	●	●			●	F, G, I, J	4
Monetize agencies' unused water rights for equitable balance of basin assets			●																		G, H	4
Decrease Watermaster assessment costs	●				●			●													I, J	4
Support to develop a justification for increases in water rates and developer fees to invest in needed water infrastructure	🔴	●							●								●				F, G, H	
Develop an equitable distribution of costs/benefits of the OBMP	●	●		●		🔴	●	🔴	🔴	●				🔴	●						H, J	4
Watermaster assessments for implementation of the OBMP should be allocated based on benefits received	●				●																H	4
Continue or enhance incentives to pump groundwater from the Chino Basin			🔴																		G, I	3, 4
Improve flexibility for parties to execute water rights transfers														🔴							G, I	4

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural											
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA	Overlying Non-Ag	IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Chino Basin Water Quality Degradation																						
Develop a water quality management plan to ensure ability to produce groundwater rights	🔴	●		●			●	●	●	●				🔴	●		●	●			E, F, G, J	2, 3
Develop regional infrastructure to address water quality contamination and treatment				●	●			●													A, B, C, E, F, G, I, J	2
Plan for and be prepared for new drinking water quality regulations that may result in an increase in groundwater treatment and costs	●	●	🔴	🔴			🔴	●	🔴	●					🔴		●				E, F	2
Be more proactive and engaged in the process to develop new drinking water quality regulations								●													A, B, D, E, G, J	2
Recycled Water Quality Degradation																						
Maintain compliance with recycled water and dilution requirements pursuant to the Chino Basin groundwater recharge permit		●					●	●	🔴	🔴				🔴	🔴						A, B, D, E, G, J	2
Increased Cost of Basin Plan Compliance																						
Develop management strategy to ensure sufficient supplies to blend with recycled water and comply with Salt and Nutrient Management Plan	●	●									🔴				●		●				G, K	2
Perform the minimum amount of monitoring/reporting that is required for basin management and regulatory compliance	●			●			●	●													L	3, 4

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
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Reduced Recycled Water Availability and Increased Cost																						
Fully utilize IEUA recycled water resources		🔴		●			●	●		🔴					●						A, D, E, F, G	1
Maximize the use of recycled water for direct use or recharge	●	🔴		🔴			●	🔴	🔴	🔴					●						A, D, E, F, G	1
Evaluate the potential for direct potable reuse of recycled water	●								●						●						D, E, F	1
Develop alternative management strategies to comply with the recycled water discharge obligations to the Santa Ana River	●	●		●			●	●		●					●		●				D, E, F	1, 3
Utilize non-IEUA sources of recycled water that are not being put to beneficial use	🔴	●					●	●	🔴	🔴					●		●				D, E, F	1
Other																						
Coordinate timing of agreements, grants, etc. to ensure implementation of the OBMP Update	●							●	🔴	●					●	●	●				F, G, H, I, J	
Improve communication between the parties	🔴			🔴				●						🔴	●		●				F, H, I	
Educate elected officials and decision makers on the need and urgency to address the water management challenges	●	🔴							🔴						●	●	●				F, G, H, I, J	
Consider a long-term planning horizon of up to 50 years	●								●	●					●						F, G, H, I, J	3

Appendix C

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: 🔴 Need ● Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
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Reduced Imported Water Availability and Increased Cost																						
Ensure that there is a reliable local water supply to replace imported water during shut down of imported water delivery infrastructure for maintenance and longer-term emergency outages	🔴	●	●	🔴			●	🔴	●	●					🔴	🔴	🔴	🔴			B, C, G	1, 3
Identify and utilize new sources of supplemental water	🔴	●		●			🔴	●	●	●					●	●	●				A, B	1, 3
Construct inter-basin and intra-basin connections for the benefit of regional water supply and conjunctive use	●	●		🔴			●	●	🔴			🔴			●	🔴	●	🔴			C, G	1, 3
Understand how imported water reliability from Metropolitan Water District will be affected with and without the California Water Fix	●							●	🔴						●	●	●				-	1, 3
Develop management strategies that ensure parties will meet future desalter replenishment obligation and have the money to fund it	●	●		🔴			🔴		●								●			🔴	H, I, J	3
Increase water-supply reliability at the lowest possible cost	🔴			●			●	●				🔴		🔴	●		●				A, B, D, J	3
Need a better understanding of the water management plans of the Parties to be able to better plan for imported water needs and to assure reliability of Metropolitan Water District water supply	●			●					🔴			🔴			●	●	●	🔴			A	3
Analyze water management scenarios that plan for unexpected challenges and emergencies	●							●	🔴	●					●	●	●				E, G	3
Ensure that sufficient supplemental water supplies will be available to meet future replenishment requirements							●		🔴	●		🔴		?	●					🔴	A	1, 3
Despite the best efforts of the Parties to decrease reliance on imported water, the cost of the total water supply continues to increase	●																				-	3
Use more recycled water for replenishment obligation	●			🔴			🔴		🔴								●				A, D, E, F	3
Continue to build collaborative programs between the Metropolitan Water District and Chino Basin	🔴						●	●	●						●		●	●			B, I	3

Appendix C

Table 2b
Draft Activities for Consideration in the 2020 OBMP Update,
Derived from the Activities Defined by Stakeholders in Listening Session #2**

ID	Activity
A	Construct new recharge facilities to increase the capacity for stormwater and recycled water recharge and provide recharge capacity in areas of the basin necessary to ensure long-term balance of recharge and discharge.
B	Develop and implement storage-and-recovery programs to increase water supply reliability, increase Safe Yield, and improve water quality.
C	Develop and implement regional conveyance and treatment programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence.
D	Maximize the reuse of recycled water produced by IEUA and others.
E	Develop a water-quality management plan to address current and future water-quality issues and ensure the protection of beneficial uses, now and into the future.
F	Develop strategic regulatory-compliance solutions that achieve multiple benefits in managing water quality.
G	Optimize the use of all sources of water supply by developing the ability to move water across the basin and between stakeholders.
H	Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements.
I	Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement.
J	Continue to identify and pursue low-interest loans and grants to support the implementation of the OBMP Update. An example of such an effort is the Chino Basin Project.

***Note: See Table 2 of Listening Session #2 Memo*

Appendix C

Table 3
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
			Reductions in Chino Basin Safe Yield	Inability to Pump Groundwater with Existing Infrastructure	Increased Cost of Groundwater Use	Chino Basin Water Quality Degradation	Recycled Water Quality Degradation	Increased Cost of Basin Plan Compliance	Reduced Recycled Water Availability and Increased Cost	Reduced Imported Water Availability and Increased Cost
Goal 1 - Enhance Basin Water Supplies										
1a • Not all of the stormwater runoff available to the Chino Basin is diverted and recharged. Failure to divert and recharge stormwater is a permanently lost opportunity. • The existing methodology to select recharge projects for implementation is based on the cost of imported water. There are currently no known projects with a unit cost lower than the cost of imported water, hindering expansion of stormwater capture and recharge • Pumping capacity in some areas of the basin is limited due to low groundwater levels and land subsidence.	A Construct new facilities and improve existing facilities to increase the capacity to store and recharge surface water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge	• Increases recharge of high-quality stormwater that will: • protect/enhance the Safe Yield, • improve water quality, • reduce dependence on imported water, • increase pumping capacity in areas of low groundwater levels and areas of subsidence concern, and • provide new supply of blending water to support the recycled-water recharge program. • Provides additional supplemental-water recharge capacity for replenishment and implementation of storage and recovery programs. • Provides additional surface water storage capacity.	✓	✓	✓	✓	✓	✓		✓
1b • There is a surplus of recycled water available to the Chino Basin parties that is not being put to beneficial use, which is a loss of a low-cost, local water supply. • Existing infrastructure limits the reuse and recharge of recycled water in the Chino Basin. • Existing requirements to discharge recycled water to the Santa Ana River limit the amount of water available for reuse and recharge	D Maximize the reuse of recycled water produced by IEUA and others	• Results in a new, consistent volume of in-lieu and/or wet water recharge that will: • protect/enhance the Safe Yield, • reduce dependence on imported water, • improve water-supply reliability, especially during dry periods, and • increase pumping capacity in areas of low groundwater levels and areas of subsidence concern.	✓	✓					✓	✓

Appendix C

Table 3
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
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Goal 2 - Protect and Enhance Water Quality										
2a • Areas of the basin are contaminated with VOCs and constituents of emerging constituents (CECs). • Water-quality regulations are evolving and becoming more restrictive, which limits the beneficial uses of groundwater. • Groundwater treatment may be necessary to meet beneficial uses, but can be expensive to build and operate. • The basin is hydrologically closed, which causes accumulation and concentration of salts, nutrients, and other contaminants. • Some stored water in the Chino Basin cannot be used due to water quality and insufficient treatment capacity	E Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses F Develop strategic regulatory-compliance solutions that achieve multiple benefits in managing water quality	• Proactively addresses new and near-future regulations. • Enables the parties to make informed decisions on infrastructure improvements for water-quality management. • Removes groundwater contaminants from the Chino Basin and thereby improves groundwater quality. • Enables the parties to produce or leverage their water rights that may be constrained by water quality. • Ensures that groundwater is pumped and thereby protects/enhances the Safe Yield.	✓	✓	✓	✓				✓
2b • Water-quality regulations are evolving and generally becoming more stringent, which could limit the reuse and recharge of recycled water.	K Develop management strategy within the Salt and Nutrient Management Plan to ensure ability to comply with dilution requirements for recycled water recharge	• Enables the continued and expanded recharge of recycled water, which will: • protect water quality, • improve water-supply reliability, especially during dry periods, and • protect/enhance the Safe Yield.	✓			✓	✓	✓		✓

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Goal 3 - Enhance Management of the Basin										
3a • Existing infrastructure (pumping and treatment capacity and conveyance) is insufficient to conduct puts and takes under proposed storage programs. • There is unused storage space in the Basin the use of which is constrained by the storage limits defined in existing CEQA documentation. • Watermaster's current storage management plan is not optimized to protect/enhance basin yield, improve water quality, avoid new land subsidence, ensure balance of recharge and discharge, maintain hydraulic control, etc.	B Develop, implement, and optimize storage-and-recovery programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality.	• Storage programs that protect/enhance basin yield, improve water quality, avoid new land subsidence, ensure balance of recharge and discharge, maintain hydraulic control, etc. • Leverages unused storage space in the Basin. • Reduces reliance on imported water, especially during dry periods. • Potentially provides outside funding sources to implement the OBMP Update. • Improves water quality through the recharge of high quality water.	✓	✓	✓	✓				✓

Appendix C

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3b • Land subsidence in northwest MZ1 may limit the ability for parties to pump their respective rights in this area. • Poor water quality and increasingly restricting water quality regulations limits the ability for some parties to pump their respective rights.	C Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence. G Optimize the use of all sources of water supply by improving the ability to move water across the basin and amongst stakeholders, prioritizing the use of existing infrastructure.	• Enables producers in MZ1 to obtain water through regional conveyance, which supports management of groundwater levels to reduce the potential for subsidence and ground fissuring. • Enables the parties to increase production in areas currently constrained by poor water quality. • Removes groundwater contaminants from the Chino Basin and thereby improves water quality. • Protects/enhances the Safe Yield. • Maximizes the use of existing infrastructure, which will minimize costs. • Provides infrastructure that can also be used to implement storage and recovery programs.	✓	✓	✓	✓				✓
3d • Watermaster needs information to comply with regulations and its obligations under its agreements and Court orders, yet financial resources to collect this information are limited.	L Perform the appropriate amount of monitoring and reporting required for basin management and regulatory compliance	• Ensures full compliance with regulatory requirements. • Ensures full support of basin management initiatives. • Enables parties to monitor the performance of the OBMP Update.	✓	✓	✓	✓	✓	✓	✓	✓

Appendix C

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Goal 4 - Equitably Finance the OBMP										
4a • The distribution of benefits associated with the OBMP Update is not defined. • Funding needed for the OBMP implementation activities of the Watermaster is not projected beyond the current year budget, which limits parties ability to plan required funding for the future. • There is currently no formal process to evaluate and adapt the OBMP implementation plan, schedule and cost.	H Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements.	• Provides transparency as to the benefits of the OBMP Update activities. • Provides information needed to plan financial resources. • Improves the likelihood that the OBMP will be implemented.			✓					
4b • Limited financial resources constraint the implementation of the OBMP.	I Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement	• Lowers the cost of OBMP implementation. • Improves the likelihood that the OBMP will be implemented.			✓					
	J Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update. An example of such an effort is the Chino Basin Project.				✓					

Appendix B

Response to Comments

Scoping Report Comments[1]

City of Chino – Comments on Scoping Report Part 1 Provided by Dave Crosley

1. ***Page 12, last paragraph, 1st sentence ends with a reference to footnote "3" which seems misplaced.***

   The reference to footnote 3 has been removed.

2. ***Page 31, Activity D. The described scope pertaining to Activity D could be reshaped to reflect a reduced level of effort by Watermaster.***

   The objectives of Activity D are to maximize recycled water reuse. As described in the Scoping Report, the IEUA would be the appropriate entity to lead the implementation of Activity D on behalf of all parties in the IEUA, TVMWD, and WMWD service areas. The draft report suggested that part of Watermaster's role would be to convene and lead a committee that could guide the process, however such a role is not required to implement the activity. Watermaster's role could be to team with the IEUA or other coordinating agency in the implementation of Activity D to ensuring its implementation is consistent with the Judgment, the Peace Agreements and other agreements, the maximum benefit SNMP, and the Watermaster Rules and Regulations. Specifically, Watermaster should ensure that the process to maximize recycled water is integrated with the goals of the OBMP and that the process includes projects to maximize the use of recycled water for replenishment purposes (Judgment ¶ 49(a)). Accordingly, the text has been modified to reflect this revised role. Note that this is consistent with the 2000 OBMP Implementation Plan for Program Element 5 - *Develop and Implement Regional Supplemental Water Program* in the 2000 OBMP, for which IEUA was the agency responsible for implementation of expanded recycled water reuse. The revised text can be found on page 36 of the final report.

3. ***Page 25, last paragraph, 3rd sentence states "[T]he recent decline in the direct use of recycled water is a result of reduced water use due to drought and state-mandated water conservation programs that required significant reductions in water use." What data supports this statement? The last sentence of the preceding paragraph describes conservation-related causation of reduced recycled water availability, but just because there is a reduced supply it does not necessarily follow that conservation caused less recycled water demand. We suggest clarification.***

   The text has been updated per discussions with the IEUA. Per the IEUA, the recent decline is due to the mindful reduction in use by the City of Chino to accommodate changes in IEUA policy related to the use of recycled water base entitlements and conversions of land from agricultural to urban uses. The new text appears on page 31, fourth full paragraph, third sentence.

4. ***Page 26, 2nd paragraph, 1st sentence states "…the IEUA is maximizing the reuse of recycled water given the constraint of meeting its obligations to discharge a minimum of 17,000 AFY to***

[1] Comments and questions about the OBMP process were addressed in a separate document that is available on Watermaster's website at: http://www.cbwm.org/docs/OBMP%20Update/20191017%20Watermaster%20Responses%20to%20comments%20on%20Process.pdf.

comply with the Santa Ana River Judgment and associated agreements with WMWD." This statement is misleading, as the IEUA discharge of recycled water to the river has generally exceeded the minimum 17,000 AFY flow requirement instead of directing excess supplies of recycled water to satisfy significant potential direct reuse demands throughout the IEUA service area. The 4th paragraph appearing on page 27 describes some of the circumstances that contribute to the challenge of maximizing reuse.

The text of this paragraph has been updated to more clearly articulate the challenge that the availability of recycled water poses for IEUA in meeting its obligations of the Santa Ana River Judgment, specifically that the increasing demand for recycled water for reuse will constrain the IEUA's ability to continue to use recycled water to meet its discharge obligations. The revised text is on page 34, first full paragraph of the final Scoping Report.

5. ***Page 28, 3rd full paragraph under the subheading Santa Ana River Judgment states "… discharge requirements of the Judgment preclude the IEUA from reusing 100 percent of its recycled water supply." This is an oversimplified and misleading characterization of the Judgment requirement. The subject Judgment (OC Judgment) describes an obligation of entities located upstream of Prado to provide for a minimum flow of water to downstream of Prado. IEUA and WMWD, as upstream entities, have a joint obligation. IEUA has utilized unclaimed recycled water produced via the treatment of wastewater generated within the service areas of its members in order to satisfy its share of the joint IEUA/WMWD obligation. However, the minimum flow need not necessarily be supplied from recycled water generated from wastewater treatment, and the agencies within whose jurisdictions the wastewater is generated possess a contractual entitlement to the recycled water. If those agencies claim their entitlement then IEUA, as a regional (Chino Basin) water supply agency (not a wastewater treatment service provider), still has a joint (along with WMWD) obligation to provide a minimum flow downstream of Prado. The OC Judgment does not preclude the recycled water entitlement holders from using 100 percent of the recycled water.***

The text of this paragraph has been updated to eliminate the statement that "… discharge requirements of the Judgment preclude the IEUA from reusing 100 percent of its recycled water supply." It was also modified to more clearly articulate the challenge that the availability of recycled water poses for IEUA in meetings its obligations of the Santa Ana River Judgment. The revised text is on page 34, first full paragraph of the final Scoping Report.

6. ***Page 30, Task 7 paragraph, 2nd sentence which states "ensure that Watermaster is maximizing the reuse of recycled water…" should probably be refined to indicate that Watermaster is enabling/accommodating/facilitating the reuse of recycled water.***

The text has been updated to reflect a reduction of Watermaster's role, as discussed in the response to comment number 2 above.

City of Ontario – Comments Provided by Katie Gienger

7. ***Activity B – Storage and Recovery Programs. The tasks of this activity are a duplication of efforts already underway by the Chino Basin Water Bank (CBWB). It is unclear what Watermaster will do above and beyond the activities already performed by the CBWB. The focus of this activity in***

the OBMP should be Watermaster's role in administering the Judgment, such as evaluating proposed Storage & Recovery programs for MPI.

The purpose of the Scoping Report is to provide the parties with an understanding of the work that would need to be performed to accomplish the desired outcomes of each of the 2020 OBMP Update activities. To the extent that the scopes of work described herein are already being partly or completely performed by Watermaster or others, the Scoping Report acknowledges such. The next steps in the process to prepare the 2020 OBMP Update will focus on the review and revision of the activities scoped herein and the integration of the ongoing activities with the existing OBMP. The recommended 2020 OBMP Implementation Plan, inclusive of ongoing and new activities will be documented in a subsequent report, *2020 Optimum Basin Management Program Update Report*, and will form the foundation for the parties to develop a final implementation plan and agreements to implement the OBMP Update. This purpose has been clarified in the report introduction on page 6, last paragraph.

Activity B is designed to obtain agreement on the specific objectives and desired benefits for Storage and Recovery (S&R) Programs, to identify "optimized" S&R programs that achieve the benefits while causing no material physical injury, and to help guide the development of future applications for S&R Programs. These outcomes are required for Watermaster to implement the Physical Solution of the Judgment and will support Watermaster approval of S&R applications. As such, Activity B is deemed necessary by Watermaster.

The second paragraph of the introduction to the Activity B scope of work (Page 27) acknowledges that prior work has been performed to describe and/or evaluate S&R programs for the Storage Framework Investigation, the Chino Basin Water Bank, and the Chino Basin Program. At such time that Activity B will be performed, the scope of work to will be updated to leverage this work.

8. ***Activity D – Maximize Reuse of Recycled Water. The tasks of this activity are a duplication of the IEUA recycled water efforts as described in our first general comment. It is unclear what Watermaster will do above and beyond the activities already performed by IEUA. For this reason, we recommend the parties discuss the best approach in scoping this activity to avoid a duplication of effort.***

   As to the first part of our comment on duplication, the introduction of Activity D scope of work acknowledges that the IEUA is performing a significant amount of work to evaluate opportunities to acquire surplus recycled water supplies for recharge as part of the CBP, and recommends that this work be leveraged to simplify the scope of Activity D. The description of IEUA's work has been expanded to reflect its various other efforts to analyze recycled water supply and demands.

   In the Scoping Report, the scope of work and costs to implement each OBMP Update activity were designed to achieve the desired outcomes defined by the stakeholders assuming that the activities could be implemented independently and that the planning efforts of others are not leveraged. The purpose of this assumption in the Scoping Report is to describe in detail the precise work required to achieve the outcomes. Additionally, the scopes of work and costs described in the Scoping Work leverage existing work being performed by Watermaster, but not by others. These assumptions are described on pages 14 and 15 of the Scoping Report under "Assumptions Applied in Defining the Scope of Work, Schedule, and Cost of the OBMP activities." There will be opportunities to leverage work done by other agencies to avoid duplication of effort and to reduce the costs.

As to the second part of your comment on Watermaster's role, please see the response to Comment 2 above. Additionally, it is important to note that not all aspects of the OBMP require direct involvement by the Watermaster. For example, in the 2000 OBMP Implementation Plan, there are several implementation actions in Program Elements 3 and 5 that were the responsibility of the Chino Desalter Authority or the IEUA.

9. ***Activity D – Maximize Reuse of Recycled Water, Page 28 – Santa Ana River Judgment – The TM states "The discharge requirements of the Judgment preclude the IEUA from reusing 100 percent of its recycled water supply." This statement is not accurate and should be revised to reflect that the SAR obligation is not required to be met with recycled water. The Santa Ana River Judgment states on page 9 "(1) At Prado. Base Flow shall: (i) include any water caused to be delivered by CBMWD or WMWD directly to OCWD, pursuant to its direction and control and not measured at the gages at Prado;" The Judgment anticipated using recycled water, but also allows for supplemental water to meet the SAR obligation, which was undertaken by Chino Basin Municipal Water District (now IEUA) on behalf of the Chino Basin producers***

   Please refer to the responses to Comments 4 and 5 above.

10. ***Activity EF – Each water purveyor tracks and monitors current and emerging constituents on its own behalf, including engaging in formal and informal discussions with other water purveyors facing similar challenges. Watermaster has historically provided an arena for data sharing and compilation as well as ideas on best practices which has been a valuable resource. Agencies are already required to perform the necessary monitoring for compliance of water systems permits; therefore a Groundwater Quality Management Plan (and the proposed monitoring program) may be a redundant effort. It is not clear what regulatory compliance Watermaster is subject to aside from its involvement in the Salt & Nutrient Management Plan related to hydraulic control.***

    The Judgment provides Watermaster the discretion to develop an OBMP, including both water quantity and water quality considerations. A groundwater quality management plan like the one scoped in the Scoping Report provides the parties with the comprehensive data and information, including best practices for monitoring, that are needed to understand and manage the future water quality challenges that could impact the parties' ability to fully utilize their pumping rights.

    Currently, water purveyors are not required by the State to perform monitoring of contaminants with State notification levels or other emerging contaminants of concern; the monitoring of these contaminants is voluntary until there is an established drinking water regulation or a mandated monitoring order. In the past monitoring of emerging contaminants in the Chino Basin was not prevalent, and often did not use the laboratory method detection limits low enough to understand the occurrence in relation to State notification levels, and the occurrence was not characterized well enough to prepare for compliance with potential drinking water regulations. As described in the Scoping Report, a recent example of this is 1,2,3-trichloropropane, which became regulated in late 2017. A groundwater quality management plan and associated monitoring program would not be a redundant effort as it will include strategies to investigate and analyze emerging contaminates in the Basin in a comprehensive and consistent way and that would leverage all existing groundwater monitoring performed by Watermaster and others. A groundwater quality management plan will ensure there is consistent and adequate monitoring of emerging contaminants as they are being identified to plan for potential water quality regulations, and if needed identify the most efficient means to address regional water-quality challenges.

As to concerns of duplication, please also refer to responses to Comments 7 and 8 above.

Inland Empire Utilities Agency – Comments on Scoping Report Part 1 Provided by Sylvie Lee and Joshua Aguilar

11. ***Page 1, regarding the title of Activity D, suggested edit to add direct use in the title, or does it not take into account direct use of recycled water?***

    The maximization of recycled water reuse in Activity D is meant to encompass all forms of recycled water reuse including: direct non-potable reuse (landscape irrigation or industrial uses), groundwater recharge or injection (indirect potable reuse), and direct potable reuse. See page 30 for description of Activity D's objective.

12. ***Page 2, regarding the title of Activity HIJ, should it reference subsequent implementation plan instead of the OBMP Update?***

    The term OBMP Update is not exclusive of the implementation plan or the agreements to implement it.

13. ***Page 14, in the summary of Activity A, third bullet. Can we say something to the effect of minimizing losses or is that covered under pumping sustainability?***

    The text of the bullet was expanded to include reference to the need to maintain hydraulic control. The revised text is on page 20, third bullet of the final Scoping Report.

14. ***Page 19, fourth bullet. External funding should be listed [as something that the Storage and Recovery Program Master Plan will enable the parties to do] as this has been very successful for the region in reducing the cost of successful programs (GWR, Desalter, RW, etc.).***

    Concur. As, described under the "Summary" section for Activity B, the Storage and Recovery Master Plan can provide support in the application for external funding (grants and low-interest loans). The term "external funding" has been added to the list of things that can offset Watermaster assessments and reduce OBMP assessments. The revised text is on page 24, first bullet of the final Scoping Report.

15. ***Page 21, first paragraph. Is this [Storage and Recovery Program Master Plan] a new one that needs to be created or is it the Storage Management Plan? What is the purpose and shelf life in addition to the SMP?***

    The 2020 Storage Management Plan is a set of rules by which to manage all storage in the Chino Basin, including the parties' local storage accounts and S&R Programs—it does not define how S&R programs should be designed to achieve the benefits desired by the parties. Activity B is designed to obtain agreement on the specific objectives and desired benefits for S&R Programs, to identify "optimized" S&R programs that achieve the benefits, to help guide the development of future applications for S&R Programs, and to help apply for grants and low-interest loans to implement S&R Programs. This work will be documented as the Storage and Recovery Master Plan, which may need to be updated to be consistent with periodic updates to the Storage Management Plan.

16. ***Page 21, first paragraph. Is that our goal, "to reference a common set of objectives for storage and recovery programs and align the objectives with requirements in grant applications and other funding opportunities"? Seems like "Master Plan" should be broader than individual S&R requirements.***

    Please refer to the response to Comment 15.

17. ***Page 38, under "Scope of Work for Activity EF." Are there recommendations for the "centralized" treatment options as suggested in the "needs"?***

    As described in the "Scope of Work for Activity EF" section, Task 5 of the scope of work for Activity EF is to identify groundwater quality treatment projects using existing and new facilities, to screen them using agreed upon criteria developed in Task 4, and to select a final list of projects for detailed evaluation in Task 6. The groundwater quality treatment projects can range from individual well-head treatment to regional treatment plants. Under Task 6, cost opinions for these projects will be developed and will include a comparison of the cost to implement treatment projects by individual municipal agencies to those of collaborative projects.

San Antonio Water Company – Comments Provided by Brian Lee

Monte Vista Water District – Comments Provided by Mark Kinsey (reiterative of SAWCo comments)

18. ***General Note of Duplication. A majority of the proposed activities duplicate existing planning efforts, as outlined in the below chart and further discussed per activity below:***

Proposed Activity	**Existing Planning Efforts**
Activity A	Recharge Master Plan; Recharge Investigations & Projects Committee
Activity B	Chino Basin Water Bank; Inland Empire Utilities Agency
Activity D	Inland Empire Utilities Agency and Contracting/Member Agencies; Jurupa Community Services District; City of Pomona
Activity E/F	Local Agencies; Water Quality Committee (existing authority to reconvene)
Activity K	Maximum Benefit Salt and Nutrient Management Plan
Activity C/G	Integrated Resource Plan

Please refer to the responses to Comments 7, 8, and 10. Please also note that in the next step of the 2020 OBMP Update process the OBMP Update activities described in the Scoping Report will be integrated with the 2000 OBMP Program Elements. If the implementation actions that arise from the OBMP Update activities are already encompassed by the existing actions in the 2000

OBMP IP, then no new implementation actions will be included in the 2020 OBMP Update. See responses to comments 19 through 24 for more detail about specific activities.

19. ***Activity A. We disagree with this activity and its implementation schedule because it duplicates an existing and active planning effort, the Recharge Master Plan (RMP). The RMP has been developed and updated consistent with the Peace Agreements. Watermaster's Recharge Investigations and Projects Committee (RIPCom)- open to all parties- meets quarterly to review the ongoing implementation of the latest RMP. The process of updating the RMP includes an exhaustive review of opportunities to improve Basin recharge, and each RIP Com meeting agenda includes a standing item for discussion and consideration of new recharge projects.***

    Watermaster staff has verbally confirmed with certain parties that there is no intent to duplicate the RMP process, and that this activity proposes instead to continue the existing process. However, the current draft of the technical memorandum lacks clarity on how newly proposed activities enhance existing activities. Overall, we believe there is no need to create a new process (with associated costs) that duplicates an existing, successfully implemented ongoing process.

    As described in the report on pages 16 and 17, based on the alignment of the objectives of Activity A with those of the RMPU, Activity A can be accomplished through the existing RMPU process. The scope of work summarized in the report is for developing the 2023 RMPU, not in addition to it. Please also refer to responses to Comments 7, 8, 10, and 18 regarding duplication of efforts.

20. ***Activity B. We disagree with this activity and its implementation schedule because it duplicates existing and active planning efforts to develop Storage and Recovery Programs. The Peace Agreement provides criteria for Watermaster to facilitate and regulate the development of Storage and Recovery Programs that "provide broad mutual benefits" to the Judgment parties (¶5.2(c)). We are aware of two entities, the Chino Basin Water Bank and the Inland Empire Utilities Agency (IEUA), that are actively engaged with Watermaster and their partners in developing Storage and Recovery Program proposals. We believe that these and other potential applicants should cover the cost of demonstrating how their proposed Storage and Recovery Programs may provide broad mutual benefits to the parties. Additionally, Watermaster's role in facilitating Storage and Recovery Programs necessitates a healthy division between the evaluating and approving entity (Watermaster) and the Program applicant(s).***

    The Peace Agreement assigns Watermaster as the evaluating and approving entity for S&R Programs. As such, Watermaster must have criteria upon which to define and evaluate "broad mutual benefits" of S&R Programs. Activity B includes a process for the parties and Watermaster to build and achieve consensus on the definition(s) of broad mutual benefits and the objectives of S&R Programs. These definitions are key to Watermaster's ability to evaluate and rank S&R Programs when presented with applications. Activity B also helps guide the parties (or others) in the development of S&R Programs, so that the application and evaluation process is most efficient.

    As to duplication of efforts, the intention of Activity B is to leverage past and current work to the maximum extent. The description in Activity B states that: "Prior work has been performed for the Storage Framework Investigation, the Chino Basin Water Bank, and the Chino Basin Program.

These past efforts can be leveraged…" in the execution of Activity B. See also the responses to Comments 7, 10, and 18.

21. ***Activity D. We disagree with this activity and its implementation schedule because it duplicates existing and active planning efforts by IEUA, IEUA member agencies, Jurupa Community Service District, and the City of Pomona. These planning efforts seek to address the full and beneficial utilization of recycled water supplies available in the Chino Basin. We believe parallel planning processes are neither advisable nor cost-effective.***

    Please refer to the responses to Comments 8 and 18.

22. ***Activity E/F. We disagree with this activity and its implementation schedule because it proposes activities that are either outside of Watermaster's authority or already authorized under the existing OBMP Implementation Plan. Water quality compliance is the responsibility of water providers under their respective operating permits. Watermaster' s role under the OBMP Implementation Plan is to monitor water quality to ensure that parties' use of the basin meet Basin Plan objectives and do not cause material physical injury. The existing OBMP Implementation Plan already directs Watermaster to form a "water quality committee" to oversee and provide input on these activities; we see no reason why Watermaster cannot reconvene such a committee under its existing authority.***

    Please refer to the responses to Comments 10 and 18.

23. ***Activity K. We disagree with this activity and its implementation schedule because the Maximum Benefit Salt and Nutrient Management Plan already contains dilution compliance requirements that Basin parties must meet in order to continue recharging recycled water. As stated in the sixth listening session, Watermaster and IEUA are already implementing this activity through their work in developing a Basin Plan amendment proposal, and that the activity simply proposes to "do what we are doing."***

    Activity K will ensure that the evaluation of a future compliance challenge with the recycled water dilution requirements will be done on a routine basis hereafter and not just during the current investigation to support the Basin Plan amendment proposal – such a routine assessment will also be required by the Regional Board, as described in the discussion of Activity K. Please also refer to response to Comments 7, 8, 10, 18, and 21.

24. ***Activity C/G. We disagree with this activity and its implementation schedule because it duplicates IEUA's ongoing integrated resource planning process. All parties and Watermaster staff are participating in this planning process, which is focused on identifying projects to improve the reliability and resiliency of regional water supplies.***

    Please refer to the response Comments 7, 8, 10, and 18.

25. ***Activity L. This is a proposed review of Watermaster's current monitoring and reporting processes to ensure they are as efficient and cost-effective as possible. We consider this review an essential administrative best practice and fully support its immediate implementation and incorporation into Watermaster's Rules and Regulations and other procedural documents, as appropriate.***

Comment noted. Watermaster proposes that it be implemented in Fiscal Year 2020/21 and will present if for consideration in the budget at the appropriate time.

26. ***Activity H/I/J. The Chino Basin Judgment establishes the following requirement for basin management, inclusive of the OBMP: "In the process of implementing the physical solution for Chino Basin, Watermaster shall consider the following parameters: ... (c) Economic Considerations. - Financial feasibility, economic impact and the cost and optimum utilization of the Basin's resources and the physical facilities of the parties are objectives and concerns in equal importance to water quantity and quality parameters" (Exhibit "I" ¶(c), emphasis in original).***

    Here and elsewhere in the Court-approved management agreements, Watermaster is directed to consider economics - inclusive of equitable distribution of costs and benefits, reductions in costs, and funding opportunities - for all basin management activities tied to implementation of the Physical Solution. Therefore, we respectfully request that Watermaster fulfill this requirement to incorporate economic considerations into any agreed-upon activity in this and any other basin management process.

    Comment noted. As stated on pages 80 and 81 regarding economic considerations:

    "The objectives for Activities H, I, and J can be efficiently met by incorporating tasks within the other activities to characterize the benefits and costs of the projects produced by the activities."

    and

    "The steps to achieve an equitable allocation of benefits and costs should be addressed by in the agreement that will be developed by the parties to implement the 2020 OBMP Update. The 2020 OBMP implementation agreement could be designed to ensure that the desired extent of cost/benefit assessments are performed to support equitable cost allocations in the implementation of activity scopes of work, to anticipate and accommodate the development of project implementation agreements that define the project-specific cost/benefit allocation, and to periodically update cost projections for implementation of the 2020 OBMP Update activities and associated projects to support planning of financial resources."

Appendix D

Stakeholder Participation Log

Appendix D

Stakeholder Attendance at the OBMPU Listening Sessions

Name	Agency/Stakeholder	LS1	LS2	LS3	LS4	LS5	LS6	LS7	LS8
Bob Feenstra	Agricultural Pool		X	X				X	X
Jeff Pierson	Agricultural Pool	X	X	X				X	
Diana Frederick	Agricultural Pool - State of CA		X						
Craig Stewart	Agricultural Pool - State of CA/CIM				X				
Pete Hall	Agricultural Pool - State of CA/CIM		X	X					
John Schatz	Appropriative Pool		X		X				X
John Thornton	Arcadis (consultant to the Chino Basin Water Bank)					X	X	X	X
Brian Geye	Auto Club Speedway	X	X				X	X	X
Andrew Lazenby	Brown and Caldwell (consultant to IEUA)			X					
Tom O'Neill	Chino Basin Desalter Authority		X	X					
Elizabeth Skrzat	Chino Basin Water Conservation District							X	
Kristen Wegner	Chino Basin Water Conservation District	X		X	X				
Don Galeano	Chino Basin Watermaster Board			X					
Ron Craig	Chino Hills, City of	X	X	X	X	X	X	X	X
Amanda Coker	Chino, City of	X	X	X		X		X	X
Dave Crosley	Chino, City of	X	X			X	X		X
Eunice Ulloa	Chino, City of	X		X	X	X		X	
Bob Page	County of San Bernardino		X						
Eduardo Espinoza	Cucamonga Valley Water District	X	X	X	X	X		X	X
John Bosler	Cucamonga Valley Water District						X		
Praseetha Krishnan	Cucamonga Valley Water District	X	X			X	X	X	
Tracy Egoscue	EIG (representing the Agricultural Pool)	X	X	X		X	X	X	X
Shawnda Grady	Ellison, Schneider & Harris (representing JCSD)		X						
Eric Tarango	Fontana Union Water Company	X		X				X	
Josh Swift	Fontana Union Water Company				X	X		X	
Cris Fealy	Fontana Water Company	X		X	X	X	X		
Roger Putty	GEI (consultant to IEUA)				X				
Chris Berch	Inland Empire Utilities Agency	X	X	X	X				
Christiana Daisy	Inland Empire Utilities Agency							X	
Joshua Aguilar	Inland Empire Utilities Agency		X		X	X		X	X
Kirby Brill	Inland Empire Utilities Agency	X							
Liz Hurst	Inland Empire Utilities Agency			X	X				
Liza Muñoz	Inland Empire Utilities Agency					X	X	X	
Sylvie Lee	Inland Empire Utilities Agency	X	X	X	X		X	X	X
Abhi Singh	Intera (consultant to IEUA)		X						
Betty Anderson	Jurupa Community Services District				X				
Chris Berch	Jurupa Community Services District					X	X	X	X
Eldon Horst	Jurupa Community Services District			X	X				
Steven Popelar	Jurupa Community Services District		X						
Ed Means	MC (consultant to Chino Water Bank)					X			
Brandon Goshi	Metropolitan Water District	X		X	X			X	X
Justin Scott-Coe	Monte Vista Water District					X	X	X	
Van Jew	Monte Vista Water District		X			X			

Appendix D

Stakeholder Attendance at the OBMPU Listening Sessions

Name	Agency/Stakeholder	LS1	LS2	LS3	LS4	LS5	LS6	LS7	LS8
Bob Bowcock	Non-Agricultural Pool	X	X		X				
Wendy Sanders	NRG/ERM	X							
Courtney Jones	Ontario, City of	X	X	X	X	X			
Katie Gienger	Ontario, City of			X	X	X	X	X	X
Scott Burton	Ontario, City of		X						
Marsha Westropp	Orange County Water District	X					X		
Chris Diggs	Pomona, City of	X	X		X	X	X	X	X
Darron Poulsen	Pomona, City of	X	X			X	X	X	
Raul Garibay	Pomona, City of	X	X	X					
Brian Lee	San Antonio Water Company	X				X			
Teri Layton	San Antonio Water Company	X			X	X			X
James McKenzie	San Bernardino County Flood Control District				X	X		X	
Jorge Vela	San Bernardino County Flood Control District					X			
Marty Zvirbulis	San Gabriel Valley Water Company							X	
Tom Harder	TH&Co (representing the Appropriative Pool)	X		X	X		X	X	X
John Mendoza	Three Valleys Municipal Water District	X	X	X		X	X		X
Matt Litchfield	Three Valleys Municipal Water District		X	X		X			
Tim Kellett	Three Valleys Municipal Water District					X		X	X
Harrison Nguyen	Upland, City of	X							
Rosemary Hoerning	Upland, City of	X	X	X	X				
Steve Ledbetter	Upland, City of							X	
Steve Nix	Upland, City of					X	X		
Nadia Loukeh	West Valley Water District			X					
Jason Pivovaroff	Western Municipal Water District				X	X			X
Ryan Shaw	Western Municipal Water District	X	X	X			X	X	
Rick Rees	Wood (representing State of CA)	X	X	X		X	X	X	X
Individual Count		31	32	29	25	30	21	30	21
Stakeholder Count		19	17	19	18	17	17	21	16

Appendix E

2020 Storage Management Plan

Appendix E

2020 Storage Management Plan Final Report

December 11, 2019

Prepared for:

Prepared by:

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Acronyms, Abbreviations, and Initialisms

af	acre-feet
afy	acre-feet per year
DYYP	Dry Year Yield Program
IEUA	Inland Empire Utilities Agency
MPI	Material Physical Injury
MZ1	Management Zone 1
MZ2	Management Zone 2
MZ3	Management Zone 3
OBMP	Optimum Basin Management Program
OBMPU	Optimum Basin Management Program Update
SFI	Storage Framework Investigation
SMP	Storage Management Plan

Section 1 – Background

The objective of this report is to describe the 2020 Storage Management Plan (SMP).[1] The basis of the 2020 SMP was described in the *Final 2020 Storage Management Plan White Paper*,[2] which has been incorporated into this document as Appendix A. The Watermaster stakeholders reviewed and commented on the draft White Paper and participated in two workshops that occurred in June and July 2019. The final technical requirements of the 2020 SMP were developed in part from the work conducted in the 2018 *Storage Framework Investigation*[3] (SFI), the White Paper, and discussions with the Watermaster stakeholders. The draft versions 1 and 2 of the 2020 SMP were distributed to the Watermaster stakeholders on September 6, 2019 and October 24, 2019, respectively. The Watermaster stakeholders provided comments on these drafts and the complete set of comments and Watermaster staff responses are included in Appendices B1 and B2. Some of the comments resulted in updates to the to the 2020 SMP and they are included herein.

Groundwater pumping rights in the Chino Basin were adjudicated in the 1970s and settled in the 1978 stipulated agreement (Judgment). The Judgment[4] established a Watermaster to administer the decree under the court's continuing jurisdiction and empowered it to manage and control available storage capacity and to enter into agreements for the storage of water. As a prerequisite to implementing the Optimum Basin Management Program (OBMP) the Parties[5] executed the Peace Agreement, providing direction and guidance to Watermaster on how storage should be prioritized and managed. The OBMP addresses the management of groundwater pumping, recharge, storage and recovery, and the transfer of water. The prevailing standard for all operations is the avoidance of "Material Physical Injury" (MPI)[6,7] under Court-Approved Management Agreements executed contemporaneously.

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1 The abbreviation "SMP" means Storage Management Plan. When referring specifically to the 2020 Storage Management Plan the year "2020" precedes SMP (i.e. 2020 SMP).

2 Wildermuth Environmental, Inc. (2019). *Final 2020 Storage Management Program White Paper*. This report can be found here: https://cbwm.syncedtool.com/shares/folder/e83081106c3072/?folder_id=1847

3 Wildermuth Environmental, Inc. (2018). *Storage Framework Investigation, Final Report*. This report can be found here: https://cbwm.syncedtool.com/shares/folder/e83081106c3072/?folder_id=1429

4 Original Judgment in Chino Basin Municipal Water District vs. City of Chino, et al., signed by Judge Howard B. Weiner, Case No. 164327. File transferred August 1989, by order of the Court, and assigned new case number RCV51010. The Restated Judgment can be found here: https://cbwm.syncedtool.com/shares/folder/e83081106c3072/?folder_id=247

5 The terms Party and Parties refer to a party to the Judgment, party to the Peace and or Peace II Agreement, or a party to all three.

6 Defined terms in the Court Approved Management Agreements will appear with the first letter of each word capitalized; a footnote with their definitions is included at the first use of the defined term.

7 "Material Physical Injury" means material injury that is attributable to the Recharge, Transfer, storage and recovery, management, movement or Production of water, or implementation of the OBMP, including, but not limited to, degradation of water quality, liquefaction, land subsidence, increases in pump lift (lower water levels), and adverse impacts associated with rising Groundwater. Material Physical Injury does not include "economic

Given the passage of twenty years since its approval, Watermaster has revisited the OBMP goals and objectives and plans to update the OBMP by June 2020 (hereafter, 2020 OBMPU). Updating the SMP is integral to the 2020 OBMPU. The 2020 SMP will be incorporated into the 2020 OBMPU and its implementation plan.

The term "managed storage" as used herein (and consistent with the 2018 SFI) refers to water stored by the Parties and other entities and includes Carryover,[8,9] Local Storage,[10] and Supplemental Water[11] held in storage accounts by the Parties and Storage and Recovery Programs.[12] Local Storage includes Excess Carryover[13] for the Overlying Non-Agricultural Pool Parties and Excess Carryover and Supplemental Waters for the Appropriative Pool and Overlying Non-Agricultural Pool Parties.

1.1 Storage Agreements and Transfers from Storage Accounts

Since the Judgment came into effect, Watermaster developed rules and regulations, standard storage agreements, and related forms. There are three types of storage agreements that result in five types of storage accounts: Excess Carryover, Local Supplemental-Recycled, Local Supplemental-Imported, Pre-2000 Quantified Supplemental, and Storage and Recovery. An Excess Carryover account includes a Party's unproduced rights in the Safe Yield (Safe Yield for Overlying Non-Agricultural Pool Parties and Operating Safe Yield for Appropriative Pool

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injury" that results from other than physical causes. Once fully mitigated, physical injury shall no longer be considered material. [Peace Agreement § 1.1(y).]

8 Defined terms in the Court Approved Management Agreements will appear with the first letter of each word capitalized and a footnote with their definitions is included at the first use of the defined term.

9 "Carry-Over Water" means the un-Produced water in any year that may accrue to a member of the Overlying Non-Agricultural Pool or the Appropriative Pool and that is Produced first each subsequent Fiscal Year or stored as Excess Carry-Over. (Judgment Exhibit H ¶ 12.)

10 "Local Storage" means water held in a storage account pursuant to a Local Storage Agreement between a party to the Judgment and Watermaster. Local Storage accounts may consist of: (i) a Producer's unproduced Excess Carry-Over Water or (ii) a party to the Judgment's Supplemental Water, up to a cumulative maximum of one hundred thousand (100,000) acre-feet for all Parties to the Judgment stored in the Basin on or after July 1, 2000 or (iii) that amount of Supplemental Water previously stored in the Basin on or before July 1, 2000 and quantified in accordance with the provisions and procedures set forth in Section 7.2 of these Rules and Regulations, or (iv) that amount of water which is or may be stored in the Basin pursuant to a Storage Agreement with Watermaster which exists and has not expired before July 1, 2010. [Peace Agreement § 1.1(x).]

11 "Supplemental Water" means water imported to Chino Basin from outside the Chino Basin Watershed and Recycled Water. [Judgment ¶ 4(bb) and Peace Agreement § 1.1(ww).]

12 "Storage and Recovery Program" means the use of the available storage capacity of the Basin by any person under the direction and control of Watermaster pursuant to a Court approved Groundwater Storage Agreement but excluding "Local Storage," including the right to export water for use outside the Chino Basin and typically of broad and mutual benefit to the Parties to the Judgment. [Peace Agreement §1.1(uu).]

13 "Excess Carry-Over Water" means Carry-Over Water which in aggregate quantities exceeds a party's share of Safe Yield in the case of the Non-Agricultural Pool, or the assigned share of Operating Safe Yield in the case of the Appropriative Pool, in any year.

Parties) and Basin Water acquired from other Parties. A Local Supplemental Water account includes imported and recycled water that is recharged by a Party and similar water acquired from other Parties. A Storage and Recovery account includes Supplemental Water and the Peace Agreement requires that Watermaster shall give first priority to Storage and Recovery Programs that produce a "broad and mutual benefit to the Parties to the Judgment."[14] Watermaster tracks the puts, takes, losses, and end of year storage totals for all of these storage accounts, and reports on this accounting in the annual assessment process. The losses assessed by Watermaster are based on the amount of water in managed storage (excluding Carryover) and they offset the increase in groundwater discharge to the Santa Ana River from the Chino Basin attributable to managed storage (excluding Carryover). Watermaster also assesses losses due to evaporation on the puts when water is recharged in spreading basins.

In evaluating applications for storage agreements, Watermaster must conduct an investigation to determine if the water stored and recovered under a proposed storage agreement has the potential to cause MPI to a Party or the basin. If Watermaster determines that implementation of the proposed storage agreement has the potential to cause MPI, the applicant must revise its application and demonstrate that there will be no MPI, or Watermaster must impose conditions in the storage agreement to ensure there is no MPI. Watermaster cannot approve a storage agreement that has the potential to cause MPI.

The Restated Judgment provides that the Basin's groundwater storage capacity may be utilized for the storage and conjunctive use of supplemental water only under Watermaster control and regulation and that no use of such capacity be made except pursuant to written agreement with Watermaster (Restated Judgment, ¶ 11, 12; see also Peace Agreement, § 5.2(a)). The Pooling Plans of the Overlying (Non-Agricultural) Pool (Restated Judgment Exhibit "G") and the Appropriative Pool (Restated Judgment Exhibit "H") each require agreement with Watermaster as a condition of storing Excess Carryover water within the Basin.

Consistent with ¶'s 14 and 28 of the Restated Judgment and the Chino Basin Watermaster Rules and Regulations ("Rules and Regulations"), storage of water within the Basin has been accomplished pursuant to Watermaster's existing Form 1 (Application for a Local Storage Agreement) and Form 8 (Standard Local Storage Agreement). The Board enters into storage agreements only after an application is noticed and considered by the Pool Committees, Advisory Committee, and Watermaster Board (see Rules and Regulations, Article X), and when a finding is made that storage will not result in MPI to any Party to the Judgment or the Basin. (Peace Agreement, § 5.2(b)(iv).)

The Form 1 Application for Local Storage Agreement was approved in 2001 and has not been amended since that time; it is the mechanism through which Parties may apply to enter into a Local Storage Agreement.

The Form 8 Local Storage Agreement, as it was similarly approved by the Court in 2001 and still exists today, provides for the storage of a set quantity of water for the duration of the Peace Agreement. While Watermaster tracks production on a quarterly basis and accounts for unproduced water and water entering storage annually, in the event that a Party wishes to increase its quantity of water in storage—either via recharge of Supplemental Water or the

[14] See §5.2(c)(iv)(b) of the Peace Agreement

accrual of Excess Carryover water—in order to ensure that that the additional quantity of water is stored in compliance with the provisions of the Restated Judgment, Peace Agreement, and Rules and Regulations, it must enter into a new storage agreement. In practice, this means that each of the members of the Overlying (Non-Agricultural) and Appropriative Pools must go through the application process each year in which their balances of stored water increase.

The Parties, amongst themselves, are actively involved in water transfers of annual unproduced rights in the Safe Yield and water in their storage accounts. Watermaster has an application and review process for transfers that is similar to the storage agreement application process. Transfers are one way that the Parties recover water held in storage accounts.

1.2 Existing Managed Storage and Proposed Storage and Recovery Programs

The Parties engage in conjunctive-use activities individually by storing Basin and Supplemental Waters that are in excess of their demands and subsequently recover that water as their individual needs arise. These activities collectively cause a temporary increase in managed storage. Table 1-1 summarizes the amount of water in managed storage by the Parties. Table 1-1 also shows the amount of water stored by the Metropolitan Water District of Southern California (Metropolitan) Dry-Year Yield Program (DYYP). The total volume of water in managed storage as of June 30, 2019 was 549,244 af.

Table 1-1 Ending balances in managed storage in the Chino Basin (af)

Fiscal Year ending June 30	Appropriative Pool				Overlying Non-Agricultural Pool			Total Managed Storage by Parties	Dry Year Yield Program Storage	Total Managed Storage
	Carryover	Excess Carryover	Local Supplemental Storage	Subtotal	Carryover	Excess Carryover	Subtotal			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) = (7) + (4)	(9)	10) = (9) + (8
2000	28,911	170,342		199,253	6,541	31,031	37,572	236,825	0	236,825
2001	15,940	77,907	92,813	186,660	5,301	32,330	37,631	224,291	0	224,291
2002	13,521	70,103	87,801	171,425	5,285	33,727	39,012	210,437	0	210,437
2003	18,656	71,329	81,180	171,165	6,743	36,850	43,593	214,758	7,738	222,496
2004	21,204	70,503	80,963	172,670	7,177	40,881	48,058	220,728	26,300	247,028
2005	21,289	76,080	88,849	186,218	7,227	45,888	53,115	239,333	38,754	278,087
2006	32,062	56,062	86,170	174,294	7,227	49,178	56,405	230,699	58,653	289,352
2007	34,552	50,895	83,184	168,631	7,084	51,476	58,560	227,191	77,116	304,307
2008	41,626	83,962	81,520	207,108	6,819	45,248	52,067	259,175	74,877	334,052
2009	42,795	101,908	79,890	224,593	6,672	46,600	53,272	277,865	34,494	312,359
2010	41,263	120,897	90,133	252,293	6,934	47,732	54,666	306,959	8,543	315,502
2011	41,412	146,074	98,080	285,566	6,959	49,343	56,302	341,868	0	341,868
2012	42,614	209,981	116,138	368,733	6,914	13,993	20,907	389,640	0	389,640
2013	39,413	225,068	116,378	380,859	7,073	15,473	22,546	403,405	0	403,405
2014	41,708	224,496	123,484	389,688	6,478	12,812	19,290	408,978	0	408,978
2015	40,092	239,517	127,994	407,603	6,823	12,225	19,048	426,651	0	426,651
2016	39,733	248,013	131,522	419,267	7,195	9,949	17,144	436,411	0	436,411
2017	38,340	260,682	143,552	442,575	7,226	8,292	15,519	458,093	6,315	464,408
2018	34,582	254,221	155,018	443,821	7,198	10,775	17,973	461,795	41,380	503,174
2019	38,605	279,033	166,406	484,044	7,227	12,004	19,231	503,275	45,969	549,244

The 2018 SFI projected that for the planned use of managed storage by the Parties up to 700,000 af that Hydraulic Control would be maintained, that there would be no MPI, and that there would be an adverse impact from the reduction of net recharge and Safe Yield attributable to the use of managed storage. The 2018 SFI made an identical finding for Storage and Recovery

Programs that would operate in an identical manner to the existing Metropolitan DYYP and using the managed storage space between 700,000 af and 800,000 af.

As of June 30, 2019, the Parties' aggregate amount of water in managed storage was 503,275 af (see Table 1.1). The Parties are projected to use in aggregate about 720,000 af of managed storage for their individual conjunctive-use operations based on the most recent planning information provided by them (See Appendix C). The projected average annual increase in managed storage by the Parties is about 21,600 afy through 2030, after which the aggregate amount of managed storage space used by the Parties is projected to decline through about 2070.

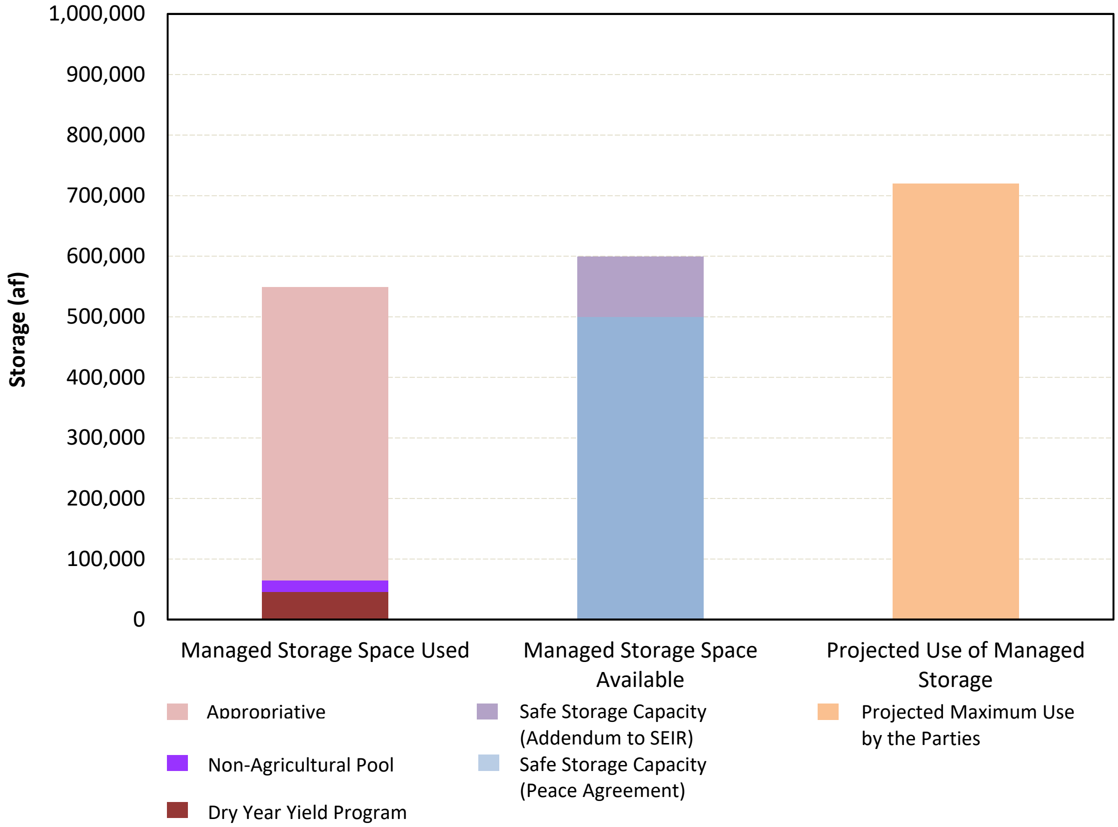
Metropolitan's DYYP is the only active Storage and Recovery Program in the basin. The DYYP can store up to 100,000 af with maximum puts of 25,000 afy and maximum takes of 33,000 afy. The DYYP Storage and Recovery Program agreement provides that puts and takes can exceed these values if agreed to by Watermaster (as was done in fiscal years 2018 and 2009, respectively). As of June 30, 2019, there was 45,969 af stored in the DYYP account. The agreement that authorizes the DYYP will expire in 2028.

The combined use of managed storage by the Parties and Metropolitan's DYYP is projected to reach a maximum of about 790,000 af assuming that the DYYP has 100,000 af in storage in 2028 and that subsequent to 2028 Metropolitan removes that water from managed storage at the contract rate of 33,300 afy starting in 2029.

Figure 1-1 compares the current amount of water in managed storage to the managed storage space available and the projected use of storage space by the Parties. The managed storage space used is 549,244 af. The amount of managed storage space available for use by the Parties pursuant the 2010 Peace II Project Subsequent Environmental Impact Report and its 2017 Addendum is 600,000 af. The storage space used by the Parties will exceed this 600,000 af limit by 120,000 af by 2030.[15]

[15] See Appendix C for updated groundwater pumping and managed storage projections.

Figure 1-1 Comparison of managed storage space used, managed storage space available, and projected maximum use of managed storage by the Parties



The IEUA and some of the Parties are considering Storage and Recovery Programs with yet-to-be proposed operational parameters. According to the discussions in the development of the 2018 SFI, the amount of storage space required in aggregate for all contemplated Storage and Recovery Programs, including the DYYP, is projected to range between 200,000 and 300,000 af.

Section 2 – Storage Management Plan Description

This section describes the 2020 SMP based on the requirements of the Judgment, the Peace Agreement, the conclusions of the 2018 SFI, the 2020 SMP White Paper, and Watermaster stakeholder input from the 2020 SMP workshop process during the period of June through December 2019.

2.1 Use of Storage Space by the Parties for Their Individual Conjunctive-Use Activities and by Entities Engaged in Storage and Storage and Recovery Programs

An aggregate amount of 800,000 af is reserved for the Parties' conjunctive-use activities (includes Carryover, Excess Carryover, and Supplemental Accounts) and Metropolitan's DYYP. This amount is referred to as the "First Managed Storage Band" (FMSB).

The managed storage space between 800,000 and 1,000,000 af is reserved for Storage and Recovery Programs. Storage and Recovery Programs that utilize the managed storage space above 800,000 af will be required to mitigate potential MPI as if the 800,000 af were fully used. Renewal or extension of the DYYP agreement will require the DYYP to use storage space above 800,000 af.

The allocation of storage space for use by Parties and for Storage and Recovery Programs may be revised in subsequent updates of the SMP.

Note that the use of managed storage greater than 1,000,000 af may be possible provided the storing entity submits a Storage and Recovery Program application, demonstrates that the program has broad mutual benefit, demonstrates that program's mitigation measures will meet the mitigation requirements of the Watermaster to ensure there will be no MPI and other adverse impacts[16], complies with CEQA, and obtains approval from the Watermaster.

2.2 Reservation of Existing Spreading Basin Facilities to Satisfy Watermaster Recharge and Replenishment Obligations

The Parties and IEUA, through the OBMP, have substantially increased storm and supplemental water recharge capacity in the Chino Basin. The increase in supplemental water recharge capacity was done to ensure that Watermaster could meet its future recharge and replenishment obligations pursuant to Court and Regional Board orders. Watermaster will include provisions in storage agreements to prioritize the use of spreading basins to satisfy Watermaster's recharge and replenishment obligations over the use of spreading basins for other uses subject to limitations provided in existing agreements with the owners of the facilities.

[16] Adverse impacts include reductions in net recharge and Safe Yield; and an increase in the groundwater discharge from the Chino North GMZ to the Santa Ana River contributing to a loss of Hydraulic Control.

2.3 Storage Management Activities of the Parties

2.3.1 Limitation of Transfers or Leases of Water Rights and Water Held in Managed Storage

Early in the OBMP implementation period, Watermaster determined that transfers or leases of water rights and water held in managed storage (hereafter transfers) from Parties that are situated such that they pump groundwater outside of MZ1 to Parties that pump in MZ1 for *the purpose of replenishment* have the potential to cause MPI.[17]

This limitation on transfers should be reconsidered if the land subsidence management plan for MZ1 includes consideration for such transfers, the land subsidence plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan.

2.3.2 Mitigation of Reduced Net Recharge and Safe Yield

The 2018 SFI demonstrated that storing water has the effect of reducing net recharge and Safe Yield. The reduction in net recharge caused by storage is an adverse impact. The Safe Yield, a prospective calculation, is based on projected estimates of net recharge that include the effects of managed storage on net recharge[18]. The reduction in Safe Yield due to projected storage management by the Parties is thus incorporated into the Safe Yield estimate. Watermaster considers this adverse impact to be mitigated by the prospective calculation of the Safe Yield.

2.4 Storage and Recovery Programs

2.4.1 Prioritization of Put and Take Operations in MZ2 and MZ3

Storage and Recovery programs are implemented through a series of "puts" and "takes" where water goes into storage during a put and is recovered from storage during a take. Based on the results of the 2018 SFI, these puts and takes should be prioritized to occur in MZ2 and MZ3 to avoid new land subsidence and interfering with land subsidence management in MZ1, to minimize pumping sustainability challenges, to minimize the impact of storage and recovery operations on solvent plumes, to preserve the state of Hydraulic Control, and to take advantage of the larger and more useful groundwater storage space in MZ2 and MZ3.

This spatial prioritization on puts and takes should be reconsidered if the land subsidence management plan for MZ1 includes consideration for Storage and Recovery programs, the land subsidence management plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan.

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[17] See the report entitled: Material Physical Injury analysis – Monte Vista Water District lease of West Valley Water District production rights in the Chino Basin for fiscal year 2006/07. Prepared by WEI in April 2007.

[18] Refer to the 2015 Reset Technical Memorandum and the April 2017 Court Order for additional information on the Safe Yield reset methodology. These documents can be found here: https://cbwm.syncedtool.com/shares/folder/e83081106c3072/?folder_id=1595.

2.4.2 Evaluation of Storage and Recovery Program Impacts, MPI, and Mitigation

The intent of this provision is to reaffirm the requirements of ¶ 12 of the Judgment and §5.2(c)(xiii) and 5.2(c)(ix) of the Peace Agreement, as to the review and approval of Storage and Recovery Program applications, and to require Storage and Recovery Program storage agreements to provide provisions that require Storage and Recovery Program participants to cease or modify their operations if Watermaster determines, subsequent to Watermaster and Court approval of a Storage and Recovery Program storage agreement, that the participant's storage and recovery operations are causing or threaten to cause MPI. The types of MPI to be addressed include but are not limited to land subsidence, pumping sustainability, water quality, shallow groundwater, and liquefaction.

Watermaster will review each Storage and Recovery Program application, estimate the surface and ground water systems response, prepare a report that describes the response and potential MPI, and develop mitigation requirements to mitigate MPI caused by the proposed Storage and Recovery Program. The Storage and Recovery Program applicant will develop mitigation measures pursuant to these requirements and incorporate them into their Storage and Recovery Program application. Upon approval by Watermaster, these mitigation measures will be incorporated into the Storage and Recovery Program storage agreement.

Watermaster will periodically review current and projected basin conditions, compare this information to the projected basin conditions assumed in the evaluation of the Storage and Recovery Program application process, compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations, and make findings regarding the efficacy of related MPI mitigation requirements and measures in the Storage and Recovery Program storage agreements. And, based on its review and findings, Watermaster may require changes in the Storage and Recovery Program storage agreements to mitigate MPI.

2.4.3 Adverse Impacts Due to a Storage and Recovery Program Must Be Mitigated

Adverse impacts include but are not limited to reductions in net recharge and Safe Yield and an increase in the groundwater discharge from the Chino North GMZ to the Santa Ana River contributing to a loss of Hydraulic Control. Watermaster will, as part of the Storage and Recovery Program application review process, make a projection of the program's expected impact on net recharge and Safe Yield and on the state of Hydraulic Control.

The 2018 SFI concluded the that the net recharge and Safe Yield of the basin would be reduced annually by about 2.0 percent (ranged from 1.5 to 2.4 percent) of the volume of water stored in a Storage and Recovery Program storage account. Watermaster will estimate the reduction in net recharge and Safe Yield for each Storage and Recovery Program and deduct it from water stored in each Storage and Recovery Program storage account to compensate for its impact on net recharge and Safe Yield.

Watermaster will review these impacts and develop mitigation requirements for the proposed Storage and Recovery Program. The Storage and Recovery Program applicant will develop mitigation measures pursuant to these requirements and incorporate them into their Storage and Recovery Program application. Upon approval by Watermaster, these mitigation measures will be incorporated into the Storage and Recovery Program storage agreement.

Watermaster will periodically review the current and projected net recharge loss rate and the state of Hydraulic Control, compare this information to the projected basin conditions assumed in the evaluation of the Storage and Recovery Program application process, compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations, and make findings regarding the efficacy of the related mitigation measures and requirements in the Storage and Recovery Program storage agreement. And, based on its review and findings, Watermaster may require changes in the Storage and Recovery Program storage agreements to mitigate impacts on net recharge and Safe Yield and on the state of Hydraulic Control.

2.5 Storage Agreement Application Process

As part of the development of an updated Storage Management Plan, environmental review will be conducted as to the impacts of a planned quantity of storage space reserved for the Parties' conjunctive-use activities and Metropolitan's DYYP. As a means of streamlining the process through which Parties apply for, receive approval of, and enter into storage agreements with Watermaster, the existing Form 8 Local Storage Agreements will be modified to be consistent with an "evergreen agreement" paradigm.

Within an "evergreen agreement" paradigm, the forms of the agreements, as revised, will allow for the quantities stored pursuant to the agreements to increase, during the term of the agreements, to cover the amount of water that each Party to an agreement places into storage, as shown in each Watermaster-approved annual Assessment Package. The evergreen agreements will be valid for the duration of the Peace Agreement and will be automatically adjusted upon Watermaster's approval of each subsequent Assessment Package so long as the cumulative amount of water in storage is less than the quantity reserved for the Parties' conjunctive-use operations and Metropolitan's DYYP (cumulatively, the FMSB) and Watermaster has made no finding that MPI is threatened to occur as a result of the increase in the quantity of water in storage.

2.6 Storage Management Plan Update

Watermaster will periodically review and update the SMP based on monitoring information obtained since the previous SMP was adopted, technology changes, and the "needs and requirements of the lands overlying the Chino Basin and the owners of the rights in the Safe Yield or Operating Safe Yield of the Basin."[19] The periodic review and update of the SMP will require the use of updated planning and hydrologic data and models, and it should be completed: at no less than a five-year frequency, when the Safe Yield is recalculated, or when Watermaster determines a review and update is warranted based new information and/or the needs of the Parties or the Basin.

The projected aggregate amount of water in managed storage by the Parties in 2056 (planning horizon of the 2018 SFI) is about 340,000 af. The impacts to the Basin and the Parties from

[19] Judgment, ¶12.

reducing managed storage below 340,000 af has not been estimated. Notwithstanding the SMP update frequency stated above, Watermaster should update the SMP at least five years before the aggregate amount of managed storage by the Parties is projected to fall below 340,000 af.

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Appendix A

2020 Storage Management Plan White Paper

Final 2020 Storage Management Plan White Paper

The objective of the 2020 Storage Management Plan white paper is to provide a concise compilation of technical storage management issues developed from the Storage Framework Investigation that should be considered in the 2020 Storage Management Plan. The draft 2020 Storage Management Plan white paper was distributed by the Chino Basin Watermaster on June 8, 2019 and it was reviewed at the June 20, 2019 Storage Management Plan workshop. The stakeholders were asked to provide comments on the draft white paper by July 5, 2019. These comments and Watermaster staff responses to them are included in Exhibit A attached herein. Some of those responses resulted in changes in the final white paper.

Background

Groundwater pumping rights in the Chino Basin were adjudicated in the 1970s and settled in the 1978 stipulated agreement (Judgment). The Judgment established a Watermaster to administer the decree under the court's continuing jurisdiction and empowered it to manage and control available storage capacity and to enter into agreements for the storage of water. As a prerequisite to implementing the Optimum Basin Management Program ("OBMP") the parties executed the Peace Agreement providing direction and guidance to the Watermaster on how storage should be prioritized and managed. The OBMP addresses the management of extraction, recharge, storage, recovery, and transfer of water. The prevailing standard for all operations is the avoidance of "undesirable results"—defined as "material physical injury"—under court approved management agreements executed contemporaneously and subsequent to the adoption of the OBMP Update in June 2020.[1]

Given the passage of twenty years since its approval, Watermaster has revisited the OBMP goals and objectives and plans to update the OBMP by June 2020. Updating the OBMP storage management plan is integral to the OBMP update. This background section provides the historical and institutional background for Watermaster's storage management activities, managed storage conditions, and groundwater management challenges impacted by managed storage activities.

Judgment

There is a significant amount of unused storage space in the Chino Basin. Groundwater in storage was estimated to have declined by about 1,600,000 af over the period 1922 through 1978, the starting point of the Judgment implementation. This decline of groundwater in storage was recognized in the Judgment,[2] and it requires that the use of this space be undertaken only under Watermaster control and regulation. Specifically, Judgment paragraphs 11 and 12 state:

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[1] The Optimum Basin Management Program can be found here: http://www.cbwm.org/rep_engineering.htm.

[2] Original judgment in Chino Basin Municipal Water District vs. City of Chino, et al., signed by Judge Howard B. Weiner, Case No. 164327. File transferred August 1989, by order of the Court, and assigned new case number RCV51010. The Restated Judgment can be found here:

"11. Available Ground Water Storage Capacity. There exists in Chino Basin a substantial amount of available ground water storage capacity which is not utilized for storage or regulation of Basin Waters[3]. Said reservoir capacity can appropriately be utilized for storage and conjunctive use of Supplemental Water[4] with Basin Waters. It is essential that said reservoir capacity utilization for storage and conjunctive use of Supplemental Water be undertaken only under Watermaster control and regulation, in order to protect the integrity of both such Stored Water[5] and Basin Water in storage and the Safe Yield[6] of Chino Basin.

12. Utilization of Available Ground Water Capacity. Any person or public entity, whether a party to this action or not, may make reasonable beneficial use of the available ground water storage capacity of Chino Basin for storage of Supplemental Water; provided that no such use shall be made except pursuant to written agreement with Watermaster, as authorized by Paragraph 28. In the allocation of such storage capacity, the needs and requirements of lands overlying Chino Basin and the owners of rights in the Safe Yield or Operating Safe Yield[7] of the Basin shall have priority and preference over storage for export."

These paragraphs establish Watermaster's control over the use of the storage space in the basin, require the accounting of Stored Water and Basin Water in storage, require accounting for the impacts of managed storage on Safe Yield and the prevention of unauthorized overdraft, require storing entities to obtain a storage agreement from Watermaster, and prioritize the use of storage space to meet the needs and requirements of the lands overlying the Chino Basin and of the Judgment parties over the use storage space to store water for export.

Judgment paragraphs 28 and 29 state:

"28. Ground Water Storage Agreements. Watermaster shall adopt, with the approval of the Advisory Committee, uniformly applicable rules and a standard form of agreement for storage of Supplemental Water, pursuant to criteria therefore set forth in Exhibit "I". Upon appropriate application by any person, Watermaster shall enter into such a storage agreement; provided that all such storage agreements shall first be approved by written order of the Court, and shall by their terms preclude operations which will have a substantial adverse impact on other producers.

29. Accounting for Stored Water. Watermaster shall calculate additions, extractions and losses and maintain an annual account of all Stored Water in Chino

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https://cbwm.syncedtool.com/shares/folder/e83081106c3072/?folder_id=247

[3] Basin Water is a defined term. Please see Storage Framework Appendix D for its definition.

[4] Supplemental Water is a defined term. Please see Storage Framework Appendix D for its definition.

[5] Stored Water is a defined term. Please see Storage Framework Appendix D for its definition.

[6] Safe Yield is defined term. Please see Storage Framework Appendix D for its definition.

[7] Operating Safe Yield is a defined term. Please see Storage Framework Appendix D for its definition.

Basin, and any losses of water supplies or Safe Yield of Chino Basin resulting from such Stored Water."

These paragraphs require that Watermaster develop storage agreements for entities (Judgment parties and others) to store supplemental water in the basin, have the storage agreements approved by the Court, include terms in the storage agreements to ensure that storage "operations" do not cause "substantial adverse impact on other producers," and collect information to enable it to account for "all Stored Water in Chino Basin, and any losses of water supplies or Safe Yield of Chino Basin resulting from such Stored Water." Losses of water supplies or Safe Yield refer to storage losses and changes in Safe Yield caused by the management of storage.

Optimum Basin Management Program and the Peace Agreements

The Chino Basin OBMP[8] set forth agreed goals and objectives in 1999. A year later, the Peace Agreement[9] and the OBMP Implementation were approved by the Court in 2000. Many of the operable features of the OBMP were incorporated into the OBMP Implementation Plan,[10] conditioned on compliance with the Peace Agreement. The OBMP Implementation Plan is Exhibit B to the Peace Agreement. The Peace Agreement is an agreement among the Judgment parties to implement the OBMP and was reviewed in a programmatic environmental impact report (PEIR), certified by the Inland Empire Utilities Agency (IEUA) in July 2000. The OBMP Implementation Plan contains a storage management plan that was developed to allow the parties and other entities to utilize the unused storage space in the basin and mitigate potential Material Physical Injury[11] (MPI) from its use.

The OBMP storage management plan consists of managing groundwater production, replenishment, recharge, and storage such that total storage within the basin ranges from a low of 5,300,000 af to a high of 5,800,000 af. The following definitions are included in the OBMP Implementation Plan:

- Operational storage requirement (OSR) is the storage or volume in the Chino Basin that is necessary to maintain the Safe Yield. The OSR was estimated in the development of the OBMP to be about 5.3 million af. This storage value was set as the estimated storage in the basin in 1997.[12]
- Safe storage is an estimate of the maximum amount of storage space in the basin that can be used and not cause significant water-quality and/or high-groundwater related

[8] The OBMP report is located here: http://www.cbwm.org/docs/engdocs/obmpphas1rep/Text/OBMP_Ph1_Report.pdf

[9] The Peace Agreement is located here: http://www.cbwm.org/docs/legaldocs/Peace_Agreement.pdf

[10] The OBMP Implementation Plan is Appendix B to the Peace Agreement, and it is located here: http://www.cbwm.org/docs/legaldocs/Implementation_Plan.pdf

[11] Material Physical Injury is a defined term. Please see Storage Framework Appendix D for its definition.

[12] Page 2-11, Optimum Basin Management Program, Phase I Report.

problems. Safe storage was estimated in the development of the OBMP to be about 5.8 million af.

- Safe storage capacity (SSC) is the difference between safe storage and the OSR. The allocation and use of storage space in excess of the SSC will preemptively require mitigation; that is, mitigation must be defined and resources committed to mitigation prior to its allocation and use.

Safe storage is equal to the OSR plus the SSC. The SSC was estimated during the development of the OBMP to be equal to the calculated decline in storage (400,000 af) during the base period (1965 through 1974) used to estimate the Safe Yield[13] in the Judgment plus an assumed additional decline in storage (100,000 af) in the intervening period up to the filing of the Judgment (1974 to 1978). The assumption underlying SSC was that it would be safe to store water in storage space that was recently created prior to implementing the Judgment.

Water occupying the SSC includes Carryover,[14] Excess Carryover,[15] Local Storage,[16] and Supplemental Waters stored by the parties. Water stored for Storage and Recovery Programs is also included in the SSC.[17] Carryover, Excess Carryover, Local Storage, and Supplemental Waters are referred to herein collectively as managed storage.

Subsequent to the approval of the PEIR in 2000, Watermaster and the Judgment parties developed revisions to the OBMP based on: new monitoring and borehole data collected since 1998, an improved hydrogeologic conceptualization of the basin and new numerical models that have improved the understanding of basin hydrology since 2000, and the need to expand the Chino Basin Desalters' (desalters) capacity to the 40,000 afy of groundwater pumping required in the OBMP Implementation Plan. Concurrently, the IEUA and Watermaster worked with the Santa Ana Regional Water Quality Control Board (Regional Board) to revise the total dissolved solids (TDS) and nitrate objectives for the Chino North Management Zone[18] to enable the reuse of the IEUA's recycled water without desalting it for a period estimated to be at least 30 years and without impairing the beneficial use of Chino Basin groundwater. One of the Regional Board's conditions for raising the TDS and nitrate objectives was the achievement of Hydraulic Control.[19]

Hydraulic Control is the reduction of groundwater discharge from the Chino North Management Zone to the Santa Ana River to less than 1,000 afy. Hydraulic Control is a goal of the OBMP with the intent of maintaining and enhancing the Safe Yield of the basin by ensuring that agricultural

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[13] Ibid, page 2-28 and Table 2-13

[14] Carryover Water is a defined term. Please see Storage Framework Appendix D for its definition.

[15] Excess Carryover Water is a defined term. Please see Storage Framework Appendix D for its definition.

[16] Local Storage Water is a defined term. Please see Storage Framework Appendix D for its definition.

[17] Storage and Recovery Program is a defined term. Please see Storage Framework Appendix D for its definition.

[18] The Chino North Management Zone consists of the combination of OBMP Management Zones 1, 2, and 3, exclusive the Prado Basin flood pool area.

[19] Hydraulic Control is a defined term. Please see Storage Framework Appendix D for its definition.

groundwater production in the southern half of the basin would be replaced by groundwater production for municipal uses as the land use in that area transitions from agricultural uses to urban uses. Through extensive investigations, it was determined that Hydraulic Control and the maintenance of Safe Yield required the expansion of desalter groundwater production to 40,000 afy and the reduction of basin water in storage by 400,000 af. These investigations included a recalculation of the total water in storage in the basin, based on the improved hydrogeologic understanding. The total storage in the Chino Basin for 2000 was estimated to be about 5,935,000 af, which is 635,000 af greater than that estimated for the OSR and 135,000 af greater than safe storage.[20]

The OBMP Implementation Plan was amended in 2007, and the Peace II Agreement enabled the expansion of the Chino Desalter pumping capacity from 20,000 afy to 40,000 afy. The technical investigations conducted to support the expansion of desalter groundwater production to 40,000 afy and the use of 400,000 af[21] of groundwater to partially meet the Replenishment Obligation for desalter production also indicated that the Safe Yield of the Chino Basin, at that time, was likely less than that stated in the Chino Basin Judgment and that it was projected to decline further in the future due to changes in cultural conditions in the watersheds overlying and tributary to the Chino Basin. The IEUA completed and subsequently certified a supplemental environmental impact report (SEIR) for the Peace II Agreement in 2010.

Starting in 2011, Watermaster began the technical effort to recalculate the Safe Yield. This work involved updating the hydrogeologic conceptual model of the basin, updating the historical hydrology, updating and recalibrating numerical models that simulate the surface and ground water hydrology of the Chino Basin area, and projecting the surface and groundwater response of the basin to future management plans that included storage management. This work is documented in *2013 Chino Basin Groundwater Model Update and Recalculation of Safe Yield Pursuant to the Peace Agreement* (WEI, 2015; hereafter, Safe Yield report). The results of that work yielded a reassessment of the hydrology of the basin from 1961 through 2011 and projections of basin hydrology through 2050, based on the best available planning information. The conclusions of the Safe Yield report, related to storage management, are:

- On July 1, 2000, the total water in storage in the basin was about 5,935,000 af, inclusive of the 236,000 af of managed storage. This is about 635,000 af greater than the OSR of 5,300,000 af that was established in the OBMP Implementation Plan.

- Managed storage was projected to increase from 487,000 af in 2016 to about 663,000 af by 2030 (exceeding the SSC by 163,000 af) and decline thereafter to zero af by 2051. Managed storage was projected to be used to meet future replenishment obligations.

[20] Wildermuth Environmental, Inc., 2007. 2007 CBWM Groundwater Model Documentation and Evaluation of the Peace II Project Description.

[21] The 400,000 af of groundwater used for desalter replenishment is referred to as Re-Operation.

- Total storage was projected to fall below the OSR of 5.3 million af in 2041.

In 2017, the IEUA adopted an addendum to the Peace II SEIR, that provided a temporary increase in the SSC to 600,000 af through June 30, 2021 to provide time for Watermaster and the Judgment parties to update the OBMP storage management plan. The Storage Framework Investigation (2018) was conducted to provide technical support to update the storage management plan. In the absence of developing and adopting a new storage management plan by June 30, 2021, the SSC would again be limited to 500,000 af.

Storage Agreements

Since the Judgment came into effect, Watermaster developed rules and regulations, standard storage agreements, and related forms. There are three types of storage agreements that result in several types of storage accounts: Excess Carryover, Local Supplemental, Local Storage and Storage and Recovery. An Excess Carryover account includes a party's unproduced rights in the Safe Yield (Safe Yield for Overlying Non-Agricultural Pool[22] parties and Operating Safe Yield for Appropriative Pool[23] parties) and Basin Water acquired from other parties. A Local Supplemental Water account includes imported and recycled water that is recharged by a party and similar water acquired from other parties. A Storage and Recovery account includes Supplemental Water and is intended to produce a "broad and mutual benefit to the Parties to the Judgment." Watermaster tracks the puts, takes, losses, and end of year storage totals for all of these storage accounts, and reports on this accounting in the annual assessment process.

In evaluating applications for storage agreements, Watermaster must conduct an investigation to determine if the water stored and recovered under a proposed storage agreement will cause potential MPI to a party or the basin. If Watermaster determines that implementation of the proposed storage agreement will cause potential MPI, the applicant must revise its application so there is no MPI, or Watermaster must impose conditions in the storage agreement to ensure there is no MPI. Watermaster cannot approve a storage agreement that will result in MPI.

The parties, amongst themselves, are actively involved in water transfers of annual unproduced rights in the Safe Yield and water in their storage accounts. Watermaster has an application and review process for transfers that is similar to the storage agreement application process. Transfers are one way that the parties recover water held in storage accounts.

Existing Managed Storage and Proposed Storage and Recovery Programs

The Watermaster parties engage in conjunctive-use activities individually by storing Basin and Supplemental Waters that are in excess of their demands and subsequently recover that water as their individual needs arise. These activities collectively cause a temporary increase in managed storage. Table 1 summarizes the amount of water in managed storage by the Parties. Table 2-1 also shows the amount of water stored by the Metropolitan Water District of Southern California (Metropolitan) Dry-Year Yield Program (DYYP). The total volume of water in managed

[22] Overlying Non-Agricultural Pool is a defined term. Please see Storage Framework Appendix D for its definition.

[23] Appropriative Pool is a defined term. Please see Storage Framework Appendix D for its definition.

storage as of June 30, 2018 was about 581,100 af. Table 1 does not reflect the anticipated reductions in managed storage that will occur to offset unassessed desalter replenishment obligations.[24]

[24] The reconciliation of the water held in managed storage and the desalter replenishment obligation should be complete by the end of calendar year 2019, and the final Storage Management Plan report will include an updated version of this table that reflects these changes.

Table 1 Ending Balances in Managed Storage in the Chino Basin[1]
(af)

Fiscal Year Ending June 30	Appropriative Pool				Overlying Non-Agricultural Pool			Total Managed Storage by Parties	Dry Year Yield Program Storage[6]	Total Managed Storage
	Carryover[2] (1)	Excess Carryover (ECO)[3] (2)	Local Supplemental Storage[4] (3)	Subtotal (4)	Carryover[2] (5)	Local Storage[5] (6)	Subtotal (7)	(8) = (7) + (4)	(9)	(10) = (9) + (8)
2000	28,911	170,342		199,253	6,541	31,031	37,572	236,825	0	236,825
2001	15,940	77,907	92,813	186,660	5,301	32,330	37,631	224,291	0	224,291
2002	13,521	70,103	87,801	171,425	5,285	33,727	39,012	210,437	0	210,437
2003	18,656	71,329	81,180	171,165	6,743	36,850	43,593	214,758	7,738	222,496
2004	21,204	70,503	80,963	172,670	7,177	40,881	48,058	220,728	26,300	247,028
2005	21,289	76,080	88,849	186,218	7,227	45,888	53,115	239,333	38,754	278,087
2006	32,062	56,062	86,170	174,294	7,227	49,178	56,405	230,699	58,653	289,352
2007	34,552	50,895	83,184	168,631	7,084	51,476	58,560	227,191	77,116	304,307
2008	41,626	83,962	81,520	207,108	6,819	45,248	52,067	259,175	74,877	334,052
2009	42,795	101,908	79,890	224,593	6,672	46,600	53,272	277,865	34,494	312,359
2010	41,263	120,897	90,133	252,293	6,934	47,732	54,666	306,959	8,543	315,502
2011	41,412	146,074	98,080	285,566	6,959	49,343	56,302	341,868	0	341,868
2012	42,614	209,981	116,138	368,733	6,914	13,993	20,907	389,640	0	389,640
2013	39,413	225,068	116,378	380,859	7,073	15,473	22,546	403,405	0	403,405
2014	41,708	231,679	125,052	398,439	6,478	12,812	19,290	417,729	0	417,729
2015	44,437	254,643	132,791	431,871	6,823	12,225	19,048	450,919	0	450,919
2016	45,683	279,757	144,012	469,452	7,195	9,949	17,144	486,596	0	486,596
2017	43,314	308,100	157,628	509,043	7,226	11,343	18,569	527,612	6,315	533,927
2018	40,390	308,056	170,168	518,614	7,198	13,894	21,092	539,706	41,380	581,086

1. Account balances are from Watermaster Assessment Packages and do not account for the desalter replenishment obligation or the change in Safe Yield.
2. The un-produced water in any year that may accrue to a member of the Non-Agricultural Pool or the Appropriative Pool and that is produced first each subsequent Fiscal Year or stored as Excess Carryover
3. Carryover Water which in aggregate quantities exceeds a party's share of Safe Yield in the case of the Non-Agricultural Pool, or the assigned share of Operating Safe Yield in the case of the Appropriative Pool, in any year.
4. Water imported to Chino Basin from outside the Chino Basin Watershed and recycled water.
5. Water held in a storage account pursuant to a Local Storage Agreement between a party to the Judgement and Watermaster. "Local Storage Agreement" means a Groundwater Storage Agreement for Local Storage.
6. Ending balance in the Dry Year Yield Program storage account.

Metropolitan's DYYP is the only active Storage and Recovery Program in the basin. The DYYP can store up to 100,000 af with maximum puts of 25,000 afy and maximum takes of 33,000 afy. As of July 1, 2018, there were 41,380 af stored in the DYYP account. The agreement that authorizes the DYYP will expire in 2028.

The IEUA and some of the parties are proposing the implementation of Storage and Recovery Programs, including the Chino Basin Water Bank and the Chino Basin Program (CBP). The operational parameters of these proposed programs are not yet defined; that said, the amount of storage space required has been identified to range between 200,000 and 300,000 af.

Current Groundwater Management Challenges and Their Relationship to Current Storage Management

The results of the groundwater modeling work reported in the Safe Yield report projected, based on the best planning information available at that time, that the total storage in the basin will likely be relatively stable through the mid to late 2020s, and by 2050, groundwater levels were projected to decline over a broad area ranging from about 65 feet in the Pomona area to 50 feet in the Jurupa Community Services District (JCSD) and Desalter II well field areas.[25] This decline in groundwater levels was projected to occur because managed storage was used to replenish desalter production and over-production by Appropriative Pool parties.

During the development of the *2013 Amendment to the 2010 Recharge Master Plan Update* (2013 RMPU), the JCSD asserted that declining groundwater levels in the areas around and in the JCSD and Chino Basin Desalter Authority (CDA) well fields contributed to declining groundwater pumping capacity at JCSD and CDA wells. Loss in production capacity in this area is likely due to hydraulic interference among the wells and could be mitigated by reducing pumping at these wells, spreading out production over a greater area, and/or by increased recharge located proximate and tributary to the JCSD and CDA well fields. The projected decline in groundwater levels after the mid to late 2020s is projected to further exacerbate pumping sustainability challenges in this part of the basin.

The existing storage management plan is based on fixed amounts of water in storage, and its technical basis is not supported by new information available after the storage management plan was first developed (1999). Review of this new information (developed since 1999), indicates that it is possible to expand the SSC to enable greater use of storage space. This new information includes an updated hydrogeologic conceptual model; 20 years of intensive monitoring of basin operations (not available in 1999), including monitoring the basin response as managed storage approached the SSC of 500,000 af; and groundwater model-based projections of the basin response to future management plans where the managed storage exceeded 500,000 af. Re-Operation will reduce the amount of Basin Water in storage by 400,000 af. The current storage management plan does not account for Re-Operation.

The new information developed since 1999 suggests that the unanticipated use of managed storage to meet future desalter and other replenishment obligations could cause potential MPI: it has the potential to exacerbate land subsidence and pumping sustainability challenges, impact net recharge and Safe Yield, increase groundwater discharge through the CCWF, cause a loss of Hydraulic Control, and change the direction and speed of the contaminant plumes. The OBMP storage management plan needs to be updated to include features that will ensure there is no MPI to a party or the basin caused by the conjunctive-use activities of the parties and Storage and Recovery Programs.

Storage Management Plan Requirements

This section describes the technical features of the recommended storage management plan, based on the requirements of the Judgment, the Peace Agreement, and the conclusions of the Storage Framework Investigation.

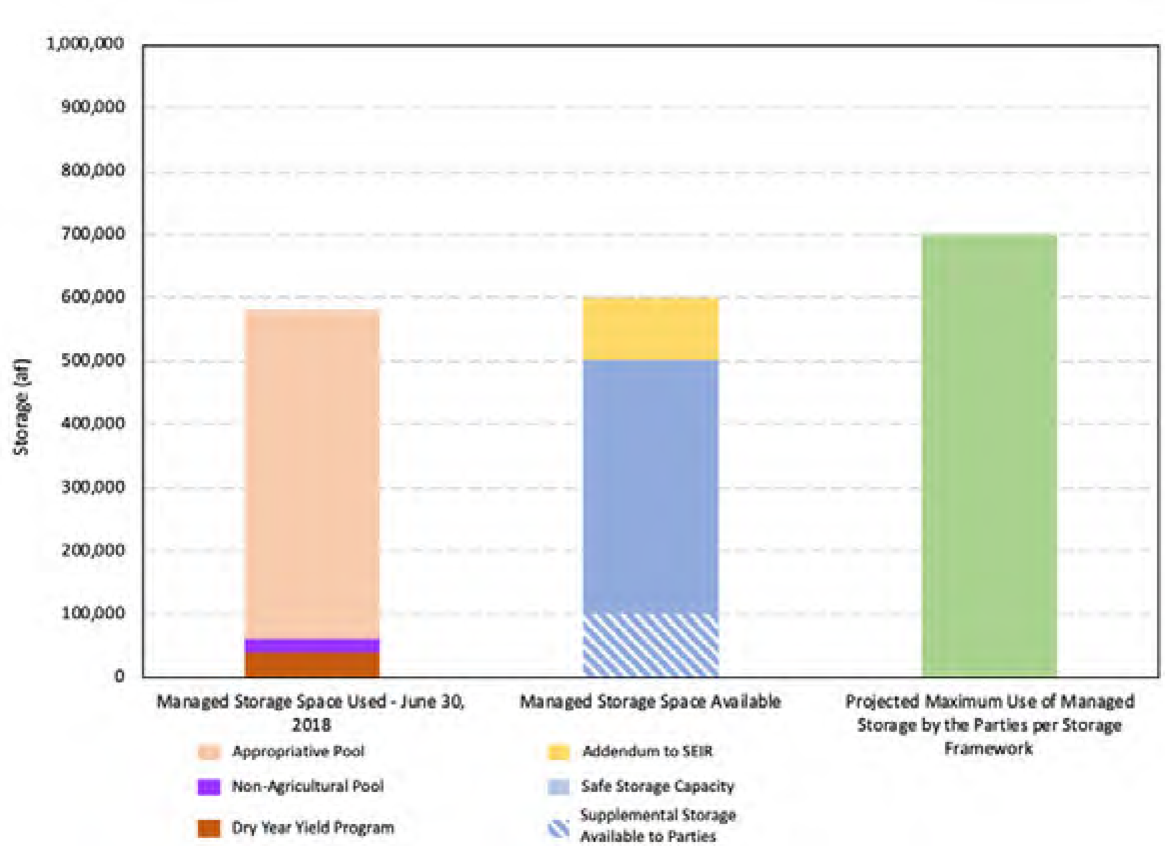
[25] See Figure 2-2 in the Storage Framework Investigation or Figure 7-5d from the Safe Yield report.

Allocation of Storage Space to the Parties Use of Managed Storage and Storage and Recovery Programs

The stakeholders desire to reserve storage space for the parties' individual uses and for Storage and Recovery Programs to provide certainty to their water supply planning and operations.

Based on the best available planning information provided by the parties in the Storage Framework Investigation, the parties' use of managed storage was projected to reach about 700,000 af in 2030 and decline monotonically thereafter. Therefore, it is logical to consider starting discussions for the parties use of managed storage with a limit of 700,000 af in the Storage Management Plan, and this will be adjusted in accordance with stakeholder input. Therefore, it is logical to consider establishing a limit for the parties' use of managed storage at 700,000 af in the Storage Management Plan. Figure 1 below compares the current use of managed storage to the storage space permitted per the Peace Agreement and the expected maximum use of managed storage by the parties.

Figure 1 Comparison of Managed Storage Space Used, Managed Storage Space Available and Projected Maximum Use of Managed Storage by the Parties



Alternatively, the Watermaster and the parties could establish a lower or higher limit, but additional engineering work will be required to assess the basin response and potential MPI for a higher limit.

The Storage Framework Investigation evaluated the use of 300,000 af of storage for Storage and Recovery Programs that was superimposed on the storage management activities of the parties. Therefore, it is logical to consider establishing an aggregate limit for all Storage and Recovery Programs at 300,000 af in the Storage Management Plan, and this limit will be adjusted in accordance with stakeholder input.

Reservation of Existing Spreading Basin Facilities to Satisfy Watermaster Recharge and Replenishment Obligations

The Judgment parties and IEUA, through the OBMP, have substantially increased the storm and supplemental water recharge capacity in the Chino Basin. The increase in supplemental water recharge capacity was done to ensure that Watermaster could meet its future recharge and replenishment obligations. Watermaster will include provisions in storage agreements that Watermaster will prioritize the use of spreading basins to satisfy Watermaster's recharge and replenishment obligations over the use of spreading basins for other uses.

Storage Management Activities of the Parties

Limitation of Transfers or Leases of Water Rights and Water Held in Managed Storage

Early in the OBMP implementation period Watermaster determined that transfers or leases of water rights and water held in managed storage (hereafter transfers) from parties that are situated such that they pump groundwater outside of MZ1 to parties that pump in MZ1 for *the purpose of replenishment* have the potential to cause MPI.

This limitation on transfers should be reconsidered if the land subsidence management plan for MZ1 includes consideration for such transfers, the land subsidence plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan.

Mitigation of Reduced Net Recharge and Safe Yield

Currently, Watermaster assesses a 0.07 percent loss to storage accounts based on the estimated groundwater discharge from the Chino North Management Zone to the Santa Ana River. The Storage Framework Investigation demonstrated that storing water has the effect of reducing net recharge and Safe Yield. The Storage Framework Investigation estimate of reduced net recharge is inclusive of discharge from the Chino North Management Zone to the Santa Ana River. The reduction in net recharge caused by storage is an adverse impact.

There are two fundamental approaches to mitigate the reduction in net recharge caused by the parties' storage management activities:

- In the first approach, the reduction net recharge would be embedded in Safe Yield, and it would be implicitly allocated to Appropriative Pool parties, based on their pro rata share of Operating Safe Yield.

- In the second approach, the reduction in net recharge would be debited to the storage accounts of the storing parties in the Appropriative and Overlying Non-agricultural pools, based on each parties' amount of water in storage.

Watermaster and the parties need to determine which of the above approaches or variant of them to include in the storage management plan to ensure that the impact from the parties' storage management activities are considered and addressed.

Storage and Recovery Programs

Prioritization of Put and Take Operations in MZ2 and MZ3

Storage and Recovery programs are implemented through a series of "puts" and "takes" where water goes into storage during a put and is recovered from storage during a take. Based on the results of the Storage Framework Investigation, these put and takes should be prioritized to occur in MZ2 and MZ3 to avoid new land subsidence and interfering with land subsidence management in MZ1, to minimize pumping sustainability challenges, to minimize the impact of storage and recovery operations on solvent plumes, to preserve the state of Hydraulic Control, and to take advantage of the larger and more useful groundwater storage space in MZ2 and MZ3.

This spatial prioritization on puts and takes should be reconsidered if the land subsidence management plan for MZ1 includes consideration for Storage and Recovery programs, the land subsidence plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan.

Evaluation of Storage and Recovery Program Impacts, MPI, and Mitigation

The intent of this provision is to reaffirm the requirements of Paragraph 12 of the Judgment and the Peace Agreement, as to the review of Storage and Recovery Program applications, and to require Storage and Recovery Program agreements to provide provisions that require Storage and Recovery Program proponents to cease or modify their operations if Watermaster determines, subsequent to Watermaster and Court approval of a Storage and Recovery Program storage agreement, that the proponent's storage and recovery operations are causing or threaten to cause potential MPI. The potential MPIs to be addressed include but are not limited to: land subsidence, pumping sustainability, reductions in net recharge and safe yield, water quality impacts, shallow groundwater, and liquefaction.

Watermaster will review each Storage and Recovery Program application, estimate the surface and groundwater system response, prepare a report that documents the response and potential MPI, and develop mitigation measures to mitigate MPI caused by the proposed Storage and Recovery Program. Watermaster will incorporate these mitigation measures into the Storage and Recovery Program storage agreement.

Watermaster will periodically review current basin conditions, compare this information to the projected basin conditions prepared in the evaluation of the Storage and Recovery Program application process, compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations, and make findings regarding the efficacy of related MPI mitigation requirements in the Storage and Recovery Program storage agreement. And, based on its review and findings, Watermaster may require changes in the Storage and Recovery Program operations to mitigate MPI.

Hydraulic Control Impacts Due to a Storage and Recovery Program Must Be Mitigated

Watermaster will, as part of the Storage and Recovery Program application review process, make a projection of the program's expected impact on the state of Hydraulic Control. Watermaster will review these impacts and develop mitigation requirements for the proposed Storage and

Recovery Program. These mitigation requirements will be incorporated into the Storage and Recovery Program storage agreement.

Watermaster should periodically review the state of Hydraulic Control and update projections of the state of Hydraulic Control, compare this information to the projected Hydraulic Control assessment prepared in the evaluation of the Storage and Recovery Program application process, compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations, and make findings regarding the efficacy of the related mitigation requirements in the Storage and Recovery Program storage agreement. And, based on its review and findings, Watermaster may require changes in the Storage and Recovery Program operations to mitigate impacts on the state of Hydraulic Control.

Storage Agreement Application Process

Watermaster and the parties should consider updating the storage agreement application process to incorporate changes in the technical features of storage management and to improve the efficiency of the application process.

Storage Management Plan Update

Watermaster should periodically review and update the storage management plan based on: monitoring information obtained since the previous storage management plan was adopted, technology changes, and the “needs and requirements of the lands overlying the Chino Basin and the owners of the rights in the Safe Yield or Operating Safe Yield of the Basin.” The assessment of technical storage management concerns and opportunities requires the use of updated hydrologic data and models and can be completed efficiently with the recalculation of Safe Yield on a ten-year frequency or more frequently.

The projected aggregate amount of managed storage by the parties in 2050 (planning horizon of the Storage Framework Investigation) is about 340,000 af. Notwithstanding the update frequency recommended above, Watermaster should consider updating the storage management plan before the aggregate amount of managed storage by the parties falls below 340,000 af if not done earlier in a periodic update of the storage management plan.

Exhibit A

Comments and Responses on the June 8, 2019 Storage Management Plan White Paper

Monte Vista Water District

Comment No. 1. Page 1, first full paragraph, text that reads: "As a prerequisite to implementing the Optimum Basin Management Program ("OBMP") the parties executed an *agreement* providing direction and guidance to the Watermaster on how storage should be prioritized and managed." Emphasis added. ***MVWD comment reads: "please state agreement and year."***

Response. The agreement referred to is the 2000 Peace Agreement. Text modified to refer to the Peace Agreement.

Comment No. 2. Page 1, third full paragraph, , text that reads: "*Groundwater storage* was estimated to have declined by about 1,600,000 af over the period 1922 through 1978, the starting point of the Judgment implementation. This decline in *groundwater storage* was recognized in the Judgment, and it requires that the use of this space be undertaken only under Watermaster control and regulation." Emphasis added. ***MVWD comment reads: Storage did not decline, groundwater in storage declined" and "change to "groundwater in storage", respectively.***

Response. Text changed as requested.

Comment No. 3. Page 7, second full paragraph, text that reads: "The IEUA and some of the parties are proposing the implementation of Storage and Recovery Programs, including the Chino Basin Water Bank, the Santa Ana River Conservation and Conjunctive-Use Program (SARCCUP), and the Chino Basin Program (CBP). ***MVWD comment reads: " It may be more contemporary to now delete the reference to SARCCUP."***

Response. Text changed as requested.

Comment No. 4. Page 7, last paragraph continuing to top of page 8, text that reads: "The results of the groundwater modeling work reported in the Safe Yield report projected, based on the best planning information available at that time, that the total storage in the basin will likely be relatively stable through the mid to late 2020s, and by 2050, groundwater levels were projected to decline over a broad area ranging from about -65 feet in the Pomona area to -50 feet in the Jurupa Community Services District (JCSD) and Desalter II well field areas." ***MVWD comment reads: "Described as a decline, the negative signs cause a double negative."***

Response. Text changed to remove the negative signs.

Comment No. 5. Page 8, third full paragraph, text that reads: "The new information developed since 1999 suggests that the unanticipated use of managed storage to meet future desalter and other replenishment obligations could cause potential MPI: it has the potential to exacerbate land subsidence and pumping sustainability challenges, impact net recharge and Safe Yield, increase groundwater discharge through the CCWF, cause a loss of Hydraulic Control, and change the direction and speed of the contaminant plumes." ***MVWD comment reads: "Based on my 6/20 discussion with Andy I think he understands that it may be more clear if the phrase 'to meet future desalter and other replenishment obligations' is removed".***

Response. The text was not changed.

Comment No. 6. Page 9, last paragraph, text that reads: "Therefore, it is logical to consider establishing a limit for the parties' use of managed storage at 700,000 af in the Storage Management Plan." ***MVWD comment reads: "Change 'logical' to "conducive". 'Logical' seems to give an 700k an aura of certainty higher that it deserves."***

Response. The text was changed to read: "Therefore, it is logical to consider starting discussions for the parties use of managed storage with a limit of 700,000 af in the Storage Management Plan, and this will be adjusted in accordance with stakeholder input."

Comment No. 7. Page 10, second full paragraph, text that reads: "Therefore, it is logical to consider establishing an aggregate limit for all Storage and Recovery Programs at 300,000 af, provided that the aggregate storage limit for parties does not exceed 700,000 af." ***MVWD comment reads: "This sentence/conclusion should probably be put on hold pending on how Watermaster stakeholders decide to be addressed, including mitigation measures."***

Response: Note that the subsequent sentence in the text reads: "Watermaster and the parties could establish a lower or higher aggregate storage limit for Storage and Recovery Programs, but additional engineering work will be required to assess the basin response and MPI for a higher aggregated storage limit." This sentence responds to the comment. That said, the text was changed to read: "Therefore, it is logical to consider establishing an aggregate limit for all Storage and Recovery Programs at 300,000 af in the Storage Management Plan, and this limit will be adjusted in accordance with stakeholder input."

Comment No. 8. Page 11, first paragraph, text that reads: "Watermaster has the right to the use existing spreading basins to meet its recharge and replenishment obligations over the use of these facilities by any party or person to accomplish supplemental water recharge." ***MVWD comment reads: "Is it WM or WM stakeholders who have invested into the basins that have this right?"***

Response: The OBMP identified that there was not enough supplemental water recharge capacity to meet future replenishment obligations. OBMP implementation led to the construction of recharge improvements that increased supplemental water recharge capacity for replenishment. The intent of constructing the recharge improvements is specific to increasing storm water recharge and providing Watermaster recharge capacity for replenishment. The text has been changed to read that Watermaster will include provisions in storage agreements that Watermaster will prioritize the use of spreading basins to satisfy Watermaster's recharge and replenishment obligations over the use of spreading basins for other uses.

Comment No. 9. Page 11, second paragraph, text that reads: "Early in the OBMP implementation period Watermaster determined that transfers or leases of water rights and water held in managed storage (hereafter transfers) from parties that are situated such that they pump groundwater outside of MZ1 to parties that pump in MZ1 have the potential to cause MPI." ***MVWD comment reads: "Transfers/leases into MZ1 do not have the potential to cause MPI. It can be said that physical pumping/production to some level has the potential to cause MPI. Transfer/leases and pumping/production are not one in the same."***

Response: The text will be revised to improve clarity and will read: "Early in the OBMP implementation period Watermaster determined that transfers or leases of water rights and water held in managed storage (hereafter transfers) from parties that are situated such that they pump groundwater outside of MZ1 to parties that pump in MZ1 *for the purpose of replenishment* have the potential to cause MPI."

San Antonio Water Company

Comment No. 1. Page 1, first full paragraph, text that reads: "As a prerequisite to implementing the Optimum Basin Management Program ("OBMP") the parties executed an <u>*agreement*</u> providing direction and guidance to the Watermaster on how storage should be prioritized and managed." Emphasis added. ***SAWC comment reads: "Would you please direct me to document and page where this is referenced?"***

Response. The agreement referred to is the 2000 Peace Agreement. Text will be modified to refer to the Peace Agreement.

Comment No. 2. Page 2, citation to Judgment Paragraph 28. ***SAWC comment reads: "Storage agreements are currently not going to court...correct? Are there concerns at this time because of that?"***

Response: There are no concerns at time. The present storage agreement, procedures, and forms have been approved by the Court through the approval of the Peace Agreement and Watermaster Rules and Regulations.

Comment No. 3. Page 8, third full paragraph, text that reads: "The new information developed since 1999 suggests that the unanticipated use of managed storage to meet future desalter and other replenishment obligations could cause potential MPI: it has the potential to exacerbate land subsidence and pumping sustainability challenges, impact net recharge and Safe Yield, increase groundwater discharge through the CCWF, cause a loss of Hydraulic Control, and change the direction and speed of the contaminant plumes. The OBMP storage management plan needs to be updated to include features that will ensure there is no MPI to a party or the basin caused by the conjunctive-use activities of the parties and Storage and Recovery Programs. ***" SAWC comment reads: "I need further understanding. If the parties are not pumping the water and utilizing it as a transfer, why is there a problem? Wasn't this thought about when the desalter replenishment obligation was discussed? Didn't WEI do a study on the impact of this decision? Is it because the re-op schedule was changed?***

Response: The original storage management plan was developed for the OBMP in 1999, based on the best available information available to Watermaster. The overlying land and water use practices have evolved over time, and we have continued to refine our understanding of the Basin and its responsiveness to all known variables. Even since Re-Operation was approved by the Court in 2007, the collection and analysis of new data and the application of technology improvements have provided Watermaster and the parties the ability to develop a more refined evaluation of the potential the impacts to the basin from specific recharge, pumping, and storage activities. It is true, the length of time water is held in storage and the rate and location of its withdrawal have implications. Potential impacts attributable to proposed changes in the current baseline will be addressed using our improved knowledge and analytical tools and incorporated into the 2020 Storage Management Plan.

Comment No. 4. Page 11 first full paragraph, text that reads: "Watermaster has the right to the use existing spreading basins to meet its recharge and replenishment obligations over the use of these facilities by any party or person to accomplish supplemental water recharge." ***SAWC comment reads: "Why does Watermaster get first use of basin? Didn't the parties pay for the basin. Why is SAWCo's water not given priority over someone pumping rights they don't have?"***

Response: As to priority of use of the recharge basins, please see response to MVWD Comment No. 8. As to the question: "*Why is SAWCo's water not given priority over someone pumping rights they don't have?"* This is not a storage management plan question

Comment No. 5. Page 11, first bulleted item following the fifth paragraph, text that reads: "In the first approach, the reduction net recharge would be embedded in Safe Yield, and it would be implicitly allocated to Appropriative Pool parties, based on their pro rata share of Operating Safe Yield." SAWC's comment reads : ***"Other options need to be considered such as time frame for storage if it makes sense."***

Response: The white paper refers to bookends on the approach to identify and mitigate a reduction in Safe Yield caused by the use of managed storage. The impact on Safe Yield from the duration that water is held in managed storage is included the bookend approaches and any variants of them.

Overlying Agricultural Pool

Comment No. 1. Page 1, first paragraph, text that reads: " The prevailing standard for all operations is the avoidance of "undesirable results"—defined as "material physical injury"—under court approved management agreements executed contemporaneously and subsequent to the adoption of the OBMP Update in June 2020. " ***Ag pool comment reads: "MPI is legally defined by Watermaster legal documents (court approved management agreements) and it does not include "undesirable results." Ag Pool supports this concept however and recommends that WM bolster this in light of the defined term."***

No response required.

Comment No. 2. Page 3, first bullet after the second full paragraph, text that reads: "Operational storage requirement (OSR) is the storage or volume in the Chino Basin that is necessary to maintain the Safe Yield. The OSR was estimated in the development of the OBMP to be about 5.3 million af. This storage value was set as the estimated storage in the basin in 1997. " ***Ag Pool comment reads: "Should there be a discussion on the relevance of OSR and SSC for the OBMP Update?"***

Response: The relevancy of the original OBMP storage management plan will be described in the 2020 Storage Management Plan. The 2020 Storage Management Plan will be incorporated into the OBMP update.

Comment No. 3. Page 4, first full paragraph, text that reads: "Water occupying the SSC includes Carryover, Excess Carryover, Local Storage, and Supplemental Waters stored by the parties. Water stored for Storage and Recovery Programs is also included in the SSC. Carryover, Excess Carryover, Local Storage, and Supplemental Waters are referred to herein collectively as managed storage. " ***Ag Pool comment reads: "Why is this (managed storage) defined that way?"***

Response: Managed storage refers to all water that is stored by virtue of the management activities of the parties and Storage and Recovery Program entities, and it includes carryover water.

Comment No. 4. Page 4 last paragraph continuing onto Page 5, text that reads: "These investigations included a recalculation of the total water in storage in the basin, based on the improved hydrogeologic understanding. The total storage in the Chino Basin for 2000 was estimated to be about 5,935,000 af, which is 635,000 af greater than that estimated for the OSR and 135,000 af greater than safe storage." ***Ag Pool Comment reads: "This should be explained. Consider adding a technical rationale for the revised total storage and reference where this rationale was developed."***

Response: The engineering work for the Peace II Agreement produced a new hydrogeologic conceptual model that resulted in an updated estimate of the water in storage in 2000. A footnote will be added to state this and provide a reference to the documentation for it.

Comment No. 5. Page 5, second bullet after the second full paragraph, text that reads: "Managed storage was projected to increase from 487,000 af in 2016 to about 663,000 af by 2030 (exceeding the SSC by 163,000 af) and decline thereafter to zero af by 2051. Managed storage was projected to be used to meet future replenishment obligations." ***Ag Pool comment: "When and how will the storage be used? Should there be a schedule?"***

Response. The cited text refers to description of how managed storage is projected to change based on the work done to recalculate the Safe Yield and reported in *2013 Chino Basin Groundwater Model Update and Recalculation of Safe Yield Pursuant to the Peace Agreement* (WEI, 2015). The water in managed storage was assumed to be used for replenishment purposes based on the projected aggregate replenishment obligation. No schedule was recommended for the use of managed storage in the report. The concept of a schedule should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 6. Page 6, first paragraph, text that reads: "Since the Judgment came into effect, Watermaster developed rules and regulations, standard storage agreements, and related forms. There are three types of storage agreements that result in several types of storage accounts: Excess Carryover, Local Supplemental, Local Storage and Storage and Recovery. An Excess Carryover account includes a party's unproduced rights in the Safe Yield (Safe Yield for Overlying Non-Agricultural Pool parties and Operating Safe Yield for Appropriative Pool parties) and Basin Water acquired from other parties. A Local Supplemental Water account includes imported and recycled water that is recharged by a party and similar water acquired from other parties. A Storage and Recovery account includes Supplemental Water and is intended to produce a "broad and mutual benefit to the Parties to the Judgment." Watermaster tracks the puts, takes, losses, and end of year storage totals for all of these storage accounts, and reports on this accounting in the annual assessment process." ***Ag Pool comment reads: "Should the different storage accounts be valued and used appropriately?"***

Response: This question should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 7. Page 6, second paragraph, text that reads: "In evaluating applications for storage agreements, Watermaster must conduct an investigation to determine if the water stored and recovered under a proposed storage agreement will cause MPI to a party or the basin. If Watermaster determines that implementation of the proposed storage agreement will cause MPI, the applicant must revise its application so there is no MPI, or Watermaster must impose conditions in the storage agreement to ensure there is no MPI. Watermaster cannot approve a storage agreement that will result in MPI." ***Ag Pool comment reads: "What about storage absent agreements? Is it assumed that is MPI?"***

Response: The paragraph describes an agreement approval process. Currently, all storage accounts have agreements in place.

Comment No. 8. Page 6, third paragraph, text reads: "The parties, amongst themselves, are actively involved in water transfers of annual unproduced rights in the Safe Yield and water in their storage accounts. Watermaster has an application and review process for transfers that is similar to the storage agreement application process. Transfers are one way that the parties recover water held in storage accounts." ***Ag Pool comment reads: "Should the management plan curtail these? Should the parties be on notice that the ability to use a transfer is conditional on Watermaster's continued finding that removal of water held in storage will not cause MPI?"***

Response: Watermaster has an application and review process for transfers that is similar to the storage agreement application process. If Watermaster determines that a proposed transfer will cause MPI, the applicant must revise its application so there is no MPI, or Watermaster must impose conditions on the transfer to ensure there is no MPI. Watermaster cannot approve a transfer that will result in MPI. These questions should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 9. Page 6, fourth paragraph, text that reads: "Table 1 does not reflect the anticipated reductions in managed storage that will occur to offset unassessed desalter replenishment obligations.[23]" ***Ag Pool comment reads: "Why not? Where is that analysis?"***

Response. See footnote 23 in the June 8th initial draft of the 2020 Storage Management Plan White Paper (footnote 24 in the July 18th final draft). Watermaster is the process of updating assessment packages from prior years pursuant to the Court order that approved the Safe Yield for the period 2011 through 2020. It is anticipated that the assessment package update will be completed within the calendar year. Table 1 will be updated after the assessment packages are updated.

Comment No. 10. Page 7, first paragraph, text that reads: "Metropolitan's DYYP is the only active Storage and Recovery Program in the basin. The DYYP can store up to 100,000 af with maximum puts of 25,000 afy and maximum takes of 33,000 afy. As of July 1, 2018, there were 41,380 af stored in the DYYP account. The agreement that authorizes the DYYP will expire in 2028." ***Ag Pool comment reads: "Should all storage be managed like this one? Why or why not?"***

Response: These questions should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 11. Page 7, second paragraph, text that reads: "The IEUA and some of the parties are proposing the implementation of Storage and Recovery Programs, including the Chino Basin Water Bank, the Santa Ana River Conservation and Conjunctive-Use Program (SARCCUP), and the Chino Basin Program (CBP). The operational parameters of these proposed programs are not yet defined; that said, the amount of storage space required has been identified to range between 200,000 and 300,000 af." ***Ag Pool comment reads: "What would be the impact. What are the proposed best management practices for this type of use?"***

Response: Absent specific proposals for these proposed Storage and Recovery Programs, the Ag Pool questions cannot be answered. The CBP is currently being formulated, and the Ag Pool questions will be answered in detail in early 2020.

Comment No. 12. Page 8, first full paragraph, text that reads: "During the development of the 2013 Amendment to the 2010 Recharge Master Plan Update (2013 RMPU), the JCSD asserted that declining groundwater levels in the areas around and in the JCSD and Chino Basin Desalter Authority (CDA) well fields contributed to declining groundwater pumping capacity at JCSD and CDA wells. Loss in production capacity in this area is likely due to hydraulic interference among the wells and could be mitigated by reducing pumping at these wells, spreading out production over a greater area, and/or by increased recharge located proximate and tributary to the JCSD and CDA well fields. The projected decline in groundwater levels after the mid to late 2020s is projected to further exacerbate pumping sustainability challenges in this part of the basin." ***Ag Pool comment: "Will these types of techniques be required in the plan?"***

Response. This question should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 12. Page 8, second full paragraph that reads: "The existing storage management plan is based on fixed amounts of water in storage, and its technical basis is not supported by new information available after the storage management plan was first developed (1999). Review of this new information (developed since 1999), indicates that it is possible to expand the SSC to enable greater use of storage space. This new information includes an updated hydrogeologic conceptual model; 20 years of intensive monitoring of basin operations (not available in 1999), including monitoring the basin response as managed storage approached the SSC of 500,000 af; and groundwater model-based projections of the basin response to future management plans where the managed storage exceeded 500,000 af. Re-Operation will reduce the amount of Basin Water in storage by 400,000 af. The current storage management plan does not account for Re-Operation. ***Ag Pool comment reads: "Detail of this is warranted."***

Response: Additional detail will be provided in draft Storage Management Plan document when it is prepared.

Comment No. 13. Page 8, third full paragraph that reads: "The new information developed since 1999 suggests that the unanticipated use of managed storage to meet future desalter and other replenishment obligations could cause potential MPI: it has the potential to exacerbate land subsidence and pumping sustainability challenges, impact net recharge and Safe Yield, increase groundwater discharge through the CCWF, cause a loss of Hydraulic Control, and change the direction and speed of the contaminant plumes. The OBMP storage management plan needs to be updated to include features that will ensure there is no MPI to a party or the basin caused by the conjunctive-use activities of the parties and Storage and Recovery Programs." ***Ag Pool comment reads: "What are the proposed management techniques to avoid this?"***

Response: The management features/requirements to avoid MPI are described in the 2020 Storage Management Plan White Paper, following the cited text, and they will be included in the Storage Management Plan.

Comment No. 14. Page 9, second paragraph that reads: "Based on the best available planning information provided by the parties in the Storage Framework Investigation, the parties' use of managed storage was projected to reach about 700,000 af in 2030 and decline monotonically thereafter. Therefore, it is logical to consider establishing a limit for the parties' use of managed storage at 700,000 af in the Storage Management Plan." ***Ag Pool comment reads: "This seems a bit high and not specific enough to each pumper. An itemized list of each parties desire for storage would be useful. What the parties lay claim to cannot be used by water bankers including IEUA for their grant funding. Water bankers are going to want absolute certainty in what they can bank.***

Response: These comments should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 15. Page 10, first paragraph that reads: “Alternatively, the Watermaster and the parties could establish a lower or higher limit, but additional engineering work will be required to assess the basin response and MPI for a higher limit.“ ***Ag Pool comment reads: “Why wouldn't we do that now?”***

Response: This question should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 16. Page 10, second paragraph, text that reads: “The Storage Framework Investigation evaluated the use of 300,000 af of storage for Storage and Recovery Programs that was superimposed on the storage management activities of the parties. Therefore, it is logical to consider establishing an aggregate limit for all Storage and Recovery Programs at 300,000 af, provided that the aggregate storage limit for parties does not exceed 700,000 af. Watermaster and the parties could establish a lower or higher aggregate storage limit for Storage and Recovery Programs, but additional engineering work will be required to assess the basin response and MPI for a higher aggregated storage limit.” ***Ag Pool comment reads: “Again, should we do pumper and location specific analysis?”***

Response: An MPI analysis is required for each Storage and Recovery Program proposal, and they will include a “pumper and location-specific analysis.”

Comment No. 17. Page 11, first paragraph, text that reads: “The Judgment parties and IEUA, through the OBMP, have substantially increased the storm and supplemental water recharge capacity in the Chino Basin. The increase in supplemental water recharge capacity was done to ensure that Watermaster could meet its future recharge and replenishment obligations. Watermaster has the right to the use existing spreading basins to meet its recharge and replenishment obligations over the use of these facilities by any party or person to accomplish supplemental water recharge.” ***Ag Pool comment reads: “Why is this important and should it be developed further?”***

Response: This is important because Storage and Recovery Program agreements need to specify that Watermaster has priority use of the existing spreading basins for its recharge and replenishment obligations over the use of these facilities for storage and recovery operations. The intent is to avoid conflicts between the recharge capacity required by Watermaster to fulfill its obligations under the Judgment and the desire of Storage and Recovery Program proponents to use the same existing recharge facilities to conduct recharge for their storage and recovery programs. The need to develop this further should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 18. Page 11, Second and third paragraphs, text that reads: “Early in the OBMP implementation period Watermaster determined that transfers or leases of water rights and water held in managed storage (hereafter transfers) from parties that are situated such that they pump groundwater outside of MZ1 to parties that pump in MZ1 have the potential to cause MPI. No such transfers have occurred since the OBMP was implemented in 2000. This limitation on transfers should be reconsidered if the land subsidence management plan for MZ1 includes consideration for such transfers, the land subsidence plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan." ***Ag Pool comment reads: "Why not include these requirements and potential uses in this plan? Additional details, analyses and monitoring would be needed to evaluate."***

Response: This requirement will be included in the 2020 Storage Management Plan. The ongoing monitoring and analysis for land subsidence and the implementation of future land subsidence plans will provide the information necessary to update the requirement.

Comment No. 19. Page 11, last paragraph, text that reads: "Watermaster and the parties need to determine which of the above approaches or variant of them to include in the storage management plan to ensure their storage management activities do not cause MPI." ***Ag Pool comment reads: "What does Wildermuth (the expert) recommend? Should those that benefit the most pay the most?***

Response: The specific approach in allocating mitigation liability for storage induced changes in net recharge and Safe Yield should be discussed and addressed by the parties.

Comment No. 20. Page 12, second paragraph, text that reads: "This limitation on puts and takes should be reconsidered if the land subsidence management plan for MZ1 includes consideration for Storage and Recovery programs, the land subsidence plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan." ***Ag Pool comment reads: "What does Wildermuth recommend as the tool to accomplish this? This needs further evaluation during development of the plan and continued validation and adjustment during operations on annual basis."***

Response: This management requirement will be described in greater detail in the draft 2020 Storage Management Plan.

Comment No. 21. Page 12, third paragraph, text that reads: "The intent of this provision is to reaffirm the requirements of Paragraph 12 of the Judgment and the Peace Agreement, as to the review of Storage and Recovery Program applications, and to require Storage and Recovery Program agreements to provide provisions that require Storage and Recovery Program proponents to cease or modify their operations if Watermaster determines, subsequent to Watermaster and Court approval of a Storage and Recovery Program storage agreement, that the proponent's storage and recovery operations are causing or threaten to cause MPI. The potential MPI to be addressed include but are not limited to: land subsidence, pumping sustainability, reductions in net recharge and safe yield, water quality impacts, shallow groundwater, and liquefaction." ***Ag Pool comment reads: "Propose abandonment of the Watermaster rebuttable presumption of no MPI."***

Response: This comment should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 22. Page 12, third paragraph, text that reads: “Watermaster will review each Storage and Recovery Program application, estimate the surface and groundwater system response, prepare a report that documents the response and potential MPI, and develop mitigation measures to mitigate MPI caused by the proposed Storage and Recovery Program. Watermaster will incorporate these mitigation measures into the Storage and Recovery Program storage agreement.” ***Ag Pool comment reads: “How will this requirement be reflected in the plan?”***

Response: It will be explicitly stated. This requirement is in the Peace Agreement.

Comment No. 23. Page 12, fifth paragraph, text that reads: “Watermaster will periodically review current basin conditions, compare this information to the projected basin conditions prepared in the evaluation of the Storage and Recovery Program application process, compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations, and make findings regarding the efficacy of related MPI mitigation requirements in the Storage and Recovery Program storage agreement. And, based on its review and findings, Watermaster may require changes in the Storage and Recovery Program operations to mitigate MPI.” ***Ag Pool comment reads: Will this be required by the plan?***

Response: Yes.

Comment No. 24. Page 13, first full paragraph, text that reads: “Watermaster should periodically review the state of Hydraulic Control and update projections of the state of Hydraulic Control, compare this information to the projected Hydraulic Control assessment prepared in the evaluation of the Storage and Recovery Program application process, compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations, and make findings regarding the efficacy of the related mitigation requirements in the Storage and Recovery Program storage agreement. And, based on its review and findings, Watermaster may require changes in the Storage and Recovery Program operations to mitigate impacts on the state of Hydraulic Control.” ***Ag Pool comment: “Define "periodically." The Ag Pool proposes that this be done on an annual basis and no less than every two years.***

Response: This management requirement will be described in greater detail in the draft 2020 Storage Management Plan.

Comment No. 25. Page 13, second full paragraph, text that reads: “Watermaster and the parties should consider updating the storage agreement application process to incorporate changes in the technical features of storage management and to improve the efficiency of the application process.” ***Ag Pool comment reads: “Why not require it now and include it in the plan?”***

Response: This comment should be addressed by the parties in the development of the 2020 Storage Management Plan.

Comment No. 26. Page 13, third full paragraph, text that reads: “Watermaster should periodically review and update the storage management plan based on: monitoring information obtained since the previous storage management plan was adopted, technology changes, and the "needs and requirements of the lands overlying the Chino Basin and the owners of the rights in the Safe Yield or Operating Safe Yield of the Basin." The assessment of technical storage management concerns and opportunities requires the use of updated hydrologic data and models and can be completed efficiently with the recalculation of Safe Yield on a ten-year frequency or more frequently." ***Ag Pool comment reads: "Propose that Wildermuth define when this would be necessary and provide advice. Define "periodically."***

Response: This management requirement will be described in greater detail in the draft 2020 Storage Management Plan.

Comment No. 27. Page 13, fourth full paragraph, text that reads: "The projected aggregate amount of managed storage by the parties in 2050 (planning horizon of the Storage Framework Investigation) is about 340,000 af. Notwithstanding the update frequency recommended above, Watermaster should consider updating the storage management plan before the aggregate amount of managed storage by the parties falls below 340,000 af if not done earlier in a periodic update of the storage management plan." ***Ag Pool comment reads: "Consider adding a buffer of additional AF to provide time to adjust. Consider other potential factors as well, such a rate of decline and projected time of reaching this untested threshold. Repeat that the periodic update should be conducted on an annual basis. not on a regular basis to ensure that it does not fall below. How will storage be allocated among the parties. What happens if everyone wants 100k AF? Where is the substance of the plan?***

Response: As to the direct comment, the intent of the periodic review and update of the Storage Management Plan is to track the amount of water in managed storage, update the plan as necessary to avoid MPI, and to test the efficacy of the 340,000 af threshold. The frequency of the Storage Management Plan review and update will be established to ensure no MPI from the use of managed storage. This management requirement will be described in greater detail in the draft 2020 Storage Management Plan. The answers to the questions "How will storage be allocated among the parties. What happens if everyone wants 100k AF?" and "Where is the substance of the plan?" should be addressed by the parties in the development of the 2020 Storage Management Plan.

Overlying Non-Agricultural Pool

Comment No. 1. Background section, ***Overlying Non-ag Pool comment reads: "In this section, the report says that as a prerequisite to implementing the OBMP, "the parties executed an agreement." Which agreement does this refer to? Which parties executed it?***

Response. The agreement referred to is the 2000 Peace Agreement. Text will be modified to refer to the Peace Agreement.

Comment No. 2. Judgment section, ***Overlying Non-ag Pool comment reads: "In this section, the draft says that groundwater storage "was estimated" to have declined by about 1,600,000 af over the period from 1922 through 1978. Who made this estimate? When? What is the source for this statement?***

Response: The change in storage was reported in *2013 Chino Basin Groundwater Model Update and Recalculation of Safe Yield Pursuant to the Peace Agreement* (WEI, 2015).

Comment No. 3. Judgment section, ***Overlying Non-ag Pool comment reads: "In this section, the draft says that Section 11 and Section 12 of the Judgment require that use of storage be undertaken only under Watermaster control and regulation. Section 11 and Section 12 apply only to Supplemental Water. Is there a basis in the Judgment*** **for control or regulation by Watermaster of carryover water? What is the basis?**

Response: Watermaster does not require agreements for carryover. Paragraph 7 of Exhibit "G" (Overlying (Non-Agricultural) Pool Pooling Plan) and Paragraph 12 of Exhibit "H" (Appropriative Pool Pooling Plan) to the Restated Judgment both require a storage agreement with Watermaster as a condition of storing excess carryover.

Comment No. 4. Judgment section, **Overlying Non-ag Pool comment reads: "In this section, the draft says that Section 28 requires Watermaster to develop and administer storage agreements for Supplemental Water. Section 28 requires Watermaster to administer Supplemental Water, but does not require or authorize Watermaster to develop or administer storage agreements for carryover water. Is there a basis in the Judgment for storage agreements for carryover water? What is the basis?**

Response: See response to Comment No. 3 above.

Comment No. 5. Storage Agreement section, **Overlying Non-ag Pool comment reads: "In this section, the report says that an Excess Carryover account includes a party's unproduced rights in the Safe Yield *"and Basin Water acquired from other parties."* What is intended by the words in italics? Should the italicized words be replaced with "and Excess Carryover acquired from other parties"?**

Response: It includes a party's unproduced safe yield rights and the unproduced rights acquired from other parties.

Comment No. 6. Storage Agreement section, **Overlying Non-ag Pool comment reads: "In this section, the report says that, in evaluating applications for storage agreements, Watermaster must conduct an investigation to determine if the water stored and recovered under a proposed storage agreement will cause MPI to a party or the basin. As stated above, the Judgment appears to authorize control and regulation by Watermaster of Supplemental Water, but not carryover water. Is there a basis in the Judgment for investigations of MPI for storage of excess carryover? What is the basis?**

Response: Paragraph 7 of Exhibit "G" (Overlying (Non-Agricultural) Pool Pooling Plan) and Paragraph 12 of Exhibit "H" (Appropriative Pool Pooling Plan) to the Restated Judgment both require a storage agreement with Watermaster as a condition of storing excess carryover.

Comment No. 7. Existing Managed Storage and Proposed Storage and Recovery Programs section. ***Overlying Non-ag comment reads: "In this section, the report introduces the term "managed storage" for the first time. Prior to this section, all storage was referred to as "storage." The implication is that "managed storage" is a subset of "storage." What is the difference between "storage" and "managed storage"?***

Response: Managed storage is the aggregate of Carryover, Excess Carryover, Local Storage, and Supplemental Waters. This term was used throughout the Storage Framework Investigation presentations and report.

Comment No. 8. Storage Management Plan Requirements section. ***Overlying Non-ag comment reads: "In this section, the report says that it is "logical" to consider establishing an aggregate limit for all storage at 700,000 af. As stated above, the Judgment appears to authorize control and regulation by Watermaster of Supplemental Water, but not carryover water. Should limits on storage apply to Supplemental Water and perhaps other water, but not apply to carryover water?"***

Response: The limits suggested in this section are intended to apply to all water held in managed storage, which includes carryover water.

Comment No. 9. Mitigation of Reduced Net Recharge and Safe Yield section***. Overlying Non-ag comment reads: "In this Section, the report says that Watermaster assesses a 0.07 percent loss to storage accounts based on estimated losses of water in the Basin to the Santa Ana River. As stated above, the Judgment appears to authorize control and regulation by Watermaster of Supplemental Water, but not carryover water. Should such losses be assessed on Supplemental Water and perhaps other water, but not on carryover water?***

Response: Watermaster assesses these losses on excess carryover and supplemental water in storage.

Comment No. 10. Mitigation of Reduced Net Recharge and Safe Yield section. ***Overlying Non-ag comment reads: "In this Section, the report says that the "Storage Framework Investigation" demonstrated that storing water has the effect of reducing net recharge and Safe Yield. Where on Watermaster's website can the Storage Framework Investigation currently be found? Where in the report is this effect "demonstrated." If storage has this effect, should such reduction be attributed to Supplemental Water and perhaps other water, but not to carryover water?***

Response. Please see the Storage Framework Investigation Report located here:
https://cbwm.syncedtool.com/shares/folder/e83081106c3072/?folder_id=1429

The effect of managed storage on net recharge was presented and discussed at several workshops that were conducted during the preparation of the Storage Framework Investigation and pdfs of the PowerPoint presentation from these workshops are located here: https://cbwm.syncedtool.com/shares/folder/e83081106c3072/?folder_id=1406

Comment No. 11. Mitigation of Reduced Net Recharge and Safe Yield section. ***Overlying Non-ag comment reads: "In this Section, the report says that reduction in net recharge caused by storage is an MPI. Carryover water is unproduced water, and unproduced water is a natural condition pre-dating existing development of the basin. How can a natural condition be an MPI?***

Response: In a truly natural condition, basin storage will be maximized and all recharge to the basin is lost to rising groundwater and evapotranspiration by riparian vegetation. In a truly natural condition, net recharge is zero. Increasing the volume of water in managed storage has the effect of suppressing net recharge regardless of how you label the water that is included in the managed storage. That said, the text has been changed substituting the term "adverse impact" for MPI.

City of Ontario

Comment No. 1. Page 10, second paragraph. ***The City's comment reads: "Paragraph 2 contemplates establishing an aggregate limit of 300kaf for all Storage & Recovery (S&R) programs, "provided that the aggregate storage limit for parties does not exceed" 700kaf. This is different from establishing an aggregate limit equal to the total space (1M af) less the volume used by parties (700kaf or less). In the case that parties use less than 700kaf, while S&R programs remain limited to 300kaf, how will the difference between the actual volume of stored water and 1M af be addressed?"***

Response: The suggested aggregate allocation of 700 kaf to the parties for their individual conjunctive-use activities and the 300 kaf for Storage and Recovery Programs is based on the results of the Storage Framework Investigation. The allocation of managed storage space for these two types of uses should be discussed and agreed upon by the parties for inclusion in the 2020 Storage Management Plan.

Comment No. 2. Page 11, "Limitation of Transfers or Leases of Water Rights and Water Held in Managed Storage section." ***The City's comment reads: " The second paragraph in this section states that the limit on certain transfers "should be reconsidered" under certain conditions. It seems logical that these conditions could also include mitigation such as may be required for S&R programs. In addition, S&R programs may be designed such that puts and takes aid in addressing land subsidence, plumes, etc."***

Response: This management requirement will be described in greater detail in the draft 2020 Storage Management Plan

Comment No. 3. Page 11, Mitigation of Reduced Net Recharge and Safe Yield section***. City's comment reads: "This section identifies "two fundamental approaches to mitigate the reduction in net recharge" caused by stored water. Are there additional approaches that can be explored? One such approach may be preemptive mitigation rather than allocation of effects."***

Response: The white paper refers to bookends on the approach to identify and mitigate a reduction in Safe Yield caused by the use of managed storage. The specific approach in allocating mitigation liability for storage induced changes in net recharge and Safe Yield should be discussed and addressed by the parties.

Comment No. 4. Page 12, Evaluation of Storage and Recovery Program Impacts, MPI, and Mitigation section. ***City's comment reads: "The second paragraph in this section states that "Watermaster will review each Storage and Recovery Program application, estimate the surface and groundwater system response...." (emphasis added) It is unclear why it is necessary for Watermaster to evaluate surface water system responses."***

Response: The use of existing recharge facilities for Storage and Recovery Programs may conflict with the use of the same facilities for stormwater recharge and may reduce net recharge. The intent to is characterize this conflict and to subsequently develop conditions on the Storage and Recovery Program to mitigate it.

Comment No. 5. ***The City's comment reads: "General: Please provide citations for all references to guidance documents, particularly when quotation marks are used. Example: Page 13, 1st paragraph under "Storage Management Plan Update."***

Response: This request will be incorporated into the final version of the White Paper.

Appendix B1

Comments and Responses on the draft 2020 Storage Management Plan Report, Version 1

Appendix B1 -- Comments and Responses on the Draft 2020 Storage Management Plan Report, Version 1

October 1, 2019 letter from the Overlying Agricultural Pool

Comment No. 1**.** Page 1, fourth paragraph. Ag pool comment reads: ***"In regard to use of storage space by the Parties and other entities, the Ag Pool proposes that a schedule be developed to dictate when, how and by whom storage will be used. The Ag Pool also proposes that different storage accounts be valued and used appropriately."***

Response. Please see Section 2.1 of the draft 2020 SMP, Version 2.

Comment No. 2. Page 1, fifth paragraph. Ag pool comment reads: ***"The Draft 2020 SMP introduces "three types of storage agreements that result in four types of storage accounts," but only describes three of those four types of storage accounts. (Draft 2020 SMP, Section 1.1.) It also does not explain which type(s) of accounts are available to which Parties or Pools. Although this information is available in other documents, adding this information to the SMP would make for a more complete description of the types and ownerships of current and potential future accounts and would make this section more consistent with Table 1-1."***

Response. In Table 1-1, the column heading in the Overlying Non-Agricultural accounts for "Local Storage" has been changed to "Excess Carryover."

Comment No. 3. Page 1, fifth paragraph. Ag pool comment reads: ***"This paragraph also states that the Watermaster tracks "losses" and reports its accounting in the annual assessment process. Would it be helpful to expand on the types of "losses" that Watermaster tracks? Are there losses other than storage losses?***

Response. The text has been revised to include a description of the losses referred to in Section 1.1.

Comment No. 4. Page 1, sixth paragraph. Ag pool comment reads: ***"The Draft 2020 SMP also states that Watermaster must conduct an investigation to determine if the water stored and recovered under the proposed storage agreement will cause "potential MPI," and that the Watermaster cannot approve a storage agreement that will "result in MPI." (Draft 2020 SMP, Section 1.1.) Is the difference in wording intentional? If so, it would be helpful to explain the***

difference in meaning/use and maybe add this clarification to Note 7 on page 1-1. "Potential MPI" is also used in the first paragraph of Section 2.3.3.2."

Response The text was updated and now reads:

> "In evaluating applications for storage agreements, Watermaster must conduct an investigation to determine if the water stored and recovered under a proposed storage agreement has the potential to cause MPI to a Party or the basin. If Watermaster determines that implementation of the proposed storage agreement has the potential to cause potential MPI, the applicant must revise its application and demonstrate that there will be no MPI, or Watermaster must impose conditions in the storage agreement to ensure there is no MPI. Watermaster cannot approve a storage agreement that has the potential to cause MPI. "

Comment No. 5. Page 2 first full paragraph. Ag pool comment reads: ***"The Draft 2020 SMP recommends that the Watermaster's current limitation on transfers or leases of water rights and water held in managed storage from Parties that are situated such that they pump groundwater outside of MZ1 to Parties that pump in MZ1 for the purpose of replenishment "should be reconsidered if the land subsidence management plan for MZ1 includes consideration for such transfers, the land subsidence plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan." (Draft 2020 SMP, Section 2.3.1.) The Watermaster has indicated that "[t]he ongoing monitoring and analysis for land subsidence and the implementation of future land subsidence plans will provide the information necessary to update the requirement." (Comments and Responses on the June 8, 2019 Storage Management Plan White Paper, p. 10) However, the Draft 2020 SMP does not identify or discuss any parameters that will be used to determine whether the subsequent monitoring demonstrates the sufficiency of the land subsidence management plan. The Draft 2020 SMP also does not identify when such an evaluation would be made or if the limitation would be reinstated if conditions change in the future. Accordingly, the Draft 2020 SMP should be revised to include more detail on when and how the "sufficiency" of the plan will be determined."***

Response. Consider the timeline to reach a point where a land subsidence management plan for MZ1 has been functioning and monitoring and analysis can provide reliable information to assess the ability to allow transfers from Parties outside of MZ1 to Parties inside MZ1 that will not cause land subsidence. Given the present state of knowledge, it could take at least ten years to develop this plan and an agreement to implement it. It could take ten or more years of implementation and monitoring to assess the efficacy of the land subsidence management plan and additional investigations after that to determine if transfers from Parties outside of MZ1 to Parties inside MZ1 could be done without contributing to land subsidence. In sum, more than 20 years. Given this timeline, it is not appropriate to *"identify or discuss any parameters that will be used to determine whether the subsequent monitoring demonstrates the sufficiency of the land* *subsidence management plan."* Rather, the land subsidence management plan should include monitoring and analysis to demonstrate whether or not these transfers could occur and the conditions under which transfers could occur pursuant to the Peace Agreement. The land subsidence management plan should include monitoring and analysis that will provide information to determine if Storage and Recovery Programs can be operated in MZ1 without causing land subsidence.

Comment No. 6. Page 2 second paragraph. Ag pool comment reads***: "The Draft 2020 SMP identifies the two potential approaches to mitigate the reduction in net recharge caused by the Parties' storage management activities but does not further discuss the approaches. Regarding the second identified potential approach, the Ag Pool maintains that working through this issue will require consideration of factors that may/may not be known at the time a storage agreement is proposed or executed, versus uncertainties that could affect the availability, quantity, or cost of water under future continued storage or take conditions. For example, might a Party's interest in executing a storage agreement be affected if the debit associated with reduction in net recharge could not be quantified in advance?"***

Response. A proposed approach has been incorporated into the draft 2020 SMP, Version 2.

Comment No. 7. Page 2 third paragraph. Ag pool comment reads: ***"The Draft 2020 SMP states that storage "put" and "takes" should be prioritized to occur in MZ2 and MZ3 to avoid new land subsidence and interfering with land subsidence management in MZ1, to minimize pumping sustainability challenges, to minimize the impact of storage and recovery operations on solvent plumes, to preserve the state of Hydraulic Control, and to take advantage of the larger and more useful groundwater storage space in MZ2 and MZ3. Nonetheless, the Draft 2020 SMP again recommends that such prioritization "should be reconsidered if the land subsidence management plan for MZ1 includes consideration for such transfers, the land subsidence plan is implemented, and subsequent monitoring demonstrates the sufficiency of the land subsidence management plan" without further detail. (Draft 2020 SMP, Section 2.3.3.1.) The Draft 2020 SMP should be revised to include more detail on when and how the "sufficiency" of the plan will be determined."***

Response. See response to comment No. 5.

Comment No. 8. Page 2 fourth paragraph. Ag pool comment reads***: "Section 1.2, paragraph 1 identifies MWD's "Dry-Year Yield Program (DYYP)." The Ag Pool suggests adding a definition for MWD's DYYP that is more robust than the brief description contained in the paragraph under Table 1-1. Additionally, the paragraph indicates a maximum put of 25,000 afy and a maximum take of 33,000 afy under the DYYP. However, Table 1-1 shows the maximums were***

exceeded twice, in 2009 (40,383 take) and 2018 (35,065 put). An explanation of these apparent exceedances would be helpful."

Response. The text has been modified to explain the put exceeding 25,000 afy in fiscal year 2018 and the take exceeding 33,000 af in fiscal year 2009.

Comment No. 9. Page 2 fifth paragraph. Ag pool comment reads***: "Section 1.2, paragraph 4 refers to "managed storage space available." The Ag Pool suggests that Watermaster consider clarifying whether this is physical space available (without resulting in MPI), space available through existing approvals, both, or something else."***

Response. It's physical space available to the Parties and it was authorized in the 2010 Peace II Project Subsequent Environmental Impact Report and its 2017 Addendum. Other than the impact from the use of managed storage on net recharge and Safe Yield, no MPI is projected to occur.

Comment No. 10. Page 2 sixth paragraph. Ag pool comment reads: ***"The Draft 2020 SMP states that the "Watermaster will periodically review current and projected basin conditions, compare this information to the projected basin conditions prepared in the evaluation of the Storage and Recovery Program application process, compare the projected Storage and Recovery Program operations to actual Storage and Recovery Program operations, and make findings regarding the efficacy of related MPI mitigation measures and requirements in the Storage and Recovery Program storage agreement. And, based on its review and findings, Watermaster may require changes in the Storage and Recovery Program agreements to mitigate MPI." (Draft 2020 SMP, Section 2.3.3.2.) The Ag Pool proposes that Watermaster's review of Hydraulic Control be conducted on an annual basis and no less than every two years."***

Response. Presently Watermaster evaluates the state of hydraulic control on a one- to two-year frequency and reports the results of the evaluation to the Regional Board pursuant to its Maximum Benefit commitments.

Comment No. 11. Page 3 first full paragraph. Ag pool comment reads: ***"Sections 2.3.3.2 and 2.3.3.3 refer to Watermaster developing mitigation measures and incorporating such measures into a storage agreement. Is it appropriate that Watermaster develop the mitigation measures (given that doing so might affect the feasibility or cost of a Party's storage program) or should Watermaster simply identify the potential MPI that must be mitigated and leave it to the Party to develop and propose mitigation measures that Watermaster finds sufficient and acceptable?"***

Response. The text in Section 2.3.3.2 was modified to read:

> "Watermaster will review each Storage and Recovery Program application, estimate the surface and groundwater system response, prepare a report that describes the response and potential MPI, and develop mitigation requirements to mitigate MPI caused by the proposed Storage and Recovery Program. The Storage and Recovery Program applicant will develop mitigation measures pursuant to these requirements and incorporate them into their Storage and Recovery Program application. Upon approval by Watermaster, these mitigation measures will be incorporated into the Storage and Recovery Program storage agreement."

The text in Section 2.3.3.3 was modified to read:

> "Watermaster will, as part of the Storage and Recovery Program application review process, make a projection of the program's expected impact on the state of Hydraulic Control. Watermaster will review these impacts and develop mitigation requirements for the proposed Storage and Recovery Program. The Storage and Recovery Program applicant will develop mitigation measures pursuant to these requirements and incorporate them into their Storage and Recovery Program application. Upon approval by Watermaster, these mitigation measures will be incorporated into the Storage and Recovery Program storage agreement."

Comment No. 12. Page 3 second paragraph. Ag pool comment reads***: "The Draft 2020 SMP states that the Watermaster will "periodically" update the SMP and suggests "it can be completed efficiently with the recalculation of Safe Yield on a ten-year frequency." The Draft 2020 SMP also suggests that Watermaster should consider updating the SMP at least five years before the aggregate amount of managed storage by the Parties falls below 340,000 af if not done earlier in a periodic update of the SMP. The Ag Pool proposes that a projection of anticipated managed storage should be made at least every 5 years if the SMP is updated every 10 years. This will facilitate identification of an interim trigger to update the SMP based on managed storage falling below the 340,000 af threshold."***

Response. The text was modified to read:

> "Watermaster will periodically review and update the SMP based on: monitoring information obtained since the previous SMP was adopted, technology changes, and the "needs and requirements of the lands overlying the Chino Basin and the owners of the rights in the Safe Yield or Operating Safe Yield of the Basin." The periodic review and update of the SMP will require the use of updated planning and hydrologic data and models, and it should be completed: at no less than a five-year frequency; when the Safe Yield is recalculated; or when Watermaster determines a review and update is warranted based new information and/or the needs of the Parties or the Basin.

> The projected aggregate amount of water in managed storage by the Parties in 2056 (planning horizon of the 2018 SFI) is about 340,000 af. The impacts to the Basin and the Parties from reducing managed storage below 340,000 af has not been estimated. Notwithstanding the SMP update frequency stated above, Watermaster should update the SMP at least five years before the aggregate amount of managed storage by the Parties is projected to fall below 340,000 af."

Comment No. 13. Page 3 third paragraph. Ag pool comment reads: ***"The storage agreement application process section of the Draft 2020 SMP was left blank to be filled by Watermaster staff in the next draft. The Ag Pool proposes that the storage agreements include limits for the parties' use of managed storage. The storage agreements should also include a provision that places applicants on notice that water transfers between parties and its storage and extraction are subject to the continued finding of no MPI by Watermaster. The pumping sustainability issues should also be addressed in the storage agreements by including identification and analysis of production locations. The Draft 2020 SMP also did not address Ag Pool's proposed abandonment of the Watermaster rebuttable presumption of no MPI. Accordingly, Ag Pool restates its proposal to abandon the Watermaster's rebuttable presumption of no MPI."***

Response. Watermaster will present its proposed storage application process in the draft 2020 SMP Report, Version 3 in November.

October 1, 2019 annotated version of the draft 2020 SMP, Version 1 provided by the Inland Empire Utilities Agency

Comment No. 1. Comment refers to Section 2.2 referenced immediately above. IEUA comment reads: ***"Will there be a prioritization of Basins and resulting operation scheme?"***

Response. There is an existing hierarchal scheme for the use of spreading basins that includes the following: (1) flood control, (2) maximizing storm water recharge, (3) Watermaster replenishment and recharge, (4) IEUA recycled water recharge, and (5) maintenance. Use of spreading basins by Storage and Recovery Programs would come after the five higher priority uses have been satisfied.

Comment No. 2. Comment refers to Section 2.3.2 on page 2-2: "Two potential approaches were identified in the 2019 SFI and 2020 SMP White Paper to mitigate the reduction in net recharge caused by the Parties storage management activities." IEUA comment reads: ***"Should this include S&R programs or is it implicit?"***

Response. Section 2.3.2 refers to mitigation of the reduction in net recharge and Safe Yield due to the use of managed storage by the Parties. Mitigation for the reduction of net recharge and Safe Yield due to the use of managed storage by a Storage and Recovery Program is explicitly described in Section 2.3.3.2 of the draft 2020 SMP Report, Version 2.

Comment No. 3. Comment refers to Section 2.3.4 on page 2-3 and refers to a future section of the 2020 SMP that is not yet written. IEUA comment reads: ***"A flow chart may be helpful for this section once it is prepared?"***

Response. A flow chart may be included in the draft 2020 SMP, Version 3.

Comment No. 4. Comment refers to Section 2.3.4 on page 2-3 and refers to a future section of the 2020 SMP that is not yet written. IEUA comment reads: ***So are the S&R Programs going to be analyzed with boundary conditions of managed storage between 720kaf and 340kaf? Or based on annual projections as provided herein?"***

Response. No. Storage and Recovery Programs will be evaluated for their use of storage space in excess of that used by the Parties. Presently, the managed storage use by the Parties is projected to reach a maximum value of 720,000.

Appendix B2

Comments and Responses on the draft 2020 Storage Management Plan Report, Version 2

Appendix B2 – Comments and Responses on the October 24, Draft 2019 Storage Management Plan Report, Version 2

November 19, 2019 comment letter from the Overlying Agricultural Pool (OAP)

Comment No. 1**.** Section 1.1. OAP comment reads: ***"The introduction and descriptions of storage agreements and accounts remain unclear. The text refers to three types of agreements and four types of accounts. The text names four types of accounts, but only describes three. The relationship between types of accounts and their corresponding agreements should be clarified."***

Response. The text of SMP document was revised and it now reads:

> "Since the Judgment came into effect, Watermaster developed rules and regulations, standard storage agreements, and related forms. <u>There are three types of storage agreements that result in five types of storage accounts: Excess Carryover, Local Supplemental-Recycled, Local Supplemental-Imported, Pre-2000 Quantified Supplemental, and Storage and Recovery.</u> An Excess Carryover account includes a Party's unproduced rights in the Safe Yield (Safe Yield for Overlying Non-Agricultural Pool Parties and Operating Safe Yield for Appropriative Pool Parties) and Basin Water acquired from other Parties. Local Supplemental Water accounts includes imported and recycled water that is recharged by a Party and similar water acquired from other Parties. A Storage and Recovery account includes Supplemental Water and is intended to produce a "broad and mutual benefit to the Parties to the Judgment." Watermaster tracks the puts, takes, losses, and end of year storage totals for all of these storage accounts, and reports on this accounting in the annual assessment process. <u>The losses assessed by Watermaster are based on the amount of water in managed storage (excluding Carryover) and they offset the increase in groundwater discharge to the Santa Ana River from the Chino Basin attributable to managed storage (excluding Carryover). Watermaster also assesses losses due to evaporation on the puts when water is recharged in spreading basins</u>." (emphasis added)

Comment No. 2**.** Section 1.1. OAP comment reads: ***"The response to OAP Comment No.3 indicates the "text has been revised to include a description of the losses referred to in Section 1.1." (Appendix B Response to Comments on 2020 SMP V1, p. B-1.) The noted revisions and description are not apparent. Where in the text can they be found? There is a storage loss factor***

for flow out of the Chino North Management Zone (described in the White Paper). Are other losses calculated and tracked?"

Response. See text revision in the response to Comment No. 1 above.

Comment No. 3**.** Section 1.1. OAP comment reads: ***Details, such as the date it was approved by the court and its purpose, are provided for Form 8, however, corresponding information about Form 1 is not provided. Consider adding such information or explaining why the information is not relevant for Form 1."***

Response. The text of SMP document was revised to include the following paragraph in Section 1.1:

> "The Form 1 Application for Local Storage Agreement was approved in 2001 and has not been amended since that time; it is the mechanism through which Parties may apply to enter into a Local Storage Agreement."

Comment No. 4. Section 2.1. OAP comment reads: ***"This section does not describe how storage may be allocated among the Parties. Watermaster counsel has indicated Watermaster has no priority for allocation of storage but what will happen if it becomes a limited resource? Is it first come first serve until fully allocated with the hope that it will not be fully allocated?"***

Response. Watermaster anticipates, based on the Parties' projections, that 800,000 AF would be adequate to satisfy the Parties' storage activities and the DYYP until 2030. Watermaster plans to evaluate projections periodically and update the SMP no less frequently than every 5 years having the opportunity to adjust and avoid limiting the Parties use.

Comment No. 5. Section 2.1. OAP comment reads: ***"It is clear that a storing entity must prepare an evaluation of managed storage above 1,000,000 acre-feet (af) "to ensure that there will be no material injury." The OAP suggests making it clear (as we understand from the workshops) that the evaluation will be both a technical evaluation in addition to CEQA compliance. The OAP suggests including clarification that the evaluation needs to address potential Material Physical Injury (MPI) as well as adverse impacts (Safe Yield reduction and loss of hydraulic control)."***

Response: The text of SMP document was revised and it now reads:

> "Note that the use of managed storage greater than 1,000,000 af may be possible provided the storing entity submits a bona fide Storage and Recovery Program application, demonstrates that the program has broad mutual benefit,

> demonstrates that program's mitigation measures will meet the mitigation requirements of the Watermaster to ensure there will be no MPI and other adverse impacts, complies with CEQA and obtains approval from the Watermaster." (emphasis added)

Comment No. 6. Section 2.3.2. *OAP comment reads:* ***"Future evaluations of storage impacts to Safe Yield will be done in the Safe Yield reset or interim corrections. It may be helpful in this section to reference the 2015 Reset Technical Memorandum and the April 2017 Court order for additional information on the Safe Yield reset methodology."***

Response. A footnote was added to this section that reads:

> "Refer to the 2015 Reset Technical Memorandum and the April 2017 Court Order for additional information on the Safe Yield reset methodology. These documents can be found here: https://cbwm.syncedtool.com/shares/folder/e83081106c3072/?folder_id=1595."

Comment No. 7. Section 2.4.2. OAP comment reads: ***"The Draft SMP Version 2 states, "…recharge loss rate… may be adjusted from time-to time…" What is the mechanism for developing and approving this adjustment, and can it only be done under the condition of additional evaluation of Safe Yield?"***

Response. Watermaster may adopt uniform rules to address triggers, notice, opportunity to respond and to implement corrective actions. Moreover, as part of the Storage and Recovery application and approval process, each Storage and Recovery application may have customized conditions responsive to the characteristics of the specific project.

Comment No. 8. Section 2.4.2. OAP comment reads: ***"The Draft SMP Version 2 states, "Watermaster will periodically review current and projected basin conditions…" Periodically is subject to interpretation. Will this review be done at a minimum frequency, based on threshold changes in amounts of water in storage, or combined with other reviews (e.g., SMP updates, additional Safe Yield evaluations"***

Response. Watermaster will periodically review current and projected basin conditions when it updates the SMP as described in Section 2.6. Watermaster could conduct additional reviews if routine assessments of monitoring and planning data indicate changed conditions from that which was assumed in the evaluation of existing Storage and Recovery Program, when the Safe Yield is recalculated and when new Storage and Recovery Program applications are submitted to Watermaster.

Comment No. 9. Section 2.4.3. OAP comment reads: ***"The Draft SMP Version 2 states, "Watermaster will periodically review current and projected state of Hydraulic Control…" Periodically is subject to interpretation. Will this review be done at a minimum frequency, based on threshold changes in amounts of water in storage, or combined with other reviews (e.g., SMP updates, additional Safe Yield evaluations)?"***

Response. Hydraulic Control is evaluated annually in the Max Benefit Report to the Regional Board.

Comment No. 10. Section 2.4.3. OAP comment reads: ***"Please clarify that loss of Hydraulic Control is not an MPI, if that is what is intended. Loss of Hydraulic Control appears to have a higher threshold of impact than impacts to Safe Yield in the SMP because loss of Hydraulic Control "must be mitigated" as indicated in the section heading. The OAP suggests additional discussion of this need for a higher level of mitigation in the text of this section."***

Response. The text of SMP document was revised in multiple locations to state that loss of Hydraulic Control is an adverse impact and not MPI.

Comment No. 11. Section 2.6. OAP comment reads: ***"This section identifies the need for Watermaster to "update the SMP at least five years before the aggregate amount of managed storage by the Parties is projected to fall below 340,000 af." Watermaster has indicated in its response to comments that this threshold of 340,000 af includes Storage and Recovery programs. The 340,000 af threshold was established because impacts to the basin (e.g. subsidence induced by groundwater withdrawal) due to reducing managed storage below this threshold have not been evaluated. It could be termed "the band of storage management untested for MPI." We suggest that it may be appropriate to discuss this issue in Section 2.4.2 because there is additional risk in any storage and recovery program that relies on this untested band of storage management."***

Response. The 340,000 af threshold includes managed storage by the Parties and does not include Storage and Recovery programs.

November 21, 2019 comment email from the Overlying Non- Agricultural Pool (ONAP)

Comment No. 1. Page 1-2 – Last sentence of Background section. ONAP comment reads: ***"This sentence omits that Non-Agricultural Pool Parties can have Supplemental Waters. Please make the correction."***

Response: The text of SMP document was revised and it now reads:

> "Local Storage includes Excess Carryover for the Overlying Non-Agricultural Pool Parties and Excess Carryover and Supplemental Waters for the Appropriative Pool and Overlying Non-Agricultural Pool Parties."

Comment No. 2. Page 1-4 and Page 2-1 – Conjunctive-Use. ONAP comment reads: ***"Section 1.2 and Section 2.1 talk about conjunctive-use. How is conjunctive-use defined? What is included and excluded?"***

Response: First sentence of Section 1.2 describes conjunctive use.

Comment No. 3. Page 2-3 & 2-4 – Local Storage Applications/Agreements. ONAP comment reads: ***"Section 2.5 addresses the evergreen concept and the need for a revised Form 8. Will a new Form 1 also be needed? Will input from the Pools be considered in crafting revised forms?"***

Response: Proposed revised Forms, to the extent desired, will be considered and approved through the Pool Committee, Advisory Committee, and Board process.

Comment No. 4. Section 2.5. ONAP comment reads: **"Section 2.5 also comments that the evergreen agreements would be valid for the duration of the Peace Agreement. What happens upon expiration and how much advance notice will Parties have?"**

Response: The expiration of the Peace Agreement will be known at least five years in advance. Accordingly, the effect of the expiration of the Peace Agreement and storage agreements can be considered and addressed at the time an intervening SMP update is undertaken.

Comment No. 5. Page 2-4 – MPI. ONAP comment reads: ***"The last sentence in Section 2.5 discusses MPI. Please provide a summary of what MPI may be caused by water in storage if***

the Parties do not exceed the proposed First Managed Storage Band of 800,000 AF. What MPI could be caused over 800,000 AF?"

Response: The Storage Framework Investigation indicated there is no MPI within the FMSB; storage used above 800,000 AF will need to be evaluated for MPI (land subsidence, water quality, and pumping sustainability) and other adverse effects (e.g. reduction in Safe Yield, loss of Hydraulic Control).

November 19, 2019 comment letter from the City of Chino

Comment No. 1. Section 1.2 (Page 1-5 2nd paragraph) and Section 2.1 (page 2-1 paragraphs 1 and 2). City's comment reads: ***"Section 1.2 indicates the combined use of managed storage and the existing Dry Year Yield (DYY) conjunctive use program is projected to reach a maximum of ~790,000 AF, assuming there is 100,000 AF in the DYY in 2028. Section 2.1 paragraph 1 indicates the First Managed Storage Band (FMSB, upper threshold = 800,000 AF) includes the DYY. Section 2.1 paragraph 2 indicates that extension of the DYY (beyond 2028) will require the DYY to use storage space above the 800,000 AF band threshold.*** (a) ***Does this mean that if the DYY is extended (beyond 2028) that the 100,000 AF of space below the 800,000 AF threshold (within FMSB) previously reserved for DYY use prior to 2028 is immediately available for managed storage use in 2029 and no longer available for the DYY?*** (b) ***Does this mean that any extension of the DYY program beyond 2028 would likely be required to mitigate impacts in-advance?*** (c) ***Do the terms of the existing DYY agreement require that the water in the DYY account be entirely depleted (withdrawn) prior to 2028 agreement expiration?"***

Response. (a) – Yes. (b) – Any Storage and Recovery Program would be approved only if any projected MPI and adverse impacts are addressed such that the Program could be undertaken without MPI or adverse impacts. (c) – The storage agreement does not address this issue; the Operating Committee is currently reviewing. The SMP is planned to be updated at a frequency no less than every 5 years so any changes regarding the DYYP agreement could be addressed in later updates if necessary.

Comment No. 2. City's comment reads: ***"Expanding on Comment No. 1 (above), the possibility of adjusting the FMSB upper threshold up or down, based on the Parties' needs, was discussed at the November 6th SMP Workshop #3. Please expand on the timing of the modifications to the FMSB and what the process would be to make changes to the FM SB. For example, would changes to the FMSB upper threshold require consent from all three Pools and would unanimous consent be required from the Appropriative and Overlying Non-Agricultural Pool members?"***

Response. The Restated Judgment gives Watermaster control over storage; Watermaster plans to update the SMP as described in Section 2.6 and at that time will seek input including water demand and supply projections from the Parties. The FMSB was defined based on the Parties' input, which would be considered again at the time of any SMP update.

Comment No. 3. Section 2.3.2. City's comment reads: ***"Section 2.3.2 indicates that reduction in Safe Yield (SY) due to projected managed storage volume is incorporated into the SY estimate, and that this adverse impact (i.e. reduced Safe Yield) is mitigated by the prospective calculation***

of SY. (a) ***Please provide a tabulation or other form of explanation that illustrates the impact/mitigation below the FMBS threshold of 800,000 AF. Presumably, other factors (besides managed storage) may also have the effect of reducing Safe Yield.*** (b) ***Can it be determined what portion of estimated SY reduction is due to storage management and what portion of estimated SY reduction is due to other factors?*** (c) ***If yes, then how can these factors (i.e. managed storage and other cultural condition factors) be described in separate quantitative terms to allow for a practical means to reconcile the associated impacts on an annual basis?***

For example, if SY (net recharge) is reduced as a result of increasing storage volumes (assuming no corresponding implementation of a plan for optimizing production that would be necessary to maintain SY), can this cause & effect be expressed algebraically? (d) ***If yes, then what is the algebraic formula? If no, then what practical method(s) may be used to quantify the cause & effect on an annual basis as storage volumes fluctuate?"***

Response. (a) – This information has not been developed by Watermaster or its consultants. (b) – Theoretically, yes. (c) – Technical work could be done to develop methods to allocate the projected changes in net recharge and Safe Yield based on changes in cultural conditions and the individual Parties pumping, recharge and the storage activities. (d) – This would be determined in the work described in (c). This scope of work is highly impractical as there are many variables to consider and thus has not been considered or budgeted.

Comment No. 4. City's comment reads: ***"Expanding on Comment No. 3 (above), Storage Framework Investigation (SFI) Figure 5-7 depicts a projected inflection point at approximately Year 2040 when the net recharge begins to steadily increase. SFI Figure 6-3 describes managed storage volumes in Year 2040 to be well above 500,000 AF (depending on assumed operating scenario), and then dropping to approximately 340,000 AF in the Year 2056. Please provide an explanation of the circumstances depicted by these two figures, and how/why Safe Yield (net recharge) is projected to increase in the future when there is a significant amount of managed storage."***

Response. As to Figure 5-7, the following observations can be made from the review of 2018 SFI report Tables 3-4 and 3-5. In Scenario 1A, total groundwater pumping is projected to increase from about 146,000 afy in 2018 to about 154,000 afy in 2030 (~ 8,000 afy increase) and thereafter gradually increase to about 177,000 afy by 2040 (~23,000 afy increase). Projected pumping is less than pumping rights through 2030 and storage is projected to increase through 2030. After 2030, pumping exceeds pumping rights and storage is projected to decrease. The net recharge projection generally declines with increasing storage and increases with decreasing storage. There is a time lag between the onset of the decrease in storage and increase in net recharge that is attributable to the basin dynamics – in 2032 the rate of decline in net recharge declines and by about 2040 the net recharge starts to increase. Inspection of the water budget shown in Table 3-5 indicates that the total recharge during the 2018 through 2050 period is fairly consistent and averages about 200,000 afy; and that the total discharge increases gradually over the same period from about 190,000 afy to 218,000 afy tracking the projected pumping. Cultural conditions have some effect in that the deep infiltration of precipitation and applied water decreased by about 5,000 afy from 2018 to 2050 and however this effect has been offset by a projected increase in storm water recharge in 2021.

As to Figure 6-3 the projected decline in managed storage occurs because 80 percent of the projected replenishment obligation, estimated to be about 17,000 afy after 2030, is satisfied from managed storage.

Comment No. 5. . Sections 2.4.2 and 2.4.3. City's comment reads: ***"Both discussions end with an indication that Watermaster may require changes in Storage and Recovery (S/R) agreements to mitigate impacts. What processes of Watermaster notification and S/R Party response are contemplated to allow S/R Parties to modify their behavior to avoid or minimize further mitigation after they have presumably already provided mitigation at the time their S/R agreements were initially approved?"***

Response. Watermaster may adopt uniform rules to address triggers, notice, opportunity to respond and to implement corrective actions. Moreover, as part of the Storage and Recovery application and approval process, each Storage and Recovery application may have customized conditions responsive to the characteristics of the specific project.

Comment No. 6. White Paper. City's comment reads: ***"The SFI (page 1-5) indicates the Chino Basin Groundwater Model and Recalculation of Safe Yield Pursuant to the Peace Agreement {Safe Yield report) assessed the hydrology of the Chino Basin, and concluded that managed storage was projected to increase from 487,000 AF in Year 2016 to approximately 663,000 AF by Year 2030 and then decline thereafter to zero (0.0) AF by Year 2051. This was restated in the White Paper at the bottom of page 5. However, as described in Comment No. 4 (above), the subsequent SFI analysis (Figure 6-3) indicates managed storage is projected to be approximately 340,000 AF in Year 2056.*** (a) ***Does the SFI analysis update/replace the conclusion of the Safe Yield report with respect to the projected volume of managed storage in future years? Please explain."***

"The White Paper (page 3) indicates the Operational Storage Requirement (OSR) is the volume of storage necessary to maintain the Safe Yield (SY), and that during the development of the Optimum Basin Management Program (OBMP ~ Year 2000) the OSR was estimated to be 5.3 MAF. The White Paper also indicates the Safe Storage Capacity {SSC} in addition to the OSR was estimated (~ Year 2000) to be 500,000 AF (the SSC is the amount of storage for which it was believed significant water quality impacts would not be triggered by groundwater level). More recent Storage Framework Investigation (SFI) analyses seem to indicate that the SSC is~ 800,000 AF. SMP Section 2.6 indicates it is projected that the aggregate amount of managed storage by the Parties is approximately 340,000 AF in Year 2056 and that impacts resulting from an aggregate managed storage volume less than 340,000 AF has not been estimated.

However, recent SMP workshop discussions seem to suggest that if the aggregate managed storage volume is less than 340,000 AF, then it is believed that new land subsidence may result. (b) ***What relationships exist between the originally estimated 5.3 MAF OSR, the originally estimated 500,000 AF SSC, the 800,000 AF SFI FMSB, and the projected 340,000 AF managed storage volume?"***

Response. (a) – Yes. The 2018 SFI uses updated water demand and supply projections. (b) – The estimated 5,300,000 af OSR and 500,000 af SSC described in the Peace Agreement IP have no relationship to 800,000 af FMSB described in the 2020 SMP. The storage management plan in the 2020 SMP is a completely different management paradigm than that described in the Peace Agreement IP. The 2018 SFI and 2020 SMP are based on 20 years of monitoring, a significantly updated hydrogeologic understanding of the basin and improved modeling.

Comment No. 7. Section 2.3.2. City's comment reads: ***"Comment No. 3 (above), pertaining to Section 2.3.2, describes a circumstance that might generally be regarded as an adverse impact since SY is reduced. Maintenance of the 340,000 AF threshold described in Comment No. 6 (above) would seem to represent a positive impact i.e. prevents triggering the "onset of new land subsidence" that would likely occur when managed storage falls below that critical managed storage volume. If true, then how might this positive impact be quantified?"***

Response. Quantification of a benefit on preventing the occurrence of new land subsidence by maintaining managed storage in excess of 340,000 af is beyond the scope of the 2018 SFI.

November 19, 2019 comment letter from the City of Ontario

1. **Storage Bands**

   a. ***Section 1.2 describes end conditions for the volume of water in the DYYP account in 2028 and the subsequent extraction. This paragraph (the second paragraph on page 1-5) does not accurately characterize the agreement between Metropolitan Water District and the Parties to the DYYP. Parties are not obligated to perform (i.e. remove water from the DYYP storage account) after 2028.***

   Response. The DYYP agreement does not address this issue; the Operating Committee is currently reviewing. The SMP is planned to be updated at a frequency no less than every 5 years so any changes regarding the DYYP agreement could be addressed at later updates if necessary.

   b. ***Section 2.1 states that "the managed storage space between 800,000 and 1,000,000 af is reserved for Storage and Recovery Programs" (emphasis added).***

      i. ***If, due to changing conditions or water resource management, Parties desire to store more than 800,000 af, will Watermaster authorize storage agreements for Parties to do so?***

      Response. Yes, but this will require future technical evaluations and an SMP revision that would occur in periodic update of the SMP as described in Section 2.6.

      ii. ***Does this statement indicate that Watermaster intends to reserve space above 800,000 af for Storage and Recovery Programs which may never come to fruition?***

      Response. No, Watermaster anticipates, based on Parties' projections, that 800,000 AF would be adequate to satisfy Parties' storage activities and the DYYP until 2030. Watermaster plans to evaluate projections periodically and update the SMP no less frequently than every 5 years having the opportunity to adjust and avoid limiting the Parties use.

   c. ***Section 2.1 states that "renewal or extension of the DYYP agreement will require the DYYP to use storage space above 800,000 af." It is unclear why this is required.***

   Response. The FMSB for the 2020 SMP includes the projected managed storage requirement of the Parties and the DYYP. The DYYP is included in the FMSB because it is an existing Storage and Recovery Program, it places contractual requirements on the Parties and it will terminate in 2028. Renewal or extension of the DYYP will trigger a new Storage and Recovery Program application process and the terms of the renewed or extended DYYP storage agreement will need to be consistent with the SMP at the time the new Storage and Recovery Program application is considered by Watermaster. Storage and Recovery Programs utilize storage above the FMSB. The 800,000 afy contained in the FMSB will be revised no later than 2025 and it may be increased or decreased based on the managed storage requirements of the Parties.

d. ***In the last paragraph of Section 2.1, it is noted that "the use of managed storage greater than 1,000,000 af may be possible provided the storing entity…demonstrates that the program has broad mutual benefit."***

   i. ***What is the basis for this requirement? The Peace Agreement does not require all Storage and Recovery Programs provide broad mutual benefit. Broad mutual benefit is only necessary if Watermaster acts to condition, curtail or prohibit Local Storage to provide priority to Storage and Recovery Program(s).***

   Response. Section 5.2(c)(iv)(b) of the Peace Agreement provides that Watermaster shall prioritize its efforts to regulate and condition the storage and recovery of water developed in a Storage and Recovery Program for the mutual benefit of the Parties to the Judgment and give first priority to Storage and Recovery Programs that provide broad mutual benefits.

   ii. ***How is broad mutual benefit demonstrated and/or determined?***

   Response. Broad mutual benefit will be determined at the time that application(s) for Storage and Recovery Program storage agreements are received, and it may be determined through Activity B as it is being contemplated in the 2020 OBMP Update.

2. **Use of Spreading Basins**

a. ***In Appendix B, Watermaster's response to Inland Empire Utilities Agency's (IEUA) Comment No. 1 states that "there is an existing hierarchal scheme for the use of spreading basins." The listed "hierarchal scheme" includes first flood control, second stormwater recharge, third Watermaster replenishment and recharge, and fourth IEUA recycled water recharge. Who developed the hierarchal scheme for the use of spreading basins and where is this scheme documented? To which basins does it apply? Basins may be owned by San Bernardino County Flood Control District, Chino Basin Water Conservation District, or IEUA.***

Response. The priorities are established in Section III of the "Agreement for Operation and Maintenance of Facilities to Implement the Chino Basin Recharge Master Plan". They are also specified by basin in the Operations Manual.

b. ***Additionally, basins and basin improvements in some cases were funded 50% by IEUA to increase recycled water recharge. How does the stated hierarchal scheme recognize the priority of the Parties that have invested financially in the basins?***

Response. See response to comment 2.a. above.

3. ***Mitigation***

a. ***What is the benchmark for mitigation impacts to net recharge and Safe Yield? In other words, is the demonstrated reduction compared against 140,000 afy, 135,000 afy, or another value, such as a theoretical Safe Yield absent stored water?***

Response. The benchmark is estimated net recharge and Safe Yield absent stored water.

b. ***The Storage Framework Investigation concluded that the reduction in Safe Yield (as a percentage of average annual storage space used) ranged from 1.50% to 2.41% for bands 2, 3 and 4. The Storage Management Plan states this value as 2.0 percent. Please clarify if the 2.0 percent is an average across the three bands or if Watermaster is using a different methodology to set the 2.0 percent impact.***

Response. It is an average. For clarity the text of SMP document was revised and it now reads:

> "The 2018 SFI concluded the that the net recharge and Safe Yield of the basin would be reduced annually by about 2.0 percent <u>(ranged from 1.5 to 2.4 percent) of</u> the volume of water stored in a Storage and Recovery Program." (emphasis added)

c. ***Section 2.4.1 suggests prioritizing puts and takes in MZ2 and MZ3, in part due to impacts on "solvent plumes." Solvent plumes are also present in MZ2 and could be impacted by puts and takes in that zone, as could pumping depressions. Each Storage and Recovery***

Program should be individually analyzed to determine acceptable put and take locations.

Response. Comment noted.

d. ***For the process described in the second paragraph of Section 2.4.2, please describe if Watermaster will estimate lifetime reduction in net recharge at the onset of a Storage and Recovery Program, to be deducted annually similar to Local Storage losses, or if another method is envisioned.***

Response. Watermaster will prepare an initial estimate of "rate" of reduction in net recharge and Safe Yield attributable to a specific Storage and Recovery Program during the application process. Watermaster may update the rate periodically as described in the fourth paragraph of Section 2.4.2 (SMP version 2) and through periodic updates of the SMP as described in Section 2.6.

4. Scope and Timing of Environmental Review

The Appropriative Pool formally requested that Watermaster proceed with the environmental review of storage management, including working with the Appropriative Pool's technical consultant. Watermaster has indicated that it intends to incorporate the Storage Management Plan into the current Optimum Basin Management Plan (OBMP) update effort, and then pursue environmental review on the package. However, the OBMP update effort is not subject to the same demonstrated time sensitivities as the Storage Management Plan, and negotiations have not yet begun on the activities to be included in an implementation plan. Ontario requests that Watermaster, responsive to the Pool's request, perform environmental review of the Storage Management Plan independent of and ahead of any environmental review that may be needed for the OBMP update.

Response. Comment noted.

5. Frequency of Updates

What is the basis for setting the minimum frequency at every five years? Performing the update every ten years concurrently with Safe Yield recalculations will provide a timelier and more comprehensive picture of storage projections. The five-year requirement is excessive and presents an unnecessary cost to the paying stakeholders. If conditions change or if the need arises, additional updates can be performed. Ontario recommends a minimum frequency of every ten years for updates.

Response. Comment noted.

6. Characterization of Material Physical Injury

a. In Footnote 7 defining Material Physical Injury, storage and recovery is incorrectly listed as “Storage, and Recovery.” In the definition in Peace I, the term “storage and recovery” is not capitalized (in other words, is not a defined term) and is not separated into two actions by the placement of the comma.

Response. The text of SMP document was revised and it now reads:

> "Material Physical Injury" means material injury that is attributable to the Recharge, Transfer, storage and recovery, management, movement or Production of water, or implementation of the OBMP, including, but not limited to, degradation of water quality, liquefaction, land subsidence, increases in pump lift (lower water levels), and adverse impacts associated with rising Groundwater.” (emphasis added)

b. Section 1.2 states that “for the planned use of managed storage by the Parties up to 700,000 af…there would be no MPI with the exception of a reduction of net recharge and Safe Yield….” A reduction of net recharge and Safe Yield is not included in the definition of Material Physical Injury.

Response. The SMP document has been revised to characterize the reduction in net recharge and Safe Yield attributable to managed storage activities as an adverse impact. The text now reads:

> “The 2018 SFI projected that for the planned use of managed storage by the Parties up to 700,000 af that Hydraulic Control would be maintained, that there would be no MPI and that there would be an adverse impact from the reduction of net recharge and Safe Yield attributable to the use of managed storage.” (emphasis added)

c. Section 2.4.2 includes “reduction in Safe Yield” in the list of “MPIs to be addressed” in the first paragraph. A reduction in Safe Yield is not included in the definition of Material Physical Injury.

Response. The SMP document has been revised to characterize the reduction in net recharge and Safe Yield attributable to managed storage activities as an adverse impact.

7. ***Types of Storage Accounts Storage Agreements***

   a. ***Section 1.1 lists "four types of storage accounts" under "three types of storage agreements." It is unclear what the three types of storage agreements are, and the four types of storage accounts include "Local Storage" separate from "Local Supplemental" and "Excess Carryover." By definition, Local Storage includes Excess Carryover and Local Supplemental. Please clarify this statement.***

   Response. The text of the SMP document was revised and now reads:

   > "Since the Judgment came into effect, Watermaster developed rules and regulations, standard storage agreements, and related forms. There are three types of storage agreements that result in five types of storage accounts: Excess Carryover, Local Supplemental-Recycled, Local Supplemental-Imported, Pre-2000 Quantified Supplemental, and Storage and Recovery. An Excess Carryover account includes a Party's unproduced rights in the Safe Yield (Safe Yield for Overlying Non-Agricultural Pool Parties and Operating Safe Yield for Appropriative Pool Parties) and Basin Water acquired from other Parties. Local Supplemental Water accounts includes imported and recycled water that is recharged by a Party and similar water acquired from other Parties. A Storage and Recovery account includes Supplemental Water and is intended to produce a "broad and mutual benefit to the Parties to the Judgment. Watermaster tracks the puts, takes, losses, and end of year storage totals for all of these storage accounts, and reports on this accounting in the annual assessment process." (emphasis added)

   b. ***Please include a citation for the quotation at the top of page 1-3.***

   Response. The SMP document was revised to include the citation. The citation reads: "See paragraph 5.2(c)(iv)(b) of the Peace Agreement"

November 22, 2019 comment letter from the City of Upland

Comment No. 1. Section 1.2, Page 1-4. City's comment reads: " **Reduction of net recharge appears to be characterized herein as Material Physical Injury (MPI).** (a) **However, in Section 2.3.2 and at the November 6, 2019 2020 SMP workshop, reduction of net recharge is characterized as an adverse impact and mitigated for within the Safe Yield recalculation.** (b) **With the typical duration between Safe Yield recalculations being approximately 10-years, why isn't the mitigation for reduction of net recharge calculated annually to respond to the annual fluctuations in storage volume (as proposed in Section 2.4.2 for Storage and Recovery Programs)?** (c) **What are the advantages and disadvantages for mitigating for reduction in net recharge being embedded in Safe Yield versus on an annual basis?"**

Response. (a) – The text in the SMP has been modified to describe reductions in net recharge and Safe Yield as an adverse impact. (b) The Court's April 2017 order establishes the SY recalculation methodology; the recalculation considers the volume of wet water in Storage over the coming decade. (c) See part (b).

Comment No. 2. Section 1.2, Page 1-5. City's comment reads: " **Generally, what is the technical basis for allowing the Dry Year Yield Program (DYYP) to exceed puts and takes? What was the technical basis for allowing the DYYP takes to exceed 40,000 acre-feet (AF) in 2009? Is that approved by Watermaster as an administrative procedure or is that circulated through the Pools and board for approval?"**

Response. When MWD wants to exceed the 25,000 AF of annual put set forth in the DYYP agreement, the Parties consider the request through the regular Watermaster process.

Comment No. 3. Section 2.1, Page 2-1. City's comment reads: " **Regarding storage greater than 1,000,000 AF, consider revising and elaborating on that process. More specifically, what constitutes a "bona fide" application. In addition, please consider adding the required CEQA analysis to store above 1,000,000 AF."**

Response. The text in the SMP document was revised to include a footnote containing a definition of a bona fide Storage and Recovery Program application. The footnote reads:

> "A bona fide Storage and Recovery Program application includes the name of the person; the source, quantity and quality of the Supplemental Water; a description of the facilities proposed to be used, operating plan and duration of the proposed Storage and Recovery Program; CEQA documentation; and any other information Watermaster requires to evaluate the application."

The SMP text was also revised to include a requirement to complete a CEQA process for Storage and Recovery Program application that wish to use managed storage space in excess of 1,000,000 af.

Comment No. 4. Section 2.2, Page 2-1. City's comment reads: **" The City's "Upland Basin" is used by Watermaster and IEUA pursuant to an agreement between the three agencies. The agreement stipulates a specific quantity of storage space allocated to Watermaster and IEUA. To date, the agencies have worked cooperatively under said agreement to optimize basin usage, including storage above the dead storage quantity and allowing others to use the City's basin for recharge. The priority of additional recharge above the 200,000 AF in the agreement is subject to negotiation. This section needs to be clarified to recognize that use of some spreading basins is subject to separate agreement(s)."**

Response. The text of the SMP document was revised and it now reads:

> "Watermaster will include provisions in storage agreements to prioritize the use of spreading basins to satisfy Watermaster's recharge and replenishment obligations over the use of spreading basins for other uses <u>subject to limitations provided in existing agreements with the owners of the facilities</u>." (emphasis added)

Comment No. 5. Section 2.3.1, Pages 2-1 and 2-2 . City's comment reads: **" The limitations placed on agencies within MZ1 due to the potential to cause MPI will likely be in effect for "more than 20-years" according to Watermaster (Appendix B, Comment No. 5, Page B-2) appear to pose a long-term constraint on the ability of agencies within MZ1 to manage water. This limitation on transfers should also allow for a reconsideration on a case by case basis, over the next 20-years or more, by Watermaster to ensure there will be no MPI.**

For example, if a proposed transfer or lease from a Party that pumps outside of MZ1 to a Party that pumps in MZ1 demonstrates groundwater levels remain greater than the new land subsidence metric (i.e. new land subsidence won't occur per 2018 SFI Section 2.2.1), then consideration should be given by Watermaster."

Response. Comment noted.

Comment No. 6. Section 2.3.2, Page 2-2. City's comment reads: **" Same comments as above regarding mitigation for reduction of net recharge."**

Response. Comment noted.

Comment No. 7. Section 2.5, Page 2-4. City's comment reads: **" Define the term "evergreen agreement". Please provide clarification on the automatic adjustment (i.e. can be adjusted both up and down)."**

Response. Evergreen in this context signifies an agreement to store water that accommodates changes in the quantity of water in storage within FMSB, without requiring a new storage application.

November 20, 2019 comment letter from the Monte Vista Water District

Comment No. 1. MVWD comment: **"The SMP should specify which portions are proposed for incorporation into the 2020 Optimum Basin Management Program (OBMP) Implementation Plan as an amendment to the Peace Agreement. It may make more sense for Peace Agreement Parties to negotiate an amendment to the Peace Agreement (OBMP Implementation Plan) prior to approving the SMP, as the SMP must be consistent with the Peace Agreement, whether or not it is amended and only through consent of the Peace Agreement Parties."**

Response. The entire document is planned to be included in the 2020 OBMP IP.

Comment No. 2. MVWD comment: **"The SMP should acknowledge the priority of storage for Storage and Recovery Programs to the extent that Local Storage may be curtailed or prohibited (Peace Agreement 5.2 (b)(xi))."**

Response. The SMP has been drafted to provide the Parties with the use of all necessary storage for Local and Storage and Recovery activities consistent with the Parties' preferences and needs.

Comment No. 3. MVWD comment: **"The SMP should direct Watermaster to fully mitigate any reduction in Safe Yield due to either historical or projected storage activities in a manner that is equitably applied to all applicable storage activities so that Safe Yield is kept whole in respect to these storage activities."**

Response. Watermaster considers that the effects of storage activities in Safe Yield are addressed by the recalculation of Safe Yield pursuant to the Technical Memorandum methodology approved by the Court's April 28, 2017 order. Watermaster staff has been informed that the Appropriative Pool has reached agreement among Parties on how to compensate for individual storage activity effects on Safe Yield reduction.

Comment No. 4. MVWD comment: **"The SMP should focus on water stored in the basin that is subject to an agreement with Watermaster under the Judgment. This includes Local Storage (Excess Carryover and Supplemental), Storage and Recovery, and Preemptive Replenishment. Carryover is part of a producing Party's annual production right and not subject to an agreement with Watermaster. If Carryover is in excess of a Party's annual share of safe yield, the Party may then store the excess Carryover in a Local Storage (Excess Carryover) account under agreement with Watermaster. In contrast, water under a preemptive replenishment agreement is water stored in the basin under agreement with Watermaster; therefore, its management should be included in the SMP."**

Response. The Safe Storage Capacity identified in the OBMP IP included Carryover, which is “wet water” in storage. Similarly, the SMP provides for management of water in storage regardless of whether an agreement with Watermaster is required.

Comment No. 5. MVWD comment: **“For purposes of brevity and to avoid any potential confusion, the SMP should avoid describing the process and requirements for determining material physical injury (MPI), and instead refer to relevant sections of the Peace Agreement and Rules and Regulations governing MPI determination.”**

Response. Comment noted.

Comment No. 6. MVWD comment: **“The SMP should, under the principle of "beneficiary pays," include the implementation of a storage assessment as a more equitable way to allocate Chino Basin Watermaster costs related to storage.”**

Response. The judgment provides for Watermaster costs to be recovered using production-based assessments.

General response to MVWD redlined version of 2020 Draft Storage Management Plan, Version 2.

MVWD prepared a redline version of the 2020 SMP Version 2 document. The document has been modified to reflect comments received from various parties, this includes MVWD’s edits consistent with the overall document philosophy. Watermaster’s staff general responses to the suggested redline document are listed below:

1. Information included in the Background section is considered useful to the reader.
2. Carryover is “wet water” in the basin and was included in the Safe Storage Capacity in the OBMP IP. While Carryover does not require a storage agreement with Watermaster it is within Watermaster’s management and control, thus it is included in managed storage.
3. Preemptive replenishment accounts will no longer be used after current balances have been depleted.
4. The rebuttable presumption of no MPI was eliminated as part of the Second Amendment to the Peace Agreement.
5. Watermaster estimates the amount of storage to be used by Parties based on their projections will be 800,000 af including DYYP and not 720,000 af.
6. Watermaster is tasked with evaluating transfers and put and take operations before approving them.
7. The SMP provides a high-level description of Storage and Recovery Program requirements including Hydraulic Control impacts, this is intended to be helpful to future Storage and

Recovery Program applications.

8. Watermaster considers it necessary that the SMP be updated at the indicated frequency.

November 20, 2019 comment letter from the Chino Basin Water Bank

Comment No. 1. Comment reads: ***"Based on our understand that the storage space used by the Parties is projected to reach 720 KAF and the combined use of managed storage by the Parties and Metropolitan's DYYP is projected to reach a maximum of about 790 KAF, how was the 800 KAF for the S&R Program derived?"***

Response: Please see Appendix C of the final SMP report. The projected use of managed storage space by the Parties and Metropolitan is just under 800,000 af. The value of 800,000 af was arrived at by rounding up.

Comment No. 2. Comment reads: ***"Why are S&R required to mitigate MPI as if the 800 KAF were fully used, when it potentially is not?"***

Response: This is based on the Peace Agreement paragraph 5.2(c)(xiii) and (ix) that require Watermaster to condition Storage and Recovery Program storage agreements to protect the Parties and the basin from any potential MPI and to consider Broad Mutual Benefits.

Comment No. 3. Comment reads: ***"How do the estimated net recharge of 2.41% and 1.5% as average storage used translate to the annual loss percentages?"***

Response: See response to City of Ontario's comment No. 3.b.

Comment No. 4. Comment reads: ***"What process does Watermaster propose to adjust loss percentages in the future so that S&R Programs will have adequate time to prepare prior to changing conditions going into effect?"***

Response: Watermaster may adopt uniform rules to address triggers, notice, opportunity to respond and to implement corrective actions. Moreover, as part of the Storage and Recovery application and approval process, each Storage and Recovery application may have customized conditions responsive to the characteristics of the specific project.

Appendix C

2019 Update of Water Demand, Water Supply and Managed Storage Projections through 2050

Appendix C – 2019 Update of Water Demand, Water Supply and Managed Storage Projections through 2050

During the development of the 2020 SMP, Watermaster requested the Appropriative Pool Parties to review their water demand, associated water supply plan and their plans to use their stored water that were used in the 2018 SFI and update them if warranted. The planning period for the 2020 SMP is 2020 through 2050. Table C-1 shows the projected groundwater pumping by all Parties along with the recent historical pumping. The groundwater pumping projections for the Appropriative Pool Parties were unchanged from those used in the 2018 SFI except for three Parties: Cities of Chino and Pomona and the Monte Vista Water District (MVWD). The table below summarizes the differences between the pumping projections used in the 2018 SFI and the 2020 SMP. In summary the projected pumping in the 2020 SMP is less than that assumed in the 2018 SMP.

Comparison of total projected pumping for the 2018 SFI and 2020 SMP (afy)

Year	2018 SFI	2020 SMP	2020 SMP – 2018 SFI
2020	144,527	139,519	-5,008
2025	149,468	144,596	-4,872
2030	154,302	151,808	-2,494
2035	167,772	164,600	-3,122
2040	176,765	173,805	-2,969

Table C-2 lists the projected time series of managed storage by the Parties through 2050 based on the pumping projections in Table C-1. Table C-2 is constructed as follows.

- Column 1 lists the planning fiscal year ending on June 30.
- Column 2 list the projected total annual pumping based on the updated total pumping projections listed in Table C-1.
- Columns 3, 4 and 5 contain the projected annual Safe Yield from Scenario 1A of the 2018 SFI, Reoperation water used to partially offset annual Desalter replenishment obligation and the projected annual recycled water recharge.
- Column 6 lists the total annual pumping right which is equal to the sum of columns 3, 4 and 5.
- Column 7 lists the net annual replenishment obligation and is equal to the projected total annual groundwater pumping minus the projected total annual pumping rights. A negative value means that pumping is less than pumping rights and the difference results in an increase in managed storage. A positive value indicates that pumping exceeds pumping rights and a replenishment obligation has occurred that must offset through wet-water recharge and or from managed storage.

- Column 8 lists the annual amount of the replenishment obligation that is satisfied from storage. In the 2018 SFI it was determined that about 80 percent of the replenishment obligation would be satisfied from water in storage accounts and that assumption has not changed.
- Column 9 lists the annual amount of the replenishment obligation that is satisfied through wet-water recharge.
- Column 10 list the time history of end-of-year managed storage. The end-of-year managed storage is numerically equal to the end-of-year managed storage at the end of the prior year minus the net replenishment obligation (column 7) plus wet-water replenishment (column 9).

The maximum managed storage by the Parties is reached is 713,100 af in 2030. After 2030, the managed storage is projected to decline annually and reach about 484,000 af by 2050.

Metropolitan's Dry-Year Yield Program (DYYP) is the only active Storage and Recovery Program in the basin. The DYYP can store up to 100,000 af with maximum puts of 25,000 afy and maximum takes of 33,000 afy. The DYYP storage and recovery agreement provides that puts and takes can exceed these values if agreed to by Watermaster (as was done in fiscal years 2018 and 2009, respectively). The agreement that authorizes the DYYP will expire in 2028.

The combined use of managed storage by the Parties and Metropolitan's DYYP is projected to reach a maximum of about 791,300 af assuming that the DYYP has 100,000 af in storage in 2028 and that subsequent to 2028 Metropolitan removes that water from managed storage at the contract rate of 33,300 afy starting in 2029. This is illustrated in the table below.

Total potential combined end-of-year managed storage of the Parties and Metropolitan (af)

Year	Parties	Metropolitan	Total
2026	664,842	100,000	764,842
2027	678,623	100,000	778,623
2028	691,254	100,000	791,254
2029	702,734	66,667	769,434
2030	713,063	33,333	746,463
2031	713,061	67	713,128

Appendix E

Table C-1 Historical and Projected Groundwater Pumping in the Chino Basin

(af)

Producer	Historical Pumping										Pumping Projection (2019 Update)				
								Statistics (2013-2019)							
	2013	2014	2015	2016	2017	2018	2019	Min	Max	Mean	2020	2025	2030	2035	2040
Overlying Agricultural Pool															
Aggregate Agricultural Pool Pumping	23,946	22,063	17,361	16,904	17,786	18,827	15,572	15,572	23,946	*18,923*	15,678	12,788	9,968	7,907	4,808
Overlying Non-Agricultural Pool															
Ameron	59	18	29	30	25	-	-	18	59	*32*	-	-	-	-	-
Angelica Textile Service	48	37	26	28	20	-	-	20	48	*32*	-	-	-	-	-
California Speedway Corporation	509	436	454	300	410	438	389	300	509	*419*	500	500	500	500	500
California Steel Industries, Inc.	1,303	1,417	1,279	1,187	1,298	1,266	1419	1,187	1,419	*1,310*	1,450	1,450	1,470	1,500	1,530
General Electric Company	1,285	1,626	1,355	917	1,667	957	1127	917	1,667	*1,276*	1,667	1,667	1,667	1,667	1,667
NRG California South LP	470	290	221	204	211	212	18	18	470	*232*	232	232	232	232	232
Riboli Family and San Antonio Winery, Inc.	10	10	7	4	5	6	26	4	26	*10*	10	10	10	10	10
Southern Service Company	-	-	-	-	-	21	23	21	23	*22*	32	32	32	32	32
TAMCO	-	-	-	-	-	18	10	10	18	*14*	32	32	32	32	32
Subtotal Overlying Non-Agricultural Pool Pumping	*3,685*	*3,834*	*3,371*	*2,670*	*3,636*	*2,919*	*3,010*	*2,670*	3,834	*3,304*	*3,923*	*3,923*	*3,943*	*3,973*	*4,003*
Appropriative Pool															
Arrowhead Mountain Spring Water Company	413	379	426	356	367	308	285	285	426	362	400	400	400	400	400
City of Chino	7,022	6,725	6,546	5,010	4,972	5,162	4,315	4,315	7,022	5,679	8,262	9,696	11,058	11,945	14,355
City of Chino Hills	3,039	2,163	3,745	1,633	2,246	2,839	1,608	1,608	3,745	2,468	2,570	3,600	3,600	3,600	3,600
City of Ontario	21,146	21,980	17,675	22,849	24,840	26,280	20,722	17,675	26,280	22,213	12,363	14,514	17,947	23,715	31,016
City of Pomona	12,227	12,909	12,520	9,964	8,067	9,286	10,840	8,067	12,909	10,830	11,309	11,395	11,481	11,568	11,568
City of Upland	2,358	2,822	3,416	2,601	1,260	1,764	2,381	1,260	3,416	2,372	2,800	2,800	2,800	2,800	2,800
Cucamonga Valley Water District	18,740	16,122	14,640	20,537	16,562	6,838	9,624	6,838	20,537	14,723	12,755	13,687	13,859	19,282	19,282
Fontana Water Company	11,752	15,377	13,344	15,317	13,250	11,392	9,961	9,961	15,377	12,913	9,920	10,416	13,153	15,591	17,942
Jurupa Community Services District	17,411	18,406	12,805	9,284	11,498	15,286	13,894	9,284	18,406	14,083	10,310	12,310	14,310	14,310	14,310
Marygold Mutual Water Company	1,250	1,315	1,250	753	619	944	950	619	1,315	1,011	1,241	1,322	1,403	1,484	1,565
Monte Vista Water District	10,324	12,522	7,402	8,371	7,086	6,483	6,631	6,483	12,522	8,403	6,500	6,257	6,397	6,537	6,668
Niagara	1,000	1,343	1,860	1,775	1,532	1,571	1,683	1,000	1,860	1,537	1,537	1,537	1,537	1,537	1,537
San Antonio Water Company	1,540	1,159	1,479	1,031	538	428	376	376	1,540	936	1,232	1,232	1,232	1,232	1,232
San Bernardino County (Olympic Facility)	12	16	11	9	13	11	11	9	16	12	12	12	12	12	12
Golden State Water Company	1,059	736	720	807	850	148	0	0	1,059	617	374	374	374	374	374
Subtotal Appropriative Pool Pumping	*109,292*	*113,974*	*97,840*	*100,297*	*93,699*	*88,740*	*83,280*	*83,280*	*113,974*	*98,160*	*81,585*	*89,552*	*99,564*	*114,387*	*126,661*
Chino Desalter Authority															
Total Desalter Pumping	*27,098*	*29,282*	*30,022*	*28,191*	*28,284*	*30,088*	*31,233*	*27,098*	*31,233*	*29,171*	*40,000*	*40,000*	*40,000*	*40,000*	*40,000*
2020 SMP Projected Total Pumping	164,021	169,153	148,593	148,061	143,405	140,574	133,095	*133,095*	*169,153*	*149,557*	141,186	146,263	153,474	166,266	175,472
Less GE Injection											-1,667	-1,667	-1,667	-1,667	-1,667
2020 SMP Projected Net Total Basin Pumping											139,519	144,596	151,808	164,600	173,805
2018 SFI Projected Net Total Basin Pumping											144,527	149,468	154,302	167,722	176,765
Change in Projected Net Total Basin Pumping from the 2018 SFI Projection											-5,008	-4,872	-2,494	-3,122	-2,960

increase relative to 2018 SFI projection

decrease relative to 2018 SFI projection

Table C-2 Projected Groundwater Pumping, Pumping Rights, Replenishment and End-of-Year Volume in Managed Storage – SFI Scenario 1A Revised

(af)

Fiscal Year ending June 30 (1)	Projected Groundwater Pumping per 2020 SMP Survey for Normal Year (2)	Pumping Rights: Safe Yield[1] (3)	Pumping Rights: Reoperation Water Use to Offset the Desalter Replenishment Obligation (4)	Pumping Rights: Recycled Water Recharge (5)	Pumping Rights: Total (6) = (3)+(4)+(5)	Net Replenishment Obligation[2] (7) = (2)-(6)	Replenishment from Storage[3] (8)	Replenishment with Wet-Water Recharge (9)	End-of-Year Managed Storage $(10)_t = (10)_{t-1} - (7)_t + (9)_t$
2019									503,275
2020	139,519	135,000	12,500	13,504	161,004	-21,485	0	0	524,760
2021	140,534	140,717	12,500	13,795	167,012	-26,478	0	0	551,237
2022	141,550	140,717	12,500	14,087	167,304	-25,754	0	0	576,991
2023	142,565	140,717	12,500	14,379	167,595	-25,030	0	0	602,021
2024	143,581	140,717	12,500	14,670	167,887	-24,306	0	0	626,327
2025	144,596	140,717	12,500	14,962	168,179	-23,583	0	0	649,910
2026	146,038	140,717	5,000	15,253	160,970	-14,932	0	0	664,842
2027	147,481	140,717	5,000	15,545	161,262	-13,781	0	0	678,623
2028	148,923	140,717	5,000	15,837	161,554	-12,631	0	0	691,254
2029	150,365	140,717	5,000	16,128	161,845	-11,480	0	0	702,734
2030	151,808	140,717	5,000	16,420	162,137	-10,329	0	0	713,063
2031	154,366	137,943	0	16,420	154,363	3	2	1	713,061
2032	156,924	137,943	0	16,420	154,363	2,561	2,049	512	711,012
2033	159,483	137,943	0	16,420	154,363	5,119	4,096	1,024	706,917
2034	162,041	137,943	0	16,420	154,363	7,678	6,142	1,536	700,774
2035	164,600	137,943	0	16,420	154,363	10,236	8,189	2,047	692,585
2036	166,441	137,943	0	16,420	154,363	12,077	9,662	2,415	682,923
2037	168,282	137,943	0	16,420	154,363	13,918	11,135	2,784	671,789
2038	170,123	137,943	0	16,420	154,363	15,759	12,607	3,152	659,181
2039	171,964	137,943	0	16,420	154,363	17,600	14,080	3,520	645,101
2040	173,805	137,943	0	16,420	154,363	19,441	15,553	3,888	629,548
2041	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	614,971
2042	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	600,394
2043	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	585,818
2044	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	571,241
2045	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	556,664
2046	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	542,087
2047	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	527,510
2048	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	512,934
2049	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	498,357
2050	173,805	139,164	0	16,420	155,584	18,221	14,577	3,644	483,780

503,275 af is the estimated volume in managed storage on June 30, 2019

1 -- Safe yield estimate from net recharge estimated in Scenario 1A.

2 -- This is the annual net replenishment obligation based on the assumptions described in the 2018 SFI report; negative values mean aggregate underproduction and an increase in stored water accounts.

3 -- 80 percent of a positive replenishment obligation is satisfied from storage and 20 percent is satisfied by wet-water recharge.

F

Appendix F. Cucamonga Judgment

Recorded April 29,1958
Book 4496, page 321,
San Bernardino County
Official Records

WALKER, WRIGHT, TYLER & WARD
210 West 7th Street, Suite 631
Los Angeles 14, California
TRinity 8936

Attorneys for Plaintiff

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF SAN BERNARDINO

SAN ANTONIO WATER COMPANY, a corporation,

Plaintiff,

-vs-

FOOTHILL IRRIGATION COMPANY, a corporation; SUNSET WATER COMPANY, a corporation; LOAMOSA WATER COMPANY, a corporation; and OLD SETTLERS WATER COMPANY, a corporation; ALTA LOMA MUTUAL WATER COMPANY, a corporation; ARMSTRONG NURSERIES, a corporation; BANYAN HEIGHTS WATER COMPANY, a corporation; CARNELIAN WATER COMPANY, a corporation; CITRUS WATER COMPANY, a corporation; CUCAMONGA DEVELOPMENT COMPANY, a corporation; CUCAMONGA WATER COMPANY, a corporation; HEDGES WELL COMPANY, a corporation; HELLMAN WATER COMPANY, a corporation; HERMOSA WATER COMPANY, a corporation; JOYA MUTUAL WATER COMPANY, a corporation; REX MUTUAL WATER COMPANY, a corporation; SAPPHIRE MUTUAL WATER COMPANY, a corporation; CHARLES SNYDER; UPLAND WATER COMPANY, a corporation; HENRY G. BODKIN and BANK OF AMERICA NATIONAL TRUST AND SAVINGS ASSOCIATION, as Executors of the last will of Giovanni Vai, deceased; WESTERN FRUIT GROWERS, a corporation; HUGH P. CRAWFORD; G. N. HAMILTON RANCH, a partnership composed of Arthur Bridge, Helen Bridge, and Grace W. Burt; JOHN DOE ONE to THIRTY inclusive, MARY ROE ONE to THIRTY inclusive, JOHN DOE COMPANY ONE to TWENTY inclusive,

Defendants.

No. 92645

D E C R E E

WHEREAS, there has been filed in the above entitled action, a Stipulation for Judgment duly executed by and on the part of each and all of the following named parties to said action (who are collectively hereinafter referred to as the "stipulating parties"), to wit:

San Antonio Water Company, a corporation;

Foothill Irrigation Company, a corporation;

Ioamosa Water Company, a corporation;

Old Settlers Water Company, a corporation;

Sunset Water Company, a corporation;

Cucamonga Water Company, a corporation;

Alta Loma Mutual Water Company, a corporation;

Armstrong Nurseries, a corporation;

Banyan Heights Water Company, a corporation;

Carnelian Water Company, a corporation;

Citrus Water Company, a corporation;

Hedges Well Company, a corporation;

Hellman Water Company, a corporation;

Hermosa Water Company, a corporation;

Joya Mutual Water Company, a corporation;

Upland Water Company, a corporation;

Western Fruit Growers, a corporation;

Cucamonga Development Company, a corporation;

Sapphire Mutual Water Company, a corporation;

Charles Snyder;

Hugh P. Crawford;

Bank of America National Trust and Savings Association, a national banking association, and Henry G. Bodkin, as executors of the last Will of Giovanni Vai, deceased;

G. N. Hamilton Ranch, a partnership composed of Arthur Bridge, Helen Bridge, Grace W. Burt;

BURR & HELLYER
ATTORNEYS AT LAW
SAN BERNARDINO, CALIFORNIA

and Rex Mutual Water Company.

and,

WHEREAS, the Court has heard and considered evidence on the part of various of the stipulating parties,

NOW, THEREFORE, IT IS HEREBY ORDERED, ADJUDGED AND DECREED by this Court that:

FIRST: As used herein, the terms listed below shall have the respective meanings next following them, viz:

(a) "Cucamonga Basin" or "Basin" shall mean that certain territory in the County of San Bernardino, State of California, which is more particularly described upon Exhibit 1, and shall also include all percolating water and underground water and water sources underlying said territory;

(b) "Imported water" shall mean water derived from a stream flow in an area outside of any water shed draining into the Cucamonga Basin. Specifically, water derived from San Antonio Canyon and/or Creek is "imported water".

(c) "Irrigation season" shall mean that portion of each year when irrigating is required by the users of the water sold by the Plaintiffs and Defendants hereto. While this period varies considerably from year to year, the irrigating season generally commences during any month in which the rainfall does not exceed two inches, and the season generally terminates after the first rainfall of two inches or more. The season usually approximates the period from May 1st to November 1st.

"Spreading season" is the balance of each year remaining after deducting the irrigation season for such year, and is usually approximately the period from November 1st of one year to May 1st of the succeeding year.

"Spread" with respect to water shall mean to conduct the same upon and sink the same into the gravels of Cucamonga Basin during a spreading season.

SURR & HELLYER
ATTORNEYS AT LAW
SAN BERNARDINO, CALIFORNIA

(d) "Aggregate stipulated water" means the total number of acre feet of water set opposite the names of all stipulating parties in Exhibit 2.

(e) "Pro-rata" means, in each case, in the same proportion as the acre feet listed opposite the name or names of the party or respective parties in question bear to the aggregate stipulated water; and the verb "pro-rate" means to divide and share pro-rata among the stipulating parties.

(f) "Allocated water" of any stipulating party or parties in each case means the number of acre feet of water set out on Exhibit 2 opposite the name or names of such party or parties.

(g) "Ten preceding years" means the period of ten consecutive calendar years which immediately precedes or has preceded the year or event mentioned.

(h) "Five-sixths of the water users" shall mean stipulating parties having in the aggregate allocated water which is not less than five-sixths of the total allocated water of all stipulating parties.

(i) An "inch" of water or a "miner's inch" of water shall mean a flow of water equal to one-fiftieth (1/50th) of a cubic foot of water per second of time.

(j) Any party hereto the corporate name of which ends with "Water Company" or "Mutual Water Company" will be hereinafter referred to without such words. Thus "San Antonio" means herein "San Antonio Water Company" and similarly with the other parties using said words "Water Company" or "Mutual Water Company".

(k) "Canyon pipeline" shall mean the pipeline (varying in size between approximately 32 inches in inside diameter and about 18 inches) which extends Southerly from a point on the channel of Cucamonga Creek at an elevation of approximately 2350 feet above sea level (herein called "Northerly intake") to the "round weir" mentioned below.

(l) "Round weir" shall mean that certain weir of Ioamosa marked on the map Exhibit 3 as "Round Weir"and located near the top of the bluff on the East side of Cucamonga Creek and just Northerly from the Westerly prolongation of Almond Street, said weir being the point from which (a) two ten-inch water lines marked on the map Exhibit 3 as "Ioamosa 10 inch" lead Easterly to Ioamosa's Carnelian Street Reservoir (at about elevation 2030 feet above sea level on the East side of Carnelian Street between Hillside Road and Almond Street);(b) a six-inch water line marked on the map Exhibit 3 as "Hamilton 6 inch"leads Southeasterly to the Hamilton Ranch(which lies South of Hillside Road,North of Banyan Street,East of Sapphire Street and West of Carnelian Street),and,(c) an eight-inch water line marked on the map Exhibit 3 as "Banyan 8 inch" runs Southerly down Topaz Street to connect with the water system of Banyan Heights.

(m) "Reservoir Weir" means the weir of Ioamosa located at the Carnelian Street Reservoir.

(n)"Ioamosa Southerly Intake" shall mean a line extending West across the channel of Cucamonga Creek from the existing"Canyon Weir" of Ioamosa marked on the map Exhibit 3 as "Canyon Weir",which weir is located in Cucamonga Canyon,is part of the Canyon pipeline, and is situated about midway (or somewhat Northerly thereof)between the round weir and the Northerly intake mentioned above.

(o) "Schulhof pipe-line" means that certain three-inch water pipe-line marked on the map Exhibit 3 as "Schulhof 3 inch" which connects with the Canyon pipe-line Northerly of the round weir, and which is mentioned in paragraph Second(h) of that certain decree dated April 12, 1937, in action No. 29,799 (Schulhof v. Cucamonga Development Company) in the above entitled Superior Court.

(p) The water to which Ioamosa is entitled as provided in paragraph "Third" hereof is herein called "Ioamosa gravity water", or "gravity water".

(q) "An overflow year"shall mean any calendar year for which

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the water level determined as hereinafter provided in the index well is at an elevation of 1345 feet or higher above sea level.

For the purposes of determination of elevation above sea level the United States Geological Survey bench mark on Baseline (also known as 16th Street) as it exists on the date this decree is entered, on or near the north boundary of Section 4, Township 1 South, Range 7 west, and approximately four-fifths of a mile west of Vineyard Avenue, shall be deemed to be at an elevation above sea level of 1454 feet. The elevation of the water level in such index well shall be determined by measuring the elevation of such water in such well on October 1st of each year (Provided that if any such day falls on a Sunday or a holiday, measurements shall be made on the next business day). The index well shall be the well known as Shaft No. 9-A of the San Antonio Water Company located approximately 154 feet Southerly of the Northwest corner of Lot 14 of Red Hill subdivision and shown on the map Exhibit 5. Wells No. 11 of Cucamonga Water Company and 20 and 22 of the San Antonio Water Company shall not be pumped within three days before such date of measurements, and the tunnel bulkhead adjacent to Red Hills Country Club will be kept closed for a like period before such date. If for any reason Shaft 9-A shall not be available for measurement, then the index well shall be Wells No. 11 of Cucamonga Water Company or 20 or 22 of the San Antonio Water Company, in the order herein listed. If for any reason none of said wells shall be available for such measurement, the identity and location of the index well may be determined by a written stipulation executed by five-sixths of the water users and filed in said action, or in default of said stipulation by order of the said court.

Annexed to this Decree and hereby incorporated herein are the following Exhibits:

Exhibit 1: A description of the territory under which lies the "Cucamonga Basin";

Exhibit 2: A list of the "allocated water" of each party (Other than the stream flow mentioned in paragraph "Third");

Exhibit 3: A map of "Cucamonga Pipe Lines";

Exhibit 4: A map of "Cucamonga Spreading Works";

Exhibit 5: A map of "Well and Shaft Locations";

and said exhibits are herein respectively referred to as "Exhibit 1", "Exhibit 2", "Exhibit 3", "Exhibit 4" and "Exhibit 5".

SECOND: This paragraph deals with the right and quantity of water San Antonio may annually hereafter extract from the Cucamonga Basin as reduced by its failure to previously annually spread therein the minimum amount of water hereinafter set forth, or as increased by its previously annually spreading more imported water therein than said minimum, excepting, however, in both such situations the spreading of imported water during years in which such spread causes the Basin to overflow resulting in such year constituting an overflow year, as defined in Paragraph First, subdivision (q) thereof.

For the purpose of the computation in this Paragraph Second, it shall be assumed that San Antonio has spread in each of the ten years previous to 1957, 2,000 acre feet of imported water.

With respect to each calendar year after entry of this decree each preceding ten year period shall be divided into "included" and "Excluded" years. "Excluded years" are those calendar years which are defined as overflow years in Paragraph First, subdivision (q) thereof. All other calendar years are "included years".

If in the ten preceding years San Antonio shall have spread less than 2,000 acre feet of imported water in any of the included years, as modified by the assumption above set forth, the difference between (a) The amount of imported water which shall have been so spread in such included years, and (b) The quantity of 2,000 acre feet multiplied by the number of included years, shall be known as the "ten year deficit".

Any right of San Antonio to extract water from the Cucamonga

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Basin in any calendar year after the entry of this decree shall be reduced by the number of acre feet of water equal to the ten year deficit divided by the number of included years, if any such deficit shall have occurred, so that such right to extract water for such year shall not exceed 6,500 acre feet less the ten year deficit divided by the number of included years.

Correspondingly, with respect to each calendar year after the entry of this decree, if in the ten preceding years San Antonio shall have spread more than 2,000 acre feet of imported water in any of the included years, as modified by the assumption above set forth, the difference between (a) The amount of imported water which shall have been so spread in such included years, and (b) The quantity of 2,000 acre feet multiplied by the number of included years, shall be known as the "ten year surplus".

The right of San Antonio to extract water from the Cucamonga Basin in any calendar year after the entry of this decree, shall be increased by a number of acre feet of water equal to 95 percent of the ten year surplus divided by the number of included years, if any such surplus shall have occurred, so that there shall be added for such year to San Antonio's right to extract 6,500 acre feet of water a number of acre feet of water equal to 95 percent of the ten year surplus divided by the number of included years. Provided, however, that in no case shall such increased extraction exceed 2,000 acre feet of water for any one calendar year.

So long as the water level in the index well referred to in paragraph First, subdivision (q) herein is at an elevation below 1345 feet above sea level, and in the event San Antonio has available in any one calendar year after the year 1956 more than 2,000 acre feet of imported water, and desires to sell the same, it shall, before selling such imported water to others not parties to this Decree, annually offer to sell such imported water to the other stipulating parties hereto for spreading in the Cucamonga Basin and at a price to be fixed

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between the parties by negotiation, but in any event to be not greater than the price San Antonio can obtain from others not parties of this Decree.

In the event San Antonio and the other stipulating parties hereto do not agree by October 1st to the terms for the purchase of said imported water to be sold and spread during the next succeeding spreading season, then San Antonio is thereafter free to sell such imported water to other persons not parties hereto, or at its option, it may spread such imported water in the Cucamonga Basin and by so spreading will receive the credit for water spread as provided in this paragraph Second. If the stipulating parties and San Antonio agree to the purchase from San Antonio of any imported water, and such stipulating parties, other than San Antonio, purchase said water and the same is spread in the Cucamonga Basin, then during such year no credit shall be given to San Antonio toward estimating its ten year surplus or deficit for the amount of water so purchased and spread.

THIRD: Ioamosa and Hamilton Ranch, a partnership composed of Arthur Bridge, Helen Bridge and Grace W. Burt, are the owners of the paramount right to take and divert throughout each year at or Northerly from the Ioamosa Southerly intake all surface and subsurface flow of Cucamonga Creek, not exceeding however two hundred fifty (250) miner's inches of water, (measured at the round weir and the intake to the Schulhof pipeline), including any water which shall be supplied to the Schulhof pipeline under the terms of said decree in action No. 29,799 or otherwise. The right to said flow of Cucamonga Creek up to 250 miner's inches per year is subject to an obligation of Hamilton Ranch and Ioamosa to deliver water into the Schulhof pipeline, and the balance of said water is owned by Hamilton Ranch and Ioamosa in the following proportions:

(a) Hamilton Ranch 128/1200ths thereof;

(b) Ioamosa 1072/1200ths thereof, subject to the right of Sapphire to the extent of one (1) inch from the weir box on Ioamosa's pipeline located approximately 1200 feet East of the "round weir".

The rights of Ioamosa to the Ioamosa gravity water are subject to the provisions hereof. Ioamosa may transport such gravity water to any location or locations whether within or without the basin, and use or deliver such water at any such location or location, provided, however, if any of the Ioamosa gravity water is used or conducted outside the Basin in any year, then the quantity of water which Ioamosa shall be entitled to develop or extract from the Basin by Paragraph Fourth and Exhibit 2 herein during the next succeeding year shall be reduced by an amount equal to the quantity of Ioamosa gravity water so used or conducted outside the Basin during such year.

The stipulating parties hereto shall within sixty (60) days after the date of this judgment, at their proportionate expense, construct in a manner which shall have been approved by San Antonio Water Company or by the above entitled Court a dividing weir located where Ioamosa now maintains the "round weir". Such dividing weir shall be so constructed that it will automatically limit to 249 inches the amount of water that will flow into the above mentioned four outgoing lines that are now connected with the round weir and are referred to in paragraph First (1) herein.

Within sixty (60) days after the date of this judgment the stipulating parties hereto shall also construct in a manner which shall have been approved by San Antonio Water Company or by the above entitled Court a dividing weir at the said Carnelian Street reservoir. The dividing weir at this point shall be so constructed as to permit Ioamosa to divert fifty inches of such Ioamosa gravity water to domestic use.

During each spreading season, the remaining amount of Ioamosa gravity water over and above fifty (50) inches, shall be either:

(a) Used for irrigation purposes over Cucamonga Basin; or,

(b) Spread over Cucamonga Basin in the spreading grounds of Ioamosa or Banyan Heights Water Company; or

(c) Returned by Ioamosa to the channel of Cucamonga Creek.

During each spreading season all of the flow of Cucamonga Creek in excess of such 250 inches after passing through the debris basins numbered C1 to C12 inclusive on Exhibit 4 shall be spread in spreading grounds which now exist, or are now under construction,or which are proposed, as shown on Exhibit 4,including the channel or wash of Cucamonga Creek, and which overlie the Cucamonga Basin and are North of Baseline Road. Whenever such spreading grounds are all overflowing, or would overflow,the waters which do or would so overflow may be spread in the "15th St.Spreading Grounds" as shown on said map, and when the "15th St. Spreading Grounds"also do or would overflow, the waters which do or would so overflow the "15th St. Spreading Grounds" may be spread in what is known as the "8th Street Spreading Grounds", all as shown on Exhibit 4,even though all or part of such spreading grounds do not overlie the Cucamonga Basin.

Such spreading shall be done at one or more locations in said spreading grounds which shall be approved by San Antonio.

Such flow of Cucamonga Creek may be spread at other locations than above provided, and outside the area above described upon the written consent of 5/6th of the water users, as defined in paragraph First subdivision (k) of this Decree.

If any costs are incurred in such spreading by any party hereto,for which such party would not otherwise be reimbursed,such costs shall be pro-rated between the parties hereto.

<u>FOURTH:</u> The rights of all stipulating parties to take water from Cucamonga Basin, subject to the adjustments set forth in this decree and to the provisions of paragraphs Second and Third above,

are hereby fixed at the quantities set forth in Exhibit 2. Such rights are correlative, and except as to quantity or as herein otherwise stated are equal. No stipulating party shall have any right to export water from the Cucamonga Basin or use water extracted from the Cucamonga Basin at any place other than over the Cucamonga Basin except as provided in paragraph Third and as follows:

(a) The following stipulating parties, or any of them, may use water which they are entitled to extract from Cucamonga Basin in any location whatsoever, namely, San Antonio, Cucamonga, Upland, Old Settlers, and Sunset.

(b) Hermosa, Foothill Irrigation Company and Alta Loma are entitled to export water from Cucamonga Basin only to the extent hereinafter set forth, and none of said parties shall ever export from the Basin more water than said "Export quantity" herein listed for it, to wit:

Party	Export Quantity
HERMOSA	343 Acre Feet
FOOTHILL IRRIGATION COMPANY	483 Acre Feet
ALTA LOMA	51 Acre Feet

and if in any year water used outside the basin which has been extracted or developed from the basin by any of said parties exceeds the "Export Quantity" above listed for such party, the quantity of water which such party shall be entitled to develop or extract from the basin in the ensuing year shall be reduced by an amount equal to such excess.

FIFTH: Within sixty (60) days after the date of this judgment, San Antonio shall, in the event it has not already done so, install, at the following locations, suitable recording and measuring devises, by means of which all spread water passing through such devices may be accurately measured and the quantity of such water recorded. Said locations are as follows:

(1) On 23rd Street at the Northeast corner of Ontario

Colony Lot No. 170

(2) On 20th Street at the Northwest corner of Ontario Colony Lot No. 282; and

(3) On the West line of Ontario Colony Lot No. 301, 400 feet North of 19th Street.

Such measuring and recording devices shall be of such design and construction as may be agreed upon by and between San Antonio and Cucamonga, or, if they fail to agree, as may be designated by the Chief Engineer of the San Bernardino County Flood Control District, or by the above entitled Court.

All imported water which is to be spread upon Cucamonga Basin, whether spread by San Antonio to earn its entitlement under paragraph Second hereof, or is spread after the purchase thereof by the parties hereto other than San Antonio, shall be conducted through said recording and measuring devices by San Antonio, unless otherwise agreed in writing by the stipulating parties, including San Antonio, having allocated water equal to at least five-sixths (5/6ths) of the aggregate stipulated water, and no water not so conducted through such devices and measured shall be counted as water spread under the terms of such paragraph Second, unless so agreed in writing by such parties.

Said devices shall be designed and operated so that they continuously record the amount of water passing therethrough between the start and finish of each spreading season. In case of failure of measuring devices, average of the preceding and succeeding measurements shall be used. Such records shall be open to the inspection of all other stipulating parties on reasonable notice.

Each stipulating party shall have the right to inspect such recording and measuring devices at any time, and, in the event that the same shall ever be locked, each of the stipulating parties shall be furnished by San Antonio with a key thereto so as to permit inspection thereof. Further, San Antonio shall grant to the other stipulating parties hereto, insofar as it can do so without being

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required to obtain the same from others, a non-exclusive right of ingress and egress from the nearest public street to said recording measuring devices. The stipulating parties hereto shall pro-rate the expense of the original installation of said recording measuring devices, and San Antonio shall thereafter operate and maintain and bear the expense of operating and maintaining such devices.

SIXTH: As between the stipulating parties only, no extraction of water from Cucamonga Basin by any party in excess of the amount herein provided to be taken by such party, shall be deemed adverse to any other stipulating party, and each stipulating party hereby waives as against each other stipulating party the right to plead any statute of limitations or laches with respect to any extraction of water by such party in excess of such amount.

SEVENTH: Except as provided in paragraph Second, if any stipulating party in any year shall fail to take or receive from the basin or transport beyond the confines of the basin, the full quantity of water which such party is entitled hereunder to take or receive or transport beyond said confines, as the case may be, such failure shall not entitle such party to take or receive or so transport from the basin in any succeeding year any greater quantity of water than if in each prior year such party had taken, received and so transported from the basin all water which such party was entitled hereunder to so take, receive and transport, and, subject to the provisions of Paragraph Fifteen, such failure shall not affect the rights of other parties to the decree to take the stipulated amounts of water they are entitled to receive by Exhibit 2 herein.

Likewise, except as provided in said paragraph Second, as between the stipulating parties, no right adjudged hereunder of any party to thereafter take water from the Basin or to thereafter transport such water beyond the confines of the Basin shall be lost, impaired or diminished by any failure to take or so transport from the Basin all or any of the water to which such party is entitled hereunder unless and only to the entent that for a period of at least fifteen consecutive years such right shall not be exercised.

EIGHTH: Each stipulating party shall always maintain records of all extractions of water from the Basin by such party such that it can be determined therefrom for each year what quantity of water was taken from each well, or combination of wells, or other water source within the Basin from which such party received water.

Upon written demand of any other stipulating party, the party keeping such records shall, within 30 days after receipt of such demand, supply to the party making such demand or to the person designated by such party in such demand a written statement of the amount of water (in acre feet) so taken from each such well or combination of wells, or other source, for each year after 1957, with respect to which no such statement has previously been supplied.

Within six months hereafter as to existing wells, or upon commencement of operation as to wells first hereafter operated, each such well or combination of wells shall be so equipped with measuring devices at the expense of stipulating party who operates the same, as to show the quantity of water used or extracted.

Likewise, if any stipulating party hereafter transports water beyond the confines of the Basin, such transporting party shall thereafter maintain such measuring box, meter, weir, or other measuring device as will show readily and accurately the quantity of water at the time being transported beyond the confines of the Basin. Measurements of the quantity of water being taken at each of said points shall be made by such transporting party at least daily by weir or weekly by meter throughout the entire period water is being taken at such point. A record of such measurements and hours of operation shall always be made and maintained by such party. In case of failure of measuring device, average of the preceding and succeeding measurements shall be used.

Each stipulating party and any agent of any such party shall at all reasonable hours be entitled to inspect all such meters, boxes,

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weirs and other measuring devices, and to inspect, check, and copy any record of extractions and measurements and of all data and computations pertaining to the same in the possession or under the control of any other stipulating party or parties.

<u>NINTH:</u> Every provision of this Judgment in favor of or applying to any party hereto shall also apply to and inure to the benefit of, and also bind each and all of the heirs, legal representatives, successors and assigns of such party.

<u>TENTH:</u> The maximum quantity of water which any stipulating party shall be entitled to take from the Basin or transport beyond its confines shall not be increased or affected by the future acquisition by such party of additional lands, unless there shall be appurtenant to such lands rights to take water, which rights are in this action adjudged to exist.

Nothing in this judgment contained shall prevent any stipulating party from selling or otherwise disposing, or from purchasing or otherwise acquiring, any rights to water or to transport the same which may be adjudged to belong to any party to this action;but any such rights so acquired or so disposed shall remain subject to any limitations or restrictions herein expressed. Any transfer of the rights of any party herein shall be in writing, and notice thereof shall be given to San Antonio Water Company and Cucamonga Basin Protective Association, a corporation, whose address is Cucamonga, California, before the transferee may exercise such transferred rights.

<u>ELEVENTH:</u> The stipulating parties shall pro-rate the expense incurred after the date of this Judgment in prosecuting this action to Judgment against any other parties to this action.

The stipulating parties will unite in opposing any new, wrongful or unlawful taking of water from the Basin hereafter made by any person or corporation other than a stipulating party or parties, and will prorate the expense of making such opposition, including any litigation or engineering expense, provided that:

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(a) The term "new taking" shall not include any water development in the Basin hereafter made for the sole purpose of maintaining but not increasing any quantity of water now being taken from the Basin by the person who may hereafter make such development.

(b) If any stipulating party does not join in prosecuting any future suit to prevent, enjoin or limit any such new, wrongful or unlawful taking, such stipulating party not so joining shall bear pro-rata the expense of such suit (including attorney's fees and engineering expense) only if final judgment is rendered in such suit preventing, enjoining or limiting such taking.

TWELFTH: Each stipulating party, and the agents and employees of each such party, is and are hereby perpetually enjoined and restrained from doing any act or thing in violation of any provision of this judgment, other than paragraph Eleventh hereof.

THIRTEENTH: No stipulating party shall be entitled to recover court costs from any other stipulating party.

FOURTEENTH: The above entitled action shall continue and may be prosecuted and tried against all defendants therein, other than the stipulating parties; and the stipulating parties shall share the expense of such prosecution pro-rata. The Court will retain jurisdiction to enter modifications of this decree pursuant to stipulations provided for hereunder.

FIFTEENTH: In the event that through inadequacy of the supply of water in the Cucamonga Basin, or by reason of adjudication in any subsequent action, the stipulating parties in the aggregate shall be unable to pump and extract from the Cucamonga Basin a quantity of water so great as the aggregate stipulated water as is set forth in Exhibit 2, the stipulating parties shall pro-rate the aggregate quantity of water available in the Basin as long as such inability shall continue.

In the event between October 1st of any year and June 15th of the succeeding calendar year, five-sixths of the water users shall agree in writing by a stipulation filed in said action that the supply of water in the Basin is inadequate to safely permit the stipulating parties to pump in such ensuing year the aggregate stipulated water and that the amount of water to be pumped by each stipulating party shall for such succeeding calendar year be limited to a specified percentage (uniform for all)of the allocated water, then for such succeeding calendar year, each stipulating party is hereby enjoined and restrained from pumping or extracting from the Basin more than such percentage of allocated water of such party (subject to the provisions of paragraphs Second and Third hereof).

SIXTEENTH: The listing upon Exhibit 2 of any number of acre feet for any party to this action other than a stipulating party, shall not be deemed an admission by any stipulating party that a non-stipulating party is entitled to any water whatsoever from Cucamonga Basin, nor as to the quantity which such non-stipulating party may take from said Basin, if any, but each such figure for any non-stipulating party is listed as a matter of convenience and as a possible basis of compromise only.

SEVENTEENTH: This judgment supersedes and controls all previous agreements and decrees between the stipulating parties,or any of them but only insofar as they are inconsistent herewith.

Done in open Court this 25 day of April, 1958.

CARL B. HILLIARD

Judge

EXHIBIT 1

TERRITORY UNDER WHICH LIES THE "CUCAMONGA BASIN"

That certain territory in the County of San Bernardino, State of California, which is situated to the South of the Sierra Madre range of mountains and is bounded and described as follows, to wit:

> Beginning at the base of the hereinbefore mentioned Sierra Madre Mountains at a point situate 9000 feet due North of the Southwest corner of Lot 241, said lot being delineated on Map of Ontario Colony Lands, recorded in the Office of the County Recorder of said County in Book 11 of Maps, at page 6 thereof; thence running South to said Southwest corner of said Lot 241; thence running in a general Southeasterly direction to the Southeast corner of Lot 419, said lot being also delineated on said Map of said Ontario Colony Lands; thence continuing in a general Southeasterly direction to a point situate thirteen hundred feet North of the South line and thirteen hundred feet East of the West line of Section 4, Township 1 South, Range 7 West, S. B. B. & M., thence running in a general Easterly direction to a point situate on the East line of said Section 4, eighteen hundred feet North of the Southeast corner of said Section 4; thence running in a general Northeasterly direction to the Southeast corner of the Southwest quarter of the Northeast quarter of Section 3, Township 1 South, Range 7 West, S. B. B. & M., thence running Northeasterly to a point situate on the North line of Section 2, Township 1 South, Range 7 West, S. B. B. & M., fourteen hundred feet East of the West line of said Section 2; thence running in a general Northeasterly direction to the base of said mountains, to a point where the division line between ranges six and seven, S. B. B. & M. intersects the South base of said mountains; thence following the meandering line of the South base of said mountains, being curved northerly for canyons and southerly for ridges, in a westerly direction to the place of beginning.

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EXHIBIT 2

STIPULATED WATER

NAME		ACRE FEET PER YEAR
San Antonio Water Company	6500	6500
Alta Loma Mutual Water Company	51	600
Armstrong Nurseries		200
Banyan Heights Water Company		625
Carnelian Water Company		600
Citrus Water Company		450
Cucamonga Water Company	6500	6500
Cucamonga Development Company (included under Ioamosa)		None
Foothill Irrigation Company	483	1600
Hedges Well Company		732
Hellman Water Company (included under Ioamosa)		None
Hermosa Water Company	343	600
Ioamosa Water Company		920
Joya Mutual Water Company		390
Old Settlers Water Company	400	400
Rex Mutual Water Company		600
Charles Snyder		114
Sunset Water Company	400	400
Upland Water Company	750	750
Heirs and Devisees of Giovanni Vai, deceased		500
Hugh P. Crawford		120
Western Fruit Growers		120
Sapphire Mutual Water Company		None
G. N. Hamilton Ranch, a partnership		None
AGGREGATE STIPULATED WATER		22,721

WALKER, WRIGHT, TYLER & WARD
210 W. 7th Street, Suite 631
Los Angeles, 14, California,
TRinity 8936

Attorneys for Plaintiff

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF SAN BERNARDINO

SAN ANTONIO WATER COMPANY, a corporation,

Plaintiff,

vs.

FOOTHILL IRRIGATION COMPANY, a corporation; SUNSET WATER COMPANY, a corporation; IOAMOSA WATER COMPANY, a corporation; and OLD SETTLERS WATER COMPANY, a corporation; ALTA LOMA MUTUAL WATER COMPANY, a corporation; ARMSTRONG NURSERIES, a corporation; BANYAN HEIGHTS WATER COMPANY, a corporation; CARNELIAN WATER COMPANY, a corporation; CITRUS WATER COMPANY, a corporation; CUCAMONGA DEVELOPMENT COMPANY, a corporation; CUCAMONGA WATER COMPANY, a corporation; HEDGES WELL COMPANY, a corporation; HELLMAN WATER COMPANY, a corporation; HERMOSA WATER COMPANY, a corporation; JOYA MUTUAL WATER COMPANY, a corporation; REX MUTUAL WATER COMPANY, a corporation; SAPPHIRE MUTUAL WATER COMPANY, a corporation; CHARLES SNYDER; UPLAND WATER COMPANY, a corporation; HENRY G. BODKIN and BANK OF AMERICA NATIONAL TRUST AND SAVINGS ASSOCIATION, as Executors of the last will of Giovanni Vai, deceased; WESTERN FRUIT GROWERS, a corporation; HUGH P. CRAWFORD; G. N. HAMILTON RANCH, a partnership composed of Arthur Bridge, Helen Bridge, and Grace W. Burt; JOHN DOE ONE to THIRTY, inclusive, MARY ROE ONE to THIRTY inclusive, JOHN DOE COMPANY ONE TO TWENTY inclusive,

Defendants.

No.

STIPULATION REGARDING TRIAL AND JUDGMENT

IT IS HEREBY STIPULATED AND AGREED by and between plaintiff San Antonio Water Company and the undersigned defendants (said plaintiff and defendants being herein called "Stipulating parties")

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that:

FIRST: Each of the undersigned defendants hereby appears in the above entitled action. The allegations of the complaint on file in said action shall be deemed denied by the undersigned defendants, and they shall be and are deemed to have alleged in said action that they own such rights to the waters of Cucamonga Creek and of Cucamonga Basin (mentioned in said judgment) as may be supported by any evidence which may be introduced at the trial of said action.

SECOND: At any time after the filing of this stipulation said action may be tried as between the stipulating parties. Said trial may be held without notice if the undersigned counsel for the stipulating parties are present or represented at said trial, and in such case notice of said trial is hereby waived.

THIRD: The stipulating parties consent that a Decree in the form which precedes and is attached to this stipulation may be rendered and entered by the Court in said action, in the event the Court finds such judgment proper under the evidence which shall have been introduced.

FOURTH: The stipulating parties hereby waive the signing or filing of any Findings of Fact in said action in the event a decree in said form is to be rendered.

Dated: ~~November~~ April 25th, 1958.

SAN ANTONIO WATER COMPANY

BY [signature] President

AND [signature] Secretary

WALKER, WRIGHT, TYLER and WARD

BY [signature]

Attorneys for Plaintiff

FOOTHILL IRRIGATION COMPANY

BY [signature] President

AND [signature] Secretary

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ATTORNEYS AT LAW
SAN BERNARDINO, CALIFORNIA

IOAMOSA WATER COMPANY

BY [illegible] President

AND Frank N. Van Fleet Secretary

OLD SETTLERS WATER COMPANY

BY Harold B. [illegible] President

AND Frank N. Van Fleet Secretary

SUNSET WATER COMPANY

BY [illegible] President

AND Emma MacPherson Secretary

CUCAMONGA WATER COMPANY

BY Leon T. Lucas President

AND Clifton Chappell Secretary

ALTA LOMA MUTUAL WATER COMPANY

BY C J Minor President

AND [illegible] Secretary

ARMSTRONG NURSERIES Inc

BY J. [illegible] Armstrong President

AND [illegible] Secretary

BANYAN HEIGHTS WATER COMPANY

BY [illegible] President

AND [illegible] Secretary

CARNELIAN WATER COMPANY

BY John C. [illegible] President

AND Robert [illegible] Secretary

CITRUS WATER COMPANY

BY [illegible] President

AND [illegible] Secretary

HEDGES WELL COMPANY,

BY [illegible] President

AND [illegible] Secretary

HELLMAN WATER COMPANY

BY J. F. Grass Jr. President

AND Frank N. Van Fleet Secretary

HERMOSA WATER COMPANY

BY [illegible] President

AND Frank N. Van Fleet Secretary

JOYA MUTUAL WATER COMPANY

BY [illegible] President

AND Howard H. Mason Secretary

UPLAND WATER COMPANY

BY [illegible] President

AND [illegible] Secretary

WESTERN FRUIT GROWERS

BY [illegible] President

AND [illegible] Secretary

CUCAMONGA DEVELOPMENT COMPANY

BY [illegible] President

AND Frank N. Van Fleet Secretary

SAPPHIRE MUTUAL WATER COMPANY

BY [illegible] President

AND Frank N. Van Fleet Secretary

Charles Snyder
(Charles Snyder)

Hugh P. Crawford
(Hugh P. Crawford)

HENRY G. BODKIN and
BANK OF AMERICA NATIONAL TRUST AND SAVINGS ASSOCIATION,
As Executors of the Last Will of Giovanni Vai, deceased;

BY ______________________
ASSISTANT TRUST OFFICER

AND ______________________
(Henry G. Bodkin)

G. N. HAMILTON RANCH, a partnership,

BY ______________________
(Arthur Bridge)

BY ______________________
(Helen Bridge)

BY Arthur H. Bridge for Grace W. Burt
(Grace W. Burt)

Partners

REX MUTUAL WATER COMPANY

BY ______________________ President

AND ______________________ Secretary

SURR & HELLYER

BY John B. Surr

Attorneys for Ioamosa, Cucamonga, Banyan Heights, Joya Mutual, Rex Mutual, and Sapphire Water Companies, and for Hedges Well Company and Cucamonga Development Company.

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G

Appendix G. Six Basins Judgment

SCOTT S. SLATER, ESQ. (State Bar No. 117317)
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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

SOUTHERN CALIFORNIA WATER COMPANY Plaintiff, vs. CITY OF LA VERNE, CITY OF CLAREMONT, CITY OF POMONA, CITY OF UPLAND, POMONA COLLEGE, POMONA VALLEY PROTECTIVE ASSOCIATION, SAN ANTONIO WATER COMPANY, SIMPSON PAPER COMPANY, THREE VALLEYS MUNICIPAL WATER DISTRICT, WEST END CONSOLIDATED WATER COMPANY, and DOES 1 through 1,000, Inclusive, Respondents and Defendants.	**CASE NO.** KC029152 Assigned for All Purposes to Judge William O. McVittie Department O **(Complaint Filed, September 28, 1998)** **JUDGMENT**

THE DOCUMENT TO WHICH THIS CERTIFICATE IS ATTACHED IS A FULL, TRUE, AND CORRECT COPY OF THE ORIGINAL ON FILE AND OF RECORD IN MY OFFICE.

ATTEST DEC 18 1998

JOHN A. CLARKE

Executive Officer/Clerk of the Superior Court of California, County of Los Angeles

By ____________, Deputy

C. MORALES

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PRELIMINARY FINDINGS

A. Complaint.

The Southern California Water Company ("SCWC"), (or "Plaintiff"), and the City of La Verne ("La Verne"), City of Claremont ("Claremont"), City of Pomona ("Pomona"), City of Upland ("Upland"), Pomona College ("Pomona College"), Pomona Valley Protective Association ("PVPA"), San Antonio Water Company ("San Antonio"), Simpson Paper Company ("Simpson"), Three Valleys Municipal Water District ("TVMWD"), West End Consolidated Water Company ("West End"), collectively (Defendants) either:

i. account for essentially all of the current production of groundwater from or the replenishment to the Canyon Basin, the Upper Claremont Heights Basin, the Lower Claremont Heights Basin, the Pomona Basin, the Live Oak Basin and the Ganesha Basin ("Six Basins Area"), located in Los Angeles and San Bernardino Counties, and described in Exhibits "A,"and "B" attached hereto, and further defined in Judgment Section I(A) below; or

ii. are public agencies with an interest in the efficient and responsible management of groundwater resources within the Six Basins.

On or about September 28, 1998 the Plaintiff filed a complaint against Defendants and Does 1 through 1,000 requesting a declaration of their individual and collective rights to groundwater and a mandatory and prohibitory injunction requiring the reasonable use and equitable management of groundwater within the Six Basins pursuant to *Article X, Section 2 of the California Constitution*. The pleadings further allege that the Plaintiff and Defendants collectively claim substantially all rights of groundwater use, replenishment and storage within the Six Basins Area, that the available Safe Yield (as defined in Judgment Section I(A), below) is being exceeded and that the groundwater supply to the Six Basins Area is inadequate to meet the current and long term demands of Plaintiff and Defendants without the imposition of a physical solution. Plaintiff requests a determination of all groundwater rights, including replenishment and storage rights, of whatever nature within the boundaries of the Six Basins and request the imposition of an equitable physical solution.

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B. **Answers and Cross-Complaints.** On or before November 13, 1998, Plaintiff and Defendants filed a stipulation for entry of judgment.

C. **Jurisdiction.** This Court has jurisdiction to enter judgment declaring and adjudicating the Plaintiff's and Defendants' ("the Parties") rights to the reasonable and beneficial use of groundwater by the Parties in the Six Basins Area pursuant to *Article X, Section 2 of the California Constitution* and to impose a complete physical solution. All pre-existing rights to groundwater within the Basin held or claimed by any Party (as defined in Section I(A) of the Judgment below) are hereby settled and defined as the production allocations and the other rights and obligations set forth under this judgment ("Judgment"). The respective allocations for each Party are expressly set forth in Exhibit "D."

D. **Parties.**

1. SCWC is an investor-owned public utility incorporated under the laws of the State of California. (*See Public Utilities Code Section 1001 et seq. and 2701 et seq.*) SCWC produces groundwater from the Six Basins and delivers it for use on land within its certificated service area that predominantly overlies some portion of the Six Basins, and otherwise is within the Counties of Los Angeles and San Bernardino.

2. Pomona is a charter city situated in the County of Los Angeles. Pomona produces groundwater from the Six Basins and delivers it for use on land within its incorporated boundaries, on land lying outside its incorporated boundaries within the County of Los Angeles and on City owned lands that predominantly overlie some portion of the Six Basins. Pomona owns and controls land in the Six Basins Area upon which it has historically diverted, for direct use and spreading, surface water from San Antonio Creek and Evey Canyon.

3. La Verne is a general law city situated in the County of Los Angeles. La Verne produces groundwater from the Six Basins and delivers it for use on land within its incorporated boundaries, on land lying outside its incorporated boundaries within the County of Los Angeles and on City owned lands that predominantly overlie some portion of the Six Basins.

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4. Upland is a general law city situated in the County of San Bernardino. Upland produces groundwater from the Six Basins and delivers it for use on land within its incorporated boundaries some portion of which overlie the Six Basins. It possesses a majority of the shares of stock in San Antonio and West End.

5. San Antonio is a mutual water corporation incorporated under the laws of the State of California, with its principal place of business in San Bernardino County. San Antonio produces groundwater from the Six Basins and delivers it for use by its shareholders.

6. West End is a mutual water corporation, incorporated under the laws of the State of California, with its principal place of business in San Bernardino County. West End produces groundwater from the Six Basins and delivers it for use by its shareholders.

7. Claremont is a general law city situated in the County of Los Angeles. Claremont's incorporated boundaries and City owned lands overlie a portion of the Six Basins. The City has executed an agreement with SCWC with respect to its groundwater rights.

8. Pomona College is a California corporation, with a principal place of business in the County of Los Angeles. Pomona College owns land and groundwater production facilities that overlie the Six Basins Area and it has executed operating leases with SCWC regarding these facilities. Pomona College has executed an agreement with SCWC with respect to its groundwater rights.

9. Simpson is a Washington corporation, which is doing business in the State of California and the County of Los Angeles. Simpson produces groundwater from the Six Basins for its own use and also purchases water service from Pomona.

10. PVPA is a California corporation, operating on a non-profit basis for the mutual benefit of its members with its principal place of business in the County of Los Angeles. Shareholders of PVPA include Pomona, Pomona College, San Antonio, SCWC, Simpson, Upland and West End. PVPA owns the primary spreading grounds and recharge facilities for the Six Basins and owns other lands which also overlie the Six Basins. PVPA has undertaken ongoing studies and evaluation of groundwater conditions in the Six Basins Area.

11. TVMWD is a California Municipal Water District formed pursuant to the provisions of the municipal water district act and with the power to acquire, control, distribute, store, and spread water for beneficial purposes within its boundaries.

E. **Settlement Negotiations.**

1. **Importance of Groundwater.** Groundwater is an important water supply source for businesses, individuals and public agencies that overlie or extract groundwater from the Six Basins. The Parties have a mutual and collective interest in the efficient and reasonable use of groundwater and the coordinated management of water resources to ensure the prudent use of the resource. The Parties have a further collective interest in furthering the efficient and reasonable use of groundwater and the coordinated and comprehensive management of water resources to ensure that the common resource may be sustained and enhanced.

2. **Coordinated Study.** PVPA has conducted and continues to conduct technical studies of the Six Basins and has developed groundwater models of the Six Basins. To achieve the goals of coordinated basin management and to ensure and promote the sustainable and enhanced use of the groundwater resources of the Six Basins, the Parties joined in a collaborative process, reviewed prior groundwater production reports and hydrologic studies, other historical data and engaged in new technical studies to supplement the previous work of PVPA. Substantial engineering, hydrologic and geologic data not previously known have been collected and jointly analyzed and verified by the Parties. Included therein are estimates of production and reported production from the Six Basins and further refinement of PVPA's groundwater models. The results of these efforts provide the technical foundation for this Judgment.

3. **Overdraft.**

a. **Native Safe Yield.** The Native Safe Yield (as defined in Judgment, Section I(A), below) of the Six Basins Area has historically been augmented generally by the spreading activities conducted by PVPA, Pomona and La Verne and from return flows from water imported to the Six Basins Area through TVMWD. There is no precise estimate of the Native Safe Yield; however, without augmentation comprised of the substantial spreading operations conducted

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by PVPA and others, and the return flows from imported water, the amount of groundwater comprising the Native Safe Yield is substantially less than the Safe Yield which is allocated to the parties pursuant to this Judgment.

b. **Safe Yield.** Safe Yield (as defined in Judgment, Section I(A), below) for all groundwater supplies within the Six Basins, including the benefits of historic augmentation is nineteen thousand three hundred (19,300) acre feet per year.

c. **Groundwater Production.** Reports filed with the State of California pursuant to *Water Code Section 4999 et seq.*, production records reported to PVPA by its members, and independent verification by the Parties all demonstrate that the cumulative groundwater production of the Parties from the Six Basins Area annually has been greater than twenty thousand (20,000) acre feet in each of the five years immediately preceding the filing of this action. Therefore, groundwater production has exceeded the available Safe Yield and *a fortiori* the Native Safe Yield in each of the last five years.

F. **<u>Stipulation.</u>** The Parties, whose production from the Six Basins cumulatively comprise essentially all of the groundwater production in the Six Basins Area, which have engaged in long-standing groundwater replenishment activities or otherwise have an interest in the efficient and coordinated management of groundwater, have stipulated to the entry of this Judgment. Each of the Parties stipulate that this Judgment is a physical solution (as defined in Judgment, Section I(A), below) which provides due consideration to the environment, the respective groundwater rights of the Parties, and that this Judgment will not cause substantial material injury to any Party under these circumstances of a lengthy period of overdraft and the competing claims to groundwater. The Parties further stipulate that the Judgment is a fair and equitable allocation of water in accordance with the provisions of *Article X, Section 2 of the California Constitution*.

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JUDGMENT

IT IS HEREBY ORDERED, ADJUDGED AND DECREED:

I. INTRODUCTION

A. Definitions.

1. **"Base Annual Production Right"** means the average annual production , in acre-feet, for each Party for the twelve year period beginning on January 1 of 1985 and ending on December 31 of 1996 as set forth in Exhibit "D".

2. **"Carryover Rights"** means the maximum percentage of a Party's annual allocation of Operating Safe Yield production of which may be deferred until the following Year free of any Replacement Water Assessment.

3. **"Effective Date"** means January 1, 1999.

4. **"Four Basins or Four Basins Area"** means the following groundwater basins and the area overlying them: Canyon, Upper Claremont Heights, Lower Claremont Heights and Pomona as shown on Exhibit "A" and further described in Exhibit "B".

5. **"Groundwater"** means all water beneath the ground surface and contained within any one of the Six Basins except as provided in Article IIIA Section 1.

6. **"Imported Water"** means water that is not naturally tributary to the Six Basins Area and which is delivered to the Six Basins Area.

7. **"In Lieu Procedures"** means a method of either providing Replacement Water or water to be stored under a Storage and Recovery Agreement whereby a Party receives direct deliveries of Imported Water or water other than Replenishment Water in exchange for foregoing the production of an equivalent amount of such Party's share of the Operating Safe Yield.

8. **"Minimal Producers"** means any producer whose production is less than 25 acre feet each Year.

9. **"Native Groundwater"** means groundwater within the Six Basins Area that originates from the deep percolation of rainfall, natural stream flow or subsurface inflow, and

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expressly excluding groundwater which originates from (a) the Parties' replenishment activities and (b) return flows from both imported water and the Parties' replenishment activities, and water described in Article IIIA Section 1.

10. **"Native Safe Yield"** means the amount of Native Groundwater, in acre feet, that can be extracted from the Six Basins Area on an annual basis without causing an undesirable result. Expressed as a formula: Native Safe Annual Yield = Annually Available Groundwater - (Replenishment Water + return flows from Imported Water and Replenishment Water).

11. **"Native Water"** means water which is naturally tributary to the Six Basins Area.

12. **"Non-party"** means any person or entity which is not a party to this Judgment.

13. **"Operating Plan"** means the plan, developed by Watermaster (as defined in Judgment, Article V below) for the Four Basins Area, by which the purpose and objectives of the Physical Solution will be implemented and realized.

14. **"Operating Safe Yield"** means the amount of groundwater, in acre feet, which the Watermaster shall determine can be produced from the Four Basins Area by the Parties during any single year, free of any replacement obligation under the Physical Solution herein. Because of the benefits created by coordinated management of groundwater provided by the Physical Solution, the Operating Safe Yield set by Watermaster may exceed the Safe Yield that would otherwise be available for production by the Parties. The Two Basins Area is excluded from the Operating Safe Yield allocated pursuant to this Judgment with its annual Safe Yield being equivalent to the amount of groundwater La Verne may reasonably produce from the Two Basins Area on an annual basis without causing substantial injury to any other Party.

15. **"Overdraft"** means a condition wherein the total annual production from a groundwater basin exceeds the Safe Yield.

16. **"Party or Parties"** means any person(s) or entity(ies) named in this action, who has/have intervened in this case or has/have become subject to this Judgment through succession, stipulation, transfer, default, trial or otherwise.

17. **"Physical Solution"** means the efficient and equitable coordinated management of groundwater within the Six Basins Area to maximize the reasonable and beneficial use of groundwater resources in a manner that is consistent with the public interest, *Article X, Section 2 of the California Constitution,* and with due regard for the environment.

18. **"Producer"** means a person, firm, association, organization, joint venture, partnership, business, trust, corporation or public entity who, or which, produces or has a right to produce groundwater from the Six Basins Area.

19. **"Production"** means the process of pumping groundwater; also, the gross amount of groundwater pumped.

20. **"Replacement Water"** means imported water or water other than Replenishment Water supplied through in-lieu procedures that is acquired by the Watermaster or provided by a Party to replace production by such Party in excess of the amount of its share of the Operating Safe Yield, Carry-Over Rights and Storage and Recovery rights authorized by Watermaster.

21. **"Replacement Water Assessment"** means an assessment levied by Watermaster pursuant to Article XII A, Section 4 of this Judgment.

22. **"Replenishment"** means a program to spread or inject Replenishment Water into the Six Basins Area. A description of the current replenishment programs is attached hereto as Exhibit "E."

23. **"Replenishment Water"** means native water which augments the Native Safe Yield and thereby comprises a portion of the Operating Safe Yield pursuant to a historical replenishment program as described in Article VIB, Section 9 and Exhibit E.

24. **"Return Flows"** means water which percolates, infiltrates or seeps into the Six Basins after having been previously applied to some end use by one of the Parties or any user of water.

25. **"Safe Yield"** means the amount of groundwater, including Replenishment and return flows from Imported Water, that can be reasonably produced from the combined Two Basins

and the Four Basins Areas on an annual basis without causing an undesirable result, including but not limited to land subsidence, water quality degradation, and harm from high groundwater levels, i.e. 19,300 acre feet per year.

26. **"Six Basins or Six Basins Area"** means the Four Basins Area plus the Two Basins Area, as shown on Exhibit "A" and further described in Exhibit "B."

27. **"Spreading"** means a method of groundwater recharge whereby water is placed in permeable impoundments and allowed to percolate into a basin.

28. **"Storage and Recovery"** means a program administered under an agreement between the Watermaster and a Party to store water either directly by sinking, spreading or injecting or by in-lieu procedures, into the Four Basins, and subsequently recovering such water without regard to the limitations imposed by the Party's Base Annual Production Right.

29. **"Storage and Recovery Agreement"** means an agreement between Watermaster and a Party for Storage and Recovery of water by such Party. An acceptable pre-approved Storage and Recovery Agreement between Watermaster and Pomona is listed on Exhibit "F."

30. **"Transfer"** means temporary or permanent assignment, sale, contract or lease of any Party's Base Annual Production Right and its associated percentage of the Safe Yield, Carry-Over Rights or rights to recover water stored under a Storage and Recover Agreement to any other Party or a person that becomes a Party. A lease shall not be considered a "permanent transfer" unless both the Lessee and Lessor jointly agree to such characterization.

31. **"Two Basins or Two Basins Area"** means the Live Oak and Ganesha Basins and the areas overlying them, as shown on Exhibit "A" and further described in Exhibit "B."

32. **"Water Shortage Emergency"** means the substantial impairment, which cannot be promptly mitigated, of the ability of the Parties to provide sufficient water for human consumption, sanitation and fire protection because of: (a) a sudden occurrence such as storm, flood, fire, unexpected equipment outage; or (b) an extended period of drought.

33. **"Watermaster"** means the committee with the powers and duties defined in Article V of this Judgment.

34. **"Year"** means a calendar year.

B. **Exhibits.** Each exhibit is expressly incorporated herein and made part of this Judgment.

Exhibit A:	Six Basin Map
Exhibit B:	General Description of the Six Basins Area
Exhibit C:	Memorandum of Agreement between Watermaster and PVPA
Exhibit D:	Base Annual Production Rights of Parties
Exhibit E:	Description of Replenishment Programs
Exhibit F:	City of Pomona Storage and Recovery Agreement
Exhibit G:	Initial Operating Plan

II. FINDINGS AND HYDROLOGIC CONDITIONS

A. **Safe Yield.** Prior to the imposition of this Physical Solution, the Safe Yield of the Six Basins is historically found to be 19,300 acre feet per year.

B. **Overdraft and Prescriptive Circumstances.** For a period in excess of five consecutive Years prior to the filing of the complaint herein, the Native Safe Yield and the Safe Yield have been exceeded by the aggregate Production therefrom and the Six Basins have been in a continuous state of Overdraft. The court finds that the Production constituting such Overdraft has been open, notorious, continuous, adverse, hostile, and under claim of right. The court further finds that the groundwater Production has exceeded the Native Safe Yield and the Safe Yield in each of the last five years and thus all the required elements necessary to establish prescription have been satisfied.

1. **Adversity.** The Native Safe Yield of the Six Basins Area has been continuously exceeded for decades. It is only through the ongoing Replenishment undertaken by PVPA, Pomona and La Verne coupled with the availability of and return flows from Imported Water that a further decline in water levels has been averted. An unmanaged downward decline in water levels is known to have severe adverse impacts on the rights of groundwater producers and groundwater quality, to cause land subsidence and to cause increased pump-lifts. Moreover, the Court finds that presently

estimated Safe Yield of 19,300 acre feet, with the full benefit of the Replenishment carried on by the Parties has been exceeded and if Production is not managed pursuant to this Physical Solution, severe adverse impacts will result.

2. **Continuity.** The Native Safe Yield has been continuously exceeded for at least two decades. For each of the last five Years the Safe Yield has been exceeded. The Court finds that cumulative total Production from the Six Basins Area for the Years 1993 through 1997 is as follows:

1993	21,020 acre feet
1994	20,313 acre feet
1995	22,959 acre feet
1996	23,584 acre feet
1997	21,902 acre feet

3. **Notice.** Each of the Parties with a Base Annual Production Right, or their agents, have filed groundwater production reports with the State Department of Water Resources pursuant to *Water Code Section 4999*. These reports are public records and are available for inspection by any member of the public. SCWC is an investor-owned public utility subject to regulation by the California Public Utilities Commission (PUC). Its records, reports and filings with the PUC regularly include information regarding the wells used and groundwater produced from the Six Basins Area. The PUC has held publicly noticed rate hearings which have been attended by the public and representatives from Claremont. Pomona, La Verne and Upland are all public entities and their groundwater production information are public records and open to public inspection upon reasonable notice. PVPA has frequently published reports which indicate the nature of its Replenishment and the volume of groundwater produced in the Six Basins Area. At least two settlement agreements have been entered between certain Parties on matters related to the adverse impacts of increased groundwater production. Both of these agreements were approved by a public entity and are public records. Moreover, the negotiations leading up to the entry of this Judgment were open to all persons claiming the right to produce groundwater by virtue of their owning overlying land or having corporate boundaries overlying the Six Basins Area. Regular meetings concerning these negotiations

have been held at the headquarters of TVMWD, a public agency, and were personally attended by representatives from each of the Parties. These meetings have taken place at regular intervals for more than twelve consecutive months and the contents of this Judgment and the status of groundwater conditions in the Six Basins Area has remained readily available. Accordingly, the Court finds that all persons claiming the right to produce had actual notice, constructive notice or could have easily determined upon reasonable diligence that the Six Basins Area was in Overdraft and of each Party's claim to groundwater. The circumstances of such Overdraft and water use are such that each of the Parties either: (i) had actual knowledge of such circumstances; or (ii) should have discovered such circumstances upon the exercise of reasonable diligence or (iii) received constructive notice of the adverse nature of such aggregate production through the public record filings with the State of California pursuant to *Water Code Section 4999* and through the various reports published by the Parties.

C. **High Groundwater Levels.** There are cienegas and springs in the Four Basins Area and there is a potential for groundwater to rise to the surface regardless of the replenishment, replacement or storage operations of the Watermaster and carried out by the Parties. Periodically, though not in the past twelve years, high groundwater levels have constituted an important causative factor, in creating damage in the Four Basins Area.

D. **Water Quality Problems.** Some of the Six Basins have experienced problems of high concentrations of nitrates and volatile organic compounds (VOC's) in groundwater. Potential sources of the nitrate are historical agricultural practices and individual wastewater disposal systems, most of which have been abandoned. The Two Basins Area and some of the Four Basins Area have been adversely impacted by high concentrations of nitrates and VOC's and may also require remediation.

III. DECLARATION OF RIGHTS AND RESPONSIBILITIES

A. **General Provisions.**

1. **Surface Water Rights.** Pomona and San Antonio have prior and paramount pre-1914 water rights, superior to the rights of any other party, to the surface water and supporting

subsurface flows historically and presently diverted therefrom in San Antonio and Evey Canyon, except as provided in Article VIB Section 9 and as referenced in Article IIIA Section 1d.

a. Historically, Pomona and San Antonio have diverted, and presently are diverting, surface waters and supporting subsurface flows from San Antonio Canyon.

b. Historically, Pomona has diverted, and presently is diverting, surface water and supporting subsurface flows from Evey Canyon.

c. Pomona and San Antonio are under no obligation to spread such waters.

d. Surface waters and supporting subsurface flows diverted in San Antonio and Evey Canyons at existing diversion locations are excluded from (i) the operation of this Judgment and (ii) the determination of Operating Safe Yield, except to the extent of the portion of such waters which are spread by Pomona at its Pedley Treatment Plant, which portion is governed by the provisions of Article VIB, Section 9.

e. The diversion and the use of surface waters and supporting subsurface flows shall not be subject to this Judgment.

f. The above-referenced surface waters and supporting subsurface flows shall not be subject to allocation among the Parties pursuant to this Judgment.

g. Surface waters and supporting subsurface flows may be used by Pomona and San Antonio to satisfy Replacement Water obligations as provided in Article VIB, Section 5.

2. **Loss of Priorities.** By reason of the long continued overdraft in the Six Basins, and in light of the complexity of determining appropriative priorities and the need for conserving and making maximum beneficial use of the water resources of the State, each and all of the Parties listed in Exhibit "D" are estopped and barred from asserting special priorities or preferences *inter se* to groundwater except as expressly provided herein. All the Parties' rights to groundwater are accordingly deemed and considered to be of equal priority unless otherwise expressly stated herein.

3. **Limitations on Export.** Other than the limitation on Pomona's use of 109 acre feet as further described in Exhibit "D", any Party's share of the Operating Safe Yield, including Carryover Rights and Transfers, may be produced and exported for use outside the Six Basins Area.

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However, groundwater stored and recovered pursuant to a Storage and Recovery Agreement may be produced and exported only in accordance with the terms and conditions of the Storage and Recovery Agreement.

4. **No Abandonment of Rights.** It is in the interest of reasonable beneficial use of the Six Basins Area and its water supply, that no Party be encouraged to take and use more water in any Year than is actually required. Failure to produce all of the water to which a Party is entitled hereunder shall, in and of itself, not be deemed to be, or constitute an abandonment of such Party's right, in whole or in part.

5. **Pre-Existing Rights.** This Judgment controls each Party's rights to the Production, Replenishment, Storage and Recovery of groundwater and expressly supersedes other rights, claims or defenses arising from agreement, operation of law, prior use or a prior judgment to the extent that they are inconsistent with this Judgment. However, nothing in this Judgment shall alter or affect any rights or remedies that any Party may have under any contract or agreement with any other Party on matters which are not inconsistent with or are unrelated to the provisions of this Judgment or as provided in Article IVC herein.

6. **Physical Solution.** This Judgment represents a total and complete Physical Solution for the Six Basins Area and all basins included therein. Although prior hydrologic and physical conditions limited the Safe Yield to 19,300 acre feet per year, through the coordinated and equitable management of the Four Basins and Two Basins Areas provided under this Judgment, an Operating Safe Yield, Operating Plan and Base Annual Production Rights shall be independently established for the Four Basins Area. However, La Verne shall be entitled to produce groundwater from the Two Basins Area in addition to its equitable share of the Four Basins Operating Safe Yield, as provided in accordance with the terms of this Judgment.

7. **Portability Between the Two Basins and Four Basins Areas.** A Party's right to produce, store or recover groundwater accruing under this Judgment in the Four Basins Area may not be transferred, exchanged or exercised in the Two Basins Area. A Party's right to produce, store or

recover groundwater accruing under this Judgment in the Two Basins Area may not be transferred, exchanged or exercised in the Four Basins Area.

B. Rights of the Parties to Produce Groundwater from the Four Basins.

1. **Declaration of Rights.** The Parties listed in Exhibit "D" are the owners of appropriative rights, including rights by prescription, and exercised and unexercised overlying rights of equal priority, and each Party shall be entitled to produce groundwater under the Physical Solution and to share in the Operating Safe Yield of the Four Basins according to the percentages set forth in Exhibit "D" as Base Annual Production Rights in a manner consistent with the provisions of this Judgment.

2. **Carryover Rights.** Any Party that produces less than its share of the Operating Safe Yield in any Year shall have the right to carry the unproduced portion forward to be produced in the following year subject to the following limitations: (a) the first water produced in any Year shall be deemed to be an exercise of any Carryover Right; (b) a Party's Carryover Right cannot exceed 25 (twenty-five) per cent of such Party's share of the current Operating Safe Yield for the prior Year; and (c) Carryover Rights may be lost in the event replenishment is discontinued or curtailed as provided below in Article IIIB, Section 7.

3. **Transferability of Rights.** Subject to the limitations set forth in this Judgment, a Base Annual Production Right and its associated percentage of the Operating Safe Yield, as well as any Carryover Rights and water stored under a Storage and Recovery Agreement, may be transferred, in whole or in part, among existing Parties or to any other person that becomes a Party on either a temporary or permanent basis provided that no Party is substantially injured by the Transfer. Production pursuant to any such Transfer shall be subject to the limitations on carryover and portability set forth in Article IIIB, Section 4. Any such Transfer shall become effective upon being recorded with Watermaster. Watermaster shall revise Exhibit "D" annually, to reflect any permanent Transfers. The permanent Transfer of any Party's full Base Annual Production Right shall require Watermaster approval. Upon Watermaster approval the permanent Transfer of a Party's full Base Annual Production Right may require an adjustment in the Party representatives to the Watermaster

and the number of votes of the Party's representatives as provided in Article V. Notwithstanding the provision of this Article IIIB, Section 3, Pomona shall not be entitled to Transfer 109 acre feet of its Base Annual Production Right and its associated percentage of Operating Safe Yield.

4. **Portability of Rights Among the Four Basins.** Any Party with a Base Annual Production Right, shall have the right to produce its share of the Operating Safe Yield of the Four Basins, including any Carryover Rights or Transfers, from any or all of the Four Basins, subject to the following conditions.

a. **No Substantial Injury**. Any groundwater production from a "new" location shall not cause substantial injury to another Party.

b. **Advance Written Notice to Watermaster.** Any Party that intends to undertake any of the following actions shall provide thirty (30) days' advance written notice to the Watermaster: (i) acquire, construct or operate a "new" groundwater production facility in any one of the Four Basins in which it is then producing groundwater; (ii) change the point of extraction from an existing groundwater production facility to a "new" groundwater production facility where the old and the new groundwater production facilities are both within the Canyon or Upper Claremont Heights or Lower Claremont Heights Basins; (iii) change the point of extraction from an existing groundwater production facility on one side of the Indian Hill Fault to a "new" facility on the other side of the Indian Hill Fault.

c. **Prior Watermaster Approval.** Any Party that changes the point of extraction from an existing groundwater production facility on one side of the Indian Hill Fault to a "new" facility located on the other side of the Indian Hill Fault and increases the cumulative rate of annual extraction therefrom by more than 2,000 acre feet per year shall be required to obtain the prior written approval of the Watermaster.

d. **New Facility Defined.** "New" as used in this Section 4 means either (i) an increase or enlargement in the pre-existing design capacity of a groundwater production facility or (ii) a movement in the location of a groundwater extraction facility by more than three hundred (300) feet or from one legal parcel to another legal parcel.

e. **Procedure for Resolution of Disputes.** The Watermaster shall make all necessary determinations and resolve all disputes arising under this Article IIIB, Section 4 in accordance with the provisions of Article VIII.

5. **Rights to Unused Groundwater Storage Capacity.** From time to time there may exist in the Four Basins, unused storage capacity. Parties holding Base Annual Production Rights pursuant to this Judgment and TVMWD for the sole purpose of storing Imported Water, shall have the exclusive rights to use such storage capacity, and subject to the complete discretion of the Watermaster, may sink, spread or inject water into the Four Basins Area pursuant to a Storage and Recovery Agreement.

6. **Priorities for Use of Groundwater Storage Capacity.** In directing spreading and controlling the use of groundwater storage capacity, the Watermaster shall give first priority to Replenishment Water; second priority to Carryover Rights; third priority to Storage and Recovery of water which is naturally tributary to the Six Basins Area; fourth priority to Storage and Recovery of Imported Water, and fifth priority to Storage and Recovery of other water.

7. **Loss of Stored and Carryover Water.** After providing notice and opportunity to be heard to any affected Party pursuant to Article IXA, if the Watermaster reasonably determines that Replenishment had to be terminated or curtailed in any year, or that Replenishment Water was rejected because of insufficient storage capacity, some or all of a Party's unproduced Carryover Rights or Storage and Recovery rights may be deemed lost. The amount of water subject to loss shall be equal to that quantity of Replenishment Water which was curtailed or rejected solely because of insufficient storage capacity in the Four Basins.

The burden of a determination by Watermaster that rejected recharge has occurred and that there shall be a loss of stored and Carryover water, shall be shared proportionately by each Party to the extent the quantity of water held by each Party at the time of the loss bears to the total quantity of water within each of the classification. Any losses shall be charged first to the storage of other water, then to the storage of Imported Water, then to the storage of Native Water, then to Carryover Water as expressly set forth below.

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a. Highest priority shall be given to Replenishment Water.

b. Second priority against loss shall be given to Carryover Water.

c. Third priority against loss shall be given to storage of Native Water.

d. Fourth priority against loss shall be given to storage of Imported Water.

e. Fifth priority against loss shall be given to storage of other water.

8. **Consideration of Groundwater Levels**. Watermaster shall make every reasonable effort to establish water operations limits so that the spreading of Replenishment or Replacement water, groundwater storage pursuant to a Storage and Recovery Agreement, or the determination of Operating Safe Yield shall not cause high groundwater levels that result in material damage to overlying property (not including sand and gravel excavations or operations) or cause groundwater to surface above the undisturbed natural terrain.

C. **The Parties' Rights to Groundwater and Storage in the Two Basins.**

1. **Declaration of Rights.** In recognition of the remediation efforts that are likely to be necessary to maximize groundwater production from the Two Basins; because of the detected high nitrate concentrations and in recognition that La Verne is uniquely situated to remedy these water quality conditions and exploit future opportunities; because of the minimal hydrologic communication between the Four Basins and Two Basins, and in furtherance of a complete and total physical solution for the Six Basins Area, La Verne shall have the right to produce as much groundwater as it may reasonably withdraw from the Two Basins Area on an annual basis so long as it does not substantially injure the rights of any other Party.

2. **Storage and Recovery.** La Verne has the sole right to use available storage capacity in the Two Basins in its complete discretion for the Storage and Recovery of groundwater so long as it does not cause substantial injury to any other Party. La Verne shall not be required to obtain a Storage and Recovery Agreement from the Watermaster for Storage and Recovery programs carried out within the Two Basins Area provided that (i) such production or use of storage capacity shall not cause substantial injury to any other Party and (ii) La Verne provides 60 (sixty) days' advance written notice to Watermaster before initiating such a Storage and Recovery program.

3. **Transferability of Rights.** Subject to the limitations set forth in Article III A, Section 7, La Verne's right to produce groundwater from the Two Basins Area may be transferred, in whole or in part, among existing Parties or to any other person that becomes a Party, on either a temporary or permanent basis provided that no Party is substantially injured by the Transfer. The permanent Transfer of the right to produce groundwater from the Two Basins Area shall not be effective until approved by Watermaster.

D. **Rights and Responsibilities of PVPA.**

1. **Spreading Operations.** PVPA and the other Parties have negotiated a Supplemental Memorandum of Agreement, attached hereto as Exhibit "C". This Supplemental Memorandum of Agreement and all modifications or amendments thereto shall include a provision for Watermaster's indemnity of PVPA for all Replenishment activities undertaken by PVPA at the direction of the Watermaster. Within sixty (60) days of entry of this Judgment, Watermaster and PVPA shall execute the Agreement. Upon execution, the Agreement shall become part of the Physical Solution. PVPA shall not be required to execute a Storage and Recovery Agreement with Watermaster for its Replenishment activities carried out under the direction of the Watermaster. The Spreading operations conducted by PVPA may result in incidental Replenishment to the Two Basins Area and none of the Parties have a right to object thereto. This Replenishment is authorized under the Judgment.

2. **Waiver of Claims Against PVPA.** The Parties expressly waive any and all claims against PVPA arising from facts, conditions or occurrences in existence before the Effective Date and arising from PVPA's spreading operations including but not limited to water quality degradation, subsurface infiltration, high groundwater or groundwater Overdraft within the Six Basins Area.

E. **Non-parties.**

1. **Minimal Producers.** Minimal producers are not bound or affected by this Judgment. No person may produce twenty-five acre feet or more in any Year without becoming a Party.

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2. **Parties' Rights Versus Non-parties Reserved.** The Parties expressly reserve all rights, without limitation, concerning any and all claims raised by persons not a Party to this Judgment as provided in Article IV C Section 1.

IV. REMEDIES

A. Injunctions.

1. **Injunction Against Unauthorized Production.** Each and every Party, its officers, agents, employees, successors and assigns is enjoined and restrained from producing water from the Six Basins except as authorized herein.

2. **Injunction Against Unauthorized Storage.** Each and every Party, its officers, agents, employees, successors and assigns is enjoined and restrained from storing water in the Six Basin Area except as authorized herein.

3. **Injunction Against Unauthorized Replenishment.** Each and every Party, its officers, agents, employees, successors and assigns is enjoined and restrained from replenishing water in the Six Basin Area except as authorized herein.

B. Continuing Jurisdiction

1. **Jurisdiction Reserved.** Full jurisdiction, power and authority are retained by and reserved to the Court upon the application of any Party, by a motion noticed in accordance with the review procedures of Article XIA, Section 6 hereof, to make such further or supplemental order or directions as may be necessary or appropriate for interpretation, enforcement or implementation of this Judgment, and to modify, amend or amplify any of the provisions of this Judgment or to add to the provisions thereof consistent with the rights herein decreed; provided that nothing in this paragraph shall authorize a reduction of the Base Annual Production Right of any Party except pursuant to a Transfer.

2. **Intervention After Judgment.** Any Non-party who proposes to produce Groundwater from the Six Basins Area in an amount equal to or greater than 25 acre feet per Year, may seek to become a Party to this Judgment through (a) a stipulation for intervention entered into with Watermaster or (b) any Party or Watermaster filing a complaint against the Non-party requesting

that the Non-party be joined in and bound by this Judgment. Watermaster may execute said Stipulation on behalf of the other Parties herein, but such stipulation shall not preclude a Party from opposing such intervention at the time of the Court hearing thereon. A stipulation for intervention must thereupon be filed with the Court, which will consider an order confirming said intervention following thirty (30) days' notice to the Parties. Thereafter, if approved by the Court, such intervenor shall be a Party bound by this Judgment and entitled to the rights and privileges accorded under the Physical Solution herein, including a Base Annual Production Right in an amount equal to its average annual production in the twelve-year period beginning on January 1, of 1985 and ending on December 31, 1996, or any Base Annual Production Right it may obtain by a transfer.

C. **Reservation of Other Remedies.**

1. **Claims By and Against Non-parties.** Nothing in this Judgment shall expand or restrict the rights, remedies or defenses available to any Party in raising or defending against claims made by any Non-party. Any Party shall have the right to initiate an action against any Non-party to enforce or compel compliance with the provisions of this Judgment.

2. **Claims Between Parties on Matters Unrelated to the Judgment.** Nothing in this Judgment shall either expand or restrict the rights or remedies of the Parties concerning subject matter which is unrelated to the quantity and quality of groundwater allocated and equitably managed pursuant to this Judgment other than as provided in Article IIIA, Section 1.

3. **Groundwater Levels.** Except as expressly provided herein, nothing in this Judgment shall either expand or restrict the rights or remedies at law that any Party may have against any other Party for money damages to real or personal property resulting from high groundwater or defenses thereto for events or occurrences after the Effective Date.

V. WATERMASTER

A. **Composition, Voting and Compensation.** The Watermaster shall be a committee composed of one representative of each of the following Parties, and each representative shall have the authority to cast the indicated number of votes on any question before the committee:

City of La Verne	5 votes

City of Pomona	5 votes
City of Upland	5 votes
Southern California Water Company	5 votes
City of Claremont	2 votes
TVMWD	2 votes
PVPA	2 votes
~~Simpson Paper~~	~~1 vote~~
Pomona College	1 vote
San Antonio	1 vote

Committee representatives having the combined authority to cast twenty votes shall constitute a quorum for the transaction of affairs of Watermaster and seventeen affirmative votes shall be required to constitute action by Watermaster. Representatives shall be compensated for their services by their respective appointing authorities. Representatives may be reimbursed by Watermaster for out of pocket expenses incurred on authorized Watermaster business.

B. Nomination and Appointment Process. Each of the Parties named in Article VA, above, shall within thirty (30) days of entry of this Judgment submit to the Court its nominees for its representative member of the Watermaster Committee and one alternate and the Court shall in the ordinary course confirm the same by an appropriate order of appointment. Once appointed representatives and their alternates shall normally serve until a replacement is designated by the Party or until removed by the Court. If a representative or alternate is no longer willing or able to serve for any reason the Party represented by such member or alternate shall promptly submit a replacement for the member or their alternate. There shall be no need for replacement representative members or alternates to be approved by the Court. In its annual report to the Court, Watermaster shall update the list of its representative members and alternates.

C. Succession. For the purpose of determining whether a permanent Transfer of a Base Annual Production Right shall affect whether a Party shall have a Representative on the Watermaster Committee and the number of votes held by the representative, the following guidelines shall apply:

1. **Partial Succession.** The permanent Transfer of less than any Party's full Base Annual Production Right shall be considered a "partial" succession. A partial succession shall not create any new or additional voting rights in the successor Party or require any modifications to the rules and procedures under this Article V. The full Base Annual Production Right of any Party shall be equal to the entire quantity of the Base Annual Production Right for that Party set forth in Exhibit D on the Effective Date.

2. **Non-Party Successor.** A permanent Transfer of the full Base Annual Production Right of any Party to a Non-Party shall automatically include the authority to cast the number of votes held by the Party. In addition, the Non-Party shall succeed to all other rights and responsibilities of their predecessor Party under this Judgment.

3. **Party Successor.** A permanent Transfer of the full Base Annual Production Right between Parties shall automatically include the authority to cast a number of votes equal to the greater of: (a) the number of votes indicated for the acquiring Party on the Effective Date or (b) the number of votes indicated for the Party whose Base Annual Production Right has been acquired at the time the Transfer is approved by the Watermaster. The number of votes equal to the lesser of 3(a) or 3(b) shall be extinguished. The acquisition of one Party's full Base Annual Production Right by another Party shall not cause a change in the number of votes required to constitute a quorum or to take an action under this Article. However, in the event more than two votes are eliminated, any Party or the Watermaster upon its own motion, may petition the Court to revise the required number of votes to constitute a quorum or to take action under this Judgment.

D. **Powers and Duties.** Subject to the continuing supervision and control of the Court and the limitations set forth in this Judgment, Watermaster shall have and may exercise the following express powers, and shall perform the following duties, together with any specific powers, authority and duties granted or imposed elsewhere in this Judgment or hereafter ordered or authorized by the Court in the exercise of its continuing jurisdiction:

1. Developing, Maintaining and Implementing the Operating Plan.

2. Adopting Rules, Regulations, Procedures, Criteria and Time Schedules.

3. Acquiring or Investing in Facilities or Facility Improvements.

4. Acquiring or Investing in Monitoring Facilities.

5. Inspecting and Testing Measuring Devices.

6. Levying Assessments

7. Requiring the Acquisition of and Recharge of Replacement Water.

8. Contracting for Necessary Services. (Including the execution of agreements regarding spreading and groundwater modeling.)

9. Employing Agents, Experts and Legal Counsel provided that Watermaster shall not contract with or otherwise engage a Party with a Base Annual Production Right to perform directly or indirectly, administrative services. However, this limitation shall not apply to spreading services under Exhibit C, and meter reading.

10. Adopting an annual budget for monitoring and reporting legal and administrative costs.

11. Managing Watermaster Funds.

12. Cooperating with Federal, State and Local Agencies.

13. Entering and Administering Storage and Recovery Agreements.

14. Maintaining a Notice List.

15. Reporting Annually to the Court.

16. Engaging in Dispute Resolution.

17. Prosecuting litigation against Non-parties in furtherance of the Judgment.

18. Limiting groundwater production to Operating Safe Yield during a Water Shortage Emergency.

E. <u>Organization and Meetings</u>. At its first meeting in each Year Watermaster shall elect a chair, vice chair, secretary and treasurer and such other officers as may be appropriate. Watermaster shall hold regular meetings at places and times specified in its rules and regulations, and may hold such special meetings as may be required. Watermaster shall provide notices of all regular and special meetings to all parties and any person requesting notice in writing. Any meeting may be adjourned to a time and place specified in the order of adjournment. Meetings shall be conducted to the extent practicable in accordance with the provisions of the California Open Meetings Law ("Brown Act") *California Government Code Section 54950*, et seq as it may be amended from time to time.

F. **Limits on Assessments.** Watermaster shall not have the authority to levy assessments beyond those specifically described herein.

VI. PHYSICAL SOLUTION FOR THE SIX BASINS AREA

A. General Purposes and Objectives.

1. **Physical Solution is Consistent With the Public Interest.** The Physical Solution is consistent with each Party's full enjoyment and the reasonable exercise of its respective water rights will not materially injure the interests of any Parties and will promote coordinated groundwater management with due regard for the environment and it is therefore consistent with the public interest and the reasonable and beneficial use of water.

2. **Balance of Equities.** This Physical Solution constitutes a legal and practical means for balancing the needs of the Parties for a reliable water supply, providing an appropriate incentive for remediation of poor water quality conditions, managing the available groundwater storage capacity to protect against loss of available groundwater and against damage from high groundwater levels with due regard for the environment .

3. **Flexibility.** It is essential that this Physical Solution provides maximum flexibility so that the Watermaster and the Court may be free to adapt and accommodate future changed conditions or new institutional or technological considerations. To that end the Court's retained jurisdiction may be utilized to augment or adjust the Physical Solution without adjustment to a Party's Base Annual Production Right.

B. Guidelines for Operation of Four Basins Area.

All production, replenishment, replacement, and Storage and Recovery of water in the Four Basins Area must be conducted pursuant to the Operating Plan adopted by Watermaster in accordance with the principles and procedures contained in this Judgment. The following general pattern of operations is contemplated:

1. **Replenishment**. Groundwater will be replenished pursuant to Exhibit "E" or under any other replenishment program or activity to the extent water which is naturally tributary to the Six Basin Area, is available for that purpose and can safely be spread.

2. **Storage and Recovery**. Other Native Water, imported water or other water may be stored and recovered pursuant to Storage and Recovery Agreements.

3. **Operating Safe Yield**. Watermaster will annually, not later than September 15, establish the Operating Safe Yield for the Four Basins for the following Year, taking into consideration the amount of water in storage and the need to control water table elevations. Watermaster shall review the condition of the Four Basins at least quarterly during the Year and may make any appropriate adjustments of the Operating Safe Yield.

4. **Production**. In any Year, each Party will be free to produce its share of the Operating Safe Yield, including any Carryover Rights or Transfers, plus any water authorized to be recovered pursuant to a Storage and Recovery Agreement. Except upon Transfer, no change shall be made to any Party's Base Annual Production Rights.

5. **Replacement Water**. Notwithstanding any limitation contained in this Judgment, a Party may produce and export water from the Four Basins in excess of its Base Annual Production Right and its share of the Operating Safe Yield, plus unused Carryover rights and recoverable groundwater pursuant to an approved Storage and Recovery Agreement, subject to the requirement to provide Replacement Water in the manner set forth herein.

a. **Obligation to Provide Replacement Water.** To the extent a Party's production in the Four Basins or in any basin exceeds that Party's share of the Operating Safe Yield, plus unused Carryover rights and recoverable groundwater pursuant to an approved Storage and Recovery Agreement, the Party shall arrange for delivery of Replacement Water in an amount equal to the Party's excess production by any of the following: (i) acquiring Replacement Water directly from TVMWD except Upland which may also acquire Replacement Water from the Inland Empire Utilities Agency ("the Empire"); (ii) arranging for delivery of a Native water supply other than Replenishment Water; or (iii) paying a Replacement Water Assessment to Watermaster for the purpose of acquiring Replacement Water directly from TVMWD except as to Upland for which Watermaster may acquire replacement water from the Empire.

b. **In Lieu Procedures.** Replacement Water may be supplied through In-Lieu Procedures, spreading or other method at a place, time and manner, acceptable to Watermaster, for a price and upon terms to be determined by TVMWD except as to Upland for which the price and terms may be determined by the Empire.

c. **Replacement Water Assessment.** Watermaster will use Replacement Water Assessment proceeds to acquire Replacement Water from TVMWD, or as to Upland, the Empire.

6. **Development, Maintenance and Implementation of the Operating Plan**. Watermaster is directed to maintain and implement the Operating Plan such that Production, Replenishment and Storage and Recovery of water are consistent with and implement the purpose and objectives of the Physical Solution herein. The Operating Plan shall include rules, regulations, procedures, criteria, and time schedules, as appropriate, for at least the following elements:

a. Establishing and adjusting the Operating Safe Yield.

b. Replenishment.

c. Execution of supplemental agreements with PVPA regarding spreading grounds and the funding thereof.

d. Acquisition and delivery of Replacement Water.

e. Standard terms and conditions of Storage Agreements.

f. Replenishment, replacement and storage limits needed to protect against high groundwater levels.

g. Remediation of water quality problems.

h. Monitoring systems and protocols, including such for groundwater levels.

i. Monitoring, reporting and verification programs.

j. Transfers.

k. Annual budgets.

l. Financial management.

m. Reporting to the Court.

n. Levying Assessments.

7. **Initial Operating Plan.** Within six months of the effective date of this Judgment Watermaster shall submit to the Court for approval an initial Operating Plan. An outline of the Initial Operating Plan is attached as Exhibit "G."

8. **Annual Review of the Operating Plan.** Watermaster shall review the Operating Plan at least annually and, subsequent to each such review, submit to the Court for its approval any proposed amendments or revisions.

9. **Replenishment.** PVPA and Pomona historically augmented the Native Safe Yield within the Four Basins Area through replenishment programs or activities. For many years these replenishment programs or activities have resulted in the spreading and percolation of native waters originating in the San Antonio Canyon and Evey Canyon. To the extent such waters have been historically spread, they comprise a portion of the Safe Yield and Operating Safe Yield subject to management under this Physical Solution.

a. All Replenishment shall be at the direction of the Watermaster.

b. At the direction and sole discretion of the Watermaster PVPA shall, pursuant to the Memorandum of Agreement set forth in Exhibit "C" or any subsequent amendments thereto, continue to spread such native waters as it receives.

c. Unless it is acting for the benefit of another Party pursuant to a Storage and Recovery Agreement approved by the Watermaster, except for Replacement Water, all water PVPA spreads, sinks or injects shall be considered Replenishment and shall comprise a portion of the Operating Safe Yield.

d. Although Pomona has no continuing obligation to spread or replenish, all waters spread in excess of its "historical replenishment" shall not be considered Replenishment and a part of the Operating Safe Yield of the Four Basins Area. The "historical replenishment" of Pomona shall be equal to a twelve (12) year annual average for the twelve (12) years immediately preceding the filing of the complaint

(1985-1996), which is determined to be one-hundred and thirty) acre feet. All water Pomona spreads, sinks or injects, or causes to be spread, sunk or injected (collectively augmentation) in excess of the historical replenishment shall not be considered a portion of the Operating Safe Yield, and shall not be allocated among the Parties pursuant to their Base Annual Production Rights. Pomona shall be entitled to produce such excess quantity in addition to its Base Annual Production Right under a pre-approved Storage and Recovery Agreement as provided in Article VIA, Section 10 in a form substantially similar to Exhibit F hereto, which is ordered to be executed by Watermaster and Pomona within sixty (60) days from the Effective Date. Measurement of Pomona's rights to recover water under any Storage and Recovery Agreement shall be administered as follows:

i. Pomona shall be entitled to recover the amount by which its augmentation of water over the twelve (12) year period ending with the current year exceeds 1,560 acre feet.

ii. If less than twelve (12) years have elapsed since the effective date of this Judgment, Pomona shall have the right to recover the amount by which the total number of acre feet of groundwater augmented by Pomona exceeds one hundred thirty (130) acre feet times the number of years elapsed.

iii. The amount in excess of Pomona's historical replenishment may be recovered by Pomona as provided in the Storage and Recovery Agreement.

10. Storage and Recovery Pursuant to Storage and Recovery Agreements. Watermaster may enter a Storage and Recovery Agreement with any Party holding a Base Annual Production Right or TVMWD so long as the Storage and Recovery of groundwater will not cause an unreasonably high groundwater table and physical damage. A Storage and Recovery Agreement shall contain uniform terms and conditions as set forth in the Operating Plan and may also contain special terms and conditions as deemed appropriate by Watermaster. Water that may be stored pursuant to a Storage Agreement includes any water other than Replenishment Water including augmentation in excess of historical replenishment as expressly set forth under Article VIB, Section 9.

11. **Special Projects.** Any Party may propose for Watermaster approval, special projects including projects for controlling water levels or for remediation of water quality problems. Any such proposal shall be accompanied by an analysis that identifies the benefits of the project as well as any potential adverse impacts on any Party and any proposed mitigation measures. After notice to all Parties, if any Party files a written objection to the proposed project, Watermaster shall hold a hearing to determine whether the objections to the proposed project can be resolved. If there are no objections or if objections are resolved to the satisfaction of the Parties or if Watermaster determines that the objections are without merit, then Watermaster shall approve the proposed project. Groundwater produced under authorization as a Special Project shall not be eligible for the accrual of Carryover Rights unless authorized by Watermaster.

12. **Temporary Surplus Groundwater.** From time to time it may be in the best interest of the Parties, for the control of high groundwater, water quality remediation or other reasons, to produce groundwater over and above the then declared Operating Safe Yield. Therefore, from time to time, the Watermaster may declare a Temporary Surplus of groundwater to be available for production. The Parties' rights to the Temporary Surplus shall be in the same percentages as the Base Annual Production Right bears to the Operating Safe Yield. A Party's rights to temporary surplus shall not be eligible for the accrual of Carryover Rights set forth in Article IIIB, Section 2.

C. **Guidelines for Operation of the Two Basins Area.** All Production, Replenishment and Storage and Recovery rights for groundwater in the Two Basins Area are reserved to La Verne. However, La Verne's Production, Replenishment and Storage and Recovery of groundwater must not substantially injure other Parties.

1. **Replenishment.** La Verne shall have sole and complete discretion in the operation of Replenishment programs in the Two Basins Area provided that no other Party is substantially

injured by the program. La Verne shall provide written notice to Watermaster sixty (60) days in advance of any Replenishment program being undertaken.

2. **Storage and Recovery.** La Verne shall have sole and complete discretion in the operation of a Storage and Recovery program in the Two Basins Area provided that no other Party is substantially injured by the program. La Verne shall provide written notice to Watermaster sixty (60) days in advance of any Storage and Recovery program being undertaken. La Verne shall annually report the quantity of groundwater stored pursuant to a Storage and Recovery Program in the Two Basins Area.

3. **Production.** La Verne shall have sole and complete discretion to produce groundwater from the Two Basins Area provided that no other Party is substantially injured by such production. La Verne shall report its groundwater production to the Watermaster on a monthly basis.

VII. ASSESSMENTS

A. Ground Rules

1. **Authorization.** Subject to the continuing supervision of the Court and the limitations set forth in the Judgment, Watermaster is authorized to levy assessments to fund Replacement Water acquisition costs, administrative costs and other costs determined by Watermaster to be necessary for the implementation of the physical solution.

2. **Assessment Spread.** Excluding Replacement Water Assessments, all assessments levied by the Watermaster shall be spread such that Claremont, Pomona College and TVMWD (collectively, the "Minor Parties") shall each individually be assessed three and one half (3.5) percent of the total assessment , and eighty-nine and one half (89.5) percent of the total assessment is spread among La Verne, Pomona, Upland, San Antonio, West End, ~~Simpson~~ and SCWC (collectively, the "Major Parties") in proportion to their then-current holdings of Base Annual Production Rights, provided that for assessments other than for Replacement Water or administration (a) the total amount spread among Minor Parties shall not exceed sixty-thousand $60,000, escalated, in any year without their unanimous consent and (b) the total amount spread among the Major Parties in any year shall not exceed ten dollars ($10.00), escalated, per acre foot of their Base Annual Production Rights without their unanimous consent. "Escalated" shall mean an annual adjustment in the specified dollar value based upon the Consumer Price Index for Southern California in the immediately preceding Year. No escalation adjustment shall be made until the Judgment has been in effect for twelve consecutive calendar months. PVPA shall not have any obligation to pay any assessments.

3. **Administrative Assessment.** Watermaster is authorized to levy an annual assessment that is sufficient to fund the costs of administering the Judgment. The administrative assessment shall not exceed the cost of Watermaster's administrative budget and shall be due and payable according to a schedule established by Watermaster. The administrative assessment for the first Year following entry of Judgment shall be $8.00 per AF and shall be due and payable on January 15, 1999. Late payment shall bear an interest penalty to be established annually by Watermaster. (escalated?)

4. **Replacement Water Assessments.** To the extent Watermaster must acquire and recharge the groundwater with Replacement Water pursuant to the terms of this Judgment, in order to fund the costs thereof, Watermaster is authorized to levy Replacement Water Assessments. Replacement Water Assessments levied against any Party shall be sufficient to pay the costs to replace such Party's production in excess of the sum of such Party's share of the Operating Safe Yield, any Carryover Right or Transfers and any storage recovery, Production of Temporary Surplus or pursuant to Special Project authorization, during the prior Year, minus any Replacement Water provided to Watermaster by the Party. Any Replacement Water Assessment shall be paid within sixty (60) days from the date of the written invoice from Watermaster.

VIII. DISPUTE RESOLUTION

A. **Entity for Resolution of Dispute.** All disputes arising under this Judgment initially shall be submitted to Watermaster for resolution in accordance with the provisions of this Article.

B. **Determination Regarding Substantial Injury.** Any Party having a right to be protected against "substantial injury" caused by any other Party; the right to proceed so long as not causing substantial injury to another party; or any other claim, right or remedy against any other Party arising under the provisions of this Judgment may file a written request with the Watermaster to hold a hearing.

C. **Notice and Hearing.** Upon receipt of the written request, Watermaster shall provide written notice to each Party which generally describes the nature of the dispute. Thereafter, Watermaster shall cause an item to be placed on the agenda for the next regularly scheduled meeting of the Watermaster or if requested by the moving Party, call a special meeting for the purpose of providing a full hearing of the dispute and providing the interested Parties with notice and opportunity to be heard. No later than 30 days following the conclusion of the hearing(s) Watermaster shall issue a written decision which is dispositive of the dispute and which is supported by written findings. Any Party may seek review of an adverse decision of the Watermaster in accordance with the provisions of Article IX.

IX. ADDITIONAL PROVISIONS

A. Procedure

1. **Designation of Address for Notice and Service.** Each Party shall designate the name and address to be used for purposes of all subsequent notices and service herein, either by its endorsement on the Stipulation for Judgment or by a separate designation to be filed within thirty (30) days after Judgment has been entered. Said designation may be changed from time to time by filing a written notice of such change with Watermaster. Any Party desiring to be relieved of receiving notices of Watermaster activity may file a waiver of notice on a form to be provided by Watermaster. Watermaster shall maintain at all times a current list of Parties to whom notices are to be sent and their address for purposes of service. Watermaster shall also maintain a full current list of names and addresses of all Parties or their successors, as filed herein. Copies of such lists shall be available to any person. If no designation is made, a Party's designee shall be deemed to be, in order of priority: (i) the Party's attorney of record; (ii) if the Party does not have an attorney of record, the Party itself at the address on the Watermaster list.

2. **Service of Documents.** Delivery to or service upon any Party by Watermaster, by any other Party, or by the Court, of any document required to be served upon or delivered to a Party under or pursuant to this Judgment shall be deemed made if made by deposit thereof (or by copy thereof)

in the mail, first class postage prepaid, addressed to the designee of the Party and at the address shown in the latest designation filed by that Party.

3. **Recordation of Notice**. Within sixty (60) days following entry of this Judgment, Watermaster shall record in the office of the County Recorder of the Los Angeles and San Bernardino Counties a notice substantially complying with the notice content requirements set forth in *Section 2529 of the California Water Code* as it exists on the Effective Date.

4. **Judgment Binding on Successors.** Subject to specific provisions hereinbefore contained, this Judgment and all provisions thereof are applicable to and binding upon and inure to the benefit of not only the Parties to this action, but also to their respective heirs, executors, administrators, successors, assigns, lessees, licensees and to the agents, employees and attorneys in fact of any such Persons.

5. **Costs**. No Party stipulating to this Judgment shall recover any costs or attorneys fees in this proceeding from another stipulating Party. In any future proceedings, the costs of notice or service, shall be levied in accordance with the provisions of Article XIA, Section 6.

6. **Review Procedures**. Any action, decision, rule or procedure of Watermaster pursuant to this Judgment shall be subject to review by the Court on its own motion or on timely motion by any Party, as follows:

a. **Effective Date of Watermaster Action.** Any order, decision or action of Watermaster pursuant to this Judgment on noticed specific agenda items shall be deemed to have occurred on the date of the order, decision or action.

b. **Notice of Motion.** Any Party may, by a regularly noticed motion, petition the Court for review of Watermaster's action or decision pursuant to this Judgment. The motion shall be deemed to be filed when a copy, conformed as filed with the Court, has been delivered to Watermaster together with the service fee established by Watermaster sufficient to cover the cost to photocopy and mail the motion to each Party. Watermaster shall prepare copies and mail a copy of the motion to each Party or its designee according to the official service list which shall be maintained by Watermaster according to Article XIA, Section 1, a Party's obligation to serve notice of a motion upon the Parties is deemed to be satisfied by filing the motion as provided herein. Unless ordered by the Court, any such petition shall not operate to stay the effect of any Watermaster action or decision which is challenged.

c. **Time for Motion.** A motion to review any Watermaster action or decision shall be filed within ninety (90) days after such Watermaster action or decision, except that motions to review Watermaster Assessments hereunder shall be filed within thirty (30) days of mailing of notice of the Assessment.

d. **De Novo Nature of Proceeding.** Upon filing of a petition to review Watermaster action, the Watermaster shall notify the Parties of a date when the Court will take evidence and hear argument. The Court's review shall be de novo and the Watermaster decision or action shall have no evidentiary weight in such proceeding.

e. **Payment of Assessments.** Payment of Assessments levied by Watermaster hereunder shall be made when due, notwithstanding any motion for review of Watermaster action, decision, rules or procedures, including review of Watermaster Assessments.

B. **Entry of Judgment.** The Clerk shall enter this Judgment.

Dated: DEC 18 1998, 1998.

Judge of the Superior Court

WILLIAM J. McVITTIE

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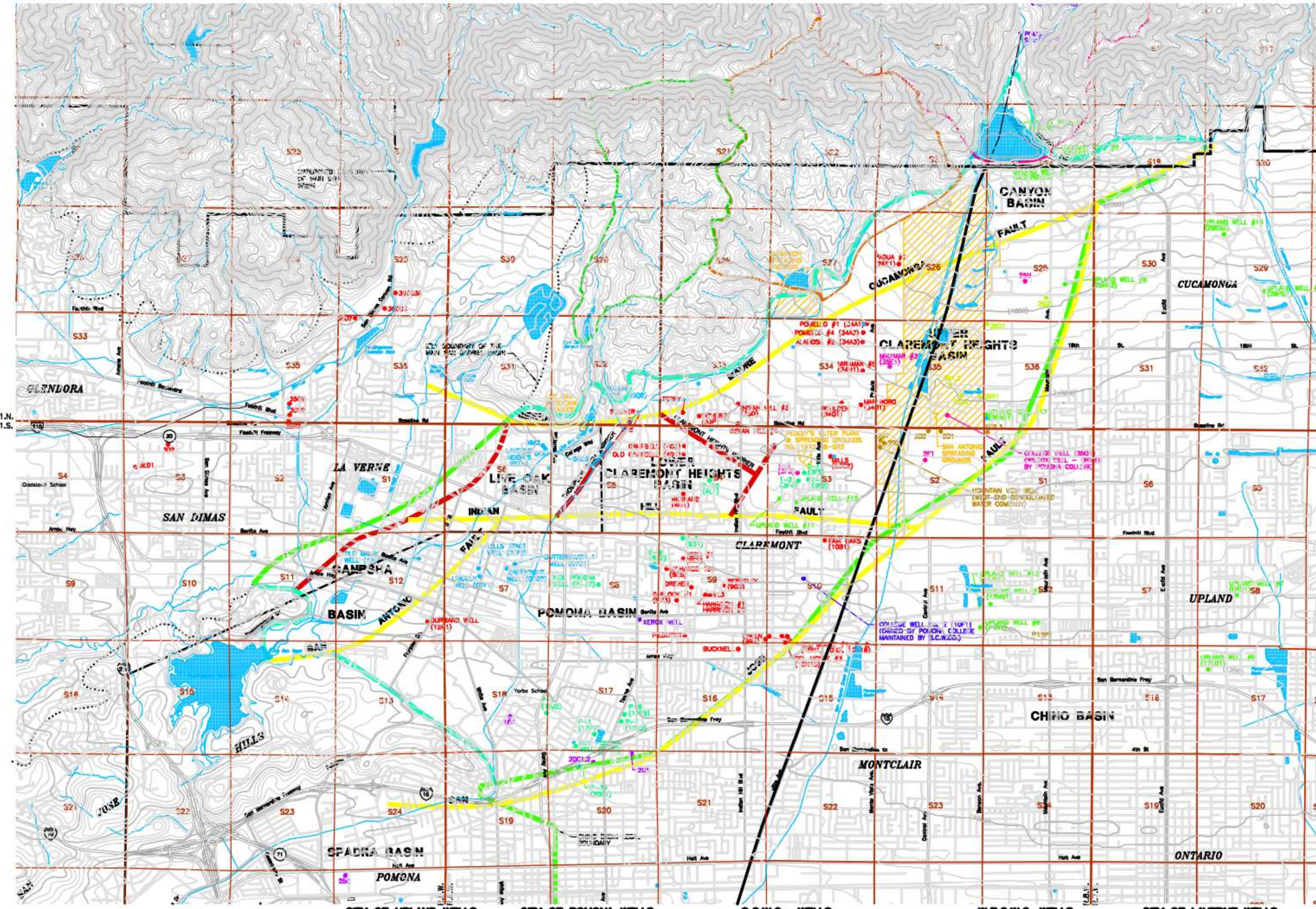
93101-2782



LEGEND

- THOMPSON CREEK WATERSHED BOUNDARY
- LIVE OAK WATERSHED BOUNDARY
- SAN ANTONIO WATERSHED BOUNDARY
- FAULT LINE
- LEGAL BOUNDARY OF ADJACENT BASIN
- GEOLOGIC FEATURE
- ALLUVIUM BOUNDARY
- MAIN SAN GABRIEL BASIN WATERSHED BOUNDARY
- MAIN SAN GABRIEL BASIN
- GROUNDWATER RECHARGE FACILITY

N

SCALE: 1" = 2000'

CITY OF UPLAND WELLS

18J02 WELL AND NUMBER

STATE ID #	CITY ID #
24L1	UPLAND WELL #1 (DESTROYED)
24E02	UPLAND WELL #1A
24E01	UPLAND WELL #2
12M01	UPLAND WELL #3 (INACTIVE)
25K03	UPLAND WELL #5
8N01	UPLAND WELL #7
11R1	UPLAND WELL #8 (INACTIVE)
17E01	UPLAND WELL #9
3M3	UPLAND WELL #11 (DESTROYED)
3M	UPLAND WELL #12 (DESTROYED)
11J01	UPLAND WELL #13 (INACTIVE)
29P01	UPLAND WELL #15
29E02	UPLAND WELL #16
36N01	UPLAND WELL #17

CITY OF POMONA WELLS

18J02 WELL AND NUMBER

STATE ID #	CITY ID #
17P7	P-1
18J2	P-3
17K2	P-7
17P5	P-8
8H2	P-9
9D1	P-13
4L1	P-20
17P3	P-32
20C1	P-33
8F1	P-37
3F2	T-1
3F4	T-2
3F3	T-3
3F5	T-4

S.C.W.Co. WELLS

18J02 WELL AND NUMBER

STATE ID #	COMPANY ID #	STATE ID #	COMPANY ID #
34A3	ALAMOSA #2	9M3	GARLOCK #1
9G3	BERKELEY	9R1	GREEN
4M1	BERNARD	9L3	HARRISON #1
34Q1	BOULDER	9L2	HARRISON #2
4C3	CAMPBELL	33Q	INDIAN HILL #3
35Q1	COLLEGE WELL	34R1	MARLBORO
10N1	DEL MONTE #1	3G2	MILLS #1
10N3	DEL MONTE #2	35E1	MIRAMAR #3
10N15	DEL MONTE #3	34H1	MIRAMAR #5
10N16	DEL MONTE #4	28E1	PADUA #1
9F	DREHER	34A1	POMELLO #1
12R1	DURWARD WELL	34A2	POMELLO #4
10B1	FAIR OAKS	33P	POMEROY
9E2	FORD #1	9E5	RICHARDS 160

W.E.C.W.C. WELLS

18J02 WELL AND NUMBER

STATE ID #	COMPANY ID #
25Q2	CANYON RIDGE WELL (DESTROYED)
1D2,3	LEMON HEIGHTS #4
2D1	ML. VIEW #1
2D2	ML. VIEW #2 (DESTROYED)
2F1	ML. VIEW #4
12P1	WEST END WELL #1 (INACTIVE)
2B1	WEST END WELL #3
2B2	WEST END WELL #4
25M1	UPLAND-FOOTHILL #1 (DESTROYED)
25L1,2	UPLAND-FOOTHILL #3

CITY OF LAVERNE WELLS

18J02 WELL AND NUMBER

STATE ID #	CITY ID #
07G2	CARTWRIGHT
07F1	LINCOLN
05D2	MALONE 2 (INACTIVE)
07F2	MILLS TRACT
12A	OLD BALDY
06A2	LAVERNE HEIGHTS 1
06A1	LAVERNE HEIGHTS 2
05D3	LAVERNE HEIGHTS 3
07G1	BUTTERBAUGH 1 (DESTROYED)

S.A.W.C. WELLS

18J02 WELL AND NUMBER

STATE ID #	COMPANY ID #
26Q1	SAWC WELL #17 (INACTIVE)
26R1	SAWC WELL #25 (INACTIVE)
35J3	SAWC WELL #26
3K1,2	SAWC WELL #27 (INACTIVE)
36D1	SAWC WELL #28 (INACTIVE)

SIMPSON PAPER CO.

18J02 WELL AND NUMBER

STATE ID #	COMPANY ID #
18K	WELL 5
20A	WELL 1
20C1	WELL 2A
20C2	WELL 2B
25C	WELL 3

KEY MONITORING WELLS

18J02 WELL AND NUMBER

STATE ID #	COMPANY ID #
12M01	UPLAND WELL #3
2F1	ML. VIEW #4
35E1	MIRAMAR #3
35Q1	COLLEGE WELL No. 1
3F3	T-3

POMONA COLLEGE

18J02 WELL AND NUMBER

STATE ID #	COMPANY ID #
35Q1	COLLEGE WELL No. 1
10F1	COLLEGE WELL No. 2

PREPARED BY:

CIVILTEC engineering inc.
(626) 357-0588

SIX BASINS AREA

FINAL BOUNDARY MAP

DESIGN: JM/MR	CHECKED: WDB	SCALE: 1" = 2000'
DRAWN: PWH	J.N. 97106	SHEET 1 OF 1

EXHIBIT "A"

EXHIBIT B

DESCRIPTION OF SIX BASINS AREA

The Six Basins Area lies between the San Jose Hills on the south, the Chino Basin on the east, the San Gabriel Mountains on the north and the Main San Gabriel Basin on the west. The boundaries of the Main San Gabriel Basin are set forth in the Judgment in the case of the *Upper San Gabriel Valley Municipal Water District vs. City of Alhambra, et al.*, Superior Court of the State of California, Los Angeles County, Case No. 924128, and the boundaries of the Chino Basin are set forth in the Judgment in the case of *Chino Basin Municipal Water District vs. City of Chino, et al, Superior Court for the State of California*, San Bernardino County, Case No. 164327. The Area consists of six interconnected groundwater basins. Each basin consists of all alluvium or other water-bearing formations lying beneath the surface of the basin. The approximate boundaries of the surface of each basin are shown on EXHIBIT A and are described generally as follows:

Canyon Basin. The surface of the Canyon Basin is bounded on the south and east by the surface trace of the Sierra Madre/Cucamonga Fault and on the north and west by the surface trace of the bedrock/alluvium interface between(a) the point of intersection in Township 1 North, Range 8 West, Section 31, SBB&M, of the Sierra Madre/Cucamonga Fault with easterly boundary of the Main San Gabriel Basin and (b) the point of intersection in Township 1 North, Range 8 West, Section 20, SBB&M, of the Sierra Madre/Cucamonga Fault with the San Gabriel Mountains. The northernmost extent of the bedrock/alluvium interface is assumed to be at the southern boundary of Township 1 North, Range 8 West, Section 13, SBB&M in San Antonio Canyon.

Upper Claremont Heights Basin. The surface of the Upper Claremont Heights Basin is bounded on the south by the surface trace of the Indian Hill Fault, on the east by the westerly boundary of the Chino Basin, on the north by the surface trace of the Sierra Madre/Cucamonga Fault and on the west by the surface trace of the Claremont Heights Barrier.

Lower Claremont Heights Basin. The surface of the Lower Claremont Heights Basin is bounded on the south by the surface trace of the Indian Hill Fault, on the east by the surface trace of the Claremont Heights Barrier, on the north by the surface trace of the Sierra Madre/Cucamonga Fault on the west by the surface trace of the Thompson Wash Barrier.

Live Oak Basin. The surface of the Live Oak Basin is bounded on the south by the surface trace of the Indian Hill Fault, on the east by the surface trace of the Thompson Wash Barrier, on the north by the surface trace of the Sierra Madre/Cucamonga Fault and on the west by the easterly boundary of the Main San Gabriel Basin.

Ganesha Basin. The surface of the Ganesha Basin is bounded on the south and east by the surface of the San Antonio Fault, on the north surface trace of the Indian Hill Fault, and on the west by easterly boundary of the Main San Gabriel Basin and by the surface trace of the bedrock/alluvium interface between (a) the point of intersection in Township 1 South, Range 9 West, Section 11, SBB&M, of the easterly boundary of the Main San Gabriel Basin with the San Jose Hills and (b) the point of intersection in Township 1 South, Range 9 West, Section 14, SBB&M, of the surface trace of the San Antonio Fault with the San Jose Hills.

Pomona Basin. The surface of the Pomona Basin is bounded on the south by the surface trace of the bedrock/alluvium boundary between (a) the intersection in Township 1 South, Range 9 West, Section 14, SBB&M, of the surface trace of the San Antonio Fault with the San Jose Hills and (b) the intersection in Township 1 South, Range 8 West, Section 19, SBB&M, of the boundary of the Chino Basin, on the north by the surface trace of the Indian Hill Fault on the west by the surface of the San Antonio Fault.

MEMORANDUM OF AGREEMENT

BETWEEN THE POMONA VALLEY PROTECTIVE ASSOCIATION

AND WATERMASTER OF THE SIX BASINS RELATING TO

WATER SPREADING AND RELATED ACTIVITIES

THE AGREEMENT, made, entered into, and executed as of this ___ day of __________, 1999, by and between the Pomona Valley Protective Association ("PVPA"), and Watermaster of the Six Basins ("Watermaster"), relating to water spreading and related activities in connection with the Canyon Basin, the Upper Claremont Height Basin, the Lower Claremont Heights Basin, the Live Oak Basin, the Ganesha Basin and the Pomona Basin (collectively, the "Six Basins").

RECITALS

WHEREAS, the rights to groundwater in connection with the Six Basins were adjudicated by the court in an action entitled "*Southern California Water Company v. City of La Verne, et al,*" Case No. KC029152 in the Superior Court of the State of California, County of Los Angeles, (the "Judgment"); and

WHEREAS, the Judgment requires the Watermaster to determine annually an Operating Safe Yield of the Six Basins and to develop an Operating Plan, which will include the monitoring and direction of all production, replenishment, replacement and storage of groundwater in the Six Basins; and

WHEREAS, PVPA, a California corporation, formed in 1910 by various water interests in Pomona Valley, engages in water conservation activities for the benefit of its shareholders, which include the City of Upland, Southern California Water Company, the City of Pomona, Simpson Paper Co., Pomona College, the San Antonio Water Company, and the West End Water Company; and

WHEREAS, PVPA owns certain real property in and around the Six Basins area primarily consisting of two spreading grounds: the San Antonio Spreading Grounds and the Thompson Creek Spreading Grounds together with appurtenant diversion and conveyance facilities (the "Spreading Grounds" herein); and

WHEREAS, in connection with its water conservation activities, PVPA has conducted several technical studies of the Six Basins including the development of a numerical groundwater model which assists in the prediction of the Six Basins' response to PVPA's spreading activities, and is used to control the groundwater resources for the Six Basins and to mitigate high groundwater in the Six Basins; and

WHEREAS, the parties to the Judgment have conducted additional studies including the enhancement and refinement of the PVPA groundwater model.

NOW, THEREFORE, in consideration of mutual promises, agreements, and covenants of Watermaster and PVPA collectively referred to herein as "the Parties" agree as follows:

I. DEFINITIONS

A. The Judgment defines certain important terms. Except as to the definitions provided in this Agreement, the terms used in this Agreement which have been defined in the Judgment shall have the meaning set forth in the Judgment and the definitions set forth in the Judgment are incorporated herein by this reference

B. "Emergency" shall mean a sudden event which threatens life or property.

C. "Models" shall mean the spreadsheet and the basin wide models used by PVPA in development of an Operating Plan and any subsequent version or improvement thereof.

D. "Parties" written with an upper case P, refer to the Watermaster and to PVPA. Parties written with a lower case p, refer to the parties to the Judgment as defined therein.

II. SPREADING GROUNDS AND SPREADING OPERATIONS

A. Watermaster Direction and PVPA Reservation. PVPA shall use and operate the Spreading Grounds primarily for the spreading of replenishment, replacement and storage water under the direction of the Watermaster Plan. PVPA reserves the right to use the Spreading Grounds for other lawful activities consistent with its water spreading activities so long as doing so does not impair PVPA's ability to spread replenishment water in quantities substantially comparable to historic quantities.

B. Impossibility and related defenses. PVPA shall not be liable, in breach or in default of the Agreement if PVPA is unable, either temporarily or permanently, to perform its obligations

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under the Agreement for reasons beyond PVPA's reasonable control, including but not limited to, acts of God, eminent domain, impossibility or impracticability of performance, interference of a third party and natural disasters, including without limitation, floods, earthquakes, and fires.

C. PVPA Discretion. PVPA shall have discretion to make operational decisions in discharging its obligation hereunder within the scope of Watermaster direction.

D. Common conditions of spreading. In addition to the direction of Watermaster PVPA shall spread replenishment, replacement or storage waters subject to the following conditions.

1. Cessation of Spreading for Emergencies. PVPA reserves the right to cease spreading at any time, without prior notice to Watermaster if, in the discretion of PVPA, such action shall be warranted by, and in connection with, any emergency condition. PVPA will give Watermaster immediate notice of any such cessation.

2. Water Quality. PVPA bears no responsibility for the quality of replenishment, replacement or storage water or the impacts of spreading such water upon water quality of the Six Basins.

3. High Groundwater. PVPA bears no responsibility for high groundwater due to any spreading of replenishment, replacement or storage water.

4. Rejected water. PVPA bears no responsibility for loss of replenishment, replacement or storage water which is rejected or otherwise lost.

5. Measurement and Reporting. Watermaster shall provide adequate measuring devices to measure the spreading of replenishment, replacement and storage waters and any such water rejected or lost. PVPA will keep, maintain and furnish to Watermaster on a monthly basis, records of the quantities of replenishment waters spread and rejected.

6. Record of Deliveries and Spreading. Watermaster shall keep, maintain and furnish to PVPA records of the quantities and quality of replacement or storage waters delivered within 30 days following delivery of such waters. PVPA shall keep, maintain, and furnish to Watermaster the quantities of replacement and storage waters spread within 30 days following delivery of such water together with an estimate of the quantities of water bypassing the spreading facilities, if any.

7. Compensation. Subject to review by the court under its continuing jurisdiction in Case No. KC029152, Watermaster shall pay PVPA's actual, reasonable and necessary costs incurred by PVPA in spreading replenishment, replacement and storage water. PVPA will bill Watermaster such costs on a quarterly basis and such bill will include a reasonably detailed accounting of such costs under generally accepted accounting principles (GAAP). Payment is due upon billing. PVPA's costs may be subject to review or audit by an outside accounting firm selected and paid by Watermaster (within thirty days following billing). Within thirty (30) days following billing, Watermaster shall either contest the billing or accept said billing.

E. Replenishment water. In addition to the above, PVPA shall spread replenishment water as it becomes available. PVPA has no control over the availability of replenishment waters and is under no obligation to spread any specific quantity of replenishment water.

F. Replacement Water. In addition to the above, PVPA shall spread Replacement Water on the Spreading Grounds under the following terms and conditions. Pursuant to the Judgment, only qualified parties under the Judgment may store water in the Six Basins upon entry into a Storage and Recovery Agreement with Watermaster. Upon request, PVPA shall spread storage water under the following terms and conditions:

1. Terms of Delivery. Watermaster shall deliver and PVPA shall spread storage water under the same terms and conditions as replacement waters.

2. Replacement Water Flows. PVPA will assist Watermaster in determining the allowable daily rates and the duration of replacement water deliveries, based upon conditions existing from time to time, including any unused capacity available at and in PVPA spreading facilities.

3. Notice of New or Changed Replacement Water Flows. Watermaster, at least seven (7) days prior to any anticipated delivery of replacement water, shall notify PVPA that water will be available for transport and spreading and shall give PVPA at least forty-eight (48) hours notice of any anticipated change in previously established flow rates of delivery for such water.

4. Spreading Grounds Limitations. PVPA may require changes in delivery flow rates when, in PVPA's opinion, continued spreading (in whole or in part) cannot be carried out

hereunder due to operational and/or maintenance problems, including, but not limited to, trespassing, insect infestations, scarification, weed abatement, and/or construction in or at PVPA's conveyance and spreading facilities. When it is reasonable to do so, PVPA will give Watermaster at least twenty-four (24) hours' notice of any such changes.

III. OWNERSHIP AND IMPROVEMENTS OF SPREADING GROUNDS

A. <u>No Dedication</u>. Nothing in this Agreement shall be construed as a dedication of the PVPA Spreading Grounds or its facilities to Watermaster, the other parties to the Judgment, or to the public use or benefit. The spreading grounds and appurtenant facilities are, and remain, the sole property of PVPA. PVPA may sell, lease, or otherwise dispose of portions of its spreading grounds at its own discretion but not inconsistent with this Agreement.

B. <u>Spreading Grounds Improvements</u>. Nothing in this Agreement obligates or otherwise requires PVPA to construct new or additional facilities in connection with its spreading operations. PVPA may at its discretion construct new or additional facilities. Watermaster may propose improvements to PVPA's spreading grounds and facilities at its own expense.

C. <u>Condemnation</u>. Watermaster agrees to and does waive and disclaim any interest in any award or settlement which may be made in any proceeding in eminent domain concerning all or part of the Spreading Grounds whether the taking be total or partial, or for easement purposes. If the taking be such as to render the Spreading Grounds totally unfit and unsuitable for the above use, then, pursuant to Paragraph II,~~A~~ B, PVPA is not in default or breach.

IV. GROUNDWATER MODEL

A. <u>License for use.</u> PVPA grants Watermaster a license to use its Spreadsheet Models pursuant to the terms and conditions of this agreement for the development of an Operating Plan. In developing the initial operating plan, Watermaster has used PVPA's Groundwater Models. In developing subsequent operating plans or revising such plans, Watermaster shall use PVPA's Groundwater Models and any subsequent version or improvement thereof, or other criteria at Watermaster's discretion.

1. Custody of the PVPA's Groundwater Models. Watermaster shall have physical custody of a copy of the model. However, PVPA shall have the right to access the Models for any purpose which is not inconsistent with the Judgment or the direction of the Watermaster.

2. Updates to Model.

Said license shall include, following consultation with PVPA, the right to make changes, modifications, improvements, updates, or refinements in or to PVPA's Groundwater Model at the sole expense of Watermaster and without any contribution from PVPA.

B. Terms and Conditions. For daily operations, Watermaster shall be responsible for keeping, maintaining and reporting on the data base necessary for use of PVPA's Groundwater Models. Watermaster shall collect water level and quality data necessary, including key well levels and rainfall data, to use the Groundwater Models to implement the Physical Solution. Watermaster shall provide this data to PVPA by the fifteenth day of each month. PVPA shall provide Watermaster readings of replenishment water spread, on a daily basis. PVPA then shall provide Watermaster with a monthly report on available storage and water levels of monitoring wells.

1. Compensation. PVPA grants Watermaster this license at no cost other than the continuing costs which may be incurred by PVPA as a result of Watermaster operating the Models.

2. No Warranty. PVPA makes no warranty and disclaims all warranties regarding PVPA's Groundwater Model and its subsequent updates or improvements.

3. Field Conditions. PVPA shall report to Watermaster any field conditions that may have an impact on Spreading Operations.

V. INDEMNIFICATION

A. Watermaster Obligations. To the extent which is allowed by law, Watermaster shall indemnify and hold harmless, PVPA, its officers, directors, employees, agents, and representatives against any and all claims, demands, costs, and/or liabilities due to, or arising from any act or omission by PVPA, its officers, directors, employees, or agents arising from any activities not connected with the spreading of water under the direction of Watermaster.

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VI. INSURANCE

A. Subject to the above, PVPA shall obtain and maintain during the term of this Agreement the following insurance policies:

1. General Liability Insurance: PVPA shall maintain general liability insurance for bodily injury, property damage, personal injury, errors and omissions, and if practicable, flooding. The insurance shall be on an occurrence basis. The policy limits shall be at least $1,000,000.

2. Property: PVPA shall obtain insurance to provide for replacement of real and personal property owned by PVPA in the event of loss by fire, flood or vandalism. This insurance shall be provided on an occurrence basis and the policy limits shall be at least $1,000,000.

VII. MISCELLANEOUS PROVISIONS

A. Effective Date. This Agreement shall not be effective until executed by the Parties and approved by the court upon motion of Watermaster in said action in Case No. KC029152.

B. Written Amendments. This Agreement may only be modified, amended, or supplemented by a subsequent writing executed by each Party hereto and approved by the Court with jurisdiction in Case No. KC029152.

C. Choice of Law. This Agreement shall be governed by and interpreted under the laws of the State of California.

D. Delivery of Notices. All notices permitted or required under this Agreement shall be addressed to the representative Parties at the following address, or such other address as the respective Parties may provide in writing for this purpose:

PVPA:	President Pomona Valley Protective Association 414 Yale Avenue, Suite H Claremont, California 91711
Six Basins Watermaster	As may be designated by Watermaster

Such Notices shall be deemed made when personally delivered or, when mailed, forty-eight (48) hours after deposit in the U.S. mail, first class postage pre-paid and addressed to the Party at its applicable address.

E. Successors and Assigns. This Agreement is binding on and shall inure to the benefit of the Parties, their respective successors in interest and assigns.

F. Assignment. No Party shall have the right to assign it rights or delegate any of its obligations hereunder without the express written consent of the other Party.

G. Construction. Each Party and/or its respective counsel has taken part in the negotiation, drafting, and preparation of this Agreement, and, therefore, any ambiguity or uncertainty in this Agreement shall not be construed against any Party. To ensure that this Agreement is not construed against any Party, the Parties expressly agree that any common law or statutory provision providing that an ambiguous or uncertain term will be construed against the drafter of an Agreement is waived and shall not apply to the construction of this Agreement.

H. Entire Agreement. This Agreement embodies the entire and final Agreement and understanding of the Parties pertaining to the subject matter of this Agreement, and supersedes all prior Agreements, understandings, negotiations, representations, and discussions pertaining to that subject matter, whether verbal or written, of the Parties. The Parties acknowledge that there are no representations, promises, warrantees, conditions, or obligations of any Party, or counsel (or any Party), pertaining to that subject matter other than is contained in this Agreement, and that no Party has executed this agreement in reliance on any representation, promise, warranty, condition, or obligation, other than is contained in this Agreement.

I. Execution. The Parties to this Agreement acknowledge that they have executed this Agreement voluntarily and without any duress or undue influence. The Parties further acknowledge that they (1) have been represented by counsel of their own choice in connection with the negotiation and execution of this Agreement, or have been advised to seek independent counsel of their own choice prior to executing this agreement; (2) have read this Agreement in its entirety; and (3) have entered into this Agreement of their own volition and not as a result of any representations or advice by other Party or counsel for any other Party.

J. Counter Parts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. This agreement shall become effective and binding immediately upon its execution by both Parties. This Agreement consists of nine (9) pages, including the signature page.

K. Termination. Upon motion made by either Party to this Agreement in accordance with the procedures set forth in Article IX, Section A of the Judgment and approval of the Court, this Agreement shall be terminated.

DATED: ______________________ WATERMASTER

____

By:

DATED: ______________________ POMONA VALLEY PROTECTIVE ASSOCIATION

____

By:

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EXHIBIT D

BASE ANNUAL GROUNDWATER PRODUCTION IN EACH BASIN, 1985- 1996
AND TOTAL BASE ANNUAL GROUNDWATER PRODUCTION, 1985- 1996
FOR EACH PARTY, AND EACH PARTY'S PERCENTAGE OF THE AGGREGATE OPERATING SAFE
YIELD FOR THE CANYON, UPPER CLAREMONT HEIGHTS, LOWER CLAREMONT HEIGHTS AND POMONA BASINS

Party	Base Annual Production, Acre Feet per Year					
	Canyon Basin Basin	Upper Claremont Heights Basin	Lower Claremont Heights Basin	Pomona Basin	Total	Percentage of Aggregate Operating Safe Yield
City of La Verne	0	0	0	1,492	1,492	7.731
City of Pomona*	0	1,234	961	1,128	3,323	17.218
Simpson Paper	0	0	0	691	691	3.580
Southern Cal. Water Co.	56	2,895	107	3,647	6,705	34.741
City of Claremont	0	267	0	268	535	2.772
Pomona College	0	357	0	0	357	1.850
City of Upland	408	1,434	0	0	1,842	9.544
West End Consolidated Water Company	0	2,972	0	0	2,972	15.399
San Antonio Water Company	0	1,383	0	0	1,383	7.166
TOTAL	464	10,542	1,068	7,226	19,300	100.000%

* Pomona shall have the right to produce an additional 109 acre feet of groundwater per year subject to the following:

(a) Pomona shall provide at least 436 acre feet of recycled water to the property presently designated by the Los Angeles County Assessor as Assessor's Parcel Nos. 834-800-8001, 834-800-8002, 834-800-8009, 834-800-5013 and 834-800-6001.

(b) Pomona's additional production right shall be added to its Base Annual Production Right and shall be subject to all provisions of the Judgment relating to Base Annual Production Rights; provided however, such additional right shall not be subject to transfer or the water produced delivered for use outside the Pomona service area.

(c) To the extent in any year Pomona provides less than 436 acre feet of recycled water to the above described property, the additional right of Pomona shall be reduced to an amount equal to one fourth (1/4) of the amount of recycled water provided. However, no reduction shall occur to the extent the failure to deliver recycled water is the result of sudden occurrences such as storms, floods, fires, earthquakes, accidents or unexpected equipment outage) or acts or omissions of the Los Angeles County Sanitation District which impair the ability of Pomona to make recycled water deliveries.

EXHIBIT E

DESCRIPTION OF REPLENISHMENT PROGRAMS

San Antonio Spreading Grounds

Owned and operated by the Pomona Valley Protective Association (PVPA), this private facility is comprised of 600 acres of spreading grounds on both the east and west sides of San Antonio channel. The grounds consist of ditches, check levees, gates, metering stations, shallow basins and deep basins. The primary source of water for this facility is from San Antonio Creek by way of controlled releases from San Antonio Dam which is owned and operated by the U.S. Army Corps of Engineers. Water is released from the dam directly into San Antonio Flood Control Channel. Upon entering the channel, water is diverted into an underground basin where control gates allow regulated flow onto the spreading grounds. Additional sources of water include uncontrolled surface flows from adjacent properties in San Bernardino and Los Angeles Counties. The Corps coordinates its releases with PVPA. Four metering stations are used for flow measurements, and a series of ditches, check levees, gates and appurtenances allow the water to be directed into shallow and deep basins. Since 1896, PVPA has regularly spread water at its facility.

Thompson Creek Spreading Grounds

Owned and maintained by PVPA, this private facility is comprised of approximately 53 acres of spreading grounds south of Thompson Creek Dam and east of Thompson Creek. PVPA operates this facility with the cooperation of the Los Angeles County Flood Control District. The grounds consist of ditches, check levees, gates, shallow and deep basins. The sources of water for this facility are Cobal, Williams, Palmer, and Padua Creeks which are diverted to the grounds by PVPA with the cooperation of the Los Angeles County Department of Public Works through the Palmer Diversion. Surface runoff is diverted onto the grounds by way of Chicken Creek through a diversion located directly north of the grounds. PVPA's facility can also receive water from Thompson Creek Dam when the reservoir exceeds the elevation of 1625 feet above sea level. Since 1918, PVPA has spread water at this facility.

Pomona Spreading Grounds

Owned and operated by the City of Pomona, this facility is comprised of 8 acres of spreading grounds adjacent to the City's Pedley Water Treatment Plant. The City acquired this property in October 1926. The present deep basin configuration of the facility was completed in 1957. The source of water for this facility is San Antonio Creek water delivered through the Loop Merserve Canyon Water Company pipeline and Evey Canyon water. This facility also receives some local runoff. Water has been spread in this vicinity on and off since about 1897.

Live Oak Spreading Grounds

Owned and operated by the Los Angeles County Department of Public Works, this facility consists of approximately 5 acres of spreading grounds. Approximately 1.5 acres north of Baseline Road and 3.5 acres south of route 30 freeway extension. The source of water for this facility is controlled releases from Live Oak Dam and Live Oak Debris Basin. This facility was first used in the 1961-62 water year.

WATER STORAGE AND RECOVERY AGREEMENT

1. IDENTIFICATION

THIS AGREEMENT dated _______________ by and between the CITY OF POMONA, a chartered municipal corporation (Pomona), and the SIX BASINS WATERMASTER, a court appointed entity established by the Los Angeles County Superior Court (Watermaster), and is based upon the following recitals.

2. RECITALS

2.1 Water rights have been adjudicated in the Six Basins Area according to the Judgment in Los Angeles County Superior Court Case No. KC 029152, entitled Southern California Water Company v. the City of La Verne.

2.2 Said Judgment establishes the Watermaster as the court empowered entity responsible for managing the Six Basins Area. Under the provisions of Paragraph VI.B.10 of the Judgment, Watermaster is authorized to enter into Storage and Recovery Agreements with any party holding a base annual production right.

2.3 Pomona is a party holding a base annual production right. In addition, Pomona has historically replenished the Six Basins Area. While Pomona is under no obligation to replenish the Six Basins Area, to the extent that it does augment groundwater supplies in excess of its historical replenishment as provided in Paragraph VI.B.9 of the Judgment, Pomona is authorized to recover such water.

2.4 Spreading and injecting or otherwise recharging groundwater in the Six Basins Area is restricted according to Paragraph IV.B of the Judgment; however, pursuant to Paragraph VI.B.10, Watermaster is authorized to enter into storage and recovery agreements for the utilization of groundwater storage capacity and for subsequent recovery use or credit by the storing entity.

2.5 Pomona and Water master desire to enter into an agreement for the storage and recovery of water.

3. AGREEMENTS

In consideration for the mutual promises and conditions contained herein and for other valuable consideration, the parties agree as follows:

3.1 Pomona may, subject to the conditions hereinafter set forth, spread and cause to be spread water which would be stored for Pomona's account. The amount of water stored and recovered shall be all amounts it has spread or caused to be spread in the Six Basins Area in excess of 130 acre feet annually as specifically provided in Paragraph VI.B.9 of the Judgment. Without limitation on accumulations, Pomona shall acquire and retain ownership of all such storage in excess of the historical replenishment of 130 acre feet per year until such water is produced by Pomona or transferred as a credit toward any Replacement Water obligation.

3.2 Pomona shall issue a report to Watermaster on a quarterly basis indicating the amount of water which Pomona has spread. The report shall be due the last day of the month next following the end of the relevant quarter.

3.3 Recovery of water by Pomona shall be accounted for as follows:

3.3.1 The first water Pomona produces in a calendar year shall be the carryover of unused rights in accordance with Paragraph III.B.2.

3.3.2 The next such water produced shall be Pomona's Base Annual Production Right.

3.3.3 The next such water produced shall be water stored pursuant to this storage and Recovery Agreement.

3.4 This Agreement shall be effective upon court approval of the Judgment in the above-referenced case.

3.5 Any notices required hereunder may be given by mail postage prepaid and addressed as follows:

TO WATERMASTER:

TO CITY OF POMONA:

Henry Pepper, Director of Utilities
Public Works Department
City of Pomona
505 S. Garey Avenue
Pomona, CA 91769-0660

EXECUTED this __________ day of ________, 1998, at __________________, CA.

CITY OF POMONA

By: ____________________________

WATERMASTER

By: ____________________________

EXHIBIT G

INITIAL OPERATING PLAN

1. **Replenishment.** PVPA shall continue to replenish the basin as it has historically done. PVPA shall curtail replenishment when the Index Water Level is at 1455 or higher, where the Index Water Level is the average of the water level elevations above Mean Sea Level for the following five Key Wells:

> Upland-Foothill No. 3 (Owner: WECWC)
> Mountain View No. 4 (Owner: WECWC)
> Miramar No. 3 (Owner: SCWC)
> College No. 1 (Owner: Pomona College)
> Tunnel Well No. 3 (Owner: Pomona)

On the second Monday of each month owners of the Key Wells shall measure and report to Watermaster and to PVPA the water level elevations in the Key Wells. Water level elevations shall be measured using protocols specified by Watermaster.

2. **Production Measurement and Reporting.** Within 180 days following Entry of Judgment each producer shall have installed on all of its producing wells a calibrated device to measure production. Such devices shall conform to, and be regularly calibrated in accordance with, specifications developed by Watermaster. Each producer shall record the monthly production from each well in acre feet and shall report such monthly production for each well and the total for all wells for the month and for the year to date to Watermaster by not later than the third working day following the end of the month.

3. **Operating Safe Yield.** The initial Operating Safe Yield of the Four Basins is 24,000 acre feet per year.

PROOF OF SERVICE

I am a resident of the State of California, over the age of eighteen years, and not a party to the within action. My business address is 21 East Carrillo Street, Santa Barbara, California 93101-2782. On December 21, 1998, I served the within document:

NOTICE OF ENTRY OF JUDGMENT

- [ ] by transmitting via facsimile the document(s) listed above to the fax number(s) set forth below on this date before 5:00 p.m.
- [x] by placing the document listed above in a sealed envelope with postage thereon fully prepaid, in the United States mail at Santa Barbara, California as set forth below.
- [ ] by causing personal delivery by _______________ of the document(s) listed above to the person(s) at the address(es) set forth below.
- [ ] by personally delivering the document(s) listed above to the person(s) at the address(es) set forth below.

SEE ATTACHED LIST

I am readily familiar with the firm's practice of collection and processing correspondence for mailing. Under that practice it would be deposited with the U.S. Postal Service on that same day with postage thereon fully prepaid in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

- [x] *(State)* I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on December 21, 1998, at Santa Barbara, California.

Gina Lane

GINA M. LANE

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H

Appendix H. Water Shortage Contingency Plan

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SAN ANTONIO WATER COMPANY

Water Shortage Contingency Plan

SEPTEMBER 2021

Prepared by Water Systems Consulting, Inc.

1.1 Water Supply Reliability Analysis

The San Antonio Water Company (SAWCo) analyzed future demand and supply in its 2020 Urban Water Management Plan (UWMP). The UWMP analyzed conditions for normal, or average, single-dry, and five-year consecutive dry periods. SAWCo aims to provide shareholders full entitlement, but in periods of drought, allocations per share may be reduced, depending on supply availability. In all scenarios, SAWCo expects to meet customer demands based on shareholders full entitlement. In addition, a Drought Risk Assessment was performed to analyze anticipated supply and demand for the next five years (2021-2025). The Drought Risk Assessment analysis determines that SAWCo's supplies are able to reliably meet customer demands. Details on this analysis as well as supply and demand estimates are discussed in the UWMP.

1.2 Annual Water Supply and Demand Assessment

As an urban water supplier, SAWCo must prepare and submit an Annual Water Supply and Demand Assessment (Annual Assessment). The Annual Assessment is a near-term outlook for supplies and demands. It is used to determine whether the potential for a supply shortage exists and whether there is a need to trigger a WSCP shortage level and response actions to maintain supply reliability. Starting in 2022, the Annual Assessment will be due by July 1st of every year, as indicated by CWC Section 10632.1. SAWCo's Annual Assessment procedure, including key data inputs, evaluation criteria and responsible staff is summarized in Table 1. Nearly all of SAWCo's staff will be involved in the Annual Assessment and implementation of this WSCP.

Table 1. Annual Assessment Procedure

TIMING	ASSESSMENT ACTIVITIES	PROCEDURE, KEY DATA INPUTS, EVALUATION CRITERIA AND OTHER CONSIDERATIONS	SAWCO STAFF RESPONSIBLE
November–December	Estimate unconstrained demands for the coming year	SAWCo anticipates annual demands equal to that of the total active shares, based on yearly entitlement.	SAWCo Staff
November-December	Estimate available supplies for the coming year, considering the following year will be dry	SAWCo will analyze historical rainfall and other local groundwater conditions that may impact supply availability and warrant a reduction to shareholder's entitlement. SAWCo will also work with various groundwater management agencies, like the Chino Basin Watermaster, etc., to monitor groundwater conditions and stay informed of any impacts to SAWCo's ability to extract and provide local groundwater. SAWCo will monitor groundwater levels provided through the Tunnel. The Tunnel serves as an indicator for conditions within the local mountains and available water for the San Antonio Creek/percolated surface water.	SAWCo Staff
December-January	Consider potential infrastructure constraints that may impact supply delivery	Identify any known infrastructure issues that may pertain to near-term water supply reliability, including repairs, construction, and environmental mitigation measures that may temporarily constrain capabilities, as well as any new projects that may add to system capacity. Identify any facilities out of service due to water quality problems, equipment failure, etc. that may impact normal water deliveries.	Operations Staff
February	Inform the Board of Annual Assessment findings	The General Manager shall inform the Board of the Annual Assessment and results and make a recommendation of which shortage stage to enter, if applicable, if the Board is in session. If the Board is not in session, the General Manager shall immediately request a special meeting of the Board.	SAWCo Board or General Manager
March	Notify the Public	The Board/SAWCo will make a public announcement published in the Inland Valley Daily Bulletin and become effective immediately upon publication. SAWCo will coordinate with other agencies that it provides water to, in addition to other local agencies.	General Manager
Ongoing	Implement WSCP actions, if needed	Relevant members of SAWCo's staff will implement shortage response actions associated with the declared water shortage level.	SAWCo Staff
Prior to July 1st	Submit Annual Assessment	Send final Annual Assessment to DWR.	General Manager

1.3 Water Shortage Levels

SAWCo uses four (4) water shortage stages to identify and response to water shortage emergencies. Stage 1 is implemented year-round to encourage water conservation and responsible water management, regardless of a shortage emergency.

The Water Code outlines six standard water shortage levels that correspond to a gap in supply compared to normal year availability. The six standard water shortage levels correspond to progressively increasing estimated shortage conditions (up to 10-, 20-, 30-, 40-, 50-percent and greater than 50-percent shortage compared to the normal reliability condition) and align with the response actions that a water supplier would implement to meet the severity of the impending shortages.

The Water Code allows suppliers with an existing WSCP that uses different water shortage levels to comply with the six standard levels by developing and including a cross-reference relating to its existing shortage categories to the six standard water shortage levels. SAWCo is maintaining its current four shortage stages for this WSCP, as shown in Table 2. A cross reference to the six standard stages is shown in Figure 1. SAWCo's existing stages and their relationship to the six standard stages.

Table 2. DWR 8-1 Water Shortage Contingency Plan Levels

SHORTAGE LEVEL	PERCENT SHORTAGE RANGE	SHORTAGE RESPONSE ACTIONS
1	Up to 10%	Required savings may be met through a combination of quantifiable and unquantifiable actions. SAWCo will only implement measures to the extent necessary to mitigate a water shortage, although estimates may indicate a greater savings is obtainable. It is anticipated that some of the required savings will be met through quantifiable shortage response actions and the remaining amount savings will be met through other actions, including communication and outreach efforts. For a list of all SAWCo specific shortage response actions and their potential savings, please refer to DWR Table 8-2.
2	Up to 30%	Required savings may be met through a combination of quantifiable and unquantifiable actions. SAWCo will only implement measures to the extent necessary to mitigate a water shortage, although estimates may indicate a greater savings is obtainable. It is anticipated that some of the required savings will be met through quantifiable shortage response actions and the remaining amount savings will be met through other actions, including communication and outreach efforts. For a list of all SAWCo specific shortage response actions and their potential savings, please refer to DWR Table 8-2.
3	Up to 50%	Required savings may be met through a combination of quantifiable and unquantifiable actions. SAWCo will only implement measures to the extent necessary to mitigate a water shortage, although estimates may indicate a greater savings is obtainable. It is anticipated that some of the required savings will be met through quantifiable shortage response actions and the remaining amount savings will be met through other actions, including communication and outreach efforts. For a list of all SAWCo specific shortage response actions and their potential savings, please refer to DWR Table 8-2.
4	Greater than 50%	Required savings may be met through a combination of quantifiable and unquantifiable actions. SAWCo will only implement measures to the extent necessary to mitigate a water shortage, although estimates may indicate a greater savings is obtainable. It is anticipated that some of the required savings will be met through quantifiable shortage response actions and the remaining amount savings will be met through other actions, including communication and outreach efforts. For a list of all SAWCo specific shortage response actions and their potential savings, please refer to DWR Table 8-2.

SAWCo Shortage Stage	Supply Reduction (%)
1	10%
2	30%
3	50%
4	Greater than 50%

Standard Shortage Stage	Standard Supply Shortage Level
1	Up to 10%
2	Up to 20%
3	Up to 30%
4	Up to 40%
5	Up to 50%
6	Greater than 50%

Figure 1. SAWCo's existing stages and their relationship to the six standard stages

1.4 Shortage Response Actions

SAWCo expects to mitigate supply shortages through a variety of response actions, including various supply sources, demand reduction actions, conservation, outreach, and if necessary, mandatory prohibitions.

1.4.1 Demand Reduction

SAWCo has identified a variety of demand reduction actions to offset supply shortages. These actions include, but are not limited to, conservation and rebate programs, leak detection and repair, limitations on irrigation and other voluntary actions to reduce customer demand. Demand reduction actions are summarized in Table 3.

Table 3. DWR 8-2 Demand Reduction Actions

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?	ADDITIONAL EXPLANATION OR REFERENCE	PENALTY, CHARGE, OR OTHER ENFORCEMENT
Stage 1	Landscape - Limit landscape irrigation to specific times	0-5%	Watering restricted to between the hours of 10:00 am and 6:00 pm	Yes
Stage 1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	0-5%	Leaks and misadjusted water fixtures shall be corrected within 72 hours of discovery or notification by SAWCo.	Yes
Stage 1	Other	0-5%	Runoff from irrigation or leaks prohibited.	Yes
Stage 1	Other	0-5%	Washing of automobiles, trucks, trailers, boats, airplanes, and other types of equipment (mobile or otherwise) unless done with a hand-held bucket or hand-held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use to ensure the water supply is shut off.	Yes
Stage 1	CII - Restaurants may only serve water upon request	0-5%	With respect to eating and drinking establishments of any kind, including but not limited to, any restaurant, hotel, café, cafeteria, bar or club, whether public or private, that benefits from the supply of water by SAWCo shall not provide drinking water to any person unless expressly requested.	Yes
Stage 2	Other	5-10%	The washing of sidewalks, walkways, driveways, public and private parking areas and all other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety.	Yes
Stage 2	Landscape - Limit landscape irrigation to specific days	5-10%	Outdoor irrigation of landscape by sprinklers is permitted only on even days of the month for those locations having a street address with an even last digit. Outdoor irrigation by sprinklers is permitted only on odd days of the month for those locations having a street address with an odd last digit. No outdoor irrigation shall take, place between the hours of 10:00 a.m. and 6:00 p.m.	Yes

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?	ADDITIONAL EXPLANATION OR REFERENCE	PENALTY, CHARGE, OR OTHER ENFORCEMENT
Stage 2	Other	5-10%	The washing of automobiles, trucks, trailers, boats, and other types of equipment (mobile or otherwise) is prohibited except on the designated outdoor water use days between the hours of 12:00 midnight to 12:00 noon and sundown to 12:00 midnight. Such washing, when allowed, shall be done with a hand held bucket or hand held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use to ensure the water supply is shutoff.	Yes
Stage 2	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	5-10%	No individual, firm or business that regularly washes vehicles for remuneration or provides facilities for customers to do so through coin operated machinery shall be permitted to operate such a business unless their place of business is equipped and operating to approved standards with equipment to recycle water for use within their facility.	Yes
Stage 2	Other water feature or swimming pool restriction	5-10%	The refilling or adding of water to swimming pools is prohibited except on designated outdoor water use days, which is restricted between the hours of 10am and 6 pm.	Yes
Stage 2	Water Features - Restrict water use for decorative water features, such as fountains	5-10%	Any non-business, operation related pond, ornamental fountain or other structure making similar use of water is prohibited.	Yes
Stage 2	Landscape - Prohibit certain types of landscape irrigation	5-10%	The irrigation of golf course fairways is prohibited. This section shall not apply to the irrigation of any golf course solely with available non-potable or reclaimed wastewater.	Yes
Stage 2	Other	5-10%	The use of water from fire hydrants shall be limited to firefighting and emergency related activities and/or other activities necessary to maintain the health, safety, and welfare of the citizens of the San Antonio Heights. This restriction shall not apply to businesses, which require the use of water for land development and building construction processes with prior written approval by the Water Company.	Yes

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?	ADDITIONAL EXPLANATION OR REFERENCE	PENALTY, CHARGE, OR OTHER ENFORCEMENT
Stage 3	Landscape - Limit landscape irrigation to specific days	10-30%	Outdoor irrigation of landscape by sprinklers is permitted only on Wednesday and Sunday for those locations having street address with an even last digit. Outdoor irrigation by sprinklers is permitted only on Tuesday and Saturday for those locations having a street address with an odd last digit. Outdoor irrigation for locations not having a street address shall occur on Wednesday and Sunday if located west of San Antonio Avenue or only on Tuesday and Saturday if located east of San Antonio Avenue.	Yes
Stage 3	Landscape - Other landscape restriction or prohibition	10-30%	No outdoor irrigation shall take place between 6:00 a.m. until one (1) hour before sundown.	Yes
Stage 3	Other	10-30%	The washing of automobiles, trucks, trailers, boats, airplanes and other types of equipment (mobile or otherwise) is prohibited except on the designated outdoor water use days pursuant to section 7734.040 between the hours of 12:00 midnight to 12:00 noon and sundown to 12:00 midnight. Such washing, when allowed, shall be done with a hand held bucket or hand held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use to ensure the water supply is shutoff.	Yes
Stage 3	Other	10-30%	Trucks, trailers and other types of mobile equipment (such as garbage trucks and vehicles used to transport food and other perishables) when said washing is necessary in order to protect the health, safety and welfare of the public, shall be restricted to the hours of sundown to noon. Such washing, when allowed, shall be done with a hand held bucket or hand held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use.	Yes
Stage 3	Water Features - Restrict water use for decorative water features, such as fountains	10-30%	Any non-business, operation related pond, ornamental fountain or other structure making similar use of water is prohibited.	Yes
Stage 3	Landscape - Other landscape restriction or prohibition	10-30%	The waters of golf course tee areas and fairways is prohibited unless done with reclaimed wastewater.	Yes

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?	ADDITIONAL EXPLANATION OR REFERENCE	PENALTY, CHARGE, OR OTHER ENFORCEMENT
Stage 3	Other water feature or swimming pool restriction	10-30%	The refilling or adding of water to existing swimming pools is prohibited except on designated outdoor water use days which shall be the same days as outdoor water is permitted pursuant to section 7734.040. New pool construction filling shall be by permit only	Yes
Stage 4	Landscape - Limit landscape irrigation to specific days	30-50%	Outdoor irrigation of landscape by sprinklers is permitted only on Sunday for those locations having street address with an even last digit. Outdoor irrigation by sprinklers is permitted only on Saturday for those locations having a street address with an odd last digit. Outdoor irrigation for locations not having a street address shall occur on Sunday if located west of San Antonio Avenue or only on Tuesday and Saturday if located east of San Antonio Avenue	Yes
Stage 4	Landscape - Limit landscape irrigation to specific times	30-50%	No outdoor irrigation shall take place between 6:00 a.m. until one (1) hour before sundown	Yes
Stage 4	Other	30-50%	The washing of automobiles, trucks, trailers, boats, airplanes, and other types of equipment (mobile or otherwise) is prohibited	Yes
Stage 4	Other water feature or swimming pool restriction	30-50%	Any non-business, operation related pond, ornamental fountain or other structure making similar use of water is prohibited	Yes
Stage 4	Other	30-50%	Washing sidewalks, driveways, public and private parking areas, tennis courts, patios, or other paved areas, except to alleviate an immediate health hazard is prohibited	Yes

1.4.2 Supply Augmentation

SAWCo maintains interconnections with the City of Upland, as well as the Monte Vista Water District (MVWD) and the City of Ontario through the Water Facilities Authority (WFA). The WFA is a Joint Powers Authority composed of the cities of Chino, Chino Hills, Ontario, and Upland and the MVWD. The WFA owns and operates a surface water treatment plant within the City of Upland that primarily treats imported water supplies from Metropolitan Water District of Southern California (Metropolitan). SAWCo's interconnection with the City of Upland could potentially provide the ability to negotiate imported water deliveries via the WFA and wheeled through this existing interconnection.

Table 4. DWR 8-3 Supply Augmentation and Other Actions

SHORTAGE LEVEL	SUPPLY AUGMENTATION METHODS AND OTHER ACTIONS BY WATER SUPPLIER	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?	ADDITIONAL EXPLANATION OR REFERENCE
Stage 2	Other purchases	0-100%	Negotiate imported water deliveries through the Water Facilities Authority
Stage 3	Other purchases	0-100%	Negotiate imported water deliveries through the Water Facilities Authority
Stage 4	Other purchases	0-100%	Negotiate imported water deliveries through the Water Facilities Authority

1.4.3 Operational Changes

SAWCo operates its system as efficiently as possible. In the event of a water shortage emergency, it is likely that surface water from the San Antonio Creek and percolated water from the San Antonio Tunnel would be vastly reduced. As a result, SAWCo would focus operations on well extractions to meet demands.

1.4.4 Additional Mandatory Restrictions

SAWCo also implements several measures at all times to avoid water waste, which include:

- Prohibit washing of sidewalks, driveways, public and private parking areas and all other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety;
- Prohibit excessive or unreasonable run-off or unreasonable spray of the areas being watered;
- Prohibit outdoor irrigation by sprinklers between 10 AM and 6 PM. Shareholders are encouraged to avoid the use of sprinklers on windy days;
- Prohibit the washing of automobiles, trucks, trailers, boats, airplanes, and other types of equipment (mobile or otherwise) unless completed with a hand-held bucket or hand-held hose equipped with a positive shutoff nozzle for quick rinses.

1.4.5 Seismic Risk Assessment, Mitigation Plan, and Emergency Response Plan

In addition to responding to drought conditions, SAWCo's WSCP can be used to respond to emergency or catastrophic conditions that impact the availability of the SAWCo's water supplies and/or the ability to deliver water within the service area. Besides drought, water supply may experience a catastrophic interruption as a result of natural disasters, such as an earthquake, wildfire, mudslide, or a regional power outage.

Planning and response measures in the event of an interruption to the water supply include the following:

- In advance of a known threat to the water and distribution system, such as a wildfire, distribution reservoirs will be filled to capacity, and any reservoir out of service will be put back into service.
- Portable generators will be deployed to critical facilities lacking emergency backup power.
- Supervisory Control and Data Acquisition (SCADA) will be used throughout the distribution system to monitor system problems, whether they be minor day-to-day problems or major disruptions.
- Distribution system crews are trained in pipe repair and replacement as a part of their normal duties and will be continually ready to perform such work on an emergency basis as needed.
- In the occurrence of a catastrophic event, SAWCo staff will be prepared to mobilize to respond to emergent issues.
- Distribution system repairs will be prioritized to best meet critical needs, including water for firefighting, and health and safety needs.
- A portion of the available potable supply will be reserved for drinking-water purposes in the event of prolonged interruption.
- In the event of distribution system failure, a clear message for timely information dissemination to the public will be developed that includes the nature of the catastrophic event, status of the distribution system, water use prohibitions, allowable water uses, potential need to boil drinking water prior to consumption, and location and availability of emergency drinking water.

In 2021, SAWCo completed a Risk and Resilience Assessment (RRA) and Emergency Response Plan (ERP) in accordance with America's Water Infrastructure Act (AWIA) of 2018. The purpose of the RRA and ERP is to meet the AWIA compliance requirements and plan for long-term resilience of SAWCo's infrastructure. The RRA assesses SAWCo's water system to identify critical assets and processes that may be vulnerable to human and natural hazards and to identify measures that can be taken to reduce risk and enhance resilience from service disruption for the benefit of customers. The RRA identifies and characterizes both infrastructure-specific and system-wide vulnerabilities and threats and quantifies the consequences of disruption. The RRA also identifies various options (and constraints) in addressing and mitigating risk. The RRA, is conjunction with the ERP, charts a course for water system resilience. The RRA also provided various recommendations to increase the reliability of SAWCo's system. Since critical pieces of infrastructure and specific vulnerabilities are detailed in the RRA and ERP, the contents of the document are confidential and for use by SAWCo's staff only. However, SAWCo can confirm that these plans meet the requirements set forth by AWIA and evaluate seismic risks and mitigation actions to SAWCo's infrastructure.

SAWCo certified with the U.S. Environmental Protection Agency that their RRA was compliant with all AWIA requirements on June 30, 2021, and will certify their ERP by December 31, 2021, meeting all federal deadlines.

1.4.6 Shortage Response Action Effectiveness

SAWCo has estimated the effectiveness of shortage response actions when data pertaining to such actions is available. Estimates of the effectiveness for actions are included in Table 3. It is expected that response actions effectiveness is also a result of successful communication and outreach efforts.

1.5 Communication Protocols

SAWCo publishes seasonal newsletters to inform customers of SAWCo's work. During a water shortage, SAWCo may publish information such as shortage stage and demand reduction measures in these newsletters. In addition, SAWCo will inform customers through informational bill stuffers. In more severe shortage stages, SAWCo would implement additional communication outlets, such as local newspaper postings, Facebook postings and notifications, and postings through local homeowners' associations and the San Antonio Heights Association newsletters.

In addition, SAWCo's newly deployed Automated Meter Reading (AMR) system will include a web portal where shareholders can enable notifications for using water over entitlement.

1.6 Compliance and Enforcement

SAWCo may administer penalties for shareholders who are not in compliance with this WSCP and engage in knowingly water waste activities during any calendar year or declared shortage stage, whichever time period is shorter in duration:

- **First Violation:** guilty of an infraction offense and punished by a fine not less than twenty-five dollars ($25) but not exceeding fifty dollars ($50)
- **Second Violation:** guilty of an infraction offense and punished by a fine not less than fifty dollars ($50) but not exceeding one hundred dollars ($100)
- **Third Violation:** guilty of a misdemeanor offense and punished by a fine not less than five hundred dollars ($500) but not exceeded one thousand dollars ($1,000)

In addition, the General Manager may enact other penalties and restrictive measures that are intended to restrict further water waste of shareholders that continue to violate the policies and procedures outlined in this plan. The General Manager may select to implement any of the following measures, or others not listed here, such as the placement of a flow restricting device upon the water service, locking off of water meter, removal of water meter, and shutting off of the service line valve.

1.7 Legal Authorities

SAWCo first established its WSCP by Resolution No. 2006-06-03, adopted at a Board meeting on September 19, 2006. Resolution No. 2006-06-03 was created to ensure responsible water management of SAWCo and its customers and promote water conservation. This Resolution provides the Board with the legal authority to declare a water shortage emergency and implement appropriate measures to mitigate a supply shortage.

1.8 Financial Consequences of WSCP

SAWCo's Bylaws specify that "all water shall be supplied at cost"; therefore, SAWCo must supply the corresponding water associated with each customer's shares. SAWCo may apply reductions to entitlement in extreme water shortages, which would decrease SAWCo's revenue. As a small water agency, SAWCo does not have the resources to hire additional staff to assist with implementation of this WSCP and various response actions.

SAWCo has developed reserves for Master Plan projects, emergency occurrences, and operating expenses, as outlined in Resolution No. 2007-01-01. This reserve was first established in July 1994 to mitigate impacts to SAWCo and ensure that with reduced deliveries, SAWCo could continue to provide services with a buffer for emergency situations. A portion of the reserve fund is allocated for emergency water purchases in the event SAWCo were to lose a water supply source.

1.9 Monitoring and Reporting

As mentioned, SAWCo has recently replaced all customer and system meters and upgraded to an AMR system. AMR meters provide daily readings that will allow SAWCo to quickly respond to large readings and correct any issues, such as system leaks or inform customers of demand reduction actions or rebates to limit water use. In addition, the AMR meters will be connected to a website where shareholders can track their own water use and enable notifications. Shareholders can be notified of excessive water use over their entitlement.

1.10 WSCP Refinement Procedures

The WSCP is best prepared and implemented as an adaptive management plan. SAWCo will use results obtained from its monitoring and reporting program to evaluate any needs for revisions. Potential changes to the WSCP that would warrant an update include, but are not limited to, any changes to trigger conditions, changes to the shortage stage structure, changes to entitlement, and/or changes to customer reduction actions.

Any prospective changes to the WSCP would need to be presented to SAWCo's Board of Directors (Board) for approval. SAWCo will hold a public hearing, obtain any comments, and formally adopt the updated WSCP. Notices for refinement and the public hearing date will be published in the local newspaper in advance of any public meetings.

1.11 Special Water Feature Distinction

Water Code Section 10623 (b) now requires that suppliers analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code. SAWCo prohibits water used for any non-business, operation related pond, ornamental fountain, or other similar structure for aesthetic use in shortage stages 2-4.

1.12 Plan Adoption, Submittal, and Availability

The WSCP will be presented for adoption to SAWCo's Board at a public meeting. The Board and members of the public may submit any comments prior to approval and adoption. The WSCP will be submitted to DWR at the same time as the 2020 Urban Water Management Plan.

The WSCP will be made available to all staff, customers, and any affected cities, counties, or other members of the public through SAWCo's website.

1.13 Resources and References

California Water Efficiency Partnership. (2021). *Jumpstart Water Shortage Toolkit Tool#1: Model Water Shortage Contingency Plans.* Sacramento: California Water Efficiency Partnership.

San Antonio Water Company. (n.d.). *Amended and Restated Bylaws of San Antonio Water Company.*

Texas Living Waters Project. (2018). *Water Conservation by the Yard: A Statewide Analysis of Outdoor Water Savings Potential.* Austin: Texas Living Waters Project, Sierra Club, National Wildlife Federation. Retrieved from Texas Living Waters Project.

United States Environmental Protection Agency. (2012). *Saving Water in Restaurants.* United States Environmental Protection Agency.

United States Environmental Protection Agency, Office of Water. (2002). *Cases in Water Conservation: How Efficiency Programs Help Water Utilities Save Water and Avoid Costs.* United States Environmental Protection Agency.

APPENDIX I

IEUA Resolution No. 2014-12-1

PURCHASE ORDER FOR SYSTEM WATER TO BE PROVIDED BY THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

PURCHASER: INLAND EMPIRE UTILITIES AGENCY	**TERM** 10 years: January 1, 2015 – December 31, 2024
INITIAL BASE PERIOD DEMAND: 103,648 acre-feet	**EFFECTIVE DATE:** January 1, 2015
INITIAL TIER 1 MAXIMUM—Annual Average: 93,283 acre-feet	**INITIAL TIER 1 MAXIMUM—Cumulative:** 932,830 acre-feet
PURCHASE ORDER COMMITMENT—Annual Average: 39,835 acre-feet	**PURCHASE ORDER COMMITMENT—Cumulative:** 398,350 acre-feet

Definitions of capitalized terms used in this Purchase Order are provided in Attachment 1. Terms used in this Purchase Order and not defined in Attachment 1 are defined in Metropolitan's Administrative Code.

COMMITMENT TO PURCHASE:

In consideration of Purchaser's commitment to purchase System Water pursuant to this Purchase Order, Metropolitan agrees to sell such System Water to Purchaser during the Term at the Tier 1 Supply Rate in an amount up to the Tier 1 Maximum—Cumulative. All System Water sold to Purchaser during the Term in an amount greater than the Tier 1 Maximum—Cumulative shall be sold to the Purchaser at the Tier 2 Supply Rate. In connection with the purchase of System Water, the Purchaser also agrees to pay all other applicable rates and charges, as established by Metropolitan from time to time. The rates and charges applicable to System Water as of the Effective Date are shown in Attachment 2.

If Purchaser's applicable System Water purchases during the Term exceed Purchaser's Tier 1 Maximum, Purchaser may elect to:

a.) Subject to the provisions of paragraph c) below, pay any Tier 2 Supply Rate obligations at the end of the Term, in an amount equal to the difference between the Purchaser's applicable System Water purchases and the Tier 1 Maximum—Cumulative during the Term times the average of the Tier 2 Supply Rate in effect during the Term; or,

b.) Pay any Tier 2 Supply Rate obligations annually as purchases are incurred, in an amount equal to the difference between the Purchaser's applicable annual System Water purchases and the Tier 1 Maximum—Annual times the Tier 2 Supply Rate in effect during the calendar year. A true-up at the end of the Term will be performed to ensure that the Purchaser has received all Tier 1 Maximum—Cumulative purchases allowed by the Purchase Order.

c.) If, after the end of the first five years, Purchaser has accrued a cumulative Tier 2 Supply Rate obligation, Purchaser may elect to pay the initial five year cumulative Tier 2 Supply Rate obligation (i) in full at the end of year five of the Term, (ii) amortize it in five equal installments over the remaining five calendar years of the Term, or (iii) pay it at the end of the Term. Commencing in year 6 of the Term, Purchaser shall pay any additional Tier 2 Supply Rate obligation annually.

Purchaser agrees to purchase System Water from Metropolitan during the Term in an amount not less than the Purchase Order Commitment. If Purchaser's applicable System Water purchases during the Term are less than the Purchase Order Commitment, each acre-foot of unmet commitment will be reduced by the amount of production from a local resource project, measured in acre-feet, that commences operation on or after January 1, 2014. A local resource project includes any project type as approved by the Board.

Purchaser agrees to pay Metropolitan an amount equal to the difference between the sum total in acre-feet of water of the Purchase Order Commitment (minus the amount reduced by the amount of production from a local resource project) and the sum total in acre-feet of water of Purchaser's applicable System Water purchases during the Term, times the average of the Tier 1 Supply Rate in effect during the Term.

Purchaser agrees to pay all amounts owing to Metropolitan, whether to satisfy a Purchase Order Commitment or a Tier 2 Supply Rate obligation, within the next regular billing cycle following the reconciliation of all certifications for special programs that the Purchaser may participate in. The Purchaser may elect to pay such amount in twelve equal monthly payments over the course of the next twelve months beginning with the first regular billing cycle following the reconciliation of all outstanding certifications for special programs. If the Purchaser elects to pay such amount over the course of the next twelve months following the regular billing cycle any outstanding balance shall bear interest at Metropolitan's then current investment portfolio average yield. All other amounts payable under this Purchase Order shall be billed and paid in accordance with the Administrative Code.

WATER SERVICE:

Conditions of water service by Metropolitan to the Purchaser, including but not limited to (i) delivery points, (ii) water delivery schedules, and (iii) water quality, will be determined in accordance with Chapter 5 (Section 4500 through 4514, inclusive, as applicable) of Metropolitan's Administrative Code.

In accordance with its Administrative Code, Metropolitan shall use its reasonable best efforts to supply System Water in the quantities requested by the Purchaser, but is not obligated to dedicate any portion of System capacity for the conveyance, distribution, storage or treatment of System Water for the benefit of the Purchaser or any other member agency. Metropolitan shall use its reasonable best efforts to deliver the System Water when needed by the Purchaser during the Term; provided however, there shall be no default under this Purchase Order if Metropolitan fails to deliver water to the Purchaser in accordance with any such schedule of deliveries during the Term.

By execution of this Purchase Order, the Purchaser recognizes and agrees that it acquires no interest in or to any portion of the System or any other Metropolitan facilities or supplies, or any right to receive water delivered through the System, excepting the right to purchase up to Purchaser's Tier 1 Maximum—Cumulative at the Tier 1 Supply Rate provided that System Water is available. This Purchase Order governs pricing of the System Water delivered to the Purchaser pursuant to this Purchase Order and does not confer any entitlement to receive System Water.

System Water provided to the Purchaser under the terms of this Purchase Order shall be subject to reduction in accordance with the shortage allocation provisions of the Water

Surplus and Drought Management Plan (the "WSDM Plan") or other such policies and principles governing the allocation of System Water as adopted by the Board.

In the event that Metropolitan's Board or General Manager determines to reduce, interrupt or suspend deliveries of System Water, any outstanding balance of the Purchase Order Commitment at the end of the Term shall be reduced by the Purchase Order Commitment—Annual Average for each and every fiscal or calendar year that a reduction, interruption or suspension occurred.

MISCELLANEOUS:

This Purchase Order will be interpreted, governed and enforced in accordance with the laws of the State of California.

This Purchase Order will apply to and bind the successors and assigns of the Purchaser and Metropolitan.

No assignment or transfer of the rights of the Purchaser under this Purchase Order will be valid and effective against Metropolitan or the Purchaser without the prior written consent of Metropolitan and the Purchaser.

If at any time during the Term, by reason of error in computation or other causes, there is an overpayment or underpayment to Metropolitan by the Purchaser of the charges provided for under this Purchase Order, which overpayment or underpayment is not accounted for and corrected in the annual re-determination or reconciliation of said charges, the amount of such overpayment or underpayment shall be credited or debited, as the case may be, to the Purchaser. Metropolitan will notify the Purchaser in writing regarding the amount of such credit or debit, as the case may be. In no case will credits or debits for charges provided for under this Purchase Order be administered beyond the limit for billing adjustments as specified in Metropolitan's Administrative Code.

IN WITNESS WHEREOF, this Purchase Order is executed by the duly authorized officers of the Metropolitan Water District of Southern California and Inland Empire Utilities Agency, as of December __, 2014.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA	INLAND EMPIRE UTILITIES AGENCY
By: ______________________________ Jeffrey Kightlinger General Manager	By: ______________________________ [Title] ______________________________

APPROVED AS TO FORM AND CONTENT:

______________________________ General Counsel	______________________________ General Counsel
By: ______________________________	By: ______________________________

Attachment 1
Purchase Order for System Water
DEFINITIONS

"Act" means the Metropolitan Water District Act, California Statutes 1969, Chapter 209, as amended and supplemented from time to time.

"Demand" means the Purchaser's purchases of System Water supplies, including full service, seasonal shift, Conjunctive Use Program, Surface Storage Operating Agreement water, Recharge and Recovery Operating Agreement water, or any other water program deemed to be a purchase of System Water.

"Effective Date" means the effective date of this Purchase Order as specified above.

"Metropolitan" means The Metropolitan Water District of Southern California.

"Purchase Order Commitment" means:

i). if the Purchaser elects option a) under the Base Period Demand as defined in section 4122 of the Administrative Code, then 60% of the Purchaser's Initial Base Firm Demand times 10; or

ii). if the Purchaser elects option b) under the Base Period Demand, then 60% of the Purchaser's highest fiscal year Demand during the period from fiscal year 2002/03 through fiscal year 2013/14, times 10.

"Purchase Order" means this Purchase Order for System Water.

"Purchaser" means the member public agency specified above, a duly organized [city/water district/county water authority] of the State of California.

"System" means the properties, works and facilities operated and/or financed by Metropolitan necessary for the supply, development, storage, conveyance, distribution, treatment or sale of water.

"System Water" means water supplies developed by Metropolitan and delivered to the Purchaser through the System or other means (e.g. conjunctive use storage).

"Term" means the term of this Purchase Order as specified above.

"Tier 1 Maximum—Annual" means an amount equal to 90% of the Base Period Demand.

"Tier 1 Maximum—Cumulative" means an amount equal to the sum of the Tier 1 Maximum—Annual amounts during the Term.

"Tier 1 Supply Rate" means Metropolitan's per-acre-foot Tier 1 Supply Rate, as determined from time to time by Metropolitan's Board of Directors. The Tier 1 Rate effective January 1, 2015, is $158/AF.

"Tier 2 Supply Rate" means Metropolitan's per-acre-foot Tier 2 Supply Rate, as determined from time to time by Metropolitan's Board of Directors. The Tier 2 Rate effective January 1, 2015, is $290/AF.

"Water Surplus and Drought Management Plan (WSDM)" means Metropolitan's policy and procedures for managing supplies and drought conditions as adopted by the Board from time to time.

Attachment 2
Purchase Order for System Water
RATES AND CHARGES

	Effective January 1, 2015	Effective January 1, 2016
Tier 1 Supply Rate ($/AF)	$158	$156
Tier 2 Supply Rate ($/AF)	$290	$290
System Access Rate ($/AF)	$257	$259
System Power Rate ($/AF)	$126	$138
Water Stewardship Rate ($/AF)	$41	$41
Full Service Untreated Rate ($/AF):		
Tier 1	$582	$594
Tier 2	$714	$728
Treatment Surcharge ($/AF)	$341	$348
Full Service Treated Rate ($/AF):		
Tier 1	$923	$942
Tier 2	$1,055	$1,076
Readiness-to-Serve Charge ($ millions)	$158	$153
Capacity Charge ($/cfs)	$11,100	$10,900

RESOLUTION NO. 2014-12-1

RESOLUTION OF THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY* (IEUA), SAN BERNARDINO COUNTY, CALIFORNIA, ESTABLISHING ALLOCATIONS FOR THE PURCHASE OF IMPORTED WATER WITHIN IEUA SERVICE AREA

WHEREAS, IEUA has Ordinance No. 100 which establishes classes of water services and regulates the sale and delivery of imported water within IEUA's service area; and

WHEREAS, IEUA has a long-term agreement with the Metropolitan Water District of Southern California (MWD) for the purchase of imported water at a Tier 1 rate; and,

WHEREAS, IEUA previously entered into agreements with its member agencies to purchase said allocation of IEUA's supply of MWD imported water at the Tier 1 rate; and

WHEREAS, these previous agreements are set to expire on December 31, 2014, and IEUA desires to establish the Tier 1 allocation limits by this Resolution.

NOW, THEREFORE, the Board of Directors hereby RESOLVES, DETERMINES AND ORDERS the following to be effective January 1, 2015:

Section 1. IEUA is able to purchase 93,283 acre-feet per year (AFY) of imported water from Metropolitan Water District (MWD) at the Tier 1 rate through December 31, 2024. IEUA's allocation from MWD may be periodically adjusted by MWD.

Section 2. Each member agency's Tier 1 allocation shall apply to water purchases in the aggregate for any Fiscal Year, and are less than or equal to the following allocations. The allocations below do not confer a contractual right to MWD imported water. Water purchases in excess of the Tier 1 allocation will be assessed at the Tier 2 rate.

Tier 1 allocation for the purchase of imported water:

Water Facilities Authority	31,384 AFY
Cucamonga Valley Water District	28,368 AFY
Fontana Water Company	10,000 AFY

Section 3. The difference between IEUA's Tier 1 allocation per Section 1 and the member agency allocations per Section 2 will be available to IEUA and/or the Chino Basin Watermaster.

Section 4. MWD WATER SUPPLY ALLOCATION PLAN (WSAP) - Reduced imported water supplies caused by the adoption of a WSAP will reduce a member agencies Tier 1 imported water allocation as identified in Section 2 above. Revised allocations will be determined by historical deliveries taken during the base periods, as established by the WSAP.

ADOPTED this 17th day of December, 2014.

Terry Catlin
President of the Inland Empire Utilities Agency* and of the Board of Directors thereof

ATTEST:

Steven J. Elie
Secretary/ Treasurer of the Inland Empire Utilities Agency* and of the Board of Directors thereof

*a Municipal Water District

STATE OF CALIFORNIA)
)SS
COUNTY OF SAN BERNARDINO)

I, Steven J. Elie, Secretary/Treasurer of the Inland Empire Utilities Agency*, DO HEREBY CERTIFY that the foregoing Resolution being No. 2014-12-1, was adopted at a regular meeting on December 17, 2014, of said Agency* by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

Steven J. Elie
Secretary/Treasurer

(SEAL)

* A Municipal Water District

APPENDIX J

1985 Installment Purchase Agreement Relating to WFA Water Treatment Plant by and between WFA and the City of Ontario

INSTALLMENT PURCHASE AGREEMENT RELATING TO
WATER FACILITIES AUTHORITY WATER TREATMENT PLANT

by and between

WATER FACILITIES AUTHORITY, as Seller

and

CITY OF ONTARIO, as Purchaser

Dated as of October 1, 1985

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INSTALLMENT PURCHASE AGREEMENT
RELATING TO WATER FACILITIES AUTHORITY
WATER TREATMENT PLANT

THIS INSTALLMENT PURCHASE AGREEMENT RELATING TO WATER TREATMENT PLANT, made and entered into as of October 1, 1985, by and between the City of Ontario (herein called the "Purchaser"), a municipal corporation organized and existing under the laws of the State of California, and the Water Facilities Authority, a joint exercise of powers authority (herein called "Seller"):

W I T N E S S E T H :

In consideration of the mutual covenants hereinafter contained and for other valuable consideration, the parties hereto do agree as follows:

ARTICLE I

RECITALS

101. Status and Powers of Authority. Seller is a California joint exercise of powers authority organized and existing under the joint exercise of powers law, Chapter 5, Division 7, Title 1 (commencing at Section 6500) of the Government Code of the State of California, and is authorized to acquire and construct the Project, to sell capacity therein to the Purchaser and perform the actions and duties more particularly described herein. The member entities comprising Seller are the Cities of Chino, Ontario and Upland, San Bernardino County Waterworks District No. 8, the Monte Vista Water District, and the Cucamonga County Water District. The Cities of Chino, Ontario and Upland, San Bernardino County Waterworks District No. 8, and the Monte Vista Water District have formed Project Committee No. 1 of Seller (collectively, the "Purchasers"), each of which will purchase certain capacity rights in the Project to be constructed by Seller. Following completion of construction of the Project, the Project is to be owned, operated and maintained by Seller for the benefit of the Purchasers.

102. Status and Powers of Purchaser. Purchaser is a municipal corporation organized and existing under the laws of the State of California.

Purchaser is desirous of purchasing capacity in the Project in order to provide treated water to its customers and thereby to further its public purpose. Purchaser is authorized to purchase real and personal property for the common benefit in order to achieve its public purposes.

Pursuant to Resolution No. _________ of the City Council of Purchaser adopted on ____________, 1985, Purchaser is authorized to enter into this Agreement.

103. Purpose of Agreement. Purchaser desires to purchase certain capacity in the Project from Seller and Seller desires to sell such capacity in the Project to Purchaser in consideration of the payment by Purchaser of installments of principal and interest on the unpaid purchase price therefor. The capacity to be acquired by the Purchaser in each portion of the Project, together with the capacities to be acquired by the other Purchasers, and a description of the Project, is set forth in Exhibit A attached hereto and by this reference incorporated herein. The purpose of this Agreement is to effectuate said transaction by setting forth the terms and conditions relating thereto.

104. Financing the Project. To provide Seller with the funds to finance the construction of the project, Seller will assign its right to secure the Installment Payments from the Purchasers to the Bank of America National Trust and Savings Association as Trustee and the Trustee will issue Certificates of Participation secured by the Installment Payments and the proceeds from the sale of the Certificates of Participation will be deposited with the Trustee for the payment of Costs. The Letter of Credit Bank will pay an amount equal to the Installment Payments due on any Interest Payment Date to the Trustee by draws on the Letter of Credit. The Purchaser agrees to pay the Installment Payments and other amounts due hereunder to Seller and the Seller agrees to pay the Installment Payments to the Letter of Credit Bank in satisfaction of the reimbursement obligations of Seller under the Reimbursement Agreement.

105. Acknowledgement of Assignment Agreement. Seller and Purchaser acknowledge that Seller on the date hereof is entering into an Assignment Agreement Relating to Water Facilities Authority Water Treatment Plant with the Letter of Credit Bank and with Bank of America National Trust and Savings Association, as Trustee (the "Trustee"); that pursuant to said Assignment Agreement, Seller is assigning and transferring to the Letter of Credit Bank and to the Trustee all of its rights under this Agreement, including, among others, its rights to exercise its remedies to enforce the receipt of such Installment Payments, as such rights and remedies are provided

by this Agreement; and that the Letter of Credit Bank and the Trustee as their interests appear constitute the assignees of Seller as described herein.

106. Acknowledgement of Status of Project. Seller and Purchaser acknowledge that Seller is the owner of the Property more particularly described in Exhibit B attached hereto and by this reference incorporated herein and will be the owner of the Project, which includes the Property, and will retain title to the Project and the Purchaser will hereunder acquire only capacity in the Project.

ARTICLE II

DEFINITIONS AND GENERAL PROVISIONS

201. Definitions in General. The terms defined in this Section shall, for all purposes of this Agreement and the Trust Agreement, have the meanings ascribed to them, unless the context clearly requires some other meaning.

Acceptance Certificate shall mean a certificate of an Authorized Representative of the Seller to the effect that the Project has been completed substantially in conformity with the plans and specifications therefor.

Adjusted Interest Rate shall mean the interest rate on the Certificates determined and established pursuant to Section 317 of the Trust Agreement.

Agreements shall mean, collectively, the Installment Purchase Agreements Relating to Water Facilities Authority Water Treatment Plant, each dated as of October 1, 1985, between the Seller and each of the Purchasers, and any and all modifications, alterations, amendments and supplements thereto made in accordance with the provisions of each Installment Purchase Agreement and the Trust Agreement, as assigned to the Trustee under the Assignment Agreement. The term Agreement shall individually refer to the Chino Installment Purchase Agreement, the Ontario Installment Purchase Agreement, the Upland Installment Purchase Agreement, the County Installment Purchase Agreement, or the Monte Vista Installment Purchase Agreement, depending on how the term is used in context.

Agreements Term shall mean the period during which the Agreements are in effect as specified in the Agreements.

Alternate Security means any guaranty agreement, surety agreement or letter of credit substituted for the Letter of Credit and securing the payment of the principal of, interest on and all other amounts with respect to the Certificates, issued by a financial institution, insurance company or banking institution which has been assigned by a major nationally recognized rating agency a credit rating equal to or higher than the then-current credit rating assigned to the Letter of Credit Bank, which must (or a commitment therefor must) be delivered to the Trustee at least ten (10) days prior to the beginning of the final 35 days of the term of the Letter of Credit, provided that the Alternate Security will not, by itself, result in reduction in the rating of the Certificates.

Assignment Agreement shall mean that certain Assignment Agreement by and among the Seller the Letter of Credit Bank and the Trustee dated as of October 1, 1985, pursuant to which the Seller assigns its rights under all the Agreements to the Letter of Credit Bank and to the Trustee on behalf of the holders of the Certificates.

Authorized Newspaper shall mean a newspaper customarily published at least once a day for at least five days (other than legal holidays) in each calendar week, printed in the English language, and of general circulation in Los Angeles, California and New York, New York.

Authorized Representative of the City of Chino shall mean the City Manager or Assistant City Manager or any person or persons designated by the City Council of the City of Chino to act on behalf of the City by a written certificate signed on behalf of the City by the Mayor and containing the specimen signature of each such person.

Authorized Representative of San Bernardino County Waterworks District No. 8 shall mean any person or persons designated by the Board of Supervisors of the County of San Bernardino acting as the Board of Directors of the San Bernardino County Waterworks District No. 8 and authorized to act on behalf of said Purchaser by a written certificate signed on behalf of said Purchaser by the Chairman of the Board and containing the specimen signature of each such person.

Authorized Representative of Monte Vista shall mean the General Manager or Assistant General Manager or any person or persons designated by the Board of Directors of the Purchaser to act on behalf of the Purchaser by a written certificate signed on behalf of the Purchaser by the President and containing the specimen signature of each such person.

Authorized Representative of the City of Ontario shall mean the City Manager or Assistant City Manager or any person or persons designated by the City Council of the City of Ontario to act on behalf of the City by a written certificate signed on behalf of the City by the Mayor and containing the specimen signature of each such person.

Authorized Representative of the Seller shall mean the Chairman of the Seller or any person or persons designated by the City Council of the Seller and authorized to act on behalf of the Seller as certified by a written certificate signed on behalf of the Seller by the Chairman of the Seller and containing the specimen signature of each such person.

Authorized Representative of the City of Upland shall mean the City Manager or Assistant City Manager or any person or persons designated by the City Council of the City of Upland to act on behalf of the City by a written certificate signed on behalf of the City by the Mayor and containing the specimen signature of each such person.

Available Moneys shall mean moneys (i) that have been on deposit with the Trustee for at least 124 days, during which period no petition by or against any Purchaser or the Seller has been filed in respect of bankruptcy, insolvency or the reorganization of such person (or has been filed but dismissed); (ii) that represent any proceeds of a draw under the Letter of Credit; (iii) that represent any proceeds of the sale of the Certificates; or (iv) Net Proceeds.

Bond Counsel shall mean a nationally recognized law firm specializing in the area of tax-exempt municipal finance.

Business Day shall mean any day other than (i) a Saturday or Sunday or legal holiday or a day on which banking institutions in any of the cities in which the principal office of the Paying Agent, the Trustee or the Letter of Credit Bank is located and authorized or required by law or regulation to close, or (ii) a day on which the New York Stock Exchange is closed.

Certificate or Certificates shall mean any certificate or certificates of participation executed and delivered by the Trustee pursuant to the Trust Agreement, each such certificate representing a proportionate interest in the principal portion of the Installment Payments payable on each Installment Payment Date and in the interest portion of the Installment Payment due and payable monthly (or payable semiannually on and after the Conversion Date), to and including such maturity date at the Adjusted Interest Rate.

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Certificate holder or Holder of Certificates shall mean the registered owner of any Certificate or Certificates.

Certificate Year shall mean the twelve-month period which commences on October 1 in every year and ends on September 30 of the succeeding year.

Construction Fund shall mean the Construction Fund established in Section 501 of the Trust Agreement.

Conversion Date shall mean the date upon which the Certificates begin to bear interest at the Fixed Interest Rate as provided in Section 320 of the Trust Agreement.

Cost shall mean and be deemed to include, with respect to the Project, but on a pro-rata basis with respect thereto together with any other proper item of cost not specifically mentioned in the Agreements, whether incurred prior to or after the date of the Agreements, (a) costs of payment of, or reimbursement for, acquisition, design, construction, installation and financing of the Project, including, but not limited to, administrative costs and capital expenditures relating to acquisition, construction, installation and financing payments, inspection costs, filing and recording costs, printing costs, reproduction and binding costs, fees and charges of the Trustee pursuant to this Trust Agreement, financing documents, legal fees and charges, financial, accounting and other professional consultant fees, the cost of obtaining the Letter of Credit, fees of rating agencies or costs of obtaining credit ratings, fees for the execution, transportation and safekeeping of Certificates, and charges and expenses in connection with the foregoing; (b) all other costs which the Seller shall be required to pay under the terms of any contract or contracts for the acquisition, construction and installation of the Project, including, but not limited to the cost of any insurance required under the Agreements; (c) any sums required to reimburse the Purchasers for advances made for either of the above items, or for any other costs incurred and for work done, or property conveyed, which is properly chargeable to the Project; and (d) such other expenses not specified herein as may be necessary or incidental to the acquisition, construction, rehabilitation and installation of the Project, the financing thereof and the placing of the same in use and operation, including the Remarketing Agent's fee, the Paying Agent's fee, and the first annual fee for the Letter of Credit. Cost as defined herein shall be deemed to include the cost and expenses incurred by any agent of the Seller for any of the above-mentioned items.

Earliest Optional Payment Date shall mean the first Interest Payment Date which occurs at least seven years after the Conversion Date.

Enterprise shall mean the entire water system of each Purchaser and in the case of San Bernardino Waterworks District No. 8 its sewer system, including without limitation all improvements, works or facilities owned, controlled or operated by the Purchaser to provide water service as such improvements, works or facilities now exist, together with all additions to be acquired, constructed and financed with funds derived from the sale of the Certificates, together with all improvements and extensions to said water system later constructed or organized.

Fiscal Year shall mean the twelve-month fiscal period of the Seller which commences on July 1 in every year and ends on June 30 of the following year.

Fixed Interest Rate shall mean the fixed annual interest rate on the Certificates established in accordance with Section 320 of the Trust Agreement.

Gross Revenues of the Enterprise or _Gross Revenues_ means all revenues, and all money secured or collected from or arising out of the use or operation of the Enterprise or arising from the Enterprise, including, without limitation, all charges, rentals, and fees required to be paid for services as permitted or required by law, resolution or order, to the Purchaser for operation of the Enterprise, excepting only all customer deposits.

Installment Payment Dates shall mean the respective dates on which Installment Payments are scheduled to be made, as set forth in Exhibit C to each Agreement.

Installment Payments shall mean the aggregate of amounts set forth in the respective Agreements corresponding to the Installment Payment Dates set forth therein and designated the principal components of such Installment Payments, plus the interest components of such Installment Payments, as such amounts may be adjusted from time to time pursuant to Sections 305 of the Agreements and all other amounts payable by the Purchasers pursuant to the terms of the respective Agreements.

Interest Payment Date shall mean (a) prior to the Conversion Date, the first Wednesday of each month or the following Business Day if said Wednesday is not a Business Day, and (b) after the Conversion Date, April 1 and October 1 of each year.

Interest Payment Fund shall mean the Interest Payment Fund of the Installment Payment Account established in Section 501 of the Trust Agreement.

Interest Period shall mean (a) prior to the Conversion Date, the period from and including Wednesday of one week through Tuesday of the following week, except that the interest period commencing on the Wednesday next preceding a Record Date shall be extended through the day immediately preceding the next Interest Payment Date, and the interest rate which would have commenced on the Wednesday on or next following the Record Date will commence on the next Interest Payment Date, and (b) on or after the Conversion Date, the period from and including the Conversion Date until the succeeding April 1st or October 1st and thereafter from said April 1st or October 1st to the following March 31st or October 30th, respectively.

Investment Securities shall mean and include any of the following securities, if and to the extent the same are at the time legal for investment of Authority funds: (1) direct obligations of the United States of America (including obligations issued or held in book-entry form on the books of the Department of the Treasury of the United States of America) or obligations the timely payment of the principal of and interest on which are fully guaranteed by the United States of America; (2) obligations, debentures, notes or other evidence of indebtedness issued or guaranteed by any of the following: Banks for Cooperatives, Federal Intermediate Credit Banks, Federal Home Loan Bank System, Export-Import Bank of the United States, Federal Financing Bank, Federal Land Banks, Government National Mortgage Association, Farmer's Home Administration, Federal Home Loan Mortgage Corporation or Federal Housing Administration; (3) interest-bearing demand or time deposits (including certificates of deposit) in banks (including the Trustee) and savings and loan associations, having combined capital and surplus of at least Seventy Five Million Dollars ($75,000,000); (4) repurchase agreements with financial institutions of the types described in (3), provided that the investments which are the subject of such agreements are permitted investments described in (1), (2) or (3) of this definition; and (5) the Local Agency Investment Fund.

Notwithstanding anything herein to the contrary, "Investment Securities" with respect to the investment of amounts representing draws under the Letter of Credit shall mean only direct obligations of the United States maturing not more than 30 days after the date on which they are acquired, and entry into a repurchase agreement with respect to such securities shall not be an allowable investment of such amounts.

Letter of Credit shall mean the irrevocable direct draw letter of credit issued by The Mitsubishi Bank, Ltd., Los Angeles Agency, in the stated amount of $____________.

Letter of Credit Bank shall mean The Mitsubishi Bank, Ltd., Los Angeles Agency, the issuer of the Letter of Credit.

Maximum Annual Debt Service shall mean as of any date of calculation the sum of (a) the interest coming due on the Outstanding Certificates at an assumed rate of 10% per annum, and (b) the amount of all sinking fund installments and principal maturities, all as computed for the Certificate Year in which such sum shall be largest; provided that on the Conversion Date the amount of the Maximum Annual Debt Service shall be reduced to reflect the actual Fixed Interest Rate.

Maximum Interest Rate shall mean 12% per annum.

Moody's shall mean Moody's Investors Service, a bond rating service with offices in New York, New York.

Maintenance and Operation Costs of the Enterprise includes the reasonable expenses of management and other expenses necessary to operate, maintain and preserve each respective Enterprise in good repair and working order, excluding depreciation.

Net Proceeds shall mean any insurance or condemnation proceeds paid with respect to the Project, remaining after payment therefrom of all expenses incurred in the collection thereof.

Net Revenues of the Enterprise shall mean the amounts of Gross Revenues of the Enterprise remaining after payment therefrom the Maintenance and Operation Costs of the Enterprise.

Outstanding, when used with reference to Certificates, shall mean, as of any date, Certificates theretofore or thereupon being authenticated and delivered under the Trust Agreement except:

(i) Certificates cancelled by the Paying Agent on or prior to such date;

(ii) Certificates (or portions of Certificates) for the payment or redemption of which moneys, equal to the principal amount or Redemption Price thereof, as the case may be, with interest to the date of maturity or redemption date, shall be held in trust under the Trust Agreement and set aside for such payment or redemption, (whether at or prior to the maturity or redemption date), provided that if such Certificates (or portions of Certificates) are to be redeemed, notice of such redemption shall have been given as in Article III provided or provision satisfactory to the Trustee shall have been made for the giving of such notice; and

(iii) Certificates in lieu of or in substitution for which other Certificates shall have been executed and delivered pursuant to Article III of the Trust Agreement.

Participants Security Agreement shall mean the Agreement dated as of October 1, 1985 by and among the Letter of Credit Bank, the Trustee and each Purchaser.

Paying Agent shall mean BankAmerica Trust Company of New York or its successor or successors or any other corporation which may at anytime be substituted in its place pursuant to the provisions of this Trust Agreement, provided that any such successor's or substitute corporation's unsecured senior debt obligations must be rated "Baa-3" or higher by a nationally recognized rating agency, if such successor or substitute corporation is not a commercial bank or trust company.

Permitted Encumbrances shall mean as of any particular time:

(i) Liens for ad valorem taxes and assessments, if any, not delinquent or which Purchasers may, pursuant to Section 415 of the Agreements, permit to remain unpaid;

(ii) The Agreements;

(iii) The Assignment Agreement;

(iv) The Trust Agreement;

(v) Participants Security Agreement; and

(vi) Easements, rights of way and other rights, reservations, covenants, conditions or restrictions which do not impair or impede construction or operation of the Project as evidenced by the certificate of an Authorized Representative of Seller filed with the Trustee and the Letter of Credit Bank.

Prime Rate shall mean the rate of interest publicly announced by the Letter of Credit Bank in Los Angeles, California from time to time as its prime rate for unsecured commercial borrowings, said rate to change effective on and as of any change in said Prime Rate.

Principal Payment Date shall mean the date on which a principal amount of the Certificates is paid as provided in Section 303(7) of the Trust Agreement.

Principal Payment Fund shall mean the Principal Payment Fund established in Section 501 of the Trust Agreement.

Project shall mean the the Water Treatment Plant and water transmission lines and energy recovery stations to be acquired and constructed more particularly described in Exhibit "A" hereof.

Purchase Date shall mean any Business Day upon which a Certificate, after receipt by the Remarketing Agent of a Tender Notice submitted in accordance with Section 401 of the Trust Agreement is purchased from the Holder thereof on behalf of a new Holder procured by the Remarketing Agent.

Purchase Payment Price shall mean as of each Installment Payment Date, the amount set forth in Exhibit C to each Agreement, minus amounts available in the Construction Fund, Principal Payment Fund, the Interest Payment Fund, and Reserve Fund, plus an amount equal to any other amounts then due and owing under that Agreement with respect to the Project or regarding that Agreement the amount due and owing under the Reimbursement Agreement with respect to the Letter of Credit.

Purchase Price shall mean as to each Purchaser, such Purchaser's share of the Cost to acquire its capacity in the Project, as set forth in Exhibit A to its Agreement.

Record Date shall mean (a) prior to the Conversion Date the second Business Day preceding the first Wednesday of each month and (b) on or after the Conversion Date the fifteeth day of the month immediately preceding an Interest Payment Date.

Redemption Fund shall mean the Redemption Fund established in Section 501 of the Trust Agreement.

Redemption Price shall mean, with respect to any Certificate, the principal amount thereof payable upon redemption thereof pursuant to such Certificate or the Trust Agreement, and following the Conversion Date, any premium payable in connection therewith.

Reimbursement Agreement shall mean the Reimbursement Agreement relating to the Letter of Credit, dated as of October 1, 1985 between the Seller and the Letter of Credit Bank.

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Remarketing Agent shall mean Merrill Lynch Capital Markets, Merrill Lynch, Pierce, Fenner & Smith Incorporated, and its successor or successors and any corporation which may be substituted in its place pursuant to that certain Remarketing Agreement dated as of October 1, 1985, by and among the Seller, the Trustee, the Remarketing Agent and the Paying Agent, provided that any such successor's or substitute corporation's debt obligations must be rated "Baa" or higher by a nationally recognized rating agency if such successor or substitute corporation is not a commercial bank or trust company and is not a bond dealer then listed.

Reserve Fund shall mean the Reserve Fund established in Section 501 of the Trust Agreement.

Reserve Requirement shall mean the amount set aside in the Reserve Fund pursuant to Section 504.1 of the Trust Agreement.

Standard & Poor's shall mean Standard & Poor's Corporation, a bond rating service with offices in New York, New York.

State shall mean the State of California.

Supplemental Trust Agreement shall mean any agreement supplemental or amendatory of the Trust Agreement.

Tender Interest shall mean, for any period of time in which there is an unreimbursed drawing under the Letter of Credit, that amount which, when added to the interest component of any Installment Payment payable to the Letter of Credit Bank during such period, will result in the Letter of Credit Bank's receiving for the first 180 days after the draw a yield equivalent to the yield of 1/2% over the average interest charged for each day on reserves traded for overnight use by member banks of the Federal Reserve System as determined by the Letter of Credit Bank, and thereafter at a yield equal the Prime Rate for a similar advance for a similar period on such unreimbursed draw under the Letter of Credit.

Tender Notice shall mean the notice required to be submitted by an owner of a Certificate for receipt by the Paying Agent on the Business Day at least seven (7) days prior to a Purchase Date as provided in Section 318 of the Trust Agreement, demanding that such Certificate be purchased.

Trust Agreement shall mean the Trust Agreement entered into by and among, the Purchasers, the Trustee, the Seller and the Paying Agent dated as of October 1, 1985 Relating to the Water Facilities Authority Water Treatment

Plant and any and all amendments and supplements thereto made in accordance with the provisions of the Trust Agreement.

Trust Estate shall mean (i) all right, title and interest of the Trustee in and to the Installment Payments and the Agreements including, without limitation: (ii) all amounts from time to time deposited in the accounts and subaccounts created pursuant to the Trust Agreement in accordance with the provisions of Article III of the Agreements, including all investments and investment earnings thereon and (iii) amounts drawn under the Letter of Credit or under any Alternate Security.

Trustee shall mean Bank of America National Trust and Savings Association, or its successor or successors or any other corporation which may at any time be substituted in its place pursuant to the provisions of the Trust Agreement.

202. Rules of Construction. Words of the masculine gender shall be deemed and construed to include correlative words of the feminine and neuter genders. Unless the context otherwise indicates, words importing the singular number shall include the plural number and vice versa, and words importing persons shall include corporations and associations, including public bodies, as well as natural persons.

The terms "hereby," "hereof," "hereto," "herein," "hereunder" and any similar terms, as used in this Agreement, refer to this Agreement.

ARTICLE III

SALE OF CAPACITY IN THE PROJECT; PURCHASE PRICE

301. Deposit of Moneys. In order to induce Purchaser to purchase the stated capacity in the Project from Seller and to assure Purchaser that the moneys needed to pay the Project Cost will be available for this purpose without delay, Seller, immediately following recordation of this Agreement and the other Agreements with other Purchasers by Seller, shall deposit with the Trustee or cause to be deposited with the Trustee, the sum of $____________. Of this amount, $____________ is required to be deposited in the Construction Fund held by the Trustee pursuant to the Trust Agreement; $____________ is required to be deposited in the Reserve Fund, of which $____________ will be held in the Ontario Reserve Account held by the Trustee pursuant to the Trust Agreement for Purchaser; and $____________ is required to be deposited in the Ontario Interest Payment Account held by the Trustee pursuant to the Trust Agreement for Purchaser.

302. Construction of Project. Seller agrees to acquire and construct or cause the acquisition and construction of the Project pursuant to the plans and specifications on file in the office of the Seller. Seller shall cause contractors under any construction contracts to comply with workers' compensation insurance laws and to pay prevailing wages in accordance with the requirements of Article 2 (commencing with Section 1770) of Chapter 1, Part 7, Division 2 of the California Labor Code. Seller shall provide for supervision of construction of the Project until completion of construction of the Project. Seller shall cause the construction to be performed diligently to the end and covenants that the Project will be substantially completed by October 8, 1988. Purchaser and Seller agree that upon substantial completion of the Project, Seller will maintain and operate the Project under the terms and provisions of this Agreement and such other agreements to be made between the Seller and the Purchasers. No changes shall be made in such plans and specifications which increase the pro rata portion of Project Cost attributable to the Purchaser's capacity in the Project in excess of the funds available in the Construction Fund unless the Purchaser deposits or causes to be deposited in the Construction Fund monies in an amount deemed by the Seller and Purchaser to be sufficient to pay such increase.

Upon completion of construction of the Project, Seller shall deliver or cause to be delivered to the Trustee an Acceptance Certificate thereof executed by an Authorized Officer of the Seller.

Prior to the date of the filing of the Acceptance Certificate or prior to October 8, 1988, whichever is earlier, the Seller shall notify Purchaser of its pro rata share of excess funds then on deposit in the Construction Fund. All such excess funds shall be transferred to the Redemption Fund for the redemption of Certificates in the principal amount of $100,000 or intregal multiples thereof unless the Purchaser instructs the Seller to have its pro rata share transferred to the Purchasers Installment Payment Account as a credit against the principal portion of its Installment Payment on the next occurring Installment Payment Date. Seller (prior to the filing of the Acceptance Certificate or October 1, 1988), whichever is earlier.

303. Payment of Project Cost. Payment for the construction of the Project, as well as all other Project Cost, up to the total amount in the Construction Fund, shall be made from the monies held by the Trustee in the Construction Fund. The Purchaser may at any time during construction contribute cash or its equivalent (as agreed upon between Seller and the

Purchaser, with the consent of the Letter of Credit Bank) to the Project which amount will be credited against the Purchase Price to be paid by the Purchaser. As an alternative, if Seller, Purchaser and the Letter of Credit Bank agree, Purchaser may be reimbursed from the Construction Fund any Project Cost heretofore or hereafter advanced by Purchaser.

304. Sale of Capacity in the Project; Term.

(a) Sale of Capacity in the Project. In consideration of the payment, or the causing of the payment, of Installment Payments provided for in Section 305 of the Trust Agreement by Purchaser to Seller or its assignee, Seller hereby grants, conveys, bargains and sells to Purchaser, effective upon the date of the Trust Agreement, the capacity in the Project described in Exhibit A, upon the terms and conditions set forth in this Agreement and Purchaser hereby accepts said grant, conveyance, bargain and sale upon said terms and conditions.

(b) Term of Agreement. The term of this Agreement shall commence upon the date of the Trust Agreement and shall terminate upon the occurrence of either of the following events: (a) payment in full of the Installment Payments by Purchaser pursuant to the provisions of this Agreement; or (b) a default by Purchaser and termination pursuant to Article VI of the Trust Agreement.

305. Installment Payments. For the purchase of the stated capacity in the Project, Purchaser shall pay to Seller, its successors and assigns, the Installment Payments set forth in Exhibit B attached hereto and by this reference incorporated herein from, but only from, the Gross Revenues of the Purchaser's Enterprise. Installment Payments shall be made to the Seller, which Installment Payments shall be held by Seller in segregated principal and interest payment accounts to be established by Seller in the name of each Purchaser until paid to the Letter of Credit Bank as provided in the Reimbursement Agreement on each Interest Payment Date and/or Principal Payment Date, as the case may be. Installment Payments received by the Seller shall be invested in Investment Securities and any earnings thereon shall be credited pro rata to each Purchaser's Principal Payment Account.

Each Installment Payment shall constitute payment in part for the title to the stated capacity in the Project as described in Exhibit A. For each Certificate Year commencing with the date of the Trust Agreement, Purchaser shall make Installment Payments on Installment Payment Dates during said Certificate Years as more particularly set forth in Exhibit B. The Purchaser shall pay from the proceeds of the sale of the

Certificates advance Installment Payments in the aggregate amount of $___________, consisting of interest only for the period from the date of the delivery of the Certificates through and including January 1, 1986, on the Purchaser's portion of the principal amount of the Certificates calculated at an assumed interest rate of 10% per annum.

Installment Payments for each Installment Payment Date during the term of this Agreement shall constitute the total amount due for said payment period, and shall be paid by Purchaser for and in consideration of the Seller selling to the Purchaser the right to receive the capacity in the Project.

In determining the amount of each Installment Payment, the Seller shall give the Purchasers a credit against the amount due from and payable by the Purchaser specified in said Exhibit B by (i) an amount equal to the amounts on deposit in the Purchaser's Principal and Interest Payment Accounts held by Seller and similar accounts established pursuant to the Trust Agreement and held by the Trustee; (ii) the investment earnings received by the Trustee from the investment of money in the Purchaser's Reserve Account as reported to Purchaser pursuant to Section 508 of the Trust Agreement; and (iii) the amount in the Reserve Account equal to the amount paid to the Letter of Credit Bank for the last Installment Payments remaining prior to the expiration of the term of this Agreement and paid by the Letter of Credit Bank, as provided in Section 504 of the Trust Agreement.

(a) Prior to the Conversion Date, the interest portion of each Installment Payment shall be calculated and paid at a rate per annum of 8% per annum, unless the Adjusted Interest Rate of the Certificates is then greater than 8% in which event the interest rate on each Installment Payment shall be at a rate per annum equal to the Adjusted Interest Rate (which shall be determined as provided in Section 317 of the Trust Agreement). In no event shall the interest portion of Installment Payments be paid at less than 8% per annum.

(b) Purchaser agrees to deposit such amounts necessary to pay the interest and principal due on the Certificates on the next Interest Payment Date and Principal Payment Date.

(c) Prior to the Conversion Date the interest portion of each Installment Payment shall be adjusted upward or downward as provided in Exhibit B of the Trust Agreement. On the 25th day of each month the Trustee shall notify the Seller by telephone of the actual interest portion of the Installment Payments due on the next Installment Payment Date.

(d) At its election, the Seller may convert the interest rate component of the Installment Payments applicable to the Certificates from the Adjustable Interest Rate to the Fixed Interest Rate as provided for in Section 320 of the Trust Agreement.

(e) As additional consideration for the purchaser of Purchasers Capacity, the Purchaser agrees to pay Tender Interest applicable to the Purchaser on each Installment Payment Date in the event of an unreimbursed draw under the Letter of Credit in addition to the Installment Payments required hereinabove.

(f) In addition to the Installment Payments, the Purchaser agrees to pay 38.29976% (which percentage will change following completion of construction evidenced by a certificate of the Authority delivered to the Purchasers, the Trustee and the Letter of Credit Bank) of: (i) all fees and expenses of the Trustee incurred in connection with the performance of its duties under the Trust Agreement and (ii) all unremimbursed draws under the Letter of Credit and the fees of the Letter of Credit Bank.

306. Interest Component. Except for the Installment Payment due through and including January 1, 1986, which are to be comprised of interest only, a portion of each Installment Payment shall be paid as, and represents, the payment of a portion of the unpaid Purchase Price and interest on the unpaid Purchase Price. The interest component of each Installment Payment is set forth in Exhibit B.

307. Payment in Lawful Money; No Set-Off. Each Installment Payment shall be paid or caused to be paid by the Purchaser in lawful money of the United States of America, which at the time of payment is legal tender for the payment of public and private debts, to the Seller or its assignee at the Office of the Seller in Montclair, California, or such other place as Seller or its assignee shall designate. Any such Installment Payments accruing hereunder which shall not be paid on or prior to each Installment Payment Date shall bear interest at the rate of twelve percent (12%) per annum from the Installment Payment Date until the same shall be paid. Notwithstanding any dispute between Purchaser and Seller, Purchaser shall make or cause to be made each and all Installment Payments when due, whether or not Seller shall deliver to Purchasers any capacity in the Project and shall not withhold any Installment Payments pending the final resolution of such dispute nor shall Purchaser assert any right of set-off or counter-claim against its obligation to make Installment Payments as set forth herein.

308. Pledge of Revenues. Except for the payment of the Purchaser's 1976 Water Revenue Bonds which constitute a first lien on said Gross Revenues, the Installment Payments shall be equally secured by a pledge, charge and lien upon the Gross Revenues of the Enterprise, and all of the Gross Revenues of the Enterprise are hereby pledged, charged and assigned for the security of said Installment Payments and any obligations of the City on a parity with the Installment Payments, and such Gross Revenues and any interest earned on the Gross Revenues shall constitute a trust fund for the security and payment of the interest on and principal of said Installment Payments and so long as any of the Installment Payments thereon are unpaid said Gross Revenues and interest thereon shall not be used for any other purpose, and except as permitted by this Agreement, and shall be held in trust for the benefit of the Seller and shall be applied pursuant to this Agreement, or to this Agreement as modified pursuant to provisions herein. The Gross Revenues of the respective Enterprises of the other Purchasers are not pledged hereunder.

309. Title. From and after the date of the Trust Agreement, title to the Purchaser's stated capacity in the Project, and each and every portion thereof, shall vest in Purchaser, provided, however, that title to the Purchaser's stated capacity in the Project and each and every portion thereof shall be subject to the subsequent payment of Installment Payments as described in Section 305 of the Trust Agreement and to the remedies of Seller and its assignee in the event of default as provided in Article VI of the Trust Agreement and to Permitted Encumbrances.

310. Disclaimer of Warranties. THE SELLER MAKES NO WARRANTY OR REPRESENTATION, EITHER EXPRESS OR IMPLIED, AS TO THE VALUE, DESIGN, CONDITION, MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE OR FITNESS FOR USE OF THE PROJECT, OR WARRANTY WITH RESPECT THERETO. In no event shall Seller be liable for any incidental, indirect, special or consequential damage in connection with or arising out of this Agreement or the existence, furnishing, functioning or Purchaser's use of any item, product or service provided for in this Agreement.

311. Manufacturers' Warranties. The Seller appoints Purchaser its agent and attorney-in-fact during the Agreement Term, so long as Purchaser shall not be in default hereunder, to assert from time to time whatever claims and rights, including warranties concerning the Project, which Seller may have against the manufacturer or supplier of such portion of the Project. As between the Seller and the Purchaser, Purchaser's sole remedy for the breach of such warranty, indemnification or representation shall be against the manufacturer of or supplier for the Project, and not against

the Seller, nor shall such matter have any effect whatsoever on the rights of the Seller with respect to this Agreement, including the right to receive full and timely payments hereunder. Purchaser expressly acknowledges that neither Seller nor the Trustee makes, or has made, any representation or warranty whatsoever as to the existence or availability of such warranties of the manufacturer of or supplier for any part of the Project.

312. Purchaser's Option to Prepay the Installment Payments. Except as provided herein, Purchaser shall not have the option to prepay all remaining Installment Payments.

(a) The Purchaser, at its option, may prepay the principal component of Installment Payments, in whole or in part, on any Installment Payment Date prior to the Conversion Date, in any integral multiple of $100,000, at the principal amount thereof, together with accrued interest to the date on which Certificates will be redeemed with such payment.

(b) The Purchaser may also, at its option, prepay the principal component of Installment Payments, in whole or in part, on the first Interest Payment Date which occurs at least seven years after the Conversion Date and on any Interest Payment Date thereafter, with a redemption premium of three percent (3%) of the principal amount of Certificates redeemed on such date, such premimum to be reduced by one percent (1%) on each anniversary of the initial redemption date until it reaches zero together with accrued interest to the date on which Certificates will be redeemed with such payment.

The principal and interest on any Certificates to be redeemed due to option prepayments shall be paid by the Letter of Credit Bank from draws on the Letter of Credit. The premium to be paid on any Certificates called for redemption shall be deposited by the Purchaser with the Trustee at least 124 days prior to the date set for redemption of related Certificates.

313. Arbitrage Covenant. The Purchaser and the Seller hereby covenant with the Certificateholders that, notwithstanding any other provision of this Agreement, they will make no use of the proceeds of the Certificates which, if such use were made on the date of delivery of the Certificates to the Certificateholders, would have caused the obligations of the Purchaser under this Agreement to be "arbitrage bonds" subject to federal income taxation by reason of Section 103(c) of the Internal Revenue Code of 1954, as amended.

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ARTICLE IV

COVENANTS RELATING TO THE PROJECT

401. Maintenance and Operation of the Project. Seller shall maintain the Project or cause the Project to be maintained and operated on behalf of Purchaser and the other Purchasers of capacity in the Project. Notwithstanding the covenants hereunder made by Seller, it is understood that the Purchasers shall pay their proportionate shares of the cost of the maintenance and operation of the Project. The obligations of the Purchasers may be more fully set forth in further agreements among the Purchasers and Seller.

402. Utilities. Seller shall pay for, or otherwise arrange for the payment of, all utility services supplied to the Project (which services shall include power, gas, telphone and all other utility services), all cost of operation of the Project and all cost of repair and replacement of the Project resulting from ordinary wear and tear or want of care.

403. Public Liability Insurance. On or before the award of any construction contract Seller shall maintain or cause to be maintained public liability insurance against claims for bodily injury or death, or damage to property occurring upon, in or about the Project, such insurance to afford protection to a limit of not less than $5,000,000 combined single limit bodily injury and property damage. Such insurance may be maintained in conjunction with or separate from any other similar insurance carried by Purchaser.

404. Workers' Compensation Insurance. On or before the award of any construction contract Seller shall be responsible for the compliance, including all financial payments, with the State of California laws as regards Workers' Compensation and employee safety.

405. Fire and Special Extended Coverage Endorsement. Seller shall maintain or cause to be maintained, throughout the term of this Agreement, fire and lightning insurance, earthquake insurance, subject to deductible conditions not to exceed 10% of the full insurable value of the above ground structures, and special extended coverage endorsement which includes vandalism and malicious mischief endorsement, on all above-ground structures constituting any part of the Project in an amount equal to at least one hundred percent (100%) of the replacement cost of such structures (less a deductible amount of not more than $5,000). All insurance required to be maintained pursuant to this Section may be subject to deductible clauses as may be approved by the Purchaser, provided deductible amounts for fire extended coverage shall

not exceed $5,000 for any one loss. Each such policy of insurance shall contain an inflation cost endorsement, a standard replacement cost endorsement providing for no deduction for depreciation, and a stipulated amount endorsement. Such insurance may be maintained in conjunction with or separate from any other similar insurance carried by Purchaser.

In addition, the Seller shall maintain or cause to be maintained use and occupancy or business interruption or rental income insurance against the perils of fire, lightning, earthquake, vandalism and malicious mischief and such other perils ordinarily defined as "extended coverage" on the above-ground structures of the Project in an amount equal to not less than 18 months' aggregate Installment Payments due from Purchasers under all the Agreements.

Any insurance required by Sections 403, 404 and 405 hereof carried by the Seller shall name the Purchasers as additional named coinsured or if carried by the Purchasers shall name the Seller as additional coinsured. Seller, or Purchasers if the required insurance is carried by the Purchasers, may be self-insured up to $500,000 for any single event.

406. <u>Form of Insurance Policies; Delivery</u>.

(a) All policies of insurance required by Section 405 of this Agreement shall provide (or Seller shall separately agree) that all proceeds thereunder relating to that portion of the Project damaged or destroyed shall be payable to the Trustee pursuant to a lender's loss payable endorsement, substantially in accordance with the form approved by the California Bankers Association. The Trustee may adjust, collect and receive all monies relating to the Project which may become due and payable under any such policies, may compromise any and all claims thereunder and shall apply the Net Proceeds of such insurance as provided in this Agreement. All policies of insurance required by Section 405 of this Agreement shall be to the Letter of Credit Bank and shall provide that Seller or its assignee and Purchaser, shall be given thirty (30) days' notice of any intended cancellation thereof or reduction of the coverage provided thereby.

(b) Seller shall deliver, or cause to be delivered, to Purchaser the Letter of Credit Bank and the Trustee in the month of December in each year a schedule, in such detail as Purchaser or the Trustee may request, setting forth the insurance policies then in force pursuant to this Agreement, the names of the insurers which have issued the policies, the amounts thereof, the property and risks covered thereby and evidence of the payment of premiums due thereunder. If so requested in writing by Purchaser or the Trustee or the Letter of Credit Bank, Seller shall also deliver, or cause to be delivered to Purchaser or the Trustee or the Letter of Credit Bank duplicate originals or certified copies of each insurance policy described in such schedule, provided, however, that delivery of the insurance policies under the provisions of this Section shall confer no responsibility upon Purchaser or the Trustee or the Letter of Credit Bank as to the sufficiency of coverage or amounts of said policies. In the event of failure of Seller to obtain or cause to be obtained the insurance required by Sections 403 through 405 of the Trust Agreement, Purchaser may obtain such insurance on behalf of Seller and may collect premiums thereof from Seller with interest at the rate of twelve percent (12%) on unpaid premiums.

407. Inability to Obtain Insurance. Notwithstanding the provisions of Sections 403 through 405, if at any time Seller shall be unable to obtain or maintain insurance to the extent required by such Sections on reasonable terms, as to amounts, costs or as to risks, the failure to maintain such insurance shall not constitute a default under this Agreement if Purchaser shall cause the employment of an independent insurance consultant having a favorable reputation for skill and experience in such matters, for the purpose of reviewing such insurance requirements and making recommendations respecting the types, amounts and provisions of reasonably obtainable insurance, including self-insurance, or the establishment of other generally accepted forms of alternative protection that should be carried in lieu thereof, or the infeasibility of obtaining insurance, and if Seller shall comply with the recommendations made in such report. A signed copy of the report of the insurance consultant shall be filed with the Trustee and the Letter of Credit Bank, and the insurance requirements specified in Sections 403 through 405 shall be deemed to be modified to conform with the recommendations in such report.

408. Application of Net Proceeds of Insurance. The Net Proceeds of any insurance required by this Agreement relating to the loss or destruction of any part of the Project which is received by the Seller shall be deposited in the Construction Fund and Seller shall assure that such Net Proceeds are and shall be applied and disbursed as set forth below:

(a) If Seller determines that such Net Proceeds are sufficient to repair, reconstruct or replace the damaged or destroyed portion of the Project, which determination shall be evidenced by a certificate executed by an Authorized Officer of Seller and filed with the Trustee as assignee of Seller, then Seller shall cause such portion of the Project to be repaired, reconstructed or replaced to at least the same good order, repair and condition as it was in prior to the damage or destruction, insofar as the same may be accomplished by the use of said Net Proceeds, and Seller shall disburse said Net Proceeds for said purpose. Any balance of said Net Proceeds not required for such repair, reconstruction or replacement shall be transferred by the Trustee to the Redemption Fund to be applied as prepayment of Installment Payments and shall be used to redeem Certificates as provided in Section 606 of the Trust Agreement.

(b) In the event that such Net Proceeds are not sufficient to repair, reconstruct or replace the damaged or destroyed portion of the Project, as evidenced by a certificate executed by an Authorized Representative of Seller and filed with the Trustee, Seller shall deposit such Net Proceeds with the Trustee and direct the Trustee to apply such Net Proceeds to the prepayment in full, on the next succeeding Installment Payment Date, of Installment Payments, by paying the then-stipulated fair market value of the stated capacity in the Project as set forth in Exhibit B of this Agreement, or if such Net Proceeds are insufficient to prepay Installment Payments in full, then Seller shall direct the Trustee to apply such Net Proceeds to prepayment of a portion of the Installment Payments, except that no such prepayment shall be in an amount less than $5,000.

Unless the Purchaser's Installment Payments have been paid in full as provided in subsection (b) of this Section 408, Purchaser shall be obligated to continue to make Installment Payments required by this Agreement notwithstanding damage to or destruction of all or a portion of the Project.

409. Application of Net Proceeds of Condemnation. All Net Proceeds received in any condemnation proceeding undertaken by any governmental agency relating to all or a portion of the Project shall be paid by Purchasers, if received by Purchasers, to the Trustee for deposit in the Principal Payment Fund and deposited in the appropriate Principal Payment Accounts and Seller shall assure that such Net Proceeds are applied and disbursed as set forth below:

(a) If Seller determines that such condemnation has not materially adversely affected the operation of the Project as set forth in a certificate executed by an Authorized Representative of Seller and filed with the Trustee, as assignee of Seller, and if such Net Proceeds are insufficient to enable Seller to prepay Installment Payments in full by paying the stipulated value of the Project as set forth in Exhibit B of the Agreements on the next succeeding Installment Payment Date, Seller shall direct the Trustee to retain such

Net Proceeds in the Principal Payment Fund and to cause such Net Proceeds to be applied as a credit against the appropriate Purchaser's next succeeding Installment Payments.

(b) If Seller determines that such condemnation has materially adversely affected the operation of the Project as set forth in a certificate executed by an Authorized Representative of Seller and filed with the Trustee, as assignee of Seller, or if such Net Proceeds are sufficient to enable Purchasers to prepay the Installment Payments in full by paying the stipulated value of the Project on the next succeeding Installment Payment Date, Seller shall direct the Trustee to deposit the Net Proceeds in the Redemption Fund and to apply such Net Proceeds to the prepayment in full or (to the extent that such condemnation pertains only to a portion of the Project) in part on the next succeeding Installment Payment Date of Installment Payments.

Unless Installment Payments shall have been paid in full as provided in subsection (b) of this Section 409, Purchaser shall be obligated to continue to make Installment Payments required by this Agreement, notwithstanding condemnation of all or a portion of the Project.

410. Payment of Installment Payments. Purchaser shall duly and punctually pay or cause to be paid the Installment Payments and the other amounts due hereunder at the dates and places and in the manner provided in this Agreement according to the true intent and meaning hereof and of the Trust Agreement and shall not directly or indirectly extend or assent to the extension of the Installment Payment Dates for any Installment Payments.

411. Compliance with this Agreement. Seller and Purchaser will faithfully observe and perform or cause to be faithfully observed and performed all the covenants, conditions and requirements of this Agreement, and will not suffer or permit any default to occur hereunder, nor do or permit to be done in, upon or about the Project or any part thereof, anything that might in any way weaken, diminish or impair the operation thereof. Neither Seller nor Purchaser will do or permit anything to be done, or omit or refrain from doing anything, in any case where any such act done or permitted to be done, or any such omission of or refraining from action, would or might be a ground for cancellation or termination of this Agreement (other than by prepayment).

412. Payment of Taxes. Purchaser will pay or cause to be paid all taxes, assessments and other governmental charges, if any, that may be levied, assessed or charged upon the Purchasers' capacity in the Project promptly as and when the

same shall become due and payable; provided, however, that Purchaser shall not be required to pay any such tax, assessment, or charge, if the validity thereof shall concurrently be contested in good faith by appropriate proceedings, if Purchaser shall set aside, or cause to be set aside, reserves agreed by Purchaser and Seller or its assignee to be in a form and amount which is adequate with respect thereto and if Purchaser shall hold Seller and its assignee harmless as to any loss or forfeiture which might arise from the nonpayment of any such item; and provided further, that Purchaser, upon the commencement of any proceedings to foreclose the lien of any such tax, assessment, or charge, will forthwith pay, or cause to be paid, any such tax, assessment or charge, unless contested in good faith as aforesaid. Purchaser will not suffer the Purchaser's capacity in the Project or any part thereof, to be sold for any taxes, assessments or other charges whatsoever, or to be forfeited therefor. Nothing herein contained shall be deemed to impose any liability to pay taxes, assessments or charges where none is imposed by law.

413. Observance of Laws and Regulations. Seller and Purchaser will well and truly keep, observe and perform or cause to be kept, observed and performed all valid and lawful obligations or regulations now or hereafter imposed on either of them by contract, or prescribed by any law of the United States, or of the State of California, or by any officer, board or commission having jurisdiction or control, as a condition of the continued enjoyment of any and every right, privilege or franchise now owned or hereafter acquired by Purchaser and enjoyed by Seller, including Seller's and Purchaser's right to exist and carry on business as a public body, corporate and political, to the end that such rights, privileges and franchises shall be maintained and preserved, and shall not become abandoned, forfeited or in any manner impaired.

414. Maintain and Preserve the Project. Seller will operate, maintain and preserve, or will cause to be operated, maintained and preserved, the Project in good repair and working order and will operate or cause to be operated the Project, in an efficient and economical manner.

415. Other Liens. Seller and Purchaser shall keep, or cause to be kept, the Project and all parts thereof free from judgments, from mechanics and materialmen's liens (except those arising from construction of the Project) and free from all liens, claims, demands and encumbrances of whatsoever nature or character, other than Permitted Encumbrances, and Seller and Purchaser shall keep or cause to be kept the Project free from any claim or liability which might impair or impede the operations of the Project; provided, however, that Seller or Purchaser shall not be required to pay any such liens, claims

or demands if the validity thereof shall concurrently be contested in good faith by appropriate proceedings, and if Seller or Purchaser shall set aside, or cause to be set aside, reserves deemed by it to be adequate with respect thereto and provided further, that Seller or Purchaser upon the commencement of any proceedings to foreclose the lien of any such charge or claim, will forthwith pay, or cause to be paid, any such charge or claim unless contested in good faith as aforesaid. Seller, Purchaser or the Trustee, may, (after first giving the other parties ten (10) days' written notice to comply therewith and failure of party liable to so comply within said ten-day period) defend against any and all actions or proceedings in which the validity of this Agreement is or might be questioned, or may pay or compromise any claim or demand asserted in any such actions or proceedings; provided, however, that, in defending against such actions or proceedings or in paying or compromising such claims or demands, Seller shall not in any event be deemed to have waived or released Purchaser from liability for or on account of any of its covenants and warranties contained herein, or from its liability hereunder to defend the validity of this Agreement and the pledge herein made and to perform such covenants and warranties.

416. <u>Against Encumbrances or Sales</u>. Except for the emcumbrance created by Purchasers Resolution No. __ providing for the issuance of its 1976 Water Revenue Bonds neither Seller nor Purchaser shall create or suffer to be created any mortgage, pledge, lien, charge or encumbrance upon the Project, or upon any real or personal property essential to the operation of the Project except Permitted Encumbrances. Except as expressly provided in this Article IV, Purchaser shall promptly, at its own expense, take such action as may be necessary to discharge or remove any such mortgage, pledge, lien, charge or encumbrance for which it is responsible, if the same shall arise at any time. Neither Seller nor Purchaser shall sell or otherwise dispose of any property essential to the proper operation of the Project, except as otherwise permitted by this Agreement.

417. <u>Prosecution and Defense of Suits</u>. Purchaser shall, promptly upon request of Seller or its assignee, from time to time take such action, or cause such action to be taken, as may be necessary or proper to remedy or cure any defect in or cloud upon its interest in the Project whether now existing or hereafter developing and shall prosecute, or cause to be prosecuted, all such suits, actions and other proceedings as may be appropriate for such purpose and shall indemnify and save Seller and its assignee harmless from all loss, cost, damage and expense, including attorneys' fees, which they or any of them may incur by reason of any such defect, cloud, suit, action or proceedings.

418. Recordation and Filing. Purchaser shall record and file, or shall cause to be recorded and filed, this Agreement and all such documents as may be required by law (together with whatever else may be necessary or be reasonably required by Seller or its assignee), in such manner, at such times and in such places as may be required by law in order fully to preserve and protect the rights of Seller and its assignee under this Agreement.

419. Waiver of Laws. Purchaser shall not at any time insist upon or plead in any manner whatsoever, or claim or take the benefit or advantage of, or suffer, any stay or extension law now or at any time hereafter in force which may adversely affect the covenants and agreements contained in this Agreement and the benefit and advantage of any such law is hereby expressly waived by Seller to the extent that Seller may legally make such waiver.

420. Compliance with Conditions Precedent. Upon the date of delivery of this Agreement, all conditions, acts and things required by law or by this Agreement to have happened or to have been performed precedent to or in the execution of this Agreement shall exist, have happened and have been performed, and this Agreement shall be within every limit prescribed by law.

421. Power to Enter Into Agreements.

(a) Purchaser is duly authorized to enter into this Agreement and the Trust Agreement. The provisions of this Agreement are and will be the valid and legally enforceable obligations of Purchaser in accordance with their terms and the terms of this Agreement.

(b) Seller is duly authorized to enter into this Agreement, the Assignment Agreement and the Trust Agreement and to enter into the transactions contemplated by this Agreement, the Assignment Agreement and the Trust Agreement. Seller has duly authorized the execution and delivery of this Agreement, the Assignment Agreement and the Trust Agreement.

422. Further Assurances. Whenever and so often as requested so to do by Seller or its assignee, Purchaser will promptly execute and deliver or cause to be executed and delivered all such other and further instruments, documents or assurances, and promptly do or cause to be done all such other and further things, as may be necessary or reasonably required in order further and more fully to vest in Seller or its assignee all rights, interest, powers, benefits, privileges and advantages conferred or intended to be conferred upon Seller and its assignee by this Agreement.

423. Seller Not Liable. Neither Seller nor its assignee nor its members, officers, agents or employees shall be liable to the Purchasers or to any other person whomsoever for any death, injury or damage that may result to any person or property by or from any cause whatsoever in, on or about the Project. The Purchasers shall indemnify, or cause indemnification of, and hold Seller, its assignee, its and their members, officer, agents and employees harmless from, and defend each of them against, any and all claims, liens and judgments for death of or injury to any person or damage to property whatsoever occurring in, on or about the Project.

424. Indemnification Due to Trustee. Purchaser shall pay, or cause to be paid, to Seller or the Trustee as assignee of Seller, fees, compensation and expenses due under the Trust Agreement upon periodic billing therefor by Seller or the Trustee as assignee of Seller. In addition, Purchaser shall and hereby agrees to indemnify, or cause indemnification of, and hold, or cause to be held, Seller and the Trustee as assignee of Seller harmless from and against all claims, losses and damages, including legal fees and expenses, arising out of (i) the use, maintenance, condition or management of, or from any work or thing done on, the Project by Purchaser, (ii) any breach or default on the part of Purchaser in the performance of any of its obligations under this Agreement, (iii) any act of negligence of Purchaser, or of any of its agents, contractors, servants, employees or licensees with respect to the Project, (iv) the authorization of payment of the Cost of the Project by Purchaser, or (v) the defense (pursuant to Section 417 of the Installment Agreement or Section 611 of the Trust Agreement) against actions or proceedings in which the validity of this Agreement is or might by questioned and the payment or compromise of claims or demands asserted in any such actions or proceedings, all to the extent permitted by law. Indemnification for any tort mentioned in this Section shall be limited to the extent and in the amounts provided for by California law. No indemnification will be made under this Section or elsewhere in this Agreement for wilful misconduct, gross negligence or negligence by the Trustee, its officers, agents, employees, successors or assigns.

425. Authority to Operate the Project. The Seller shall assure that the Property including the Project is operated pursuant to complete and lawful authority. No permits, rights, franchises or privileges relating thereto shall be allowed to lapse or be forfeited so long as the same shall be necessary for the ownership or operation of the Project. Seller shall procure, or cause to be procured, the extension or renewal of each and every permit, right, franchise or privilege so expiring and necessary or desirable for the ownership or operation of the Project as such.

426. Operation and Equipping of the Project. The Seller shall continuously furnish and equip the Project, or cause the Project to be furnished and equipped, so that the Project shall at all times constitute complete and operational water treatment and distribution facilities which are conducted, operated and maintained in an efficient and economical manner. All costs of operating and maintaining the Project shall be borne by the Purchasers pro rata or as may otherwise be set forth in further agreements between the Seller and the Purchasers.

427. Furnishing Additional Information. Purchaser shall, from time to time, furnish or cause to be furnished to Seller or its assigneesuch data regarding the Project as shall be reasonably requested in order to enable Seller and the Trustee as assignee of Seller to determine whether there has been compliance with the covenants, terms and provisions of this Agreement and of the Trust Agreement.

428. Quiet Enjoyment. The parties hereto mutually covenant that Purchaser, so long as it shall keep and perform the covenants and agreements herein contained, shall at all times during the term of this Agreement peaceably and quietly, have, hold and enjoy its interest in the Project without suit, trouble or hindrance from Seller.

429. Restriction Against Pledge. Seller shall not pledge Installment Payments or other amounts derived from the Project or from rights of Seller under this Agreement nor shall Seller encumber or place any lien upon the Project, except as otherwise provided in this Agreement, the Reimbursement Agreement, Participants Security Agreements and the Trust Agreement.

430. Assignment by Seller. Except pursuant to the Assignment Agreement and except as otherwise set forth herein, Seller shall not assign this Agreement, its rights to receive Installment Payments or its duties and obligations hereunder.

431. No Violation of Other Agreements.

(a) Purchaser hereby represents that neither the execution and delivery of this Agreement and the Trust Agreement, nor the fulfillment of and compliance with the terms and conditions of the Trust Agreement and hereof, nor the consummation of the transactions contemplated hereby or thereby, conflicts with or results in a breach of terms or violation of any other agreement to which Purchaser is a party or by which Purchaser is bound, or constitutes a default under any of the foregoing.

(b) Seller hereby represents that neither the execution and delivery of this Agreement, the Assignment Agreement, the Trust Agreement or the Reimbursement Agreement, nor the fulfillment of and compliance with the terms and conditions of the Trust Agreement and thereof, nor the consummation of the transactions contemplated hereby or thereby, conflicts with or results in a breach of terms or violation of any other agreement to which Seller is a party or by which Seller is bound, or constitutes a default under any of the foregoing or is in violation of any law, regulation or ruling of the State of California.

ARTICLE V

WATER REVENUES, COVENANTS

501. Water Revenue Fund. The Purchaser has established a Water Revenue Fund in connection with Purchasers 1976 Water Revenue Bond issue which is held by the appropriate financial officer of the Purchaser. All Gross Revenues of the Enterprise shall be deposited with the Treasurer and credited to the Water Revenue Fund. After the payment of or the provision for the payment of the principal and interest on Purchasers 1976 Water Revenue Bond issue, the Treasurer shall transfer moneys from the Water Revenue Fund to pay the Installment Payments in accordance with Section 305. Any moneys in excess of that budgeted as required for the payment of the Installment Payments and any obligations on a parity with the Installment Payments and the Maintenance and Operation Cost of the Enterprise shall constitute are surplus revenues in the Water Revenue Fund. After all covenants contained herein have been duly performed, and provided that there are no amounts then owing to the Letter of Credit Bank, these surplus revenues may be used for: (1) extensions and betterments of the Enterprise; or (2) any lawful purpose of the Purchaser.

502. Covenants. So long as the Installment Payments are unpaid, the Purchaser makes the following covenants with the Seller and its assigns, which covenants are necessary, convenient and desirable to secure the payment of the Installment Payments; provided, however, that said covenants do not require the Purchaser to expend any funds other than the revenues received or receivable from the Enterprise.

Covenant 1. Discharge Claims. The Purchaser covenants that in order fully to preserve and protect the priority and security of the Installment Payments, the Purchaser shall pay from the Water Revenue Fund and discharge all lawful claims for labor, materials and supplies furnished for or in connection with the Enterprise which, if unpaid, may become a lien or charge upon Gross Revenues of the Enterprise prior or superior to the lien of the Installment Payments and impair the security of the Installment Payments. The Purchaser shall also pay from the Water Revenue Fund all taxes and assessments or other governmental charges lawfully levied or assessed upon or in respect of the Enterprise or upon any part thereof or upon any of the Gross Revenues therefrom.

Covenant 2. Operate Works in Efficient and Economical Manner. The Purchaser covenants and agrees to operate the Enterprise in an efficient and economical manner and to operate, maintain and preserve the Enterprise in good repair and working order.

Covenant 3. Against Sale, Eminent Domain. The Purchaser covenants that the Enterprise shall not be mortgaged or otherwise encumbered, sold, leased, pledged, any charge placed thereon, or disposed of as a whole or substantially as a whole unless such sale or other disposition be so arranged as to provide for a continuance of payments into the Water Revenue Fund sufficient in amount to permit payment therefrom of the Installment Payments, payment of which is required to be made out of the Gross Revenues of the Enterprise. Provided that there is such continuance of payments into the Water Revenue Fund, the sale of a portion of the Enterprise to another Purchaser shall be permitted.The Gross Revenues of the Enterprise shall not be mortgaged, encumbered, sold, leased, pledged, any charge placed thereon, or disposed of or used except as authorized by the terms of this Agreement. The Purchaser further covenants that it will not enter any agreement which impairs the operation of the Enterprise or any part of it necessary to secure adequate revenues to pay the Installment Payments or which otherwise would impair the rights of the Purchaser with respect to the revenues or the operation of the Enterprise. If any substantial part of the Enterprise is sold, the payment therefor shall either be used for the acquisition and/or construction of improvements and extensions of the Enterprise or shall be placed in the appropriate funds and shall be used to pay the Installment Payments in the manner provided in this Agreement.

The Purchaser covenants that any amounts received as awards as a result of the taking of all or any part of the Enterprise by the lawful exercise of eminent domain, if any, either shall be used for the acquisition and/or construction of the improvements and extension of the Enterprise or shall be placed in the appropriate funds and shall be used to pay the Installment Payments in the manner provided in this Agreement.

Covenant 4. Insurance. The Purchaser covenants that it shall at all times maintain with responsible insurers all such insurance on the Enterprise as is customarily maintained with respect to facilities and properties of like character against accident to, loss of or damage to such Enterprise or properties. If any useful part of the Enterprise shall be damaged or destroyed, such part shall be restored to use. The money collected from insurance against accident to or destruction of the physical Enterprise shall be used for repairing or rebuilding the damaged or destroyed Enterprise, and to the extent not so applied, shall be applied to the prepayment of the Installment Payments.

The Purchaser shall also maintain with responsible insurers workmen's compensation insurance and insurance against public liability and property damage to the extent reasonably necessary to protect the Purchaser and the Gross Revenues.

The Purchaser mayy be self-insured up to $500,000 for any single event.

Covenant 5. Records and Accounts. The Purchaser covenants that it shall keep proper books of record and accounts of the Enterprise, separate from all other records and accounts, in which complete and correct entries shall be made of all transactions relating to the Enterprise. Said books shall at all reasonable times be subject to the inspection of the Seller or its assigns, and the Letter of Credit Bank.

Covenant 6. No Free Service. The Purchaser covenants that, except to the extent that the Purchaser is required under agreements and/or contracts existing on the effective date of this Agreement, no water or other service from the Enterprise may be furnished or rendered to the United States of America, the State of California, or any private corporation or person free of charge, and that, except to the extent that the Purchaser is required under agreements and/or contracts existing on the effective date of this Agreement, no such service shall be rendered to the United States of America, the State of California, or any private corporation or person at rates or for consideration lower than those charged other persons for similar service. The Purchaser covenants that it shall at all times during the period any of the Certificates are Outstanding maintain and enforce valid regulations for the payment of bills for water service and that such regulations shall at all times during such period provide that the Purchaser shall discontinue water service to any user whose water bill has not been paid within the time fixed by said regulations, which shall not be more than two months from the date the water bill became delinquent.

Covenant 7. Rates and Charges. The Purchaser shall and hereby covenants that it shall prescribe, revise and collect such rates and charges for the services and facilities of the

Enterprise which, after making allowances for contingencies and error in the estimates, shall in each Fiscal Year be at least sufficient, when added to funds on hand, to pay the following amounts in the order set forth:

(a) The Installment Payments and any parity obligations as they become due and payable;

(b) All current expenses for the Maintenance and Operation Cost of the Enterprise.

(c) All payments required to meet any other obligations of the Purchaser which are charges, liens, encumbrances upon or payable from the principal and interest on the Purchaser's 1976 Water Revenue Bonds, Gross Revenues of the Enterprise, including the, Trustee's fees, unreimbursed draws on the Letter of Credit, Letter of Credit Bank fees and Tender Interest;

and the charges shall be so fixed that the Gross Revenues of the Enterprise shall be at least 1.25 times the amounts payable under (a), assuming an interest rate on the Certificates of 8% per; and shall be 1.00 times the amounts payable under each of (b) and (c), if within six months after any increase in the interest rate on the Certificates above 8% per annum, the Purchaser shall increase its rates and charges to a level sufficient to maintain the foregoing coverage.

Covenant 8. <u>No Priority for Additional Obligations</u>. The Purchaser covenants that no additional bonds, notes or obligations shall be issued pursuant to any law of the State of California having any priority in payment of principal or interest out of the Gross Revenues of the Enterprise over the Installment Payments to be payable out of said revenues.

Covenant 9. <u>Limits on Additional Debt</u>. The Purchaser covenants that, except for obligations issued to refund the Certificates, no additional indebtedness evidenced by revenue bonds, revenue notes or any other evidences of indebtedness payable out of the Water Revenue Fund and ranking on a parity with the obligation to make the Installment Payments shall be created or incurred unless:

First: The Purchaser is not in default under the terms of this Agreement; and

Second: The Net Revenues of the Enterprise, calculated on sound accounting principles, as shown by the books of the Purchaser for the latest fiscal year or the last completed 12 month period ended at least 60 days prior to the adoption of the resolution of issuance for such

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additional indebtedness as shown by an audit certificate or opinion of an independent certified public accountant or firm of certified public accountants employed by the Purchaser, plus, at the option of the Purchaser, any or all of the items hereinafter in this covenant designated (a) and (b), shall have amounted to at least 1.25 times the Installment Payments due and any additional debt due in the next fiscal year immediately subsequent to the incurring of such additional indebtedness.

The items any or all of which may be added to such Net Revenues of the Enterprise for the purpose of applying the restriction contained in this covenant are the following:

(a) An allowance for Net Revenues of the Enterprise from any additions to or improvements or extensions of the Enterprise to be made with the proceeds of such additional indebtedness, and also for net revenues of the Enterprise from any such additions, improvements or extensions which have been made from moneys from any source but which, during all or any part of such fiscal year or last completed 12-month period, were not in service, all in an amount equal to 75% of the estimated additional average annual net revenues of the Enterprise to be derived from such additions, improvements and extensions for the first 36-month period in which each addition, improvement or extension, respectively, is expected to be in operation, all as shown by the certificate or opinion of a qualified independent engineer employed by the Purchaser.

(b) An allowance for earnings arising from any increase in the charges made for service from the Enterprise which has become effective prior to the incurring of such additional indebtedness but which, during all or any part of such fiscal year or last completed 12-month period, was not in effect, in an amount equal to 75% of the amount by which the net revenues of the Enterprise would have been increased if such increase in charges had been in effect during the whole of such fiscal year or last completed 12-month period, as shown by the certificate or opinion of a qualified independent engineer employed by the Purchaser.

Nothing herein shall preclude the Purchaser from issuing obligations subordinate to the payment of the Installment Payments.

Covenant 10. Against Competing Utility. The Purchaser will not acquire, construct, operate or maintain, and will not, within the scope of its powers, permit any other private or public corporation, political subdivision, district or agency, or any person whomsoever to acquire, construct, operate or maintain within the Purchaser's boundaries or any part thereof, any system or utility in competition with the Enterprise.

Covenant 11. Financial Reports. Within one hundred and eighty (180) days after the close of each fiscal year of Purchaser, Purchaser will furnish, or cause to be furnished, to Seller or its assignee and to the Letter of Credit Bank detailed certified reports of audit, based on an examination sufficiently complete, prepared by an independent certified public accountant, covering the operations of Purchaser's Water Revenue Fund and the Enterprise for said fiscal year. Such audit report shall include statements of the status of each account pertaining to the Enterprise, showing the amount and source of deposits therein, the amount and purpose of the withdrawals therefrom and the balance therein at the beginning and end of said fiscal year.

Covenant 12. Purchase of Additional Capacity. In the event of default by another defaulting Purchaser and the capacity of that defaulting Purchaser has not been acquired by another Purchaser or entity, the Purchaser agrees to purchase a portion of said defaulting Purchaser's capacity on the following conditions:

1. The purchase price for said capacity shall be not less than the payment of the balance of the Installment Payments of the defaulting Purchaser attributable to the capacity being acquired.

2. The aggregate amount of the defaulting Purchaser's capacity acquired does not exceed 25% of the original capacity of the acquiring Purchaser in the Project.

Covenant 13. Purchase of Water. Should an event of default occur hereunder the Purchaser convenants that it will obtain and pay for water from the Authority up to the amount of its originally purchased capacity interest in the Project before it will obtain, purchase, rent, lease or otherwise acquire water, or an interest in water, from any public or private source other than the Authority.

503. Prior Lien Water Revenue Bonds. The payment of the Installment Payments and all covenants and provisions of this Agreement are subject to the prior first lien on the Gross Revenues of the Enterprise created by Resolution No. __ of the Purchaser providing for the issuance of Purchaser's 1976 Water Revenue Bonds and further subject to the rights and obligations of the Purchaser set forth in said Resolution.

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ARTICLE VI

EVENTS OF DEFAULT AND REMEDIES

601. Events of Default Defined. The following shall be "events of default" under this Agreement and the terms "events of default" and "default" shall mean, whenever they are used in this Agreement, with respect to the Purchaser, any one or more of the following events, namely:

(a) Failure by Purchaser to pay any Installment Payment or other payment required to be paid hereunder at the time specified herein;

(b) Failure by Purchaser to observe and perform any covenant, condition or agreement on its part to be observed or performed, other than as referred to in clause (a) of this Section, for a period of thirty (30) days after written notice specifying such failure and requesting that it be remedied has been given to Purchaser by Seller or its assignee; provided, however, that Seller or its assignee may, upon written request of Purchaser prior to the expiration of such thirty (30) day period, consent to an extension of such time in order to cure such failure if corrective action has been instituted by Purchaser and is being diligently pursued and will, in the judgment of Seller or its assignee, be diligently pursued until the default is corrected;

(c) A court having jurisdiction in the Project shall enter a decree or order for relief in respect of Purchaser in an involuntary case under any applicable bankruptcy, insolvency or other similar law now or hereafter in effect, or appointing a receiver, liquidator, assignee, custodian, trustee, sequestrator (or similar official) of Purchaser or for any substantial part of its property, or ordering the winding up or liquidation of its affairs, and such decree or order shall remain unstayed and in effect for a period of sixty (60) days;

(d) Purchaser shall commence a voluntary case under any applicable bankruptcy, insolvency or other similar law now or hereafter in effect, or shall consent to the entry of an order for relief in an involuntary case under any such law, or shall consent to the appointment of or taking possession by a receiver, liquidator, assignee, trustee, custodian, sequestrator (or similar official) of Purchaser for any substantial part of its property, or shall make any general assignment for the benefit of creditors, or shall fail generally to pay its debts as they become due or shall take any corporate action in furtherance of any of the foregoing; or

The Seller shall give written notice of a default by the Purchaser to the Trustee and the Letters of Credit Bank. The Letter of Credit Bank shall have the right to cure any default undfer (a) and (b) hereof within thirty (30) days of receipt of such written notice.

602. Remedies on Default. Upon the happening of any of the events of default specified in Section 601 hereof, which default has not been cured by the Letter of Credit Bank as provided in Section 601 hereof, Seller or its assignee may exercise any and all remedies available pursuant to law or granted pursuant to this Agreement. Seller or its assignee is expressly authorized hereby to take over for the benefit of Seller or its assigns the Purchaser's interest in the Project described in Exhibit A of the Trust Agreement, and, in addition, at its option, to terminate this Agreement. In the event of default and notwithstanding the take-over of the Purchaser's interest in the Project by Seller or its assignee, Purchaser shall, as herein expressly provided, continue to remain liable for the payment of Installment Payments and/or damages for breach of this Agreement and the performance of all conditions herein contained and, in any event, such Installment Payments and/or damages shall be payable to Seller or its assignee at the time and in the manner set forth in subsections (a) and (b) of this Section.

(a) In the event that Seller or its assignee does not elect to terminate this Agreement pursuant to subparagraph (b) below, Purchaser agrees to and shall remain liable for the payment of Installment Payments and the performance of all conditions herein contained and shall reimburse Seller or its assignee for any deficiency arising out of the sale or leasing of the Purchaser's interest in the Project, or, in the event that Seller or its assignee is unable to sell or lease the Purchaser's interest in the Project, then for the full amount of the Installment Payments to the end of the term of this Agreement, but said Installment Payments and/or deficiency shall be payable only at the same time and in the same manner as provided in Section 305, notwithstanding such take-over of the Purchaser's capacity in the Project by Seller or its assignee or any suit in unlawful detainer, or otherwise, brought by Seller or its assignee for the purpose of effecting such take-over of the Purchaser's capacity in the Project or the exercise of any other remedy by the Seller or its assignee. Purchaser hereby irrevocably appoints Seller or its assignee as the agent and attorney-in-fact of the Purchaser to sell or lease the Purchaser's capacity in the Project in the event of default by Purchaser. Purchaser hereby exempts and agrees to save harmless Seller and its assignee from any cost, loss or damage whatsoever arising or occasioned by any such entry upon and the sale or the letting of the Purchaser's capacity in the Project. Purchaser hereby waives any and all claims for damages caused, or which may be caused, by Seller or its assignee in entering and taking possession of the Purchaser's capacity in the Project, for all claims for damages that may result from the destruction of or injury to the Project, and all claims for damges to or loss of any property belonging to Purchaser that may be in or upon the Project. Purchaser agrees that the terms of this Agreement constitute full and sufficient notice of the right of Seller or its assignee to sell or lease the Purchaser's capacity in the Project in the event of such taking of possession without effecting a surrender of this Agreement, and further agrees that no acts of Seller or its assignee in effecting such sale or leasing shall constitute a surrender or termination of this Agreement irrespective of the term for which such sale or leasing is made, or of the terms and conditions of such sale or leasing, or otherwise, but that, on the contrary, in the event of such default by Purchaser, the right to terminate this Agreement shall vest in Seller or its assignee to be effected in the sole and exclusive manner hereinafter provided for in subsection (b) below. Purchaser shall have the right to any sale proceeds or rental obtained by Seller or its assignee in excess of the full amount of the Installment Payments herein specified.

(b) In the event of default by Purchaser and consequent termination of this Agreement at the option of Seller or its assignee in the manner hereinafter provided (and notwithstanding the taking of possession of the Purchaser's capacity in the Project by Seller or its assignee in any manner whatsoever or the sale or leasing of the Project), Purchaser nevertheless agrees to pay to Seller or its assignee all cost, loss or damages howsoever arising or occurring payable at the same time and in the same manner as in the case of payment of Installment Payments pursuant to Section 305 of the Trust Agreement. Neither notice to pay the Installment Payments or to deliver up possession of the Project given pursuant to law nor any proceeding in unlawful detainer taken by Seller or its assignee shall of itself operate to terminate this Agreement, and no termination of this Agreement on account of default by Purchaser shall be or become effective by operation of law, or otherwise, unless and until Seller or its assignee shall have given written notice to the Purchaser of the election on the part of Purchaser or its assignee to terminate this Agreement.

Each and all of the remedies given to Seller and its assignee hereunder or by any law now or hereafter enacted are cumulative and the exercise of one right or remedy shall not impair the right to Seller or its assignee to exercise any or all other remedies.

Notwithstanding the foregoing, no action shall be taken by the Seller or its assignee under this Section without the prior written consent of the Letter of Credit Bank.

603. Suits at Law or in Equity and Mandamus. In addition to the remedies set forth in Section 602 of the Trust Agreement, in case one or more of the events of default shall happen, then and in every such case, Seller and its assignee shall be entitled to proceed to protect and enforce the rights vested in the Seller by this Agreement by such appropriate judicial proceeding as Seller or its assignee shall deem most effectual to protect and enforce any such right, either by suit in equity or by action at law, whether for the specific performance of any covenant or agreement contained in this Agreement or by law. The provisions of this Agreement and the duties of Purchaser and of the officers, agents and employees thereof shall be enforceable by Seller or its assignee by mandamus or other appropriate suit, action or proceeding in any court of competent jurisdiction.

(a) Without limiting the generality of the foregoing, Seller and its assignee shall have the right:

(i) Accounting. By action or suit in equity to require the Purchaser and its officers, agents and employees to provide an accounting as the trustee of an express trust.

(ii) Injunction. By action or suit in equity to enjoin any acts or things which may be unlawful or in violation of the rights of Seller or its assignee.

(iii) Mandamus. By mandamus or other suit, action or proceeding at law or equity to enforce its or their rights against Purchaser and its and any of its officers, agents, and employees, and to compel it or them to perform and carry out its and their duties and obligations under the law and its and their covenants and agreements with Purchaser as provided herein.

604. Non-Waiver. Nothing in this Article VI or in any other provision of this Agreement shall affect or impair the obligation of Purchaser, which is to pay the Installment Payments, as herein provided. No delay or omission of Seller or its assignee to exercise any right or power arising upon the happening of any event of default shall impair any such right or power or shall be construed to be a waiver of any such event of default or any acquiescence therein, and every power and remedy given by this Article VI to Seller and its assignee may be exercised from time to time and as often as shall be deemed expedient by Seller or its assignee.

605. Remedies Not Exclusive. No remedy herein or by law conferred upon or reserved to Seller or its assignee is intended to be exclusive of any other remedy, but each such remedy is cumulative and in addition to every other remedy, and every remedy given hereunder or now or hereafter existing, at law or in equity or by statute or otherwise may be exercised without exhausting and without regard to any other remedy conferred or by any law.

606. Status Quo. In case any suit, action or proceeding to enforce any right or exercise any remedy shall be brought or taken and then discontinued or abandoned, or shall be determined adversely to Seller and its assignee, then, and in every such case, Seller and its assignee shall be restored to its former position and rights and remedies as if no such suit, action or proceedings had been brought or taken.

ARTICLE VII

ADMINISTRATIVE PROVISIONS

701. Preservation and Inspection of Documents. All documents received by Seller or its assignee or Purchaser under the provisions of this Agreement shall be retained in their respective possessions and shall be subject at all reasonable times to the inspection of the other party hereto and its assigns, agents and representatives, any of whom may make copies thereof.

702. Parties in Interest. Nothing in this Agreement, expressed or implied, is intended to or shall be construed to confer upon or to give to any person or party other than Seller, its assignee the Letter of Credit Bank and Purchaser any rights, remedies or claims under or by reason of this Agreement or any covenants, condition or stipulation of the Trust Agreement; and all covenants, stipulations, promises and agreements in this Agreement made by or on behalf of Seller or Purchaser shall be for the sole and exclusive benefit of Seller and its assignee, the Trustee and the Letter of Credit Bank and Purchaser.

703. No Recourse Under Agreement. All covenants, stipulations, promises, agreements and obligations of the parties hereto contained in this Agreement shall be deemed to be the covenants, stipulations, promises, agreements and obligations of the parties hereto, respectively, and not of any member, officer, employee or agent of the parties hereto in an individual capacity, and no recourse shall be had under this Agreement for the payment of the Installment Payments or for any claim based thereon or under this Agreement against any member, officer, employee or agent of the parties hereto.

704. Notices. All notices, certificates or other communications hereunder shall be sufficiently given and shall be deemed given when delivered or deposited in the United States mail in registered form with postage fully prepaid:

If to the Seller:

Water Facilities Authority
P. O. Box 71
Montclair, California 91763
Attn: General Manager

If to the Trustee:

Bank of America National Trust and
Savings Association
555 South Flower, Fifth Floor
Los Angeles, California
Attn: Security Services Division-Trust (213) 228-4146

If to the Letter of Credit Bank:

The Mitsubishi Bank, Ltd., Los Angeles Agency
800 Wilshire Boulevard
Los Angeles, California 90017
Attn: Letter of Credit Department

If to the Remarketing Agent:

Merrill Lynch, Pierce, Fenner
& Smith, Incorporated
Tax-Exempt Money Markets
Department 43rd Floor
One Liberty Plaza 165 Broadway
New York, New York 10080 (212) 637-8862

If to the Paying Agent:

BankAmerica Trust Company of New York
Corporate Trust Department
40 Broad Street 4th Floor
New York, New York 10064 (212) 248-6992

If to Chino:

City of Chino
13220 Central Avenue
Chino, California 91710
Attn: City Manager (714) 627-7577

If to Ontario:

City of Ontario
303 East B Street
Ontario, California 91764
Attn: City Manager (714) 986-1151

If to Upland:

City of Upland
460 N. Euclid Avenue
Upland, California 91786
Attn: City Manager (714) 982-1352

If to County:

San Bernardino County Waterworks
District No. 8
13260 Central Avenue
Chino, California 91710
Attn: Chino Valley Manager (714) 627-7575

If to Monte Vista:

Monte Vista Water District
10575 Central Avenue
Montclair, California 91763
Attn: General Manager (714) 624-0035

The parties hereto, by notice given hereunder, may, respectively designate different addresses to which subsequent notices, certificates or other communications will be sent.

705. Binding Effect. This Agreement shall inure to the benefit of and shall be binding upon Seller and Purchaser and their respective successors and assigns.

706. Severability. If any one or more of the covenants, stipulations, promises, agreements or obligations provided in this Agreement on the part of Seller or Purchaser to be performed should be determined by a court of competent jurisdiction to be contrary to law, then such covenant, stipulation, promise, agreement or obligation shall be deemed and construed to be severable from the remaining covenants, stipulations, promises, agreements and obligations herein contained and shall in no way affect the validity of the other provisions of this Agreement.

707. Headings. Any headings preceding the text of the several Articles and Sections of the Trust Agreement, and any table of contents or marginal notes appended to copies of the

Trust Agreement, shall be solely for convenience or reference and shall not constitute a part of this Agreement, nor shall they affect its meaning, construction or effect.

708. Applicable Law. This Agreement shall be governed by and construed in accordance with the laws of the State of California.

709. Seller and Purchaser Representatives. Whenever under the provisions of this Agreement the approval of Seller or its assignee or Purchaser is required, or Seller or its assignee or Purchaser are required to take some action at the request of the other, such approval of such request may be given for Seller by an Authorized Representative of Seller, for assignees of Seller by an authorized representative thereof, and for Purchaser by an Authorized Representative of City, and any party hereto shall be authorized to rely upon any such approval or request.

710. Form of Certificate of Officers. Every certificate with respect to compliance with a condition or covenant provided for in this Agreement and which is precedent to the taking of any action under this Agreement shall include:

(a) A statement that the person making or giving such certificate has read such covenant or condition and the definitions herein relating thereto;

(b) A brief statement as to the nature and scope of the examination or investigation upon which the statements or opinions contained in such certificate are based;

(c) A statement that, in the opinion of the signer, he has made or caused to be made such examination or investigation as is necessary to enable him to express an informed opinion as to whether or not such covenant or condition has been complied with; and

(d) A statement as to whether, in the opinion of the signer, such condition or covenant has been complied with.

A certificate may be based, insofar as its relates to legal matters, upon a certificate or opinion of or representations by counsel, unless the persons provided the certificate know that the certificate or representations with respect to the matters upon which the certificate may be based are erroneous, or in the exercise of reasonable care should have known that the same were erroneous.

711. Counterpart. This Installment Agreement may be executed in counterpart.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed in their respective names by their duly authorized officers as of the date first above written.

WATER FACILITIES AUTHORITY, as Seller

By: ______________________
Chairman

By: ______________________
Secretary

CITY OF ONTARIO, as Purchaser

By: Faye Myers Dastrup
Mayor pro Tem

ATTEST:

____
City Clerk

10-03-85
7125p/2113/02

EXHIBIT A

COMPONENT	UPLAND	MVWD	ONTARIO	CHINO	SBC#8
Treatment Plant	29.4118	14.7059	29.4118	11.7647	14.7059
Pipeline to 8th Street	.0000	23.8095	47.6190	28.5714	.0000
Pipeline to 8th Street	.0000	.0000	100.0000	.0000	.0000
Pipeline to 8th Street	.0000	.0000	.0000	100.0000	.0000
Connections	20.0000	20.0000	40.0000	20.0000	.0000
Energy R. S. Ontario	.0000	.0000	100.0000	.0000	.0000
Energy R.S. Chino	.0000	.0000	.0000	100.0000	.0000
Energy R.S. Ontario, Chino	.0000	.0000	55.5555	44.4445	.0000

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EXHIBIT B

Installment Payments

Payment Date	Principal Component	Interest* Component	Total Payment
15-Dec-85	$0.00	$265,800.33	$265,800.33
01-Apr-86	0.00	265,800.33	265,800.33
01-Jul-86	0.00	265,800.33	265,800.33
01-Oct-86	0.00	265,800.33	265,800.33
01-Jan-87	0.00	265,800.33	265,800.33
01-Apr-87	0.00	265,800.33	265,800.33
01-Jul-87	0.00	265,800.33	265,800.33
01-Oct-87	9,574.94	265,800.33	275,375.27
01-Jan-88	9,574.94	265,800.33	275,375.27
01-Apr-88	9,574.94	265,800.33	275,375.27
01-Jul-88	9,574.94	265,800.33	275,375.27
01-Oct-88	9,574.94	265,034.34	274,609.28
01-Jan-89	9,574.94	265,034.34	274,609.28
01-Apr-89	9,574.94	265,034.34	274,609.28
01-Jul-89	9,574.94	265,034.34	274,609.28
01-Oct-89	19,149.88	264,268.34	283,418.22
01-Jan-90	19,149.88	264,268.34	283,418.22
01-Apr-90	19,149.88	264,268.34	283,418.22
01-Jul-90	19,149.88	264,268.34	283,418.22
01-Oct-90	19,149.88	262,736.35	281,886.23
01-Jan-91	19,149.88	262,736.35	281,886.23
01-Apr-91	19,149.88	262,736.35	281,886.23
01-Jul-91	19,149.88	262,736.35	281,886.23
01-Oct-91	19,149.88	261,204.36	280,354.24
01-Jan-92	19,149.88	261,204.36	280,354.24
01-Apr-92	19,149.88	261,204.36	280,354.24
01-Jul-92	19,149.88	261,204.36	280,354.24
01-Oct-92	19,149.88	259,672.37	278,822.25
01-Jan-93	19,149.88	259,672.37	278,822.25
01-Apr-93	19,149.88	259,672.37	278,822.25
01-Jul-93	19,149.88	259,672.37	278,822.25
01-Oct-93	28,724.82	258,140.38	286,865.20
01-Jan-94	28,724.82	258,140.38	286,865.20
01-Apr-94	28,724.82	258,140.38	286,865.20
01-Jul-94	28,724.82	258,140.38	286,865.20
01-Oct-94	28,724.82	255,842.40	284,567.22
01-Jan-95	28,724.82	255,842.40	284,567.22
01-Apr-95	28,724.82	255,842.40	284,567.22
01-Jul-95	28,724.82	255,842.40	284,567.22
01-Oct-95	38,299.76	253,544.41	291,844.17
01-Jan-96	38,299.76	253,544.41	291,844.17
01-Apr-96	38,299.76	253,544.41	291,844.17
01-Jul-96	38,299.76	253,544.41	291,844.17

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01-Oct-96	38,299.76	250,480.43	288,780.19
01-Jan-97	38,299.76	250,480.43	288,780.19
01-Apr-97	38,299.76	250,480.43	288,780.19
01-Jul-97	38,299.76	250,480.43	288,780.19
01-Oct-97	47,874.70	247,416.45	295,291.15
01-Jan-98	47,874.70	247,416.45	295,291.15
01-Apr-98	47,874.70	247,416.45	295,291.15
01-Jul-98	47,874.70	247,416.45	295,291.15
01-Oct-98	47,874.70	243,586.47	291,461.17
01-Jan-99	47,874.70	243,586.47	291,461.17
01-Apr-99	47,874.70	243,586.47	291,461.17
01-Jul-99	47,874.70	243,586.47	291,461.17
01-Oct-99	57,449.64	239,756.50	297,206.14
01-Jan-2000	57,449.64	239,756.50	297,206.14
01-Apr-2000	57,449.64	239,756.50	297,206.14
01-Jul-2000	57,449.64	239,756.50	297,206.14
01-Oct-2000	67,024.58	235,160.53	302,185.11
01-Jan-2001	67,024.58	235,160.53	302,185.11
01-Apr-2001	67,024.58	235,160.53	302,185.11
01-Jul-2001	67,024.58	235,160.53	302,185.11
01-Oct-2001	76,599.52	229,798.56	306,398.08
01-Jan-2002	76,599.52	229,798.56	306,398.08
01-Apr-2002	76,599.52	229,798.56	306,398.08
01-Jul-2002	76,599.52	229,798.56	306,398.08
01-Oct-2002	86,174.46	223,670.60	309,845.06
01-Jan-2003	86,174.46	223,670.60	309,845.06
01-Apr-2003	86,174.46	223,670.60	309,845.06
01-Jul-2003	86,174.46	223,670.60	309,845.06
01-Oct-2003	95,749.40	216,776.64	312,526.04
01-Jan-2004	95,749.40	216,776.64	312,526.04
01-Apr-2004	95,749.40	216,776.64	312,526.04
01-Jul-2004	95,749.40	216,776.64	312,526.04
01-Oct-2004	114,899.28	209,116.69	324,015.97
01-Jan-2005	114,899.28	209,116.69	324,015.97
01-Apr-2005	114,899.28	209,116.69	324,015.97
01-Jul-2005	114,899.28	209,116.69	324,015.97
01-Oct-2005	124,474.22	199,924.75	324,398.97
01-Jan-2006	124,474.22	199,924.75	324,398.97
01-Apr-2006	124,474.22	199,924.75	324,398.97
01-Jul-2006	124,474.22	199,924.75	324,398.97
01-Oct-2006	143,624.10	189,966.81	333,590.91
01-Jan-2007	143,624.10	189,966.81	333,590.91
01-Apr-2007	143,624.10	189,966.81	333,590.91
01-Jul-2007	143,624.10	189,966.81	333,590.91
01-Oct-2007	172,348.92	178,476.88	350,825.80
01-Jan-2008	172,348.92	178,476.88	350,825.80
01-Apr-2008	172,348.92	178,476.88	350,825.80
01-Jul-2008	172,348.92	178,476.88	350,825.80
01-Oct-2008	191,498.80	164,688.97	356,187.77
01-Jan-2009	191,498.80	164,688.97	356,187.77

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01-Apr-2009	191,498.80	164,688.97	356,187.77
01-Jul-2009	191,498.80	164,688.97	356,187.77
01-Oct-2009	220,223.62	149,369.06	369,592.68
01-Jan-2010	220,223.62	149,369.06	369,592.68
01-Apr-2010	220,223.62	149,369.06	369,592.68
01-Jul-2010	220,223.62	149,369.06	369,592.68
01-Oct-2010	248,948.44	131,751.17	380,699.61
01-Jan-2011	248,948.44	131,751.17	380,699.61
01-Apr-2011	248,948.44	131,751.17	380,699.61
01-Jul-2011	248,948.44	131,751.17	380,699.61
01-Oct-2011	287,248.20	111,835.30	399,083.50
01-Jan-2012	287,248.20	111,835.30	399,083.50
01-Apr-2012	287,248.20	111,835.30	399,083.50
01-Jul-2012	287,248.20	111,835.30	399,083.50
01-Oct-2012	325,547.96	88,855.44	414,403.40
01-Jan-2013	325,547.96	88,855.44	414,403.40
01-Apr-2013	325,547.96	88,855.44	414,403.40
01-Jul-2013	325,547.96	88,855.44	414,403.40
01-Oct-2013	363,847.72	62,811.61	426,659.33
01-Jan-2014	363,847.72	62,811.61	426,659.33
01-Apr-2014	363,847.72	62,811.61	426,659.33
01-Jul-2014	363,847.72	62,811.61	426,659.33
01-Oct-2014	421,297.36	33,703.79	455,001.15
01-Jan-2015	421,297.36	33,703.79	455,001.15
01-Apr-2015	421,297.36	33,703.79	455,001.15
01-Jul-2015	421,297.36	33,703.79	455,001.15

* During the period that Certificates bear interest at an Adjusted Interest Rate, the Interest Component shall be computed at 8.0%, or at the highest Adjusted Interest Rate during the preceding three (3) months period, whichever is higher. Following conversion to a Fixed Rate of Interest, the Interest Component shall be the Fixed Rate of Interest.

APPENDIX K

WFA Ordinance No. 99-07-02

ORDINANCE NO. 99-07-02
ORDINANCE OF THE WATER FACILITIES AUTHORITY-JPA
REPEALING ORDINANCE 96-09-01

WHEREAS, the Agua de Lejos Treatment Plant has been in service since 1988;

WHEREAS, in order to maintain a state of plant readiness and reliability a scheduled approach to replacement of capital equipment is needed;

WHEREAS, a need to stabilize the fiscal impacts incurred by each Member Agency is needed;

NOW, THEREFORE, be it ordained by the Board of Directors of the Water Facilities Authority - Joint Powers Agency ("WFA") that:

1. This Ordinance establishes nine charges that will be made to each Member Agency. Charges to the Member Agencies for the WFA COPs will still be governed by the installment payment agreements. These charges are set forth below.

2. Definitions.

a. "Plant Capability": The total capability of the plant, based upon the current physical limits of the treatment plant, the ability to produce water that meets all drinking water standards, and any other reason that may justify operating the treatment plant at more or less than design capacity.

b. "Design Capacity": The capacity of the Agua de Lejos Treatment Plant is 77 mgd.

c. "Member Agency": The agencies that are signatories to the WFA Joint Powers Agreement.

d. "IEUA": Inland Empire Utility Agency (formerly Chino Basin Municipal Water District).

e. "Capital Replacement Plan": The plan and time schedule for replacement of plant equipment as adopted by the Board of Directors.

f. "Capital Improvement Project": Projects that substantially increase the capability or value of the treatment plant and are not capital replacement projects.

g. "Capital Replacement Project": Projects and/or equipment that are identified in the Capital Replacement Plan.

h. "FY": The Fiscal Year of the WFA beginning July 1.

3. Payments for the Capital Investment Required for the Treatment Plant. The final cost of the treatment plant (land, Metropolitan Water District of Southern California ("MWD") connection, treatment plant, and treatment plant expansion) is to be allocated among the Member Agencies based on percent entitlement of the treatment plant. Payments on the Certificates of Participation ("COPs") will be made quarterly in advance. The percentage entitlement of design capacity of each Member Agency is:

City of Upland	23.0% of design capacity in mg
Monte Vista Water District	24.0% of design capacity in mg
City of Ontario	31.4% of design capacity in mg
City of Chino	5.9% of design capacity in mg
City of Chino Hills	15.7% of design capacity in mg

4. Operations Issues.

a. If plant capability exceeds plant design capacity of 77 mgd, then each participating Member Agency's entitlement of plant capability is according to the percentages described above for design capacity. Each Member Agency's share of the COPs is different from their capacity share of the treatment plant. The capacity share of the plant is determined by the cash contributions made by each Member Agency plus their share of the original COPs.

b. If a Member Agency does not request its full plant entitlement, the remaining water is "unsubscribed capacity". Any other Member Agency may utilize unsubscribed capacity upon request and approval by the Plant Manager. The Plant Manager may stop the use of unsubscribed capacity immediately if the unsubscribed capacity is needed to meet the percentage entitlement of another Member Agency.

c. If requests above percentage entitlement are received that exceed plant capability, each request will be reduced in proportion to the percent entitlement of each requesting Member Agency until the plant capability is no longer exceeded.

d. Any Member Agency utilizing unsubscribed capacity will pay the direct costs related to the delivery of the unsubscribed capacity water on an acre-foot basis. These costs include the cost of purchasing water (as defined in paragraph 9 below), the Direct Treatment and Delivery Costs (as described in paragraph 8 below), and the capital replacement fund charges associated with the increase in water deliveries.

5. Payments for the Capital Investment Required for Project Costs Not Related to the Treatment Plant. The final costs of the non-treatment plant components (e.g., pipelines, turnouts, energy recovery stations and feeders), when allocated among the Member Agencies in accordance with the percentage interests as referenced in WFA Resolution No. 97-05-01 or in any ordinance superseding that resolution, will produce a percentage of the total non-treatment plant costs for Member Agencies. Payments for these costs will be made quarterly in advance.

6. General and Administrative Costs for the Authority. This cost category include all items not directly related to the treatment of water. General and Administrative Costs include, but are not limited to, the cost of the manager, administrative assistant, and related training and benefit costs of these employees. Other specific costs to be included in this category are postage, advertising, dues and subscriptions, office supplies, telephone, legal, audit, data processing, accounting, janitorial services, heating/air conditioning, fire extinguisher service, insurance, building and ground maintenance, and any travel and training of administrative personnel. These costs shall be allocated based upon percent entitlement of the treatment plant of each Member Agency. General and administrative costs will be estimated at the beginning of each fiscal year as part of the regular budget.

7. Direct Operations Costs to Maintain Plant Readiness. This cost category includes, but is not limited to those costs that maintain a state of plant readiness

with the ability to serve any Member Agency upon demand and would be incurred if the plant was serving zero "0" c.f.s. or mgd. These costs include but are not limited to, the plant operations supervisor and the instrumentation technicians, laboratory supplies, uniforms, outside laboratory services, tools, and maintenance equipment consistent with the financial limits in the WFA purchasing policy, plant equipment maintenance, and the training of the plant operations supervisor and instrumentation technicians. Direct Operations costs will be estimated at the beginning of each fiscal year as part of the regular budget. Billing for Direct Operations Costs will be based on the estimated quarterly water sales to each Member Agency. Adjustments in billings will be made quarterly based upon actual water sales.

8. Direct Treatment and Delivery Costs. All costs directly related to the quantities of water treated are to be included in this category. These costs include, but are not limited to, plant operators, power, chemicals, sludge removal and treatment, and filter media replacement. At the beginning of each fiscal year an estimate of these costs will be made. Monthly charges will be based on this estimate. The account of each Member Agency will be adjusted as necessary to reflect the actual water treatment and delivery related expenditures at the end of each fiscal year.

9. The Cost of Purchasing Raw Water for Treatment. Each Member Agency will be charged for purchasing untreated water. It is the responsibility of each

Member Agency to establish its right with IEUA (formerly CBMWD) to receive water at the basic untreated water rate.

10. Component Maintenance. Maintenance expenses that are not capital replacement costs covered in Fund No. 4 of non-treatment plant components as identified in Resolution No. 97-05-01, or in any ordinance or resolution superceding that resolution, shall be charged to the Member Agencies in proportion to their interest in the component.

11. Capital Replacement Costs.

Capital Replacement Funds. Payments for capital replacement projects shall be made based upon the four funds identified below. The four funds shall be established to facilitate payments for the replacement of equipment at the treatment plant and related facilities. The components in each fund are identified on the lists attached as Exhibit "A". No component shall be moved from one list to another without Board action. As a part of the annual budget, the Capital Replacement Plan shall be revised to reflect replacements that were completed and the anticipated needs for the next seven years. The intent of the funds is to provide an equitable means of component replacement. The money that has already been collected for Capital Replacement will be retained as reserves for capital replacement projects. No additional funds will be collected under the prior funding method. If the reserves in the account fall below $200,000, agencies will be assessed an amount sufficient to bring the balance back up to $200,000 by the end of the FY. If the reserves are used for an unscheduled project, agencies will be assessed an amount sufficient to reach a $200,000 balance by the end of the following FY. The assessment will be based on the methodology for the list on which the component that was replaced is located. Descriptions of the funds are as follows:

A. <u>Fund 1 - Components that Wear with Flow Rate</u>

Beginning in FY 1999-2000 the payments to this fund will be based upon actual water deliveries on a 10 year running average beginning FY 1990-1991. The annual dollar amount shall be in accordance with the Capital Replacement Plan-List No. 1 Items for that FY.

B. <u>Fund 2 – Components that Experience Wear as a Result of the Treatment of Water but not Correlated to Flowrate</u>

Payments for components in this fund are based upon a two part formula. Half of the payment is based upon the percentage of water used by each Member Agency, using a ten-year running average (starting with FY 1990-91). The remaining half of the payment is based upon percentage entitlement. The payments to the fund will be corrected to actual on an annual basis. The annual dollar amount will be in accordance with the Capital Replacement Plan-List No. 2 Items for that FY.

C. <u>Fund 3 – Components that Experience Wear Totally Independent of Treatment of Water</u>

Annual payments to this fund are based solely upon percent entitlement. The annual dollar amount will be in accordance with the Capital Replacement Plan-List No. 3 Items for that FY.

D. <u>Fund 4 – Components at Each Member Agency's Distribution Pipeline and Turnout System</u>

Annual payments to this fund are based upon the percentages identified in Ordinance 97-05-01 including any additional individual items identified on Capital Replacement Plan-List No. 4. The annual dollar amount will be in accordance with the Capital Replacement Plan-List No. 4 Items.

The Plant Manager shall have the authority to purchase and install replacement components utilizing the appropriate fund. The Capital Replacement Plan shall be used as a guideline to schedule the component replacement process. In accordance with the

WFA purchasing policy, items in excess of $10,000 shall be subject to Board approval except in emergencies.

12. Capital Improvement Costs. Projects that substantially increase the capability or value of the treatment plant shall be referred to as Capital Improvement Projects. Funding for these projects shall be based upon entitlement unless otherwise specified by the Board of Directors. Projects other than the treatment plant or the components identified in 97-05-01 (attached as Exhibit "B") shall be funded in accordance with the 1980 Joint Exercise of Powers Agreement, as amended.

13. Relationship to Other Agreements. To the extent this Ordinance conflicts with any earlier agreements relating to cost allocation, this Ordinance supersedes those agreements and is intended to be fully controlling.

14. Recission. Ordinance 96-09-01 is hereby rescinded.

ADOPTED this 15th day of July, 1999.

Chairman of the
Board of Directors
Water Facilities Authority -
Joint Powers Agency

ATTEST:

Patrick King, Secretary
of the Board of Directors
Water Facilities Authority -
Joint Powers Agency

APPENDIX L

2003 Local Agency Agreement by and between IEUA and the City of Ontario

AMENDMENT NUMBER 1 TO LOCAL AGENCY AGREEMENT

By and Between

INLAND EMPIRE UTILITIES AGENCY

And

CITY OF ONTARIO

THIS AGREEMENT entered into on the 16th day of December 2014, by and among the Inland Empire Utilities Agency ("IEUA"), a municipal water district duly organized and existing under the laws of the State of California, and the City of Ontario, ("Local Agency"), of Ontario, California, encompassing all the terms and conditions in the Local Agency Agreement, shall be amended as follows:

REPLACE EXHIBIT G WITH THE ATTACHED REVISED EXHIBIT G.

When a call is made by MWD, and the safety-net condition of 40,000 AFY of imported water deliveries applies, the Operating parties will make a reduction in the imported water deliveries, based on their pro-rata share of the imported water baseline.

ALL OTHER PROVISIONS OF THIS AGREEMENT REMAIN UNCHANGED.

IN WITNESS WHEREOF, the parties hereby have caused this Amendment to be entered into as of the day and year written below.

INLAND EMPIRE UTILITIES AGENCY:	CITY OF ONTARIO:
P. Joseph Grindstaff General Manager	Al C. Boling City Manager

AMENDMENT NUMBER 1 TO LOCAL AGENCY AGREEMENT

By and Among

INLAND EMPIRE UTILITIES AGENCY, THE CITY OF ONTARIO

And

JURUPA COMMUNITY SERVICES DISTRICT

THIS AGREEMENT entered into on the __________ day of September 2014, by and among the Inland Empire Utilities Agency ("IEUA"), a municipal water district duly organized and existing under the laws of the State of California, and the City of Ontario and Jurupa Community Services District, (the latter two collectively the "Local Agencies"), a General Law City and a Community Services District.

RECITALS

A. Currently, JCSD does not have direct access to imported water and in order for JCSD to comply with the DYY Program, Ontario shall reduce imported water deliveries on behalf of JCSD, up to JCSD's obligation of 2,000 acre-feet, when MWD makes a "call."

B. JCSD is responsible for producing MWD water from storage and delivering to Ontario, up to JCSD's obligation of 2,000 AF when MWD makes a "call."

C. Ontario and JCSD may develop other operating plans for JCSD compliance with the DYY Program, that differ from above, by way of separate agreement.

IN WITNESS WHEREOF, IEUA and the Local Agencies hereby have caused this Amendment to be entered into as of the day and year written above and shall be amended as follows:

REPLACE EXHIBIT G WITH THE ATTACHED REVISED EXHIBIT G.

When a call is made by MWD, and the safety-net condition of 40,000 AFY of imported water deliveries applies, the Operating parties will make a reduction in the imported water deliveries, based on their pro-rata share of the imported water baseline.

ALL OTHER PROVISIONS OF THIS AGREEMENT REMAIN UNCHANGED.

INLAND EMPIRE UTILITIES AGENCY:

P. Joseph Grindstaff
General Manager

CITY OF ONTARIO:

Al C. Boling
City Manager

JURUPA COMMUNITY SERVICES DISTRICT:

Todd Corbin
General Manager

Exhibit G

Chino Basin Conjunctive Use Program (CUP) "Dry Year" Storage Project Performance Criteria

The intent of the below Performance Criteria is to allow Metropolitan to reduce imported water deliveries to the Operating Parties and replace it with stored Chino Basin groundwater, making available additional imported water supply for delivery to other Metropolitan member agencies.

Performance

Metropolitan may, on thirty (30) days' notice, require Program Agency to meet the objectives of the project as follows:

1) During the next 12 month period, IEUA and TVMWD through their agreements with Operating Parties will cause a reduction of imported water deliveries by 33,000 AF (+/- 10 percent), at the service connection, from the Imported Water Baseline.
2) At no time shall a Metropolitan call result in a reduction in imported water deliveries below 40,000 AF. As long as the imported water deliveries by the Operating Parties total less than or equal to 40,000 AF, performance will have been met.
3) If a Metropolitan CUP call is made during implementation of Metropolitan's Water Supply Allocation Plan (WSAP), the amount of the CUP call shall be adjusted for the purposes of the WSAP performance, such that the 40,000 AF performance objective for CUP is met. The Operating Parties will still be expected to comply with all provisions of the WSAP. For purposes of the CUP, the full call amount (without adjustment for WSAP performance) would be deducted from the Storage Account and billed for by Metropolitan.
4) Metropolitan will pay O&M, Power and Treatment credits only on Chino groundwater production over the Chino Groundwater Baseline.
5) Metropolitan will bill for, and the Storage Account will be reduced by 33,000 AF.
6) If Performance Criteria is not met, the Penalty Rate will be applied on any unmet reduction of imported water delivery at the service connection.
7) A partial call will be addressed through a pro rata performance.
8) Any Chino Basin Groundwater produced above the Chino Groundwater Baseline but below the 33,000 AF call amount will be moved to the Operating Parties' supplemental storage accounts.

Chino Groundwater Baseline

For the purposes of Performance, an Operating Party's Chino Groundwater Baseline shall be set at the beginning of the performance period as the lesser of the following:

1) The average physical production adjusted upward for in-lieu CUP storage and downward for CUP extraction certified by Chino Basin Watermaster in the three (3) previous years beginning with the prior fiscal year (i.e. the baseline for a call during fiscal year 2014-15 would average years 2010-11, 2011-12 and 2012-13 and would not include 2013-14) ; or,
2) The average sum of the Operating Safe Yield and Net Ag Re-Allocation pumping rights, as reported in columns titled "Assigned Share of Operating Safe Yield" and "Net Ag Pool Reallocation" of the table titled "Pool 3 Water Production Summary," of the Chino Basin Watermaster Annual Report or Annual Assessment Package, less any rights utilized to meet Chino Basin Desalter replenishment obligations, as shown in the Chino Basin Watermaster Annual Report or Annual Assessment Package, in the three (3) previous years beginning with the prior fiscal year.

Imported Water Baseline

The Imported Baseline shall be equal to the average imported water deliveries in the three (3) previous years beginning with the prior fiscal year. The imported water deliveries in each year is adjusted downward for in-lieu CUP storage and adjusted upward for CUP extraction.

In-Lieu Storage Guidelines
For in-lieu storage, the following criteria shall apply:

1) Certification of in-lieu CUP storage by an Operating Party shall be the lesser of the following:
    a. Decrease in Chino groundwater production relative to the Chino Groundwater Baseline; or
    b. Increase in imported water deliveries to the Operating Parties above the Imported Water Baseline by at least the certified amount. In the event that the increase in imported water deliveries is less than the decrease in Chino Basin groundwater production, the certified amount shall be equal to the increase in imported water deliveries.
2) Participation in in-lieu storage is optional. Therefore, in-lieu storage is based upon individual Operating Party performance.
3) No Operating Party may certify in-lieu storage during any fiscal year in which that Operating Party incurs a replenishment obligation. .

Operating Committee

Baseline Adjustments
The Operating Committee may mutually agree to adjust the Chino Groundwater Baseline or the Imported Water Baseline to account for changed conditions. The Operating Committee may adjust the baselines due to factors such as new production wells, wells taken out of service, planned outages that would significantly affect ability to deliver supplies, significant retail conservation, and/or dramatic increase in local supplies (recycled water, desalted groundwater, etc). Increases or decreases in total demand shall not result in a baseline adjustment unless it can be shown that the change is a result of significant retail conservation. Normal demand variations due to hydrologic or economic factors are not eligible for baseline adjustments. Any request for baseline adjustment must accompany sufficient documentation to allow the Operating Committee to evaluate the request. All baseline adjustment requests must be submitted before the storage/call year with the Annual Operating Plan.

Performance Targets
The Operating Committee may mutually agree to modify performance targets due to severe and unexpected conditions. It should be generally agreed that additional use and production of all local supplies available to the Operating Parties should not be restricted or cause IEUA , TVMWD or the Operating Parties to be out of compliance of a performance target. The Operating Committee may agree to adjust the imported water performance target due to severe and unexpected conditions, such as but not limited to the following:

a. Significant loss in total local supply capacity (groundwater, desalter and recycled); and/or OR
b. Significant increase in total demand.

Any adjustment related to the performance targets does not apply to the requirements for receiving O&M, Power and Treatment credits or the amount deducted from the storage account. The full call amount would be deducted from the storage account and billed by Metropolitan regardless of any performance adjustment. Detailed documentation of the severe and unexpected conditions must be provided to allow the Operating Committee to evaluate the request.

Examples
The following examples demonstrate situations where non-performance penalties may be waived pursuant to Section XIII.B. of the Agreement.

Example 1 - Base Example

Call Amount	33,000 AF
Baseline Service Connection Deliveries	70,000 AF
Call Year Service Connection Deliveries	**40,000 AF**
Reduction at Service Connection	30,000 AF
Baseline Groundwater Production	80,000 AF
Call Year Groundwater Production	95,000 AF
Increase in Groundwater Production	**15,000 AF**

Performance is met because the actual service connection deliveries were equal to 40,000 AF. 33,000 AF is billed for and deducted from account. O&M, Power and Treatment credits are given on 15,000 AF and the remaining 18,000 AF that was paid for, but not pumped, will be moved to the Operating Parties' supplemental storage accounts.

Example 2 – Increase in Local Supply Capacity

Call Amount	33,000 AF
Baseline Service Connection Deliveries (-5,000AF)	65,000 AF
Call Year Service Connection Deliveries	**35,000 AF**
Reduction at Service Connection	30,000 AF
Baseline Groundwater Production (+5,000AF)	85,000 AF
Call Year Groundwater Production	100,000 AF
Increase in Groundwater Production	**15,000 AF**

*In this example, Agency A increases its local supply capacity by expanding a treatment plant by 5,000 AF. This would allow Agency A to increase its production. As a result, the Operating Committee agreed to increase the Baseline Groundwater Production by 5,000 AF and decrease the Imported Water Baseline by 5,000 AF.

Performance is met because the actual service connection deliveries reduction was 30,000 AF. 33,000 AF is billed for and deducted from account. O&M, Power and Treatment credits are given on 15,000 AF and the remaining 18,000 AF that was paid for, but not pumped, will be moved to the Operating Parties' supplemental storage accounts.

Example 3– Reduced Demands (-5,000 AF)

Call Amount	33,000 AF
Baseline Service Connection Deliveries (-3,000 AF)	67,000 AF
Call Year Service Connection Deliveries	**40,000 AF**
Reduction at Service Connection	27,000 AF
Baseline Groundwater Production (-2,000 AF)	78,000 AF
Call Year Groundwater Production	95,000 AF
Increase in Groundwater Production	**17,000 AF**

*In this example, the Operating Committee determined that the installation of ultra-low flow toilets in Agency A's service area would result in a demand reduction of 5,000 AF. This reduction was expected to change both the imported and groundwater baselines. As a result, Agency A's imported water baseline was adjusted down by 3,000 AF and the groundwater baseline was adjusted down by 2,000 AF by the Operating Committee.

Performance is met because the actual service connection deliveries were 40,000 AF. 33,000 AF is billed for and deducted from account. O&M, Power and Treatment credits are given on 17,000 AF and the remaining 16,000 AF that was paid for, but not pumped, will be moved to the Operating Parties' supplemental storage accounts.

Example 4 – Loss of Local Supply with Groundwater Baseline Adjustment of -5,000 AF and Imported Water +5,000 AF*

Call Amount	33,000 AF
Adjusted Baseline Service Connection Deliveries (+5,000 AF)	75,000 AF
Call Year Service Connection Deliveries	**45,000 AF**
Reduction at Service Connection	30,000 AF
Adjusted Baseline Groundwater Production (-5,000 AF)	75,000 AF
Call Year Groundwater Production	90,000 AF
Increase in Groundwater Production	**15,000 AF**

*In this example, Agency A has had six wells go out of service permanently. It will take at least 12 months to drill new wells. As a result of the outage, Agency A's total well capacity has been reduced by 5,000 AF. The Operating Committee agrees to a 5,000 AF baseline reduction on ground water and increase baseline imported water deliveries by 5,000 AF.

Performance is met because the actual service connection deliveries were reduced by 30,000 AF. 33,000 AF is billed for and deducted from account. O&M, Power and Treatment credits are given on 15,000 AF and the remaining 18,000 AF that was paid for, but not pumped, will be moved to the Operating Parties' supplemental storage accounts.

Example 5 – Water Supply Allocation Overlap

Call Amount	33,000 AF
WSAP Level 2	10%
Baseline Service Connection Deliveries	60,000 AF
WSAP Adjusted Baseline Service Connection Deliveries	55,000 AF *
Call Year Service Connection Deliveries	**40,000 AF**
Reduction at Service Connection	15,000 AF
Baseline Groundwater Production	80,000 AF
Call Year Groundwater Production	100,000 AF
Increase in Groundwater Production	**20,000 AF**

**For illustrative purposes only.*
Level 2 WSAP = (Total Demand –Local Supplies) x 90% + Adjustments

Performance is met for CUP because the actual service connection deliveries were equal to 40,000 AF. 33,000 AF is billed for and deducted from account. Power and O&M credits are given on 20,000 AF and the remaining 13,000 AF that was paid for, but not pumped, will be moved to the Operating Parties' supplemental storage accounts. For the WSAP, it is assumed that the adjusted call amount is 15,000 AF.

Example 6 – 10 Percent Performance Range

Call amount	33,000 AF
Baseline Service Connection Deliveries	80,000 AF
Call Year Service Connection Deliveries	**50,000 AF**
Reduction at Service Connection	30,000 AF
Baseline Groundwater Production	80,000 AF
Call Year Groundwater Production	100,000 AF
Increase in Groundwater Production	**20,000 AF**

Performance is met because the Operating Parties reduced service connection deliveries by 30,000 AF, which is within +/- 10 percent of 33,000. 33,000 AF is billed for and deducted from account. O&M, Power and Treatment credits are given on 20,000 AF and the remaining 13,000 AF that was paid for, but not pumped, will be moved to the Operating Parties' supplemental storage accounts.

Example 7 – Non-Performance

Call amount	33,000 AF
Baseline Service Connection Deliveries	60,000 AF
Call Year Service Connection Deliveries	**45,000 AF**
Reduction at Service Connection	15,000 AF
Baseline Groundwater Production	80,000 AF
Call Year Groundwater Production	95,000 AF
Increase in Groundwater Production	**15,000 AF**

Performance is **not** met. The actual service connection deliveries are greater than 40,000 and the reduction in service connection deliveries are less than 33,000 +/- 10 percent. 33,000 AF is billed for and deducted from account. O&M, Power and Treatment credits are given on 15,000 AF and the remaining 18,000 AF that was paid for, but not pumped, will be moved to the Operating Parties' supplemental storage accounts. 5,000 AF is billed at the Penalty Rate of 2x Tier 2.

Example 8 – "Agency A" In-lieu Storage

Baseline Service Connection Deliveries	15,000 AF
Storage Year Service Connection Deliveries	20,000 AF
Increase at Service Connection	**5,000 AF**
Baseline Groundwater Production	20,000 AF
Storage Year Groundwater Production	10,000 AF
Decrease in Groundwater Production	10,000 AF

In this example, "Agency A" would be eligible for 5,000 AF of in-lieu storage. The increase in service connection deliveries (5,000 AF) are less than the decrease in groundwater production (10,000 AF).

Exhibit G

Chino Basin Conjunctive Use "Dry Year" Storage Project Performance Criteria

Metropolitan may, on fifteen (15) days notice, require Program Agency to meet the objectives of the project as follows:

1) IEUA and TVMWD agree to reduce imported water deliveries by approximately 33,000 AF from the preceding 12 month period during the next 12 month period; and
2) IEUA, TVMWD and Chino Basin Watermaster through their agreements with Operating Parties will cause to be pumped during the next 12 months 33,000 AF from the Metropolitan Storage Account; and
3) Chino Basin pumping by the Operating Parties in the Dry Year program within the Chino Basin appropriative pool will increase over the previous year by 33,000 AF.

All three performance targets do not need to be met precisely (+ or – 10 percent.) As an example, IEUA and TVMWD would meet the objectives of the program if all three of the following occurred:

30,000 AF	Reduced imported full service deliveries when compared to the preceding 12 months.
31,000 AF	Pump from Metropolitan Storage Account.
34,000 AF	Increase pumping by Operating Parties, when compared to the preceding year.

However, the Operating Committee may mutually agree that performance targets are met even though a performance target is not met(a scenario when retail conservation were to exceed 15 – 25 percent or if other local supplies were developed, e.g., dramatic increase in recycled water use, may reduce the opportunity for the retail agencies to pump 33,000 AF from the Metropolitan Storage Account.) In this case, the Operating Committee would need to agree on the variance procedures for accepting a modified performance target after the episode. It should be generally agreed that additional use and production of all local supplies native to the Chino Basin area should not be restricted or cause IEUA, TVMWD or Chino Basin Watermaster (or the Operating Parties) to be out of compliance of the performance target. It should also be agreed that if IEUA and TVMWD retailers demand firm water from Metropolitan over the twelve month period, the pumped water would come from the Metropolitan Storage Account up to 33,000AF.

The objective of the program is to provide 33,000 acre-feet of additional pumping capacity in the Chino Basin for dry year use, to allow Metropolitan, IEUA and TVMWD the flexibility to utilize the Facilities in the most efficient manner possible (including normal year and wet years) and to ensure that upon a call of Metropolitan's stored water, Facilities will be used to provide an additional supply of water to meet IEUA's and TVMWD's needs. A partial call will be addressed through a pro rata performance of all three objectives .

APPENDIX M

Chino Basin 1978 Judgment and amendments thereto.

JUDGMENT
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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

CHINO BASIN MUNICIPAL WATER DISTRICT, Plaintiff, v. CITY OF CHINO, et al. Defendants.	)	No. 164327 JUDGMENT

I. INTRODUCTION

1. Pleadings, Parties and Jurisdiction. The complaint herein was filed on January 2, 1975, seeking an adjudication of water rights, injunctive relief and the imposition of a physical solution. A first amended complaint was filed on July 16, 1976. The defaults of certain defendants have been entered, and certain other defendants dismissed. Other than defendants who have been dismissed or whose defaults have been entered, all defendants have appeared herein. By answers and order of this Court, the issues have been made those of a full *inter se* adjudication between the

parties. This Court has jurisdiction of the subject matter of this action and of the parties herein.

2. Stipulation For Judgment. Stipulation for entry of judgment has been filed by and on behalf of a majority of the parties, representing a majority of the quantitative rights herein adjudicated.

3. Trial; Findings and Conclusions. Trial was commenced on December 16, 1977, as to the non-stipulating parties, and findings of fact and conclusions of law have been entered disposing of the issues in the case.

4. Definitions. As used in this Judgment, the following terms shall have the meanings herein set forth:

(a) Active Parties. All parties other than those who have filed with Watermaster a written waiver of service of notices, pursuant to Paragraph 58.

(b) Annual or Year -- A fiscal year, July 1 through June 30, following, unless the context shall clearly indicate a contrary meaning.

(c) Appropriative Right -- The annual production right of a producer from the Chino Basin other than pursuant to an overlying right.

(d) Basin Water -- Ground water within Chino Basin which is part of the Safe Yield, Operating Safe Yield, or replenishment water in the Basin as a result of operations under the Physical Solution decreed herein. Said term does not include Stored Water.

(e) CBMWD -- Plaintiff Chino Basin Municipal Water District.

(f) Chino Basin or Basin -- The ground water basin underlying the area shown as such on Exhibit "B" and within the boundaries described in Exhibit "K".

(g) Chino Basin Watershed -- The surface drainage area tributary to and overlying Chino Basin.

(h) Ground Water -- Water beneath the surface of the ground and within the zone of saturation, i.e., below the existing water table.

(i) Ground Water Basin -- An area underlain by one or more permeable formations capable of furnishing substantial water storage.

(j) Minimal Producer -- Any producer whose production does not exceed five acre-feet per year.

(k) MWD -- The Metropolitan Water District of Southern California.

(l) Operating Safe Yield -- The annual amount of ground water which Watermaster shall determine, pursuant to criteria specified in Exhibit "I", can be produced from Chino Basin by the Appropriative Pool parties free of replenishment obligation under the Physical Solution herein.

(m) Overdraft -- A condition wherein the total annual production from the Basin exceeds the Safe Yield thereof.

(n) Overlying Right -- The appurtenant right of an owner of lands overlying Chino Basin to produce water from the Basin for overlying beneficial use on such lands.

(o) Person. Any individual, partnership, association, corporation, governmental entity or agency, or other organization.

(p) PVMWD -- Defendant Pomona Valley Municipal Water District.

(q) Produce or Produced -- To pump or extract ground water from Chino Basin.

(r) Producer -- Any person who produces water from Chino Basin.

(s) Production -- Annual quantity, stated in acre feet, of water produced.

(t) Public Hearing -- A hearing after notice to all parties and to any other person legally entitled to notice.

(u) Reclaimed Water -- Water which, as a result of processing of waste water, is suitable for a controlled use.

(v) Replenishment Water -- Supplemental water used to recharge the Basin pursuant to the Physical Solution, either directly by percolating the water into the Basin or indirectly by delivering the water for use in lieu of production and use of safe yield or Operating Safe Yield.

(w) Responsible Party -- The owner, co-owner, lessee or other person designated by multiple parties interested in a well as the person responsible for purposes of filing reports hereunder.

(x) Safe Yield -- The long-term average annual quantity of ground water (excluding replenishment or stored water but including return flow to the Basin from use of replenishment or stored water) which can be produced from the Basin under cultural conditions of a particular year without causing an undesirable result.

(y) SBVMWD -- San Bernardino Valley Municipal Water

District.

(z) State Water -- Supplemental Water imported through the State Water Resources Development System, pursuant to Chapter 8, Division 6, Part 6 of the Water Code.

(aa) Stored Water -- Supplemental water held in storage, as a result of direct spreading, in lieu delivery, or otherwise, for subsequent withdrawal and use pursuant to agreement with Watermaster.

(bb) Supplemental Water -- Includes both water imported to Chino Basin from outside Chino Basin Watershed, and reclaimed water.

(cc) WMWD --Defendant Western Municipal Water District of Riverside County.

5. List of Exhibits. The following exhibits are attached to this Judgment and made a part hereof:

"A" -- "Location Map of Chino Basin" showing boundaries of Chino Basin Municipal Water District, and other geographic and political features.

"B" -- "Hydrologic Map of Chino Basin" showing hydrologic features of Chino Basin.

"C" -- Table Showing Parties in Overlying (Agricultural) Pool.

"D" -- Table Showing Parties in Overlying (Non-agricultural Pool and Their Rights.

"E" -- Table Showing Appropriators and Their Rights.

"F" -- Overlying (Agricultural) Pool Pooling Plan.

"G" -- Overlying (Non-agricultural) Pool Pooling Plan.

"H" -- Appropriative Pool Pooling Plan.

"I" -- Engineering Appendix.

"J" -- Map of In Lieu Area No. 1.

"K" -- Legal Description of Chino Basin.

II. DECLARATION OF RIGHTS

A. HYDROLOGY

6. Safe Yield. The Safe Yield of Chino Basin is 140,000 acre feet per year.

7. Overdraft and Prescriptive Circumstances. In each year for a period in excess of five years prior to filing of the First Amended Complaint herein, the Safe Yield of the Basin has been exceeded by the annual production therefrom, and Chino Basin is and has been for more than five years in a continuous state of over-draft. The production constituting said overdraft has been open, notorious, continuous, adverse, hostile and under claim of right. The circumstances of said overdraft have given notice to all parties of the adverse nature of such aggregate over-production.

B. WATER RIGHTS IN SAFE YIELD

8. Overlying Rights. The parties listed in Exhibits "C" and "D" are the owners or in possession of lands which overlie Chino Basin. As such, said parties have exercised overlying water rights in Chino Basin. All overlying rights owned or exercised by parties listed in Exhibits "C" and "D" have, in the aggregate, been limited by prescription except to the extent such rights have been preserved by self-help by said parties. Aggregate preserved overlying rights in the Safe Yield for agricultural pool use, including the rights of the State of California, total 82,800 acre feet per year. Overlying rights for non-agricultural pool use

total 7,366 acre feet per year and are individually decreed for each affected party in Exhibit "D". No portion of the Safe Yield of Chino Basin exists to satisfy unexercised overlying rights, and such rights have all been lost by prescription. However, uses may be made of Basin Water on overlying lands which have no preserved overlying rights pursuant to the Physical Solution herein. All overlying rights are appurtenant to the land and cannot be assigned or conveyed separate or apart therefrom.

9. Appropriative Rights. The parties listed in Exhibit "E" are the owners of appropriative rights, including rights by prescription, in the unadjusted amounts therein set forth, and by reason thereof are entitled under the Physical Solution to share in the remaining Safe Yield, after satisfaction of overlying rights and rights of the State of California, and in the Operating Safe Yield in Chino Basin, in the annual shares set forth in Exhibit "E".

(a) Loss of Priorities. By reason of the long continued overdraft in Chino Basin, and in light of the complexity of determining appropriative priorities and the need for conserving and making maximum beneficial use of the water resources of the State, each and all of the parties listed in Exhibit "E" are estopped and barred from asserting special priorities or preferences, *inter se*. All of said appropriative rights are accordingly deemed and considered of equal priority.

(b) Nature and Quantity. All rights listed in Exhibit "E" are appropriative and prescriptive in nature. By reason of the status of the parties, and the provisions of Section

storage capacity of Chino Basin for storage of supplemental water; provided that no such use shall be made except pursuant to written agreement with Watermaster, as authorized by Paragraph 28. In the allocation of such storage capacity, the needs and requirements of lands overlying Chino Basin and the owners of rights in the Safe Yield or Operating Safe Yield of the Basin shall have priority and preference over storage for export.

III. INJUNCTION

13. Injunction Against Unauthorized Production of Basin Water. Each party in each of the respective pools is enjoined, as follows:

(a) Overlying (Agricultural) Pool. Each party in the Overlying (Agricultural) Pool, its officers, agents, employees, successors and assigns, is and they each are ENJOINED AND RESTRAINED from producing ground water from Chino Basin in any year hereafter in excess of such party's correlative share of the aggregate of 82,800 acre feet allocated to said Pool, except pursuant to the Physical Solution or a storage water agreement.

(b) Overlying (Non-Agricultural) Pool. Each party in the Overlying (Non-agricultural) Pool, its officers, agents, employees, successors and assigns, is and they each are ENJOINED AND RESTRAINED from producing ground water of Chino Basin in any year hereafter in excess of such party's decreed rights in the Safe Yield, except pursuant to the provisions of the Physical Solution or a storage water agreement.

(c) Appropriative Pool. Each party in the

Appropriative Pool, its officers, agents, employees, successors and assigns, is and they are each ENJOINED AND RESTRAINED from producing ground water of Chino Basin in any year hereafter in excess of such party's decreed share of Operating Safe Yield, except pursuant to the provisions of the Physical Solution or a storage water agreement.

14. Injunction Against Unauthorized Storage or Withdrawal of Stored Water. Each party, its officers, agents, employees, successors and assigns is and they each are ENJOINED AND RESTRAINED from storing supplemental water in Chino Basin for withdrawal, or causing withdrawal of, water stored by that party, except pursuant to the terms of a written agreement with Watermaster and in accordance with Watermaster regulations. Any supplemental water stored or recharged in the Basin, except pursuant to such a Watermaster agreement, shall be deemed abandoned and not classified as Stored Water. This paragraph has no application, as such, to supplemental water spread or provided in lieu by Watermaster pursuant to the Physical Solution.

IV. CONTINUING JURISDICTION

15. Continuing Jurisdiction. Full jurisdiction, power and authority are retained and reserved to the Court as to all matters contained in this judgment, except:

(a) The redetermination of Safe Yield, as set forth in Paragraph 6, during the first ten (10) years of operation of the Physical Solution;

(b) The allocation of Safe Yield as between the several pools as set forth in Paragraph 44 of the Physical Solution;

at least 30 days' notice thereof, and after hearing thereon, to make such further or supplemental orders or directions as may be necessary or appropriate for interpretation, enforcement or carrying out of this Judgment, and to modify, amend or amplify any of the provisions of this Judgment.

V. WATERMASTER

A. APPOINTMENT

16. Watermaster Appointment. CBMWD, acting by and through a majority of its board of directors, is hereby appointed Watermaster, to administer and enforce the provisions of this Judgment and any subsequent instructions or orders of the Court hereunder. The term of appointment of Watermaster shall be for five (5) years. The Court will by subsequent orders provide for successive terms or for a successor Watermaster. Watermaster may be changed at any time by subsequent order of the Court, on its own motion, or on the motion of any party after notice and hearing. Unless there are compelling reasons to the contrary, the Court shall act in conformance with a motion requesting the Watermaster be changed if such motion is supported by a majority of the voting power of the Advisory Committee.

B. POWERS AND DUTIES

17. Powers and Duties. Subject to the continuing supervision and control of the Court, Watermaster shall have and may exercise the express powers, and shall perform the duties, as provided in this Judgment or hereafter ordered or authorized by the Court in the exercise of the Court's continuing jurisdiction.

18. Rules and Regulations. Upon recommendation by the

Advisory Committee, Watermaster shall make and adopt, after public hearing, appropriate rules and regulations for conduct of Watermaster affairs, including meeting schedules and procedures, and compensation of members of Watermaster at not to exceed $25 per member per meeting, or $300 per member per year, whichever is less, plus reasonable expenses related to activities within the Basin. Thereafter, Watermaster may amend said rules from time to time upon recommendation, or with approval of the Advisory Committee after hearing noticed to all active parties. A copy of said rules and regulations, and of any amendments thereof, shall be mailed to each active party.

19. Acquisition of Facilities. Watermaster may purchase, lease, acquire and hold all necessary facilities and equipment; provided, that it is not the intent of the Court that Watermaster acquire any interest in real property or substantial capital assets.

20. Employment of Experts and Agents. Watermaster may employ or retain such administrative, engineering, geologic, accounting, legal or other specialized personnel and consultants as may be deemed appropriate in the carrying out of its powers and shall require appropriate bonds from all officers and employees handling Watermaster funds. Watermaster shall maintain records for purposes of allocation of costs of such services as well as of all other expenses of Watermaster administration as between the several pools established by the Physical Solution.

21. Measuring Devices. Watermaster shall cause parties, pursuant to uniform rules, to install and maintain in good operating condition, at the cost of each party, such necessary measuring

devices or meters as Watermaster may deem appropriate. Such measuring devices shall be inspected and tested as deemed necessary by Watermaster, and the cost thereof shall constitute an expense of Watermaster.

22. Assessments. Watermaster is empowered to levy and collect all assessments provided for in the pooling plans and Physical Solution.

23. Investment of Funds. Watermaster may hold and invest any and all Watermaster funds in investments authorized from time to time for public agencies of the State of California.

24. Borrowing. Watermaster may borrow from time to time amounts not exceeding the annual anticipated receipts of Watermaster during such year.

25. Contracts. Watermaster may enter into contracts for the performance of any powers herein granted; provided, however, that Watermaster may not contract with or purchase materials, supplies or services from CBMWD, except upon the prior recommendation and approval of the Advisory Committee and pursuant to written order of the Court.

26. Cooperation With Other Agencies. Subject to prior recommendation or approval of the Advisory Committee, Watermaster may act jointly or cooperate with agencies of the United States and the State of California or any political subdivisions, municipalities or districts or any person to the end that the purpose of the Physical Solution may be fully and economically carried out.

27. Studies. Watermaster may, with concurrence of the Advisory Committee or affected Pool Committee and in accordance with Paragraph 54 (b), undertake relevant studies of hydrologic

conditions, both quantitative and qualitative, and operating aspects of implementation of the management program for Chino Basin.

28. Ground Water Storage Agreements. Watermaster shall adopt, with the approval of the Advisory Committee, uniformly applicable rules and a standard form of agreement for storage of supplemental water, pursuant to criteria therefore set forth in Exhibit "I". Upon appropriate application by any person, Watermaster shall enter into such a storage agreement; provided that all such storage agreements shall first be approved by written order of the Court, and shall by their terms preclude operations which will have a substantial adverse impact on other producers.

29. Accounting for Stored Water. Watermaster shall calculate additions, extractions and losses and maintain an annual account of all Stored Water in Chino Basin, and any losses of water supplies or Safe Yield of Chino Basin resulting from such Stored Water.

30. Annual Administrative Budget. Watermaster shall submit to Advisory Committee an administrative budget and recommendation for each fiscal year on or before March 1. The Advisory Committee shall review and submit said budget and their recommendations to Watermaster on or before April 1, following. Watermaster shall hold a public hearing on said budget at its April quarterly meeting and adopt the annual administrative budget which shall include the administrative items for each pool committee. The administrative budget shall set forth budgeted items in sufficient detail as necessary to make a proper allocation of the expense among the several pools, together with Watermaster's proposed allocation. The budget shall contain such additional comparative information

or explanation as the Advisory Committee may recommend from time to time. Expenditures within budgeted items may thereafter be made by Watermaster in the exercise of powers herein granted, as a matter of course. Any budget transfer in excess of 20% of a budget category during any budget year or modification of such administrative budget during any year shall be first submitted to the Advisory Committee for review and recommendation.

31. Review Procedures. All actions, decisions or rules of Watermaster shall be subject to review by the Court on its own motion or on timely motion by any party, the Watermaster (in the case of a mandated action), the Advisory Committee, or any Pool Committee, as follows:

(a) Effective Date of Watermaster Action. Any action, decision or rule of Watermaster shall be deemed to have occurred or been enacted on the date on which written notice thereof is mailed. Mailing of copies of approved Watermaster minutes to the active parties shall constitute such notice to all parties.

(b) Noticed Motion. Any party, the Watermaster (as to any mandated action), the Advisory Committee, or any Pool Committee may, by a regularly noticed motion, apply to the Court for review of any Watermaster's action, decision or rule. Notice of such motion shall be served personally or mailed to Watermaster and to all active parties. Unless otherwise ordered by the Court, such motion shall not operate to stay the effect of such Watermaster action, decision or rule.

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(c) Time for Motion. Notice of motion to review any Watermaster action, decision or rule shall be served and filed within ninety (90) days after such Watermaster action, decision or rule, except for budget actions, in which event said notice period shall be sixty (60) days.

(d) De Novo Nature of Proceedings. Upon the filing of any such motion, the Court shall require the moving party to notify the active parties, the Watermaster, the Advisory Committee, and each Pool Committee, of a date for taking evidence and argument, and on the date so designated shall review *de novo* the question at issue. Watermaster's findings or decision, if any, may be received in evidence at said hearing, but shall not constitute presumptive or prima facie proof of any fact in issue.

(e) Decision. The decision of the Court in such proceeding shall be an appealable supplemental order in this case. When the same is final, it shall be binding upon the Watermaster and all parties.

C. ADVISORY AND POOL COMMITTEES

32. Authorization. Watermaster is authorized and directed to cause committees of producer representatives to be organized to act as Pool Committees for each of the several pools created under the Physical Solution. Said Pool Committees shall, in turn, jointly form an Advisory Committee to assist Watermaster in performance of its functions under this judgment. Pool Committees shall be composed as specified in the respective pooling plans, and the Advisory Committee shall be composed of not to exceed ten (10) voting representatives from each pool, as designated by the

respective Pool Committee. WMWD, PVMWD and SBVMWD shall each be entitled to one non-voting representative on said Advisory Committee.

33. Term and Vacancies. Members of any Pool Committee, shall serve for the term, and vacancies shall be filled, as specified in the respective pooling plan. Members of the Advisory Committee shall serve at the will of their respective Pool Committee.

34. Voting Power. The voting power on each Pool Committee shall be allocated as provided in the respective pooling plan. The voting power on the Advisory Committee shall be one hundred (100) votes allocated among the three pools in proportion to the total assessments paid to Watermaster during the preceding year; provided, that the minimum voting power of each pool shall be

(a)	Overlying (Agricultural) Pool	20,
(b)	Overlying (Non-agricultural) Pool	5, and
(c)	Appropriative Pool	20.

In the event any pool is reduced to its said minimum vote, the remaining votes shall be allocated between the remaining pools on said basis of assessments paid to Watermaster by each such remaining pool during the preceding year. The method of exercise of each pool's voting power on the Advisory Committee shall be as determined by the respective pool committees.

35. Quorum. A majority of the voting power of the Advisory Committee or any Pool Committee shall constitute a quorum for the transaction of affairs of such Advisory or Pool Committee; provided, that at least one representative of each Pool Committee shall be required to constitute a quorum of the Advisory Committee. No Pool Committee representative may purposely absent himself or

herself, without good cause, from an Advisory Committee meeting to deprive it of a quorum. Action by affirmative vote of a majority of the entire voting power of any Pool Committee or the Advisory Committee shall constitute action by such committee. Any action or recommendation of a Pool Committee or the Advisory Committee shall be transmitted to Watermaster in writing, together with a report of any dissenting vote or opinion.

36. Compensation. Pool or Advisory Committee members may receive compensation, to be established by the respective pooling plan, but not to exceed twenty-five dollars ($25.00) for each meeting of such Pool or Advisory Committee attended, and provided that no member of a Pool or Advisory Committee shall receive compensation of more than three hundred ($300.00) dollars for service on any such committee during any one year. All such compensation shall be a part of Watermaster administrative expense. No member of any Pool or Advisory Committee shall be employed by Watermaster or compensated by Watermaster for professional or other services rendered to such Pool or Advisory Committee or to Watermaster, other than the fee for attendance at meetings herein provided, plus reimbursement of reasonable expenses related to activities within the Basin.

37. Organization.

(a) Organizational Meeting. At its first meeting in each year, each Pool Committee and the Advisory Committee shall elect a chairperson and a vice chairperson from its membership. It shall also select a secretary, a treasurer and such assistant secretaries and treasurers as may be appropriate, any of whom may, but need not, be members of

such Pool or Advisory Committee.

(b) Regular Meetings. All Pool Committees and the Advisory Committee shall hold regular meetings at a place and time to be specified in the rules to be adopted by each Pool and Advisory Committee. Notice of regular meetings of any Pool or Advisory Committee, and of any change in time or place thereof, shall be mailed to all active parties in said pool or pools.

(c) Special Meetings. Special meetings of any Pool or Advisory Committee may be called at any time by the Chairperson or by any three (3) members of such Pool or Advisory Committee by delivering notice personally or by mail to each member of such Pool or Advisory Committee and to each active party at least 24 hours before the time of each such meeting in the case of personal delivery, and 96 hours in the case of mail. The calling notice shall specify the time and place of the special meeting and the business to be transacted. No other business shall be considered at such meeting.

(d) Minutes. Minutes of all Pool Committee, Advisory Committee and Watermaster meetings shall be kept at Watermaster's offices. Copies thereof shall be mailed or otherwise furnished to all active parties in the pool or pools concerned. Said copies of minutes shall constitute notice of any Pool or Advisory Committee action therein reported, and shall be available for inspection by any party.

(e) Adjournments. Any meeting of any Pool or Advisory Committee may be adjourned to a time and place specified in the order of adjournment. Less than a quorum may so adjourn from time to time. A copy of the order or notice of adjournment shall be conspicuously posted forthwith on or near the door of the place where the meeting was held.

38. Powers and Functions. The powers and functions of the respective Pool Committees and the Advisory Committee shall be as follows:

(a) Pool Committees. Each Pool Committee shall have the power and responsibility for developing policy recommendations for administration of its particular pool, as created under the Physical Solution. All actions and recommendations of any Pool Committee which require Watermaster implementation shall first be noticed to the other two pools. If no objection is received in writing within thirty (30) days, such action or recommendation shall be transmitted directly to Watermaster for action. If any such objection is received, such action or recommendation shall be reported to the Advisory Committee before being transmitted to Watermaster.

(b) Advisory Committee. The Advisory Committee shall have the duty to study, and the power to recommend, review and act upon all discretionary determinations made or to be made hereunder by Watermaster.

[1] Committee Initiative. When any recommendation or advice of the Advisory Committee is received by Watermaster, action consistent therewith may be taken by Watermaster; provided, that any recommendation approved by 80 votes or more in the Advisory Committee shall constitute a mandate for action by Watermaster consistent therewith. If Watermaster is unwilling or unable to act

pursuant to recommendation or advice from the Advisory Committee (other than such mandatory recommendations), Watermaster shall hold a public hearing, which shall be followed by written findings and decision. Thereafter, Watermaster may act in accordance with said decision, whether consistent with or contrary to said Advisory Committee recommendation. Such action shall be subject to review by the Court, as in the case of all other Watermaster determinations.

[2]. Committee Review. In the event Watermaster proposes to take discretionary action, other than approval or disapproval of a Pool Committee action or recommendation properly transmitted, or execute any agreement not theretofore within the scope of an Advisory Committee recommendation, notice of such intended action shall be served on the Advisory Committee and its members at least thirty (30) days before the Watermaster meeting at which such action is finally authorized.

(c) Review of Watermaster Actions. Watermaster (as to mandated action), the Advisory Committee or any Pool Committee shall be entitled to employ counsel and expert assistance in the event Watermaster or such Pool or Advisory Committee seeks Court review of any Watermaster action or failure to act. The cost of such counsel and expert assistance shall be Watermaster expense to be allocated to the affected pool or pools.

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VI. PHYSICAL SOLUTION

A. GENERAL

39. Purpose and Objective. Pursuant to the mandate of Section 2 of Article X of the California Constitution, the Court hereby adopts and orders the parties to comply with a Physical Solution. The purpose of these provisions is to establish a legal and practical means for making the maximum reasonable beneficial use of the waters of Chino Basin by providing the optimum economic, long-term, conjunctive utilization of surface waters, ground waters and supplemental water, to meet the requirements of water users having rights in or dependent upon Chino Basin.

40. Need for Flexibility. It is essential that this Physical solution provide maximum flexibility and adaptability in order that Watermaster and the Court may be free to use existing and future technological, social, institutional and economic options, in order to maximize beneficial use of the waters of Chino Basin. To that end, the Court's retained jurisdiction will be utilized, where appropriate, to supplement the discretion herein granted to the Watermaster.

41. Watermaster Control. Watermaster, with the advice of the Advisory and Pool Committees, is granted discretionary powers in order to develop an optimum basin management program for Chino Basin, including both water quantity and quality considerations. Withdrawals and supplemental water replenishment of Basin Water, and the full utilization of the water resources of Chino Basin, must be subject to procedures established by and administered through Watermaster with the advice and assistance of the Advisory and Pool Committees composed of the affected producers. Both the

quantity and quality of said water resources may thereby be preserved and the beneficial utilization of the Basin maximized.

42. General Pattern of Operations. It is contemplated that the rights herein decreed will be divided into three (3) operating pools for purposes of Watermaster administration. A fundamental premise of the Physical Solution is that all water users dependent upon Chino Basin will be allowed to pump sufficient waters from the Basin to meet their requirements. To the extent that pumping exceeds the share of the Safe Yield assigned to the Overlying Pools, or the Operating Safe Yield in the case of the Appropriative Pool, each pool will provide funds to enable Watermaster to replace such overproduction. The method of assessment in each pool shall be as set forth in the applicable pooling plan.

B. POOLING

43. Multiple Pools Established. There are hereby established three (3) pools for Watermaster administration of, and for the allocation of responsibility for, and payment of, costs of replenishment water and other aspects of this Physical Solution.

(a) Overlying (Agricultural) Pool. The first pool shall consist of the State of California and all overlying producers who produce water for other than industrial or commercial purposes. The initial members of the pool are listed in Exhibit "C".

(b) Overlying (Non-agricultural) Pool. The second pool shall consist of overlying producers who produce water for industrial or commercial purposes. The initial members of this pool are listed in Exhibit "D".

(c) Appropriative Pool. A third and separate pool shall

consist of owners of appropriative rights. The initial members of the pool are listed in Exhibit "E".

Any party who changes the character of his use may, by subsequent order of the Court, be reassigned to the proper pool; but the allocation of Safe Yield under Paragraph 44 hereof shall not be changed. Any non-party producer or any person who may hereafter commence production of water from Chino Basin, and who may become a party to this physical solution by intervention, shall be assigned to the proper pool by the order of the Court authorizing such intervention.

44. Determination and Allocation of Rights to Safe Yield of Chino Basin. The declared Safe Yield of Chino Basin is hereby allocated as follows:

Pool	Allocation
Overlying (Agricultural) Pool	414,000 acre feet in any five (5) consecutive years.
Overlying (Non-agricultural) Pool.	7,366 acre feet per year.
Appropriative Pool	49,834 acre feet per year.

The foregoing acre foot allocations to the overlying pools are fixed. Any subsequent change in the Safe Yield shall be debited or credited to the Appropriative Pool. Basin Water available to the Appropriative Pool without replenishment obligation may vary from year to year as the Operating Safe Yield is determined by Watermaster pursuant to the criteria set forth in Exhibit "I".

45. Annual Replenishment. Watermaster shall levy and collect assessments in each year, pursuant to the respective pooling plans, in amounts sufficient to purchase replenishment water to replace production by any pool during the preceding year which exceeds that

pool's allocated share of Safe Yield in the case of the overlying pools, or Operating Safe Yield in the case of the Appropriative Pool. It is anticipated that supplemental water for replenishment of Chino Basin may be available at different rates to the various pools to meet their replenishment obligations. If such is the case, each pool will be assessed only that amount necessary for the cost of replenishment water to that pool, at the rate available to the pool, to meet its replenishment obligation.

46. Initial Pooling Plans. The initial pooling plans, which are hereby adopted, are set forth in Exhibits "F", "G" and "H", respectively. Unless and until modified by amendment of the judgment pursuant to the Court's continuing jurisdiction, each such plan shall control operation of the subject pool.

C. REPORTS AND ACCOUNTING

47. Production Reports. Each party or responsible party shall file periodically with Watermaster, pursuant to Watermaster rules, a report on a form to be prescribed by Watermaster showing the total production of such party during the preceding reportage period, and such additional information as Watermaster may require, including any information specified by the affected Pool Committee.

48. Watermaster Report and Accounting. Watermaster's annual report, which shall be filed on or before November 15 of each year and shall apply to the preceding year's operation, shall contain details as to operation of each of the pools and a certified audit of all assessments and expenditures pursuant to this Physical Solution and a review of Watermaster activities.

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D. REPLENISHMENT

49. Sources of Supplemental Water. Supplemental water may be obtained by Watermaster from any available source. Watermaster shall seek to obtain the best available quality of supplemental water at the most reasonable cost for recharge in the Basin. To the extent that costs of replenishment water may vary between pools, each pool shall be liable only for the costs attributable to its required replenishment. Available sources may include, but are not limited to:

(a) Reclaimed Water. There exist a series of agreements generally denominated the Regional Waste Water Agreements between CBMWD and owners of the major municipal sewer systems within the basin. Under those agreements, which are recognized hereby but shall be unaffected and unimpaired by this judgment, substantial quantities of reclaimed water may be made available for replenishment purposes. There are additional sources of reclaimed water which are, or may become, available to Watermaster for said purposes. Maximum beneficial use of reclaimed water shall be given high priority by Watermaster.

(b) State Water. State water constitutes a major available supply of supplemental water. In the case of State Water, Watermaster purchases shall comply with the water service provisions of the State's water service contracts. More specifically, Watermaster shall purchase State Water from MWD for replenishment of excess production within CBMWD, WMWD and PVMWD, and from SBVMWD to replenish excess production within SBVMWD's boundaries in Chino Basin, except to the

extent that MWD and SBVMWD give their consent as required by such State water service contracts.

(c) Local Import. There exists facilities and methods for importation of surface and ground water supplies from adjacent basins and watersheds.

(d) Colorado River Supplies. MWD has water supplies available from its Colorado River Aqueduct.

50. Methods of Replenishment. Watermaster may accomplish replenishment of overproduction from the Basin by any reasonable method, including:

(a) Spreading and percolation or Injection of water in existing or new facilities, subject to the provisions of Paragraphs 19, 25 and 26 hereof.

(b) In Lieu Procedures. Watermaster may make, or cause to be made, deliveries of water for direct surface use, in lieu of ground water production.

E. REVENUES

51. Production Assessment. Production assessments, on whatever basis, may be levied by Watermaster pursuant to the pooling plan adopted for the applicable pool.

52. Minimal Producers. Minimal Producers shall be exempted from payment of production assessments, upon filing of production reports as provided in Paragraph 47 of this Judgment, and payment of an annual five dollar ($5.00) administrative fee as specified by Watermaster rules.

53. Assessment Proceeds -- Purposes. Watermaster shall have the power to levy assessments against the parties (other than minimal pumpers) based upon production during the preceding period

of assessable production, whether quarterly, semi-annually or annually, as may be determined most practical by Watermaster or the affected Pool Committee.

54. Administrative Expenses. The expenses of administration of this Physical Solution shall be categorized as either (a) general Watermaster administrative expense, or (b) special project expense.

(a) General Watermaster Administrative Expense shall include office rental, general personnel expense, supplies and office equipment, and related incidental expense and general overhead.

(b) Special Project Expense shall consist of special engineering, economic or other studies, litigation expense, meter testing or other major operating expenses. Each such project shall be assigned a Task Order number and shall be separately budgeted and accounted for.

General Watermaster administrative expense shall be allocated and assessed against the respective pools based upon allocations made by the Watermaster, who shall make such allocations based upon generally accepted cost accounting methods. Special Project Expense shall be allocated to a specific pool, or any portion there of, only upon the basis of prior express assent and finding of benefit by the Pool Committee, or pursuant to written order of the Court.

55. Assessments -- Procedure. Assessments herein provided for shall be levied and collected as follows:

(a) Notice of Assessment. Watermaster shall give written notice of all applicable assessments to each party on

or before ninety (90) days after the end of the production period to which such assessment is applicable.

(b) Payment. Each assessment shall be payable on or before thirty (30) days after notice, and shall be the obligation of the party or successor owning the water production facility at the time written notice of assessment is given, unless prior arrangement for payment by others has been made in writing and filed with Watermaster.

(c) Delinquency. Any delinquent assessment shall bear interest at 10% per annum (or such greater rate as shall equal the average current cost of borrowed funds to the Watermaster) from the due date thereof. Such delinquent assessment and interest may be collected in a show-cause proceeding herein instituted by the Watermaster, in which case the Court may allow Watermaster its reasonable costs of collection, includeing attorney's fees.

56. Accumulation of Replenishment Water Assessment Proceeds. In order to minimize fluctuation in assessment and to give Watermaster flexibility in purchase and spreading of replenishment water, Watermaster may make reasonable accumulations of replenishment water assessment proceeds. Interest earned on such retained funds shall be added to the account of the pool from which the funds were collected and shall be applied only to the purchase of replenishment water.

57. Effective Date. The effective date for accounting and operation under this Physical Solution shall be July 1, 1977, and the first production assessments hereunder shall be due after July 1, 1978. Watermaster shall, however, require installation of

meters or measuring devices and establish operating procedures immediately, and the cost of such Watermaster activity (not including the cost of such meters and measuring devices) may be recovered in the first administrative assessment in 1978.

VII. MISCELLANEOUS PROVISIONS

58. Designation of Address for Notice and Service. Each party shall designate the name and address to be used for purposes of all subsequent notices and service herein, either by its endorsement on the Stipulation for Judgment or by a separate designation to be filed within thirty (30) days after Judgment has been served. Said designation may be changed from time to time by filing a written notice of such change with the Watermaster. Any party desiring to be relieved of receiving notices of Watermaster or committee activity may file a waiver of notice on a form to be provided by Watermaster. Thereafter such party shall be removed from the Active Party list. Watermaster shall maintain at all times a current list of all active parties and their addresses for purposes of service. Watermaster shall also maintain a full current list of names and addresses of all parties or their successors, as filed herein. Copies of such lists shall be available, without cost, to any party, the Advisory Committee or any Pool Committee upon written request therefor.

59. Service of Documents. Delivery to or service upon any party or active party by the Watermaster, by any other party, or by the Court, of any item required to be served upon or delivered to such party or active party under or pursuant to the Judgment shall be made personally or by deposit in the United States mail, first

class, postage prepaid, addressed to the designee and at the address in the latest designation filed by such party or active party.

60. Intervention After Judgment. Any non-party assignee of the adjudicated appropriative rights of any appropriator, or any other person newly proposing to produce water from Chino Basin, may become a party to this judgment upon filing a petition in intervention. Said intervention must be confirmed by order of this Court. Such intervenor shall thereafter be a party bound by this judgment and entitled to the rights and privileges accorded under the Physical Solution herein, through the pool to which the Court shall assign such intervenor.

61. Loss of Rights. Loss, whether by abandonment, forfeiture or otherwise, of any right herein adjudicated shall be accomplished only (1) by a written election by the owner of the right filed with Watermaster, or (2) by order of the Court upon noticed motion and after hearing.

62. Scope of Judgment. Nothing in this Judgment shall be deemed to preclude or limit any party in the assertion against a neighboring party of any cause of action now existing or hereafter arising based upon injury, damage or depletion of water supply available to such party, proximately caused by nearby pumping which constitutes an unreasonable interference with such complaining party's ability to extract ground water.

63. Judgment Binding on Successors. This Judgment and all provisions thereof are applicable to and binding upon not only the parties to this action, but also upon their respective heirs, executors, administrators, successors, assigns, lessees and

licensees and upon the agents, employees and attorneys in fact of all such persons.

64. Costs. No party shall recover any costs in this proceeding from any other party.

Dated: 1/27/78.

/s/ Howard B. Wiener

Judge

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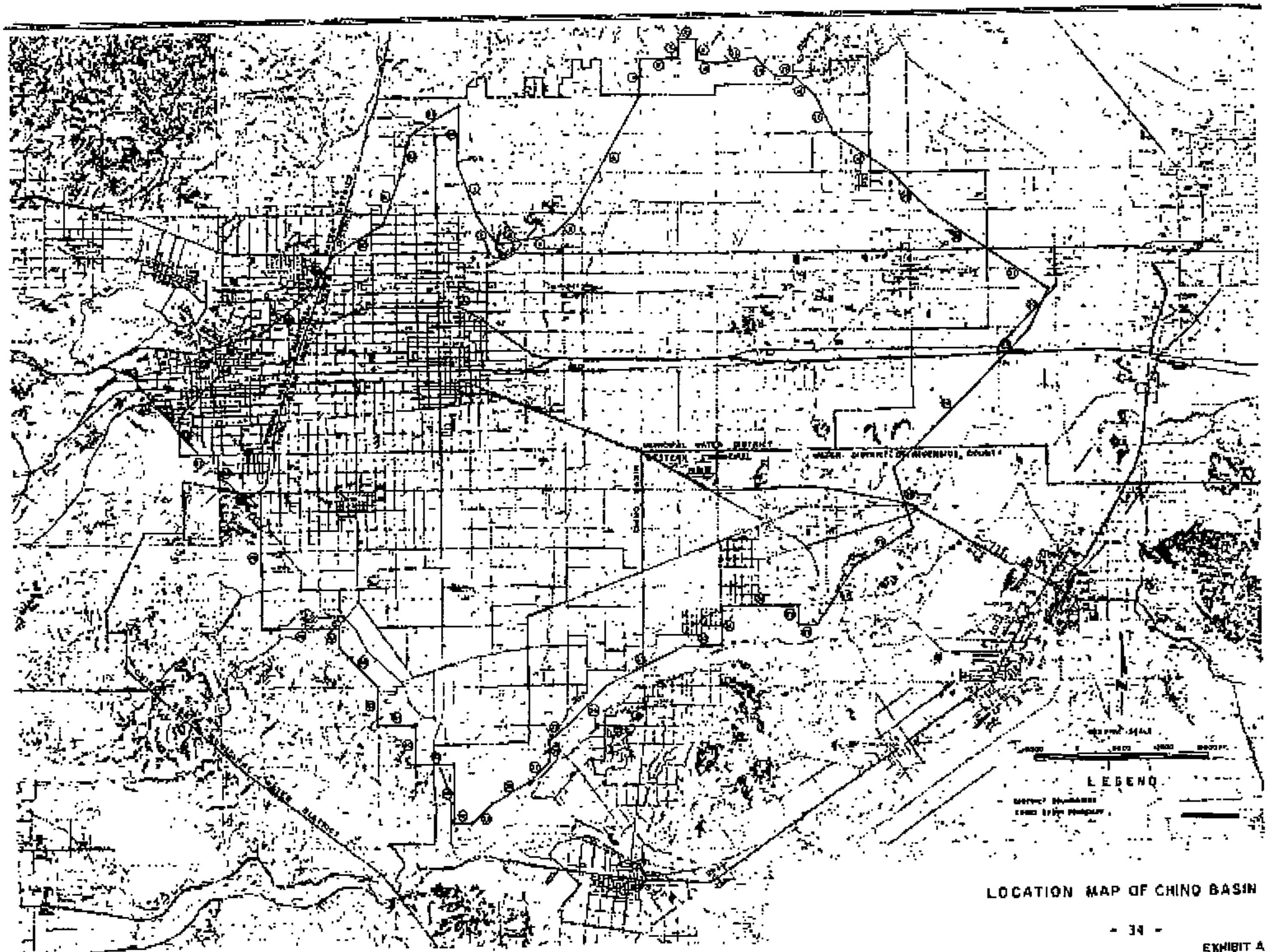
SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

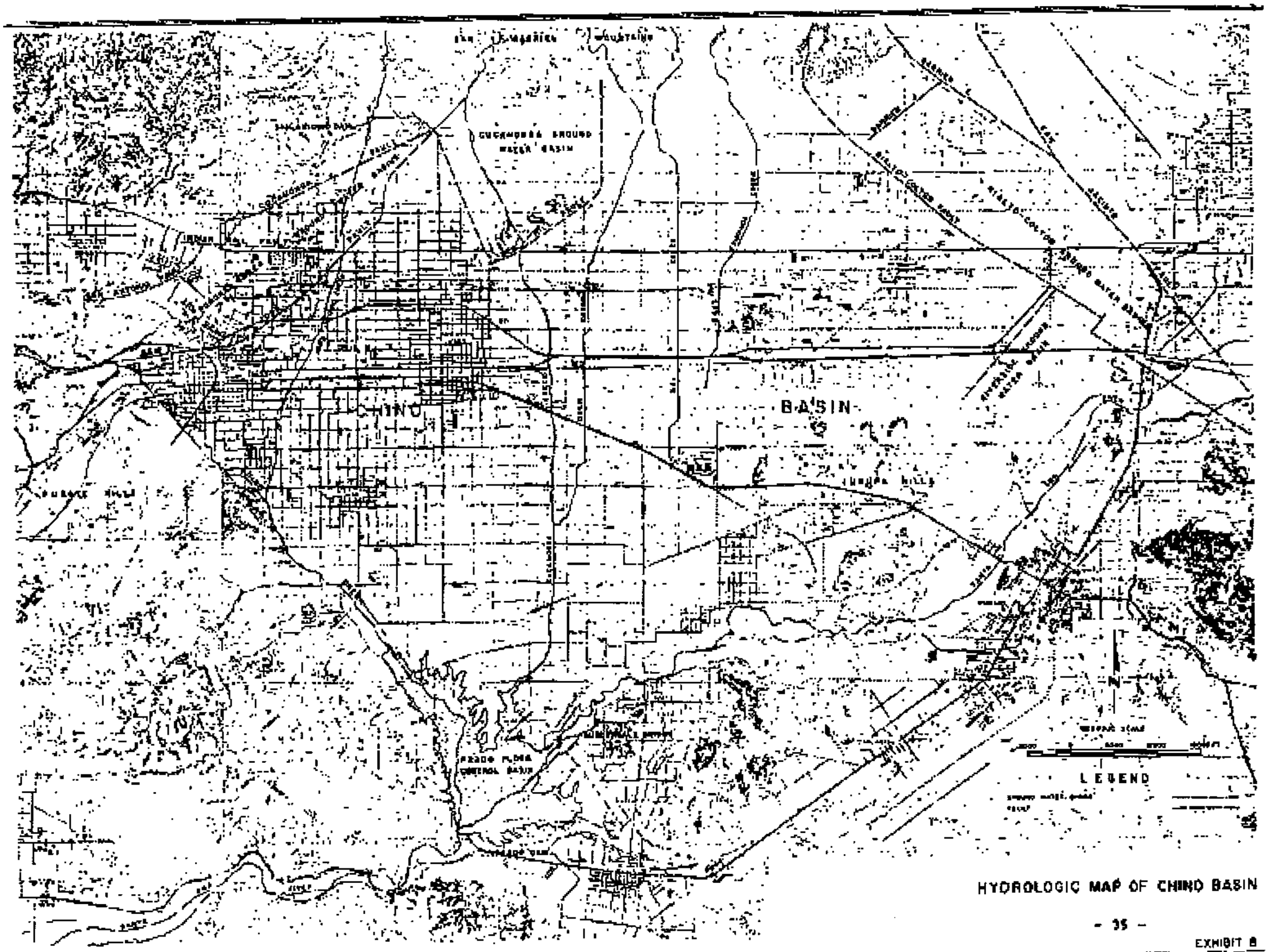
CHINO BASIN MUNICIPAL WATER DISTRICT, Plaintiff, v. CITY OF CHINO, et al. Defendants.	No. 164327

JUDGMENT



LOCATION MAP OF CHINO BASIN

EXHIBIT A



HYDROLOGIC MAP OF CHINO BASIN

EXHIBIT B

STIPULATING OVERLYING AGRICULTURAL PRODUCERS

STATE OF CALIFORNIA
COUNTY OF SAN BERNARDINO
Abacherli, Dairy, Inc.
Abacherli, Frank
Abacherli, Shirley
Abbona, Anna
Abbona, James
Abbona, Jim
Abbona, Mary
Agliani, Amelia H.
Agman, Inc.
Aguerre, Louis B.
Ahmanson Trust Co.
Akiyama, Shizuye
Akiyama, Tomoo
Akkerman, Dave
Albers, J.N.
Albers, Nellie
Alewyn, Jake J.
Alewyn, Normalee
Alger, Mary D.
Alger, Raymond
Allen, Ben F.
Allen, Jane F.
Alta-Dena Dairy
Anderson Farms
Anguiano, Sarah L.S.
Anker, Gus

Aphessetche, Xavier
Arena Mutual Water Assn.
Armstrong Nurseries, Inc.
Arretche, Frank
Arretche, Jean Pierre
Arvidson, Clarence F.
Arvidson, Florence
Ashley, George W.
Ashley, Pearl E.
Atlas Farms
Atlas Ornamental Iron Works, Inc.
Aukeman, Carol
Aukeman, Lewis
Ayers, Kenneth C., aka
Kelley Ayers
Bachoc, Raymond
Baldwin, Edgar A.
Baldwin, Lester
Banbury, Carolyn
Bangma Dairy
Bangma, Arthur
Bangma, Ida
Bangma, Martin
Bangma, Sam
Barba, Anthony B.
Barba, Frank
Barcellos, Joseph
Barnhill, Maurine W.

Barnhill, Paul
Bartel, Dale
Bartel, Ursula
Bartel, Willard
Barthelemy, Henry
Barthelemy, Roland
Bassler, Donald V., M.D.
Bates, Lowell R.
Bates, Mildred L.
Beahm, James W.
Beahm, Joan M.
Bekendam, Hank
Bekendam, Pete
Bello, Eugene
Bello, Olga
Beltman, Evelyn
Beltman, Tony
Bergquist Properties, Inc.
Bevacqua, Joel A.
Bevacqua, Marie B.
Bidart, Bernard
Bidart, Michael J.
Binnell, Wesley
Black, Patricia E.
Black, Victor
Bodger, John & Sons Co.
Boer, Adrian
Boersma and Wind Dairy

Boersma, Angie
Boersma, Berdina
Boersma, Frank
Boersma, Harry
Boersma, Paul
Boersma, Sam
Boersma, William L.
Bohlander & Holmes, Inc.
Bokma, Peter
Bollema, Jacob
Boonstoo, Edward
Bootsma, Jim
Borba, Dolene
Borba, Dolores
Borba, Emily
Borba, George
Borba, John
Borba, John & Sons
Borba, John Jr.
Borba, Joseph A.
Borba, Karen E.
Borba, Karen M.
Borba, Pete, Estate of
Borba, Ricci
Borba, Steve
Borba, Tom
Bordisso, Alleck
Borges, Angelica M.

EXHIBIT "C"

Borges, Bernadette
Borges, John O.
Borges, Linda L.
Borges, Manual Jr.
Borges, Tony
Bos, Aleid
Bos, Gerrit
Bos, John
Bos, John
Bos, Margaret
Bos, Mary
Bos, Mary Beth
Bos, Tony
Bosch, Henrietta
Bosch, Peter T.
Boschma, Betty
Boschma, Frank
Boschma, Greta
Boschma, Henry
Bosma, Dick
Bosma, Florence G.
Bosma, Gerrit
Bosma, Jacob J.
Bosma, Jeanette Thea
Bosman, Frank
Bosman, Nellie
Bosnyak, Goldie M.
Bosnyak, Martin

Bothof, Roger W.
Bouma, Cornie
Bouma, Emma
Bouma, Henry P.
Bouma, Martin
Bouma, Peter G. & Sons Dairy
Bouma, Ted
Bouman, Helen
Bouman, Sam
Bower, Mabel E.
Boys Republic
Breedyk, Arie
Breedyk, Jessie
Briano Brothers
Briano, Albert
Briano, Albert Trustee for
Briano, Albert Frank
Briano, Lena
Brink, Russell N.
Brinkerhoff, Margaret
Brinkerhoff, Robert L.
Britschgi, Florence
Britschgi, Magdalena Garetto
Britschgi, Walter P.
Brommer, Marvin
Brookside Enterprizes, dba
Brookside Vineyard Co.
Brothers Three Dairy

EXHIBIT "C"

Brown, Eugene
Brun, Martha M.
Brun, Peter Robert
Buma, Duke
Buma, Martha
Bunse, Nancy
Bunse, Ronnie L.
Caballero, Bonnie L.
Caballero, Richard F.
Cable Airport Inc.
Cadlini, Donald
Cadlini, Jesse R.
Cadlini, Marie Edna
Cambio, Anna
Cambio, Charles, Estate of
Cambio, William V.
Cardoza, Florence
Cardoza, Olivi
Cardoza, Tony
Carnesi, Tom
Carver, Robt M., Trustee
Cauffman, John R.
Chacon Bros.
Chancon, Elvera P.
Chacon, Joe M.
Chacon, Robert M.
Chacon, Virginia L.
Chez, Joseph C.

Chino Corona Investment
Chino Water Co.
Christensen, Leslie
Christensen, Richard G.
Christian, Ada R.
Christian, Harold F.
Christy, Ella J.
Christy, Ronald S.
Cihigoyenetche, Jean
Cihigoyenetche, Leona
Cihigoyenetche, Martin
Clarke, Arthur B.
Clarke, Nancy L.
Clarke, Phyllis J.
Coelho, Isabel
Coelho, Joe A. Jr.
Collins, Howard E.
Collins, Judith F.
Collinsworth, Ester L.
Collinsworth, John E.
Collinsworth, Shelby
Cone Estate (05-2-00648/649)
Consolidated Freightways Corp. of Delaware
Corona Farms Co.
Corra, Rose
Costa, Dimas S.
Costa, Laura

EXHIBIT "C"

Costa, Myrtle
Costamagna, Antonio
Costamagna, Joseph
Cousyn, Claus B.
Cramer, Carole F.
Cramer, William R.
Crossroads Auto Dismantlers, Inc.
Crouse, Beatrice I.
Crouse, Roger
Crowley, Juanita C.
Crowley, Ralph
Cucamonga Vintners
D'Astici, Teresa
Da Costa, Cecilia B.
Da Costa, Joaquim F.
Daloisio, Norman
De Berard Bros.
De Berard, Arthur, Trustee
De Berard, Charles
De Berard, Chas., Trustee
De Berard, Helan J.
De Berard, Robert
De Berard, Robert Trustee
De Bie, Adrian
De Bie, Henry
De Bie, Margaret M.
De Bie, Marvin
De Boer, Fred
De Boer, L.H.
De Boer, Sidney
De Bos, Andrew
De Graaf, Anna Mae
De Graaf, Gerrit
De Groot, Dick
De Groot, Dorothy
De Groot, Ernest
De Groot, Henrietta
De Groot, Jake
De Groot, Pete Jr.
De Haan, Bernadena
De Haan, Henry
De Hoog, Adriana
De Hoog, Joe
De Hoog, Martin
De Hoog, Martin L.
De Hoog, Mitch
De Hoog, Tryntje
De Jager, Cobi
De Jager, Edward D.
De Jong Brothers Dairy
De Jong, Cornelis
De Jong, Cornelius
De Jong, Grace
De Jong, Jake
De Jong, Lena
De Leeuw, Alice

De Leeuw, Sam
De Soete, Agnes
De Soete, Andre
De Vries, Abraham
De Vries, Case
De Vries, Dick
De Vries, Evelyn
De Vries, Henry, Estate of
De Vries, Hermina
De Vries, Jack H.
De Vries, Jane
De Vries, Janice
De Vries, John
De Vries, John J.
De Vries, Neil
De Vries, Ruth
De Vries, Theresa
De Wit, Gladys
De Wit, Peter S.
De Wyn, Evert
De Zoete, Hattie V.
Do Zoete, Leo A.
Decker, Hallie
Decker, Henry A.
Demmer, Ernest
Di Carlo, Marie
Di Carlo, Victor
Di Tommaso, Frank

Dirkse, Catherine
Dirkse, Charles C.
Dixon, Charles E.
Dixon, Geraldine A.
Doesberg, Hendrica
Doesburg, Theodorus, P.
Dolan, Marion
Dolan, Michael H.
Dominguez, Helen
Dominguez, Manual
Donkers, Henry A.
Donkers, Nellie G.
Dotta Bros.
Douma Brothers Dairy
Douma, Betty A.
Douma, Fred A.
Douma, Hendrika
Douma, Herman G.
Douma, Narleen J.
Douma, Phillip M.
Dow Chemical Co.
Dragt, Rheta
Dragt, William
Driftwood Dairy Farm
Droogh, Case
Duhalde, Marian
Duhalde, Lauren
Duits, Henrietta

EXHIBIT "C"

Duits, John

Dunlap, Edna Kraemer,
Estate of

Durrington, Glen

Durrington, William F.

Dusi, John Sr.

Dykstra, Dick

Dykstra, John

Dykstra, John & Sons

Dykstra, Wilma

Dyt, Cor

Dyt, Johanna

E and S Grape Growers

Eaton, Thomas, Estate of

Echeverria, Juan

Echeverria, Carlos

Echeverria, Pablo

Eilers, E. Myrle

Eilers, Henry W.

El Prado Golf Course

Ellsworth, Rex C.

Engelsma, Jake

Engelsma, Susan

Escojeda, Henry

Etiwanda Grape Products Co.

Euclid Ave. Investment One

Euclid Ave. Investment Four

Euclid Ave. Three Investment

Excelsior Farms

F.D.I.C.

Fagundes, Frank M.

Fagundes, Mary

Fernandes, Joseph Jr.

Fernandes, Velma C.

Ferraro, Ann

Ferreira, Frank J.

Ferreira, Joe C. Jr.

Ferreira, Narcie

Fillippi, J. Vintage Co.

Filippi, Joseph

Filippi, Joseph A.

Filippi, Mary E.

Fitzgerald, John R.

Flameling Dairy Inc.

Flamingo Dairy

Foss, Douglas E.

Foss, Gerald R.

Foss, Russel

Fred & John Troost No. 1 Inc.

Fred & Maynard Troost No. 2 Inc.

Freitas, Beatriz

Freitas, Tony T.

Gakle, Louis L.

Galleano Winery, Inc.

Galleano, Bernard D.

Galleano, D.

Galleano, Mary M.

EXHIBIT "C"

Garcia, Pete
Gardner, Leland V.
Gardner, Lola M.
Garrett, Leonard E.
Garrett, Patricia T.
Gastelluberry, Catherine
Gastelluberry, Jean
Gilstrap, Glen E.
Gilstrap, Marjorie J.
Godinho, John
Godinho, June
Gonsalves, Evelyn
Gonsalves, John
Gorzeman, Geraldine
Gorzeman, Henry A.
Gorzeman, Joe
Govea, Julia
Goyenetche, Albert
Grace, Caroline E.
Grace, David J.
Gravatt, Glenn W.
Gravatt, Sally Mae
Greydanus Dairy, Inc.
Greydanus, Rena
Griffin Development Co.
Haagsma, Dave
Haagsma, John
Hansen, Mary D.

Hansen, Raymond F.
Hanson, Ardeth W.
Harada, James T.
Harada, Violet A.
Haringa, Earl and Sons
Haringa, Herman
Haringa, Rudy
Haringa, William
Harper, Cecilia de Mille
Harrington, Winona
Harrison, Jacqueline A.
Hatanaka, Kenichi
Heida, Annie
Heida, Don
Heida, Jim
Heida, Sam
Helms, Addison D.
Helms, Irma A.
Hermans, Alma I.
Hermans, Harry
Hettinga, Arthur
Hettinga, Ida
Hettinga, Judy
Hettinga, Mary
Hettinga, Wilbur
Heublein, Inc., Grocery Products Group
Hibma, Catherine M.

EXHIBIT "C"

Hibma, Sidney
Hicks, Kenneth I.
Hicks, Minnie M.
Higgins Brick Co.
Highstreet, Alfred V.
Highstreet, Evada V.
Hilarides, Bertha as Trustee
Hilarides, Frank
Hilarides, John as Trustee
Hindelang, Tillie
Hindelang, William
Hobbs, Bonnie C.
Hobbs, Charles W.
Hobbs, Hazel I.
Hobbs, Orlo M.
Hoekstra, Edward
Hoekstra, George
Hoekstra, Grace
Hoekstra, Louie
Hofer, Paul B.
Hofer, Phillip F.
Hofstra, Marie
Hogeboom, Jo Ann M.
Hogeboom, Maurice D.
Hogg, David V.
Hogg, Gene P.
Hogg, Warren G.
Hohberg, Edith J.
Hohberg, Harold C.
Hohberg, Harold W.
Holder, Arthur B.
Holder, Dorothy F.
Holmes, A. Lee
Holmes, Frances P.
Hoogeboom, Gertrude
Hoogeboom, Pete
Hoogendam, John
Hoogendam, Tena
Houssels, J. K. Thoroughbred Farm
Hunt Industries
Idsinga, Ann
Idsinga, William W.
Imbach Ranch, Inc.
Imbach, Kenneth E.
Imbach, Leonard K.
Imbach, Oscar K.
Imbach, Ruth M.
Indaburu, Jean
Indaburu, Marceline
Iseli, Kurt H.
Ito, Kow
J & B Dairy Inc.
Jaques, Johnny C. Jr.
Jaques, Mary
Jaques, Mary Lou

EXHIBIT "C"

Jay Em Bee Farms
Johnson Bro's Egg Ranches, Inc.
Johnston, Ellwood W.
Johnston, George F. Co.
Johnston, Judith H.
Jones, Leonard P.
Jongsma & Sons Dairy
Jongsma, Diana A.
Jongsma, Dorothy
Jongsma, George
Jongsma, Harold
Jongsma, Henry
Jongsma, John
Jongsma, Nadine
Jongsma, Tillie
Jordan, Marjorie G.
Jordan, Troy O.
Jorritsma, Dorothy
Juliano, Albert
Kamper, Cornelis
Kamstra, Wilbert
Kaplan, Lawrence J.
Kasbergen, Martha
Kasbergen, Neil
Kazian, Angelen Estate of
Kingsway, Const. Corp.
Klapps Market
Kline, James K.

Knevelbaard, John
Knudsen, Ejnar
Knudsen, Karen M.
Knudsen, Kenneth
Knudson, Robert
Knudson, Darlene
Koel, Helen S.
Koetsier, Gerard
Koetsier, Gerrit J.
Koetsier, Jake
Koning, Fred W.
Koning, Gloria
Koning, J. W. Estate
Koning, James A.
Koning, Jane
Koning, Jane C.
Koning, Jennie
Koning, John
Koning, Victor A.
Kooi Holstein Corporation
Koolhaas, Kenneth E.
Koolhaas, Simon
Koolhaas, Sophie Grace
Koopal, Grace
Koopal, Silas
Koopman, Eka
Koopman, Gene T.
Koopman, Henry G.

EXHIBIT "C"

Koopman, Ted
Koopman, Tena
Koot, Nick
Koster, Aart
Koster, Frances
Koster, Henry B.
Koster, Nellie
Kroes, Jake R.
Kroeze, Bros
Kroeze, Calvin E.
Kroeze, John
Kroeze, Wesley
Kruckenberg, Naomi
Kruckenberg, Perry
L. D. S. Welfare Ranch
Labrucherie, Mary Jane
Labrucherie, Raymond F.
Lako, Samuel
Landman Corp.
Lanting, Broer
Lanting, Myer
Lass, Jack
Lass, Sandra L.
Lawrence, Cecelia, Estate of
Lawrence, Joe H., Estate of
Leal, Bradley W.
Leal, John C.
Leal, John Craig

Leck, Arthur A.
Leck, Evelyn M.
Lee, Harold E.
Lee, Helen J.
Lee, Henrietta C.
Lee, R. T. Construction Co.
Lekkerkerk, Adriana
Lekkerkerk, L. M.
Lekkerkerker, Nellie
Lekkerkerker, Walt
Lewis Homes of California
Livingston, Dorothy M.
Livingston, Rex E.
Lokey, Rosemary Kraemer
Lopes, Candida A.
Lopes, Antonio S.
Lopez, Joe D.
Lourenco, Carlos, Jr.
Lourenco, Carmelina P.
Lourenco, Jack C.
Lourenco, Manual H.
Lourenco, Mary
Lourenco, Mary
Luiten, Jack
Luiz, John M.
Luna, Christine I.
Luna, Ruben T.
Lusk, John D. and Sons
A California corporation

Lyon, Gregory E.
Lyon, Paula E.
M & W Co. #2
Madole, Betty M.
Madole, Larry B.
Marquez, Arthur
Marquine, Jean
Martin, Lelon O.
Martin, Leon O.
Martin, Maria D.
Martin, Tony J.
Martins, Frank
Mathias, Antonio
Mc Cune, Robert M.
Mc Masters, Gertrude
Mc Neill, J. A.
Mc Neill, May F.
Mees, Leon
Mello and Silva Dairy
Mello and Sousa Dairy
Mello, Emilia
Mello, Enos C.
Mello, Mercedes
Mendiondo, Catherine
Mendiondo, Dominique
Meth. Hosp. - Sacramento
Metzger, R. S.
Metzger, Winifred

Mickel, Louise
Miersma, Dorothy
Meirsma, Harry C.
Minaberry, Arnaud
Minaberry, Marie
Mistretta, Frank J.
Mocho and Plaa Inc.
Mocho, Jean
Mocho, Noeline
Modica, Josephine
Montes, Elizabeth
Montes, Joe
Moons, Beatrice
Moons, Jack
Moramarco, John A. Enterprise
Moreno, Louis W.
Moss, John R.
Motion Pictures Associates, Inc.
Moynier, Joe
Murphy, Frances V.
Murphy, Myrl L.
Murphy, Naomi
Nanne, Martin Estate of
Nederend, Betty
Nederend, Hans
Norfolk, James
Norfolk, Martha
Notrica, Louis

EXHIBIT "C"

Nyberg, Lillian N.	Ormonde, Viva
Nyenhuis, Annie	Ortega, Adeline B.
Nyenhuis, Jim	Ortega, Bernard Dino
Occidental Land Research	Osterkamp, Joseph S.
Okumura, Marion	Osterkamp, Margaret A.
Okumura, Yuiche	P I E Water Co.
Oldengarm, Effie	Palmer, Eva E.
Oldengarm, Egbert	Palmer, Walter E.
Oldengarm, Henry	Parente, Luis S.
Oliviera, Manuel L.	Parente, Mary Borba
Oliviera, Mary M.	Parks, Jack B.
Olson, Albert	Parks, Laura M.
Oltmans Construction Co.	Patterson, Lawrence E. Estate of
Omlin, Anton	Payne, Clyde H.
Omlin, Elsie L.	Payne, Margo
Ontario Christian School Assn.	Pearson, Athelia K.
Oord, John	Pearson, William C.
Oostdam, Jacoba	Pearson, William G.
Oostdam, Pete	Pene, Robert
Oosten, Agnes	Perian, Miller
Oosten, Anthonia	Perian, Ona E.
Oosten, Caroline	Petrissans, Deanna
Oosten, John	Petrissans, George
Oosten, Marinus	Petrissans, Jean P.
Oosten, Ralph	Petrissans, Marie T.
Orange County Water District	Pickering, Dora M.
Ormonde, Manuel	(Mrs. A. L. Pickering)
Ormonde, Pete, Jr.	Pierce, John

EXHIBIT "C"

Pierce, Sadie
Pietszak, Sally
Pine, Joe
Pine, Virginia
Pires, Frank
Pires, Marie
Plaa, Jeanne
Plaa, Michel
Plantenga, Agnes
Plantenga, George
Poe, Arlo D.
Pomona Cemetery Assn.
Porte, Cecelia, Estate of
Porte, Garritt, Estate of
Portsmouth, Vera McCarty
Ramella, Mary M.
Ramirez, Concha
Rearick, Hildegard H.
Rearick, Richard R.
Reinalda, Clarence
Reitsma, Greta
Reitsma, Louis
Rice, Bernice
Rice, Charlie E.
Richards, Karin
(Mrs. Ronnie Richards)
Richards, Ronald L.
Ridder, Jennie Wassenaar

Righetti, A. T.
Riley, George A.
Riley, Helen C.
Robbins, Jack K.
Rocha, John M.
Rocha, Jose C.
Rodrigues, John
Rodrigues, Manuel
Rodrigues, Manuel, Jr.
Rogrigues, Mary L.
Rodriquez, Daniel
Rogers, Jack D.
Rohrer, John A.
Rohrer, Theresa D.
Rohrs, Elizabeth H.
Rossetti, M. S.
Roukema, Angeline
Roukema, Ed.
Roukema, Nancy
Roukema, Siebren
Ruderian, Max J.
Russell, Fred J.
Rusticus, Ann
Rusticus, Charles
Rynsburger, Arie
Rynsburger, Berdena, Trust
Rynsburger, Joan Adele
Rynsburger, Thomas

EXHIBIT "C"

S. P. Annex, Inc.
Salisbury, Elinor J.
Sanchez, Edmundo
Sanchez, Margarita O.
Santana, Joe Sr.
Santana, Palmira
Satragni, John B. Jr.
Scaramella, George P.
Schaafsma Bros.
Schaafsma, Jennie
Schaafsma, Peter
Schaafsma, Tom
Schaap, Andy
Schaap, Ids
Schaap, Maria
Schacht, Sharon C.
Schakel, Audrey
Schakel, Fred
Schmid, Olga
Schmidt, Madeleine
Schoneveld, Evert
Schoneveld, Henrietta
Schoneveld, John
Schoneveld, John Allen
Schug, Donald E.
Schug, Shirley A.
Schuh, Bernatta M.
Schuh, Harold H.

Scott, Frances M.
Scott, Linda F.
Scott, Stanley A.
Scritsmier, Lester J.
Serl, Charles A.
Serl, Rosalie P.
Shady Grove Dairy, Inc.
Shamel, Burt A.
Shelby, Harold E.
Shelby, John A.
Shelby, Velma M.
Shelton, Alice A.
Sherwood, Robert W.
Sherwood, Sheila J.
Shue, Eva
Shue, Gilbert
Sieperda, Anne
Sieperda, James
Sigrist, Hans
Sigrist, Rita
Silveira, Arline L.
Silveira, Frank
Silveira, Jack
Silveira, Jack P. Jr.
Simas, Dolores
Simas, Joe
Singleton, Dean
Singleton, Elsie R.

EXHIBIT "C"

Sinnott, Jim
Sinnott, Mildred B.
Slegers, Dorothy
Slegers, Hubert J.
Slegers, Jake
Slegers, Jim
Slegers, Lenwood M.
Slegers, Martha
Slegers, Tesse J.
Smith, Edward S.
Smith, Helen D.
Smith, James E.
Smith, Keith J.
Smith, Lester W.
Smith, Lois Maxine
Smith, Marjorie W.
Soares, Eva
Sogioka, Mitsuyoshi
Sogioka, Yoshimato
Sousa, Sam
Southern Pacific Land Co.
Southfield, Eddie
Souza, Frank M.
Souza, Mary T.
Spickerman, Alberta
Spickerman, Florence
Spickerman, Rudolph
Spyksma, John

Staal, John
Stahl, Zippora P.
Stampfl, Berta
Stampfl, William
Stanley, Robert E.
Stark, Everett
Stellingwerf, Andrew
Stellingwerf, Henry
Stellingwerf, Jenette
Stellingwerf, Shana
Stellingwerf, Stan
Stelzer, Mike C.
Sterk, Henry
Stiefel, Winifred
Stiefel, Jack D.
Stigall, Richard L.
Stigall, Vita
Stockman's Inn
Stouder, Charlotte A.
Stouder, William C.
Struikmans, Barbara
Struikmans, Gertie
Struikmans, Henry Jr.
Struikmans, Henry Sr.
Struikmans, Nellie
Swager, Edward
Swager, Gerben
Swager, Johanna

Swager, Marion
Swierstra, Donald
Swierstra, Fanny
Sybrandy, Ida
Sybrandy, Simon
Sytsma, Albert
Sytsma, Edith
Sytsma, Jennie
Sytsma, Louie
Te Velde, Agnes
Te Velde, Bay
Te Velde, Bernard A.
Te Velde, Bonnie
Te Velde, Bonnie G.
Te Velde, George
Te Velde, George, Jr.
Te Velde, Harm
Te Velde, Harriet
Te Velde, Henry J.
Te Velde, Jay
Te Velde, Johanna
Te Velde, John H.
Te Velde, Ralph A.
Te Velde, Zwaantina, Trustee
Ter Maaten, Case
Ter Maaten, Cleone
Ter Maaten, Steve
Terpstra, Carol

Terpstra, Theodore G.
Teune, Tony
Teunissen, Bernard
Teunissen, Jane
Thomas, Ethel M.
Thommen, Alice
Thommen, Fritz
Tillema, Allie
Tillema, Harold
Tillema, Klaas D.
Timmons, William R.
Tollerup, Barbara
Tollerup, Harold
Trapani, Louis A.
Trimlett, Arlene R.
Trimlett, George E.
Tristant, Pierre
Tuinhout, Ale
Tuinhout, Harry
Tuinhout, Hilda
Tuls, Elizabeth
Tuls, Jack S.
Tuls, Jake
Union Oil Company of California
United Dairyman's Co-op.
Urquhart, James G.
Usle, Cathryn
Usle, Faustino

EXHIBIT "C"

V & Y Properties
Vaile, Beryl M.
Valley Hay Co.
Van Beek Dairy Inc.
Van Canneyt Dairy
Van Canneyt, Maurice
Van Canneyt, Wilmer
Van Dam, Bas
Van Dam, Isabelle
Van Dam, Nellie
Van Den Berg, Gertrude
Van Den Berg, Joyce
Van Den Berg, Marinus
Van Den Berg, Marvin
Van Der Linden, Ardith
Van Der Linden, John
Van Der Linden, Stanley
Van Der Veen, Kenneth
Van Diest, Anna T.
Van Diest, Cornelius
Van Diest, Ernest
Van Diest, Rena
Van Dyk, Bart
Van Dyk, Jeanette
Van Foeken, Martha
Van Foeken, William
Van Hofwegen, Steve
Van Hofwegen, Adrian A.

Van Hofwegen, Clara
Van Hofwegen, Jessie
Van Klaveren, A.
Van Klaveren, Arie
Van Klaveren, Wilhelmina
Van Klaveren, William
Van Leeuwen, Arie C.
Van Leeuwen, Arie C.
Van Leeuwen, Arlan
Van Leeuwen, Clara G.
Van Leeuwen, Cornelia L.
Van Leeuwen, Harriet
Van Leeuwen, Jack
Van Leeuwen, John
Van Leeuwen, Letie
Van Leeuwen, Margie
Van Leeuwen, Paul
Van Leeuwen, William A.
Van Ravenswaay, Donald
Van Ryn Dairy
Van Ryn, Dick
Van Surksum, Anthonetta
Van Surksum, John
Van Veen, John
Van Vliet, Effie
Van Vliet, Hendrika
Van Vliet, Hugo
Van Vliet, Klaas

EXHIBIT "C"

Vande Witte, George

Vanden Berge, Gertie

Vanden Berge, Gertie

Vanden Berge, Jack

Vanden Berge, Jake

Vanden Brink, Stanley

Vander Dussen, Agnes

Vander Dussen, Cor

Vander Dussen, Cornelius

Vander Dussen, Edward

Vander Dussen, Geraldine Marie

Vander Dussen, James

Vander Dussen, John

Vander Dussen, Nelvina

Vander Dussen, Rene

Vander Dussen, Sybrand Jr.

Vander Dussen, Sybrand Sr.

Vander Dussen Trustees

Vander Eyk, Case Jr.

Vander Eyk, Case Sr.

Vander Feer, Peter

Vander Feer, Rieka

Vander Laan, Ann

Vander Laan, Ben

Vander Laan, Bill

Vander Laan, Corrie

Vander Laan, Henry

Vander Laan, James

Vander Laan, Katie

Vander Laan, Martin Jr.

Vander Laan, Tillie

Vander Leest, Anna

Vander Leest, Ann

Vander Meer, Alice

Vander Meer, Dick

Vander Poel, Hank

Vander Poel, Pete

Vander Pol, Irene

Vander Pol, Margie

Vander Pol, Marines

Vander Pol, William P.

Vander Schaaf, Earl

Vander Schaaf, Elizabeth

Vander Schaaf, Henrietta

Vander Schaaf, John

Vander Schaaf, Ted

Vander Stelt, Catherine

Vander Stelt, Clarence

Vander Tuig, Arlene

Vander Tuig, Sylvester

Vander Veen, Joe A.

Vandervlag, Robert

Vander Zwan, Peter

Vanderford, Betty W.

Vanderford, Claud R.

Vanderham, Adrian

EXHIBIT "C"

Vanderham, Cornelius
Vanderham, Cornelius P.
Vanderham, Cory
Vanderham, E. Jane
Vanderham, Marian
Vanderham, Martin
Vanderham, Pete C.
Vanderham, Wilma
Vasquez, Eleanor
Veenendaal, Evert
Veenendaal, John H.
Veiga, Dominick, Sr.
Verbree, Jack
Verbree, Tillie
Verger, Bert
Verger, Betty
Verhoeven, Leona
Verhoeven, Martin
Verhoeven, Wesley
Vermeer, Dick
Vermeer, Jantina
Vernola Ranch
Vernola, Anthonietta
Vernola, Anthony
Vernola, Frank
Vernola, Mary Ann
Vernola, Pat F.
Vestal, Frances Lorraine

Vestal, J. Howard
Visser, Gerrit
Visser, Grace
Visser, Henry
Visser, Jess
Visser, Louie
Visser, Neil
Visser, Sam
Visser, Stanley
Visser, Tony D.
Visser, Walter G.
Von Der Ahe, Fredric T.
Von Euw, George
Von Euw, Majorie
Von Lusk, a limited partnership
Voortman, Anna Marie
Voortman, Edward
Voortman, Edwin J.
Voortman, Gertrude Dena
Wagner, Richard H.
Walker, Carole R.
Walker, Donald E.
Walker, Wallace W.
Wardle, Donald M.
Warner, Dillon B.
Warner, Minnie
Wassenaar, Peter W.
Waters, Michael

Weeda, Adriana
Weeda, Daniel
Weeks, O. L.
Weeks, Verona E.
Weidman, Maurice
Weidman, Virginia
Weiland, Adaline I.
Weiland, Peter J.
Wesselink, Jules
West, Katharine R.
West, Russel
West, Sharon Ann
Western Horse Property
Westra, Alice
Westra, Henry
Westra, Hilda
Westra, Jake J.
Weststeyn, Freida
Weststeyn, Pete
Whitehurst, Louis G.
Whitehurst, Pearl L.
Whitmore, David L.
Whitmore, Mary A.
Whitney, Adolph M.
Wiersema, Harm
Wiersema, Harry
Wiersma, Ellen H.
Wiersma, Gladys J.

Wiersma, Jake
Wiersma, Otto
Wiersma, Pete
Winchell, Verne H., Trustee
Wind, Frank
Wind, Fred
Wind, Hilda
Wind, Johanna
Woo, Frank
Woo, Sem Gee
Wybenga, Clarence
Wybenga, Gus
Wybenga, Gus K.
Wybenga, Sylvia
Wynja, Andy
Wynja, Iona F.
Yellis, Mildred
Yellis, Thomas E.
Ykema-Harmsen Dairy
Ykema, Floris
Ykema, Harriet
Yokley, Betty Jo
Yokley, Darrell A.
Zak, Zan
Zivelonghi, George
Zivelonghi, Margaret
Zwaagstra, Jake
Zwaagstra, Jessie M.
Zwart, Case

EXHIBIT "C"

NON-PRODUCER WATER DISTRICTS

Chino Basin Municipal Water District

Chino Basin Water Conservation District

Pomona Valley Municipal Water District

Western Municipal Water District of Riverside County

DEFAULTING OVERLYING AGRICULTURAL PRODUCERS

Cheryl L. Bain	Roy W. Lantis
Warren Bain	Sharon I. Lantis
John M. Barcelona	Frank Lorenz
Letty Bassler	Dagney H. MacDonald
John Brazil	Frank E. Martin
John S. Briano	Ruth C. Martin
Lupe Briano	Connie S. Mello
Paul A. Briano	Naldiro J. Mello
Tillie Briano	Felice Miller
Arnie B. Carlson	Ted Miller
John Henry Fikse	Masao Nerio
Phyllis S. Fikse	Tom K. Nerio
Lewellyn Flory	Toyo Nerio
Mary I. Flory	Yuriko Nerio
L. H. Glazer	Harold L. Rees
Dorothy Goodman	Alden G. Rose
Sidney D. Goodman	Claude Rouleau, Jr.
Frank Grossi	Patricia M. Rouleau
Harada Brothers	Schultz Enterprises
Ellen Hettinga	Albert Shaw
Hein Hettinga	Lila Shaw
Dick Hofstra, Jr.	Cathy M. Stewart
Benjamin M. Hughey	Marvin C. Stewart
Frieda L. Hughey	Betty Ann Stone
Guillaume Indart	John B. Stone
Ellwood B. Johnston, Trustee	Vantoll Cattle Co., Inc.
Perry Kruckenberg, Jr.	Catherine Verburg

EXHIBIT "C"

Martin Verburg

Donna Vincent

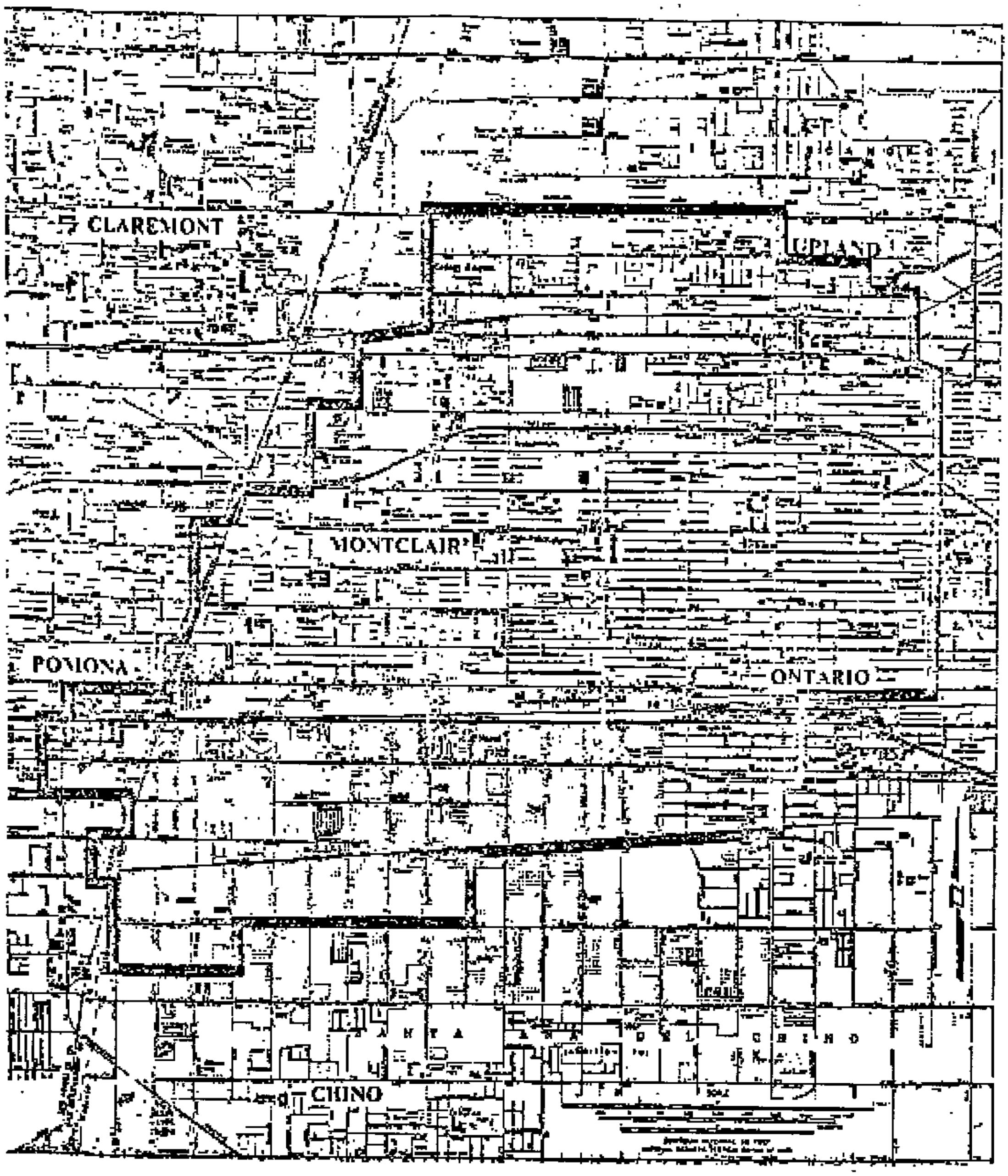
Larry Vincent

Cliff Wolfe & Associates

Ada M. Woll

Zarubica Co.

EXHIBIT "C"



CHINO BASIN

IN LIEU AREA NO. 1

EXHIBIT "J"

EXHIBIT "D"

OVERLYING NON-AGRICULTURAL RIGHTS

Party	Total Overlying Non-Agricultural Rights (Acre Feet)	Share of Safe Yield (Acre Feet)
Ameron Steel Producers	125	97.858
County Of San Bernardino	171	133.870
Conrock Company	406	317.844
Kaiser Steel Corporation	3,743	2,930.274
Red Star Fertilizer	20	15.657
Southern California Edison Co.	1,255	982.499
Space Center, Mira Loma	133	104.121
Southern Service Co., dba Blue Seal Linen	24	18.789
Sunkist, Orange Products Division	2,393	1,873.402
Carlsberg Mobile Home Properties, Ltd. '73	593	464.240
Union Carbide Corporation	546	427.446
Quaker Chemical Co.	0	0
Totals	9,409	7,366.00

EXHIBIT "E"

APPROPRIATIVE RIGHTS

Party	Appropriative Right (Acre Feet)	Share of Initial Operating Safe Yield (Acre Feet)	Share of Operating Safe Yield (Percent)
City of Chino	5,271.7	3,670.067	6.693
City of Norco	289.5	201.545	0.368
City of Ontario	16,337.4	11,373.816	20.742
City of Pomona	16,110.5	11,215.852	20.454
City of Upland	4,097.2	2,852.401	5.202
Cucamonga County Water District	4,431.0	3,084.786	5.626
Jurupa Community Services District	1,104.1	768.655	1.402
Monte Vista County Water District	5,958.7	4,148.344	7.565
West San Bernardino County Water District	925.5	644.317	1.175
Etiwanda Water Company	768.0	534.668	0.975
Felspar Gardens Mutual Water Company	68.3	47.549	0.087
Fontana Union Water Co.	9,188.3	6,396.736	11.666
Marygold Mutual Water Co.	941.3	655.317	1.195
Mira Loma Water Co.	1,116.0	776.940	1.417
Monte Vista Irr. Co.	972.1	676.759	1.234
Mutual Water Company of Glen Avon Heights	672.2	467.974	0.853
Park Water Company	236.1	164.369	0.300
Pomona Valley Water Co.	3,106.3	2,162.553	3.944
San Antonio Water Co.	2,164.5	2,506.888	2.748
Santa Ana River Water Company	1,869.3	1,301.374	2.373
Southern California Water Company	1,774.5	1,235.376	2.253
West End Consolidated Water Company	1,361.3	947.714	1.728
TOTAL	78,763.8	54,834.000	100.000

EXHIBIT 'E'

EXHIBIT "F"
OVERLYING (AGRICULTURAL) POOL
POOLING PLAN

1. Membership in Pool. The State of California and all producers listed in Exhibit "C" shall be the initial members of this pool, which shall include all producers of water for overlying uses other than industrial or commercial purposes.

2. Pool Meetings. The members of the pool shall meet annually, in person or by proxy, at a place and time to be designated by Watermaster for purposes of electing members of the Pool Committee and conducting any other business of the pool. Special meetings of the membership of the pool may be called and held as provided in the rules of the pool.

3. Voting. All voting at meetings of pool members shall be on the basis of one vote for each 100 acre feet or any portion thereof of production from Chino Basin during the preceding year, as shown by the records of Watermaster.

4. Pool Committee. The Pool Committee for this pool shall consist of not less than nine (9) representatives selected at large by members of the pool. The exact number of members of the Pool Committee in any year shall be as determined by majority vote of the voting power of members of the pool in attendance at the annual pool meeting. Each member of the Pool Committee shall have one vote and shall serve for a two-year term. The members first elected shall classify themselves by lot so that approximately one-half serve an initial one-year term. Vacancies during any term shall be filled by a majority of the remaining members of the Pool Committee.

5. Advisory Committee Representatives. The number of

representatives of the Pool Committee on the Advisory Committee shall be as provided in the rules of the pool from time to time but not exceeding ten (10). The voting power of the pool on the Advisory Committee shall be apportioned and exercised as determined from time to time by the Pool Committee.

6. Replenishment Obligation. The pool shall provide funds for replenishment of any production by persons other than members of the Overlying (Non-agricultural) Pool or Appropriator Pool, in excess of the pool's share of Safe Yield. During the first five (5) years of operations of the Physical Solution, reasonable efforts shall be made by the Pool Committee to equalize annual assessments.

7. Assessments. All assessments in this pool (whether for replenishment water cost or for pool administration or the allocated share of Watermaster administration) shall be in an amount uniformly applicable to all production in the pool during the preceding year or calendar quarter. Provided, however, that the Agricultural Pool Committee, may recommend to the Court modification of the method of assessing pool members, *inter se*, if the same is necessary to attain legitimate basin management objectives, including water conservation and avoidance of undesirable socio-economic consequences. Any such modification shall be initiated and ratified by one of the following methods:

(a) Excess Production. - In the event total pool production exceeds 100,000 acre feet in any year, the Pool Committee shall call and hold a meeting, after notice to all pool members, to consider remedial modification of the assessment formula.

(b) Producer Petition. - At any time after the fifth full year of operation under the Physical Solution, a petition by ten percent (10%) of the voting power or membership of the Pool shall compel the holding of a noticed meeting to consider revision of said formula of assessment for replenishment water.

In either event, a majority action of the voting power in attendance at such pool members' meeting shall be binding on the Pool Committee.

8. Rules. The Pool Committee shall adopt rules for conducting meetings and affairs of the committee and for administering its program and in amplification of the provisions, but not inconsistent with, this pooling plan.

EXHIBIT "G"
OVERLYING (NON-AGRICULTURAL) POOL
POOLING PLAN

1. Membership in Pool. The initial members of the pool, together with the decreed share of the Safe Yield of each, are listed in Exhibit "D". Said pool includes producers of water for overlying industrial or commercial (non-agricultural) purposes, or such producers within the Pool who may hereafter take water pursuant to Paragraph 8 hereof.

2. Pool Committee. The Pool Committee for this pool shall consist of one representative designated by each member of the pool. Voting on the committee shall be on the basis of one vote for each member, unless a volume vote is demanded, in which case votes shall be allocated as follows:

> The volume voting power on the Pool Committee shall be 1,484 votes. Of these, 742 votes shall be allocated on the basis of one vote for each ten (10) acre feet or fraction thereof of decreed shares in Safe Yield. (See Exhibit "D") The remaining 742 votes shall be allocated proportionally on the basis of assessments paid to Watermaster during the preceding year.*

3. Advisory Committee Representatives. At least three (3) members of the Pool Committee shall be designated by said committee to serve on the Advisory Committee. The exact number of such representatives at any time shall be as determined by the Pool Committee. The voting power of the pool shall be exercised in the

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*Or production assessments paid under Water Code Section 72140 et seq., as to years prior to the second year of operation under the Physical Solution hereunder.

Advisory Committee as a unit, based upon the vote of a majority of said representatives.

4. Replenishment Obligation. The pool shall provide funds for replenishment of any production in excess of the pool's share of Safe Yield in the preceding year.

5. Assessment. Each member of this pool shall pay an assessment equal to the cost of replenishment water times the number of acre feet of production by such producer during the preceding year in excess of (a) his decreed share of the Safe Yield, plus (b) any carry-over credit under Paragraph 7 hereof. In addition, the cost of the allocated share of Watermaster administration expense shall be recovered on an equal assessment against each acre foot of production in the pool during such preceding fiscal year or calendar quarter; and in the case of Pool members who take substitute ground water as set forth in Paragraph 8 hereof, such producer shall be liable for its share of administration assessment, as if the water so taken were produced, up to the limit of its decreed share of Safe Yield.

6. Assignment. Rights herein decreed are appurtenant to the land and are only assignable with the land for overlying use thereon; provided, however, that any appropriator who may, directly or indirectly, undertake to provide water service to such overlying lands may, by an appropriate agency agreement on a form approved by Watermaster, exercise said overlying right to the extent, but only to the extent necessary to provide water service to said overlying lands.

7. Carry-over. Any member of the pool who produces less than its assigned water share of Safe Yield may carry such unexercised

right forward for exercise in subsequent years. The first water produced during any such subsequent year shall be deemed to be an exercise of such carry-over right. In the event the aggregate carry-over by any pool member exceeds its share of Safe Yield, such member shall, as a condition of preserving such surplus carry-over, execute a storage agreement with Watermaster.

8. Substitute Supplies. To the extent that any Pool member, at the request of Watermaster and with the consent of the Advisory Committee, takes substitute surface water in lieu of producing ground water otherwise subject to production as an allocated share of Safe Yield, said party shall nonetheless remain a member of this Pool.

9. Rules. The Pool Committee shall adopt rules for administering its program and in amplification of the provisions, but not inconsistent with, this pooling plan.

EXHIBIT "H"
APPROPRIATIVE POOL
POOLING PLAN

1. Qualification for Pool. Any city, district or other public entity and public utility -- either regulated under Public Utilities Commission jurisdiction, or exempt therefrom as a non-profit mutual water company (other than those assigned to the Overlying (Agricultural) Pool) -- shall be a member of this pool. All initial members of the pool are listed in Exhibit "E", together with their respective appropriative rights and acre foot allocation and percentage shares of the initial and subsequent Operating Safe Yield.

2. Pool Committee. The Pool Committee shall consist of one (1) representative appointed by each member of the Pool.

3. Voting. The total voting power on the Pool Committee shall be 1,000 votes. Of these, 500 votes shall be allocated in proportion to decreed percentage shares in Operating Safe Yield. The remaining 500 votes shall be allocated proportionally on the basis of assessments paid to Watermaster during the preceding year.* Routine business of the Pool Committee may be conducted on the basis of one vote per member, but upon demand of any member a weighted vote shall be taken. Affirmative action of the Committee shall require a majority of the voting power of members in attendance, provided that it includes concurrence by at least one-third of its total members.

4. Advisory Committee Representatives. Ten (10) members of

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*Or production assessments paid under Water Code Section 72140 et seq., as to years prior to the second year of operation under the Physical Solution hereunder.

the Pool Committee shall be designated to represent this pool on the Advisory Committee. Each major appropriator, i.e., the owner of an adjudicated appropriative right in excess of 3,000 acre feet, shall be entitled to one representative. The remaining members representing the Appropriative Pool on the Advisory Committee shall be elected at large by the remaining members of the pool. The voting power of the Appropriative Pool on the Advisory Committee shall be apportioned between the major appropriator representatives in proportion to their respective voting power in the Pool Committee. The remaining two representatives shall exercise equally the voting power proportional to the Pool Committee voting power of all remaining appropriators; provided, however, that if any representative fails to attend an Advisory Committee meeting, the voting power of that representative shall be allocated among the representatives of the Appropriator Pool in attendance in the same proportion as their own respective voting powers.

5. Replenishment Obligation. The pool shall provide funds for purchase of replenishment water to replace any production by the pool in excess of Operating Safe Yield during the preceding year.

6. Administrative Assessment. Costs of administration of this pool and its share of general Watermaster expense shall be recovered by a uniform assessment applicable to all production during the preceding year.

7. Replenishment Assessment. The cost of replenishment water required to replace production from Chino Basin in excess of Operating Safe Yield in the preceding year shall be allocated and recovered as follows:

(a) For production, other than for increased export, within CBMWD or WMWD:

(1) Gross Assessment. 15% of such replenishment water costs shall be recovered by a uniform assessment against all production of each appropriator producing in said area during the preceding year.

(2) Net Assessment. The remaining 85% of said costs shall be recovered by a uniform assessment on each acre foot of production from said area by each such appropriator in excess of his allocated share of Operating Safe Yield during said preceding year.

(b) For production which is exported for use outside Chino Basin in excess of maximum export in any year through 1976, such increased export production shall be assessed against the exporting appropriator in an amount sufficient to purchase replenishment water from CBMWD or WMWD in the amount of such excess.

(c) For production within SBVMWD or PVMWD:

By an assessment on all production in excess of an appropriator's share of Operating Safe Yield in an amount sufficient to purchase replenishment water through SBVMWD or MWD in the amount of such excess.

8. Socio-Economic Impact Review. The parties have conducted certain preliminary socio-economic impact studies. Further and more detailed socio-economic impact studies of the assessment formula and its possible modification shall be undertaken for the Appropriator Pool by Watermaster no later than ten (10) years from the effective date of this Physical Solution, or whenever total

production by this pool has increased by 30% or more over the decreed appropriative rights, whichever is first.

9. Facilities Equity Assessment. Watermaster may, upon recommendation of the Pool Committee, institute proceedings for levy and collection of a Facilities Equity Assessment for the purposes and in accordance with the procedures which follow:

(a) Implementing Circumstances. - There exist several sources of supplemental water available to chino Basin, each of which has a differential cost and quantity available. The optimum management of the entire Chino Basin water resource favors the maximum use of the lowest cost supplemental water to balance the supplies of the Basin, in accordance with the Physical Solution. The varying sources of supplemental water include importations from MWD and SBVMWD, importation of surface and ground water supplies from other basins in the immediate vicinity of Chino Basin, and utilization of reclaimed water. In order to fully utilize any of such alternate sources of supply, it will be essential for particular appropriators having access to one or more of such supplies to have invested, or in the future to invest, directly or indirectly, substantial funds in facilities to obtain and deliver such water to an appropriate point of use. To the extent that the use of less expensive alternative sources of supplemental water can be maximized by the inducement of a Facilities Equity Assessment, as herein provided, it is to the long-term benefit of the entire basin that such assessment be authorized and levied by Watermaster.

(b) Study and Report. - At the request of the Pool

Committee, Watermaster shall undertake a survey study of the utilization of alternate supplemental supplies by members of the Appropriative Pool which would not otherwise be utilized and shall prepare a report setting forth the amount of such alternative supplies being currently utilized, the amount of such supplies which could be generated by activity within the pool, and the level of cost required to increase such uses and to optimize the total supplies available to the basin. Said report shall contain an analysis and recommendation for the levy of a necessary Facilities Equity Assessment to accomplish said purpose.

(c) Hearing. - If the said report by Watermaster contains a recommendation for imposition of a Facilities Equity Assessment, and the Pool Committee so requests, Watermaster shall notice and hold a hearing not less than 60 days after distribution of a copy of said report to each member of the pool, together with a notice of the hearing date. At such hearing, evidence shall be taken with regard to the necessity and propriety of the levy of a Facilities Equity Assessment and full findings and decision shall be issued by Watermaster.

(d) Operation of Assessment. - If Watermaster determines that it is appropriate that a Facilities Equity Assessment be levied in a particular year, the amount of additional supplemental supplies which should be generated by such assessment shall be estimated. The cost of obtaining such supplies, taking into consideration the investment in necessary facilities shall then be determined and spread equitably among the producers within the pool in a manner so that those

producers not providing such additional lower cost supplemental water, and to whom a financial benefit will result, may bear a proportionate share of said costs, not exceeding said benefit; provided that any producer furnishing such supplemental water shall not thereby have its average cost of water in such year reduced below such producer's average cost of pumping from the Basin. In so doing, Watermaster shall establish a percentage of the total production by each party which may be produced without imposition of a Facilities Equity Assessment. Any member of the pool producing more water than said percentage shall pay such Facilities Equity Assessment on any such excess production. Watermaster is authorized to transmit and pay the proceeds of such Facilities Equity Assessment to those producers who take less than their share of Basin water by reason of furnishing a higher percentage of their requirements through use of supplemental water.

10. Unallocated Safe Yield Water. To the extent that, in any five years, any portion of the share of Safe Yield allocated to the Overlying (Agricultural) Pool is not produced, such water shall be available for reallocation to members of the Appropriative Pool, as follows:

(a) Priorities. - Such allocation shall be made in the following sequence:

(1) to supplement, in the particular year, water available from Operating Safe Yield to compensate for any reduction in the Safe Yield by reason of recalculation thereof after the tenth year of operation hereunder.

EXHIBIT "H"

(2) pursuant to conversion claims as defined in Subparagraph (b) hereof.

(3) as a supplement to Operating Safe Yield, without regard to reductions in Safe Yield.

(b) Conversion Claims. - The following procedures may be utilized by any appropriator:

(1) Record of Land Use Conversion. Any appropriator who undertakes, directly or indirectly, during any year, to permanently provide water service to lands which during the immediate preceding five (5) consecutive years was devoted to irrigated agriculture may report such change in land use or water service to Watermaster. Watermaster shall thereupon verify such change in water service and shall maintain a record and account for each appropriator of the total acreage involved and the average annual water use during said five-year period.

(2) Establishment of Allocation Percentage. In any year in which unallocated Safe Yield water from the Overlying (Agricultural) Pool is available for such conversion claims, Watermaster shall establish allocable percentages for each appropriator based upon the total of such converted acreage recorded to each such appropriator's account.

(3) Allocation and Notice. Watermaster shall thereafter apply the allocated percentage to the total unallocated Safe Yield water available for special allocation to derive the amount thereof allocable to

each appropriator; provided that in no event shall the allocation to any appropriator as a result of such conversion claim exceed 50% of the average annual amount of water actually applied to the areas converted by such appropriator prior to such conversion. Any excess water by reason of such limitation on any appropriator's right shall be added to Operating Safe Yield. Notice of such special allocation shall be given to each appropriator and shall be treated for purposes of this Physical Solution as an addition to such appropriator's share of the Operating Safe Yield for the particular year only.

(4) Administrative Costs. Any costs of Watermaster attributable to administration of such special allocations and conversion claims shall be assessed against appropriators participating in such reporting.

11. In Lieu Procedures. There are, or any develop, certain areas within Chino Basin where good management practices dictate that recharge of the basin be accomplished, to the extent practical, by taking surface supplies of supplemental water in lieu of ground water otherwise subject to production as an allocated share of Operating Safe Yield.

(a) Method of Operation. - An appropriator producing water within such designated in lieu area who is willing to abstain for any reason from producing any portion of such producer's share of Operating Safe Yield in any year may offer such unpumped water to Watermaster. In such event, Watermaster shall purchase said water in place, in lieu of spreading replenishment water, which is otherwise required to

make up for over production. The purchase price for in lieu water shall be the lesser of:

(1) Watermaster's current cost of replenishment water, whether or not replenishment water is currently then obtainable, plus the cost of spreading; or

(2) The cost of supplemental surface supplies to the appropriator, less

a. said appropriator's average cost of ground water production, and

b. the applicable production assessment were the water produced.

Where supplemental surface supplies consist of MWD or SBVMWD supplies, the cost of treated, filtered State water from such source shall be deemed the cost of supplemental surface supplies to the appropriator for purposes of such calculation.

In any given year in which payments may be made pursuant to a Facilities Equity Assessment, as to any given quantity of water the party will be entitled to payment under this section or pursuant to the Facilities Equity Assessment, as the party elects, but not under both.

(b) Designation of In Lieu Areas. - The first in lieu area is designated as the "In Lieu Area No. 1" and consists of an area wherein nitrate levels in the ground water generally exceed 45 mg/l, and is shown on Exhibit "J" hereto. Other in lieu areas may be designated by subsequent order of Watermaster upon recommendation or approval by Advisory Committee. Said in lieu areas may be enlarged, reduced or

eliminated by subsequent orders; provided, however, that designation of In Lieu Areas shall be for a minimum fixed term sufficient to justify necessary capital investment. In Lieu Area No. 1 may be enlarged, reduced or eliminated in the same manner, except that any reduction of its original size or elimination thereof shall require the prior order of Court.

12. Carry-over. Any appropriator who produces less than his assigned share of Operating Safe Yield may carry such unexercised right forward for exercise in subsequent years. The first water produced during any such subsequent year shall be deemed to be an exercise of such carry-over right. In the event the aggregate carry-over by any appropriator exceeds its share of Operating Safe Yield, such appropriator shall, as a condition of preserving such surplus carry-over, execute a storage agreement with Watermaster. Such appropriator shall have the option to pay the gross assessment applicable to such carry-over in the year in which it accrued.

13. Assignment, Transfer and Lease. Appropriative rights, and corresponding shares of Operating Safe Yield, may be assigned or may be leased or licensed to another appropriator for exercise in a given year. Any transfer, lease or license shall be ineffective until written notice thereof is furnished to and approved as to form by Watermaster, in compliance with applicable Watermaster rules. Watermaster shall not approve transfer, lease or license of a right for exercise in an area or under conditions where such production would be contrary to sound basin management or detrimental to the rights or operations of other producers.

14. Rules. The Pool Committee shall adopt rules for

administering its program and in amplification of the provisions, but not inconsistent with, this pooling plan.

EXHIBIT "I"

ENGINEERING APPENDIX

1. Basin Management Parameters. In the process of implementing the physical solution for Chino Basin, Watermaster shall consider the following parameters:

(a) Pumping Patterns. - Chino Basin is a common supply for all persons and agencies utilizing its waters. It is an objective in management of the Basin's waters that no producer be deprived of access to said waters by reason of unreasonable pumping patterns, nor by regional or localized recharge of replenishment water, insofar as such result may be practically avoided.

(b) Water Quality. - Maintenance and improvement of water quality is a prime consideration and function of management decisions by Watermaster.

(c) Economic Considerations. - Financial feasibility, economic impact and the cost and optimum utilization of the Basin's resources and the physical facilities of the parties are objectives and concerns equal in importance to water quantity and quality parameters.

2. Operating Safe Yield. Operating Safe Yield in any year shall consist of the Appropriative Pool's hare of Safe Yield of the Basin, plus any controlled overdraft of the Basin which Watermaster may authorize. In adopting the Operating Safe Yield for any year, Watermaster shall be limited as follows:

(a) Accumulated Overdraft. - During the operation of this Judgment and Physical Solution, the overdraft accumulated from and after the effective date of the Physical

Solution and resulting from an excess of Operating Safe Yield over Safe Yield shall not exceed 200,000 acre feet.

(b) Quantitative Limits. - In no event shall Operating Safe Yield in any year be less than the Appropriative Pool's share of Safe Yield, nor shall it exceed such share of Safe Yield by more than 10,00 acre feet. The initial Operating Safe Yield is hereby set at 54,834 acre feet per year. Operating Safe Yield shall not be changed upon less than five (5) years' notice by Watermaster.

Nothing contained in this paragraph shall be deemed to authorize, directly or indirectly, any modification of the allocation of shares in Safe Yield to the overlying pools, as set forth in Paragraph 44 of the Judgment.

3. Ground Water Storage Agreements. Any agreements authorized by Watermaster for storage of supplemental water in the available ground water storage capacity of Chino Basin shall include, but not be limited to:

(a) The quantities and term of the storage right.

(b) A statement of the priority or relation of said right, as against overlying or Safe Yield uses, and other storage rights.

(c) The procedure for establishing delivery rates, schedules and procedures which may include:

[1] spreading or injection, or

[2] in lieu deliveries of supplemental water for direct use.

(d) The procedures for calculation of losses and annual accounting for water in storage by Watermaster.

(e) The procedures for establishment and administration of withdrawal schedules, locations and methods.

CHINO BASIN

IN LIEU ARE NO. 1 (MAP)

EXHIBIT "J"

LEGAL DESCRIPTION

OF CHINO BASIN

Preamble

All of the townships and ranges referred to in the following legal description are the San Bernardino Base and Meridian. Certain designated sections are implied as the System of Government Surveys may be extended where not established. Said sections are identified as follows:

Section 20, T1N, R8W is extended across Rancho Cucamonga;

Section 36, T1N, R8W is extended across the City of Upland;

Sections 2,3, and 4, T1S, R7W are extended across Rancho Cucamonga;

Section 10, T1S, R8W is extended across the City of Claremont;

Sections 19, 20, 21, 30, 31 and 32, T1S, R8W are extended across the City of Pomona;

Sections 4, 5, and 28, T2S, R8W are extended across Rancho Santa Ana Del Chino;

Sections 15 and 16, T3S, R7W are extended across Rancho La Sierra; and

Sections 17 and 20, T3S, R7W are extended across Rancho El Rincon.

Description

Chino Basin is included within portions of the Counties of San Bernardino, Riverside and Los Angeles, State of California, bounded by a continuous line described as follows:

BEGINNING at the Southwest corner of Lot 241 as shown on Map of Ontario Colony Lands, recorded in Map Book 11, page 6, Office of the County Recorder of San Bernardino County, said corner being the Point of Beginning;

1. Thence Southeasterly to the Southeast corner

of Lot 419 of said Ontario Colony Lands;

2. Thence Southeasterly to a point 1300 feet North of the South line and 1300 feet East of the West line of Section 4, T1S, R7W;

3. Thence Easterly to a point on the East line of Section 4, 1800 feet North of the Southeast corner of said Section 4;

4. Thence Easterly to the Southeast corner of the Southwest quarter of the Northeast quarter of Section 3, T1S, R7W;

5. Thence Northeasterly to a point on the North line of Section 2, T1S, R7W, 1400 feet East of the West line of said Section 2;

6. Thence Northeasterly to the Southwest corner of Section 18, T1N, R6W;

7. Thence Northerly to the Northwest corner of said Section 18;

8. Thence Easterly to the Northeast corner of said Section 18;

9. Thence Northerly to the Northwest corner of the Southwest Quarter of Section 8, T1N, R6W;

10. Thence Easterly to the Northeast corner of said Southwest quarter of said Section 8;

11. Thence Southerly to the Southeast corner of said Southwest Quarter of said Section 8;

12. Thence Easterly to the Northeast corner of Section 17, T1N, R6W;

13. Thence Easterly to the Northeast corner of Section 16, T1N, R6W;

14. Thence Southeasterly to the Northwest corner of the Southeast quarter of Section 15, T1N, R6W;

15. Thence Easterly to the Northeast corner of said Southeast quarter of said Section 15;

16. Thence Southeasterly to the Northwest corner of the Northeast quarter of Section 23, T1N, R6W;

17. Thence Southeasterly to the Northwest corner of Section 25, T1N, R6W;

18. Thence Southeasterly to the Northwest corner of the Northeast quarter of Section 31, T1N, R5W;

19. Thence Southeasterly to the Northeast corner of the Northwest quarter of Section 5, T1S, R5W;

20. Thence Southeasterly to the Southeast corner of Section 4, T1S, R5W;

21. Thence Southeasterly to the Southeast corner of the Southwest quarter of Section 11, T1S, R5W;

22. Thence Southwesterly to the Southwest corner of Section 14, T1S, R5W;

23. Thence Southwest to the Southwest corner of Section 22, T1S, R5W;

24. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 6, T2S, R5W;

25. Thence Southeasterly to the Northeast corner of Section 18, T2S, R5W;

26. Thence Southwesterly to the Southwest corner of the Southeast quarter of Section 13, T2S, R6W;

27. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 26, T2S, R6W;

28. Thence Westerly to the Southwest corner of the Northwest quarter of said Section 26;

29. Thence Northerly to the Northwest corner of said Section 26;

30. Thence Westerly to the Southwest corner of Section 21, T2S, R6W;

31. Thence Southerly to the Southeast corner of Section 29, T2S, R6W;

32. Thence Westerly to the Southeast corner of Section 30, T2S, R6W;

33. Thence Southwesterly to the Southwest corner of Section 36, T2S, R7W;

34. Thence Southwesterly to the Southeast corner of Section 3, T3S, R7W;

35. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 10, T3S, R7W;

36. Thence Southerly to the Northeast corner of the Northwest quarter of Section 15, T3S, R7W;

37. Thence Southwesterly to the Southeast corner of the Northeast quarter of Section 16, T3S, R7W;

38. Thence Southwesterly to the Southwest corner of said Section 16;

39. Thence Southwesterly to the Southwest corner of the Northeast quarter of Section 20, T3S, R7W;

40. Thence Westerly to the Southwest corner of the Northwest quarter of said Section 20;

41. Thence Northerly to the Northwest corner of Section 17, T3S, R7W;

42. Thence Westerly to the Southwest corner of Section 7, T3S, R7W;

43. Thence Northerly to the Southwest corner of Section 6, T3S, R7W;

44. Thence Westerly to the Southwest corner of Section 1, T3S, R8W;

45. Thence Northerly to the Southeast corner of Section 35, T2S, R8W;

46. Thence Northwesterly to the Northwest corner of said Section 35;

47. Thence Northerly to the Southeast corner of Lot 33, as shown on Map of Tract 3193, recorded in Map Book 43, pages 46 and 47, Office of the County Recorder of San Bernardino County;

48. Thence Westerly to the Northwest corner of the Southwest quarter of Section 28, T2S, R8W;

49. Thence Northerly to the Southwest corner of Section 4, T2S, R8W;

50. Thence Westerly to the Southwest corner of Section 5, T2S, R8W;

51. Thence Northerly to the Southwest corner of Section 32, T1S, R8W;

52. Thence Westerly to the Southwest corner of Section 31, T1S, R8W;

53. Thence Northerly to the Southwest corner of Section 30, T1S, R8W;

54. Thence Northeasterly to the Southwest corner of Section 20, T1S, R8W;

55. Thence Northerly to the Northwest corner of the Southwest quarter of the Southwest quarter of said Section 20;

56. Thence Northwesterly to the Northeast corner of the Southeast quarter of the Southeast quarter of the Northwest quarter of Section 19, T1S, R8W;

57. Thence Easterly to the Northwest corner of Section 21, T1S, R8W;

58. Thence Northeasterly to the Southeast corner of the Southwest quarter of the Southwest quarter of Section 10, T1S, R8W;

59. Thence Northeasterly to the Southwest corner of Section 2, T1S, R8W;

60. Thence Northeasterly to the Southeast corner of the Northwest quarter of the Northwest quarter of Section 1, T1S, R8W;

61. Thence Northerly to the Northeast corner of the Northwest quarter of the Northeast quarter of Section 36, T1N, R8W;

62. Thence Northerly to the Southeast corner of Section 24, T1N, R8W;

63. Thence Northeasterly to the Southeast corner of the Northwest quarter of the Northwest quarter of Section 20, T1N, R7W; and

64. Thence Southerly to the Point of Beginning.

Sections Included

Said perimeter description includes all or portions of the following Townships, Ranges and Sections of San Bernardino Base and Meridian:

T1N, R5W - Sections:	30, 31 and 32
T1N, R6W - Sections:	8, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36
T1N, R7W - Sections:	19, 20, 24, 25, 26, 29, 30, 31, 32, 35 and 36
T1N, R8W - Sections:	25 and 36
T1S, R5W - Sections:	4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 28, 29, 30, 31 and 32
T1S, R6W - Sections:	1 through 36, inclusive
T1S, R7W - Sections:	1 through 36, inclusive
T1S, R8W - Sections:	1, 2, 10, 11, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36
T2S, R5W - Sections:	6, 7 and 18
T2S, R6W - Sections:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 29, 30 and 31
T2S, R7W - Sections:	1 through 36, inclusive
T2S, R8W - Sections:	1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 35 and 36
T3S, R7W - Sections:	2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17 and 20
T3S, R8W - Sections:	1.

EXHIBIT "K"

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Attorneys for
CHINO BASIN WATERMASTER

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO - WEST DISTRICT

CHINO BASIN MUNICIPAL WATER DISTRICT, Plaintiff, v. CITY OF CHINO, Defendant.	Case No.: RCV 51010 ORDER APPROVING AMENDMENTS TO JUDGMENT DATE: November 17, 1995 TIME: 2:00 p.m. DEPT: WD-2 Specially assigned to the Honorable Judge Ben T. Kayashima

On November 17, 1995, at 2:00 p.m., the petition and motion of the Chino Basin Watermaster for an order approving amendments to the judgment to simplify conversion claim procedures came on regularly for hearing, the Honorable Judge Ben T. Kayashima presiding.

Frederic A. Fudacz and John Ossiff, of Nossaman, Guthner, Knox & Elliot, appeared on behalf of Chino Basin Watermaster. No other appearances were made.

No opposition having been received and good cause appearing therefore

IT IS HEREBY ORDERED:

1. That the petition and motion of Watermaster is granted.

2. Paragraph 10(b), "Conversion Claims" of Exhibit "H" of the Judgment is hereby deleted and replaced with a new Paragraph 10(b), attached hereto as Exhibit 1.

Date: ________________

____
Ben T. Kayashima
Judge, San Bernardino County Superior Court

EXHIBIT "1"

AMENDMENT TO JUDGMENT

NEW PARAGRAPH 10(B) OF EXHIBIT "H"

(b) Conversion Claims. The following procedures may be utilized by any appropriator:

(1) Record of Uncoverted Agricultural Acreage.

Watermaster shall maintain on an ongoing basis a record, with appropriate related maps, of all agricultural acreage within the Chino Basin subject to being converted to appropriative water use pursuant to the provisions of this subparagraph. An initial identification of such acreage as of June 30, 1995 is attached hereto as Appendix 1.

(2) Record of Water Service Conversion. Any appropriator who undertakes to permanently provide water service to lands subject to conversion may report such intent to change water service to Watermaster. Watermaster should thereupon verify such change in water service and shall maintain a record and account for each appropriator of the total acreage involved. Should, at any time, converted acreage return to water service from the Overlying (Agricultural) Pool, Watermaster shall return such acreage to uncoverted status and correspondingly reduce or eliminate any allocation accorded to the appropriator involved.

(3) Allocation of Safe Yield Rights.

(i) In any year in which sufficient unallocated Safe Yield from the Overlying (Agricultural) Pool is available for such conversion claims, Watermaster shall allocate to each appropriator with a conversion claim 1.3 acre-feet of unallocated Safe Yield water for each converted acre for which conversion has been approved and recorded by the Watermaster.

(ii) In any year in which the unallocated Safe Yield water from the Overlying (Agricultural) Pool is not sufficient to satisfy all outstanding conversion claims pursuant to subparagraph (i) herein above, Watermaster shall establish allocation percentages for each appropriator with conversion claims. The percentages shall be based upon the ratio of the total of such converted average approved and recorded for each appropriator's account in comparison to the total of converted acreage approved and recorded for all appropriators. Watermaster shall apply such allocation percentage for each appropriator to the total unallocated Safe Yield water available for conversion claims to derive the amount allocable to each appropriator.

(4) Notice and Allocation. Notice of the special allocation of Safe Yield water pursuant to conversion claims shall be given to each appropriator and shall be treated for purposes of this physical solution as an addition to such appropriator's share of the operating Safe Yield for the particular year only.

(5) Administrative Costs. Any costs of Watermaster attributable to the administration of such special allocations and conversion claims shall be assessed against the appropriators participating in such reporting, apportioned in accordance with the total amount of converted acreage held by each appropriator participating in the conversion program.

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CHINO BASIN WATERMASTER

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO - WEST DISTRICT

CHINO BASIN MUNICIPAL WATER DISTRICT, Plaintiff, v. CITY OF CHINO, Defendant.	) Case No.: RCV 51010)) ~~(Amended Proposed)~~))) ORDER FOR AMENDMENTS TO) THE JUDGMENT REGARDING) CHANGES IN POOLING PLANS) AND APPROPRIATIVE POOL) REPRESENTATION OF THE) ADVISORY COMMITTEE)))) DATE: September 18, 1996) TIME: 10:00 a.m.) DEPT: H))) Specially assigned to the Honorable) Judge J. Michael Gunn

On September 18, 1996, the motion for amendments to the Judgment to change Appropriative Pool representation on the Advisory Committee came on regularly for hearing in this matter, the Honorable J. Michael Gunn, Judge, Presiding.

The matter having been duly presented, all arguments having been heard and good cause appearing therefore,

IT IS HEREBY ORDERED:

1. That the petition and motion of Watermaster is granted.

2. That Paragraph 4, "Advisory Committee Representatives," of Exhibit "H" to the Judgment is hereby deleted and replaced with a new Paragraph 4, attached hereto as Exhibit 1.

3. That Paragraph 32, "Authorization," to the Judgment is hereby deleted and replaced with a new Paragraph 32, attached hereto as Exhibit 1.

Date: ______________

____
J. Michael Gunn
Judge, San Bernardino County Superior Court

AMENDMENT TO JUDGMENT

New Exhibit "H" Paragraph 4 to Judgment

4. Advisory Committee Representatives. Members of the Pool Committee shall be designated to represent this pool on the Advisory Committee on the following basis: Each major appropriator, i.e. the owner of an adjudicated appropriative right in excess of 3,000 acre feet, or each appropriator that produces in excess of 3,000 acre feet based upon the prior year's production, shall be entitled to one representative. Two additional representatives of the Appropriative Pool on the Advisory Committee shall be elected at large by the remaining members of the pool. The voting power of the Appropriative Pool on the Advisory Committee shall be apportioned between the major appropriator representatives in proportion to their respective voting power in the Pool Committee. The two representatives of the remaining appropriators shall exercise equally the voting power proportional to the Pool Committee voting power of said remaining appropriators; provided, however, that if any representative fails to attend an Advisory Committee meeting, the voting power of that representative shall be allocated among the representatives of the Approporiative Pool in attendance in the same proportion as their own

respective voting powers.

New Paragraph 32 to the Judgment:

32. Authorization. Watermaster is authorized and directed to cause committees of producer representatives to be organized to act as Pool Committees for each of the several pools created under the Physical Solution. Said Pool Committees shall, in turn, jointly form an Advisory Committee to assist Watermaster in performance of its functions under this judgment. Pool Committees shall be composed as specified in the respective pooling plans, and the Advisory Committee shall be composed of voting representatives from each pool, as designated by the repective Pool Committee in accordance with each pool's pooling plan. WMWD, Three Valleys Municipal Water District (Successor to PVMWD) and SBVMWD shall each be entitled to one non-voting representative on said Advisory Committee.

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SAN BERNARDINO

Attorneys for Chino Basin Watermaster

	) CASE NO. RCV 51010
CHINO BASIN MUNICIPAL	)
WATER DISTRICT,	) Judge: Honorable J. MICHAEL GUNN
Plaintiff,	)
vs.	)
CITY OF CHINO, et al.,	) MOTION TO AMEND JUDGMENT
Defendants.	)
	)
	)
	) Date: September 28, 2000
	) Time: 2:00 pm.
	)
	)
	)
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I.

BACKGROUND

In 1978, judgment was entered in *Chino Basin Municipal Water District v. City of Chino,* a groundwater adjudication of the Chino Basin. This Judgment imposed a physical solution in order to halt the decline of the groundwater levels in the Basin. The Judgment also required the parties to develop an Optimum Basin Management Program ("OBMP") in order to provide a comprehensive program that would offer a long-term solution to the many issues facing the Basin. On June 29, 2000 a final OBMP for the Chino basin was submitted to the Court, and on

July 13, 2000 the Court approved the OBMP and ordered Watermaster to proceed in accordance with its terms.

In the final months prior to completion of the OBMP, the parties negotiated a Peace Agreement that resolved the issues inhibiting finalization of the OBMP. During these negotiations it was recognized that certain minor but necessary amendments would need to be made to the Judgment so that the final OBMP would be fully consistent with the Judgment. The negotiating parties consented to these modifications and they became a part of the Peace Agreement (Article IV, section 4).

In its July 13, Order approving the OBMP, the Court ordered that a hearing would be held on September 28, 2000 to, in part, hear arguments on proposed amendments to the Judgment. Part II of this brief describes Watermaster's recommended amendments to the Judgment in conformance with the Peace Agreement.

II

Proposed Amendments to the Judgment

Watermaster recommends the following amendments to the Judgment:

(a) The Judgment shall be amended so that the last sentence of Paragraph 8 of the Judgment reads:

All overlying rights are appurtenant to the land and cannot be assigned or conveyed separate of apart therefrom for the term of the Peace Agreement except that the members of the Overlying (Non-Agricultural) Pool shall have the right to Transfer or lease their quantified production rights within the Overlying (Non-Agricultural) Pool or to Watermaster in conformance with the procedures described in the Peace Agreement between the Parties therein, dated June 29, 2000.

(b) Paragraph 6 of Exhibit "G" to the Judgment regarding the Overlying Non- Agricultural Pool shall be amended to read:

Assignment. Rights herein decreed are appurtenant to that land and are

Only assignable with the land for overlying use thereon; provided, however, (a) that any appropriator who may, directly or indirectly, undertake to provide water service to such overlying lands may, by an appropriate agency agreement on a form approved by Watermaster, exercise said overlying right to the extent, but only to the extent necessary to provide water service to said overlying lands, and (b) the members of the pool shall have the right to Transfer or lease their quantified production rights within the pool or to Watermaster in conformance with the procedures described in the Peace Agreement between the Parties therein, dated June 29, 2000 for the term of the Peace Agreement.

(c) The 1995 Amendment to the Judgment shall be amended as follows: Section 10(b)(3)(i) shall now read:

"For the term of the Peace Agreement, in any year in which sufficient unallocated Safe Yield from the Overlying (Agricultural) Pool is available for such conversions claims, Watermaster shall allocate to each appropriator with a conversion claim, 2.0 acre-feet of unallocated Safe Yield water for each converted acre for which conversion has been approved and recorded by the Watermaster."

Appendix 1 to the Judgment shall be construed to be consistent with this amendment. All other parts of the 1995 Amendment shall remain the same.

III

Conclusion

The Peace Agreement is a carefully constructed balance of the various interests in the Basin that has enabled the OBMP to be finalized. One part of the negotiation of the Peace Agreement was an agreement on the necessary amendments to the Judgment in order to make the Peace Agreement and the Judgment fully consistent with one another. The signatories have agreed that the amendments described above are the only *necessary* amendments in order to achieve consistency.

Neither the signatories to the Peace Agreement nor Watermaster believe any other proposed amendments are necessary at this time and accordingly urge this Court to make only those changes necessary so that the final OBMP is consistent with the Judgment. The Judgment has created a stable institutional framework in the Chino Basin that has made the development of the OBMP possible. Changes to this framework should be made only where absolutely necessary so as to cause minimal disruption to this stability. Watermaster has determined that the amendments proposed above are the only necessary changes that need to be made consistent with the Peace Agreement.

The parties have made a monumental effort to craft a solution that will fulfill the overriding goal of managing the Chino Basin on a sustainable basis for the benefit of all. Watermaster respectfully request that the Court approve the above referenced amendments in furtherance of the physical solution.

Dated: August __, 2000.

HATCH & PARENT

By: ____________________

Scott S. Slater

Michael Fife

Attorneys for Chino Basin Watermaster

SUPERIOR COURT FOR THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

	) CASE NO. RCV 51010
CHINO BASIN MUNICIPAL WATER	)
DISTRICT,	) ORDER CONCERNING
Plaintiff,	) MOTION TO AMEND JUDGMENT
vs.	)
CITY OF CHINO, et al.,	)
Defendants.	) Date: September 28, 2000
	) Dept: 8
	) Time: 2:00 p.m.
	)
	)
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Background

On February 19, 1998, the Court directed Watermaster to prepare an optimum basin management program ("OBMP") for the Chino Basin. On July 13, 2000, the Court found, subject to certain conditions precedent, that Watermaster's support and approval of the Peace Agreement regarding the Chino Groundwater Basin, dated June 29, 2000, hereinafter "Peace Agreement," and Watermaster's commitment to implement the OBMP Phase I Report through the provisions of the OBMP Implementation Plan as expressly set forth in Article

V of the Peace Agreement satisfied Watermaster's obligation to prepare an OBMP. One of the conditions precedent to that finding is Court approval of all Judgment modifications in furtherance of the OBMP.

On August 15, 2000, Watermaster filed a Motion to Amend the Judgment. No other party has submitted proposed Judgment modifications in furtherance of the OBMP, nor has opposition been filed to Watermaster's motion. Watermaster asserts that the parties to the Peace Agreement have agreed that the proposed amendments are the only Judgment modifications necessary to achieve consistency between the OBMP and the Judgment. Consequently, the parties have not provided comprehensive briefing on Judgment modification issues.

Discussion

Special Referee Anne Schneider has provided the Court (and the parties) with a thoughtful analysis of various provisions in the Peace Agreement that appear to be in conflict with the Judgment. Watermaster's motion recognizes some of these conflicts. However, the Special Referee's Report and Recommendation Regarding Watermaster's Motion to Amend Judgment notes several provisions in the Peace Agreement which appear to conflict with the Judgment, for which no modification is proposed. For example, Watermaster proposes to modify the amended Judgment Exhibit H conversion provisions to allow 2.0 acre-feet of unallocated Safe Yield water for each converted acre. However, no revision is proposed with respect to Appendix 1, which explains the basis for the existing 1.3 acre-feet per acre provision. Another example is the Peace Agreement provision which permits "Early Transfer" allocations of 32,800 acre-feet of water to occur annually, yet the Overlying (Agricultural) Pool is still entitled to pump 82,800 acre-feet per year without reduction. There are several other provisions of the Peace Agreement noted by the Special Referee which appear to conflict with the Judgment, for which no Judgment amendment is sought.

Order

The Court has considered the Special Referee's Report and Recommendation Regarding Motion to Amend Judgment and hereby issues its ruling accepting the Report and adopting the Recommendation of Anne Schneider.

The Court incorporates herein by reference the entirety of the Special Referee's Report and Recommendation Regarding Motion to Amend Judgment. Watermaster's Motion to Amend the Judgment is granted subject to the following: the parties are directed to file a post-hearing brief (s) clarifying their intent with respect to the Peace Agreement provisions discussed in Sections IIB through IIF in the Special Referee's Report and Recommendation Regarding Watermaster's Motion to Amend Judgment. The post-hearing brief(s) shall be submitted no later than October 26, 2000.

Dated: September 28, 2000. s/s J. Michael Gunn

J. MICHAEL GUNN, Judge

SUPERIOR COURT FOR THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

	) CASE NO. RCV 51010
CHINO BASIN MUNICIPAL WATER DISTRICT,	)
	) ORDER CONCERNING
Plaintiff,	) MOTION TO EXTEND NINE-MEMBER
vs.	) BOARD
	)
CITY OF CHINO, et al.,	) Date: September 28, 2000
Defendants.	) Dept: 8
	) Time: 2:00 p.m.
	)
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Background

On February 19, 1998, the Court appointed a nine-member board consisting of representatives from the Overlying (Agricultural) Pool, the Overlying (Non-agricultural) Pool, the Appropriative Pool, and three municipal water districts to serve as Interim Watermaster for the Chino Groundwater Basin (hereinafter sometimes referred to as "Basin"). Watermaster was directed to notice a hearing on or before October 28, 1999, to consider all parties' input as to the continuance of the nine-member board. The Court informed the parties that one of the measures that would be used in determining the effectiveness of the nine-member board, in functioning as a steward of the Basin,

would be the progress made on the adoption of an optimum basin management program ("OBMP") for the Basin. The OBMP was to be submitted to the Court no later than September 30, 1999, and a hearing was set on October 28, 1999, to consider whether to approve and order full implementation of the program. The deadline for approval of the OBMP was continued several times. The Court finally approved the OBMP, consisting of the Phase I Report and Implementation Plan, subject to certain conditions precedent, on July 13, 2000.

Discussion

Extension of Appointment of Nine-member Board

On August 30, 2000, Watermaster filed a Motion to Extend the Nine-Member Board for a Full Five-Year Term. The motion requests the Court to order that the current nine-member structure of the Watermaster board continue in effect for a full five-year term. Watermaster asserts that all of the conditions precedent set forth in the Court's July 13, 2000, Order have been satisfied. However, as noted in Special Referee Anne Schneider's Report and Recommendation Concerning Motion to Extend Nine-Member Board, there are several outstanding issues that must be resolved before it can be said that all of the conditions have been satisfied. First, it is not clear that unanimous approval of the Peace Agreement regarding the Chino Groundwater Basin, dated June 29, 2000, hereinafter "Peace Agreement," has been obtained. Western Municipal Water District's "ratification" of the Peace Agreement was conditional. Watermaster reports the need for further negotiations related to the purchase of desalted water. Second, Watermaster states that the California Legislature has appropriated \$235,000,000 for the benefit of the Santa Ana Watershed Project Authority ("SAWPA") and allocated this sum to the state Water Resources Control Board ("SWRCB") for distribution. Watermaster further states that SAWPA has submitted an application to SWRCB for distribution of these funds, including \$56,000,000 to be used to fund the Chino II desalter and an expansion of the Chino I desalter. However, Watermaster has not explained how the \$121,000,000 condition precedent is satisfied when only \$56,000,000 of the funds allocated to SAWPA are to be used for the Chino Basin desalter project. Third, while Watermaster has submitted a schedule and process for submission to the Court of detailed periodic reports regarding compliance with the Implementation Plan for the OBMP, the schedule has some omissions. For example, Program Elements 3 and 5, which encompass the desalter project, are not included in the schedule.

It must be noted that the City of Chino has filed an Opposition to Motion to Extend the Nine-Member Board for a Full Five-Year Term. Although it supports the continuation of the current nine-member board structure, the City of Chino asserts that Court guidance is needed with respect to the establishment of "criteria, procedures and schedules for the rotation of Appropriative Pool members" serving on the nine-member board. Watermaster responds that several groups must determine a procedure for rotation: Overlying (Agricultural) Pool, Overlying (Non-agricultural) Pool, and the three municipal districts that hold seats on the board and the Appropriative Pool. Watermaster is hopeful that a complete consensus will emerge prior to October 31, 2000, and requests the Court to allow the consensus-building process to continue and give the parties until October 31, 2000, to resolve their differences. An inability to reach consensus on the rotation issue is of considerable concern to the Court. The Court is unwilling to extend the appointment of the board unless and until the rotation Issue is resolved.

Periodic Reporting Requirements

In the exercise of its continuing jurisdiction, the Court shall require periodic progress reports regarding implementation of the OBMP to ensure that the Watermaster is performing its independent function and keeping to the schedule
adopted for OBMP implementation. The Court adopts the following schedule for

OBMP reporting:

Report No. 1	March 31, 2001
Report No. 2	September 30, 2001
Report No. 3	March 31, 2002

Report No. 4	September 30, 2002
Report No. 5	March 31, 2003
Report No. 6	September 30, 2003
Report No. 7	March 31, 2004
Report No. 8	September 30, 2004
Report No. 9	March 31, 2005
Report No. 10	September 30, 2005

Report No. 10 coincides with the end of the appointment of the Nine-Member Board. The OBMP progress reports, together with independent assessment of OBMP implementation status, including verification of data to be provided by the Special Referee and her technical expert, will be the basis for consideration of continuing the appointment. The Court may schedule hearings to coincide with some or all of these reports. Alternatively, the Court may, from time to time, direct the Special Referee to conduct a workshop in lieu of a court hearing. The reports should follow the format prescribed in Special Referee Anne Schneider's Report and Recommendation Concerning Motion to Extend Nine Member Board.

Future Desalters

The Court wants to particularly note that the Peace Agreement predicates any future desalting capacity on a reevaluation of the need for additional desalting after the earlier of ten years or the conversion of 20,000 acres of agricultural land. The Court is mindful that while the parties to the Peace Agreement contemplate the construction of future desalters and/or expansion of Chino I and/or Chino II

Desalters, there are no provisions in the Peace Agreement that effectively ensure that they will be built. In effect, future desalters (and any expansions of the Chino I and II Desalters) will be built "if and only If" funding from sources other than the Parties can be secured. The OBMP (Phase I Report and Phase II Implementation Plan) calls for some 40,000 acre-feet per year of desalting capacity to be installed in the southern part of the Basin by 2020. The Court hereby gives notice to the parties that a primary concern of the Court in any future application for reappointment of the nine-member board will be the parties' continued commitment to provide for future desalters and preserve safe yield in accordance with the OBMP.

Order

Watermaster seeks an order continuing the current nine-member structure of the Watermaster Board in effect for a full five-year term and authorizing it to perform all managerial and administrative functions as specified in the Judgment, including the execution of all administrative and employment contracts. Watermaster states that it will propose a schedule for rotation of its board members no later than October 31, 2000.

The Court is not inclined to extend unconditionally the reappointment of the nine-member board until both the rotation and the Western Municipal Water District issues have been resolved. Therefore, the appointment shall be made subject to certain conditions. The failure of any one of these conditions shall be considered by the Court as a compelling reason to reconsider the appointment of the nine member board. Therefore, subject to the continuing jurisdiction of the Court and satisfaction of conditions numbers 1 - 5 below, the Court hereby issues its order:

The Court has considered the Special Referee's Report and Recommendation Concerning Motion to Extend Nine-Member Board and hereby issues its ruling accepting the Report and adopting the Recommendation of Anne Schneider, except to the extent that it recommends continuation of the appointment for only three years. The Court incorporates herein by reference the entirety of the Special Referee's Report and Recommendation Concerning the Motion to Extend Nine-Member Board. The nine-member board is hereby appointed for an additional five-year term, until September 30, 2005, subject to the continuing jurisdiction of the Court to reconsider the appointment in the event Watermaster fails to timely comply with the following conditions:

1. Watermaster's report on the status of its efforts to resolve the terms and conditions applicable to the purchase of desalted water and to secure a recission of Western Municipal Water District's conditional execution of the Peace Agreement no later than December 31, 2000; and

2. Watermaster adoption and Court approval of Revised Rules and Regulations for Chino Basin by February 1, 2001; and

3. Submission of Reports Nos. 1 through 10 in accordance with the schedule set forth in the discussion above; and

4. Inclusion in such reports of schedule and budget information essentially in a form equivalent to Exhibit "E" and Table 4-14 of the Phase I Report; and

5. Watermaster cooperation in the independent assessment and verification of the data

included in Reports No. 1 through 10 to be provided to the Court by the Special Referee and her technical expert.

The parties are forewarned that any future application for reappointment of the nine-member board may be conditioned on the development of a detailed plan to reach the OBMP goal of 40,000 acre-feet per year of desalting capacity to be installed in southern part of the Basin by 2020.

Dated: September 28, 2000.

s/s J. Michael Gunn

J. MICHAEL GUNN, Judge

SCOTT SLATER (State Bar No. 117317)

MICHAEL FIFE (State Bar No. 203025)

HATCH AND PARENT

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Santa Barbara, CA 93101-2782

Telephone: (805) 963-7000

Facsimile: (805) 965-4333

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SAN BERNARDINO

Attorneys for Chino Basin Watermaster

	) CASE NO. RCV 51010
CHINO BASIN MUNICIPAL	)
WATER DISTRICT,	)
Plaintiff,	)
vs.	)
CITY OF CHINO, et al.,	) NOTICE OF ENTRY OF ORDER
Defendants.	) CONCERNING MOTION TO
	) EXTEND NINE-MEMBER BOARD
	) AND ORDER CONCERNING
	) MOTION TO AMEND JUDGMENT
	)
	)
	)
	)
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TO ALL PARTIES AND THEIR ATTORNEYS OF RECORD;

Please take notice that on September 28, 2000, the Court entered its Order Concerning Motion to Extend Nine-Member Board and Order Concerning Motion to Amend Judgment. A true and correct copy of these Orders are attached hereto and made a part hereof by this reference.

The Court also provided guidance on the factors that it will consider when deciding to reappoint the Nine-Member Watermaster Board in 2005. These factors are:

(1) All production meters will be installed;

(2) Basin Monitoring will be completely in place and will have been the basis for semi-annual reports specified in the Order;

(3) The Recharge Master Plan will be complete and appropriate recharge facilities will have been installed;

(4) The OBMP Desalter I Expansion and Desalter II will be installed and operational, with demonstrated delivery of desalter water for municipal use in the Basin.

In addition, the Court wishes to schedule a hearing on February 1, 2001 at 2:00 pm. The purpose of the hearing will be to:

(1) Approve the Revised Rules and Regulations for the Chino Basin;

(2) Approve the post-Order memorandum which will be filed on October 26, 2000;

(3) Receive a report on the status Western Municipal Water District's recission of its conditional execution of the Peace Agreement; and

(4) Receive Watermaster's Annual Report.

The Revised Rules and Regulations for the Chino Basin should be submitted to the Court by December 31, 2000.

Dated: September 28, 2000

HATCH & PARENT

By: s/s Michael Fife

Michael Fife

Attorneys for Chino Basin Watermaster

APPENDIX 1

To Chino Basin Watermaster
Amendment Regarding Land Use Conversions

The purpose of the amendment is to simplify the methodology and procedure for land use conversions under the 1978 Judgment. The basic nature of the commitment undertaken by the parties who negotiated the Judgment is not intended to be changed. The methodology used to develop the recommended 2.0 [1] per acre (af/ac) conversion factor can best be described as a gross water duty method. Essentially, the total water use was divided by the total acreage remaining to be converted to develop the gross average water use per acre.

At the Land Use Conversion Workshop held on January 10, 1995, there was a consensus among the parties to the Judgment that the large agricultural acreage within the purveyor service areas must still be converted. To depict the large southern area remaining to be converted, Watermaster staff proposed the establishment of Conversion Area No. 1 (see attached map). This area can generally be described as the area that is south of the 60 Freeway, outside the current city boundaries of Chino, Chino Hills and Ontario and for the most part, the portion of Jurupa Community Services District (JCSD) that is west of Etiwanda. The southernmost boundary of the area is taken as the Army Corps of Engineers' Prado Basin take line, unless a specific agricultural well exists inside the take line. To obtain the acreage for Conversion Area No. 1, the Santa Ana Watershed Project Authority (SAWPA), used its Geographic Information System (GIS) and determined the total acreage shown in Conversion Area No. 1 to be approximately 27,133 acres.

Also at the January 10 Land Use Conversion Workshop, the appropriators were asked to submit the proposed remaining convertible acreage inside their established service areas. Submissions of the parcels proposed as eligible for conversion, both inside and outside Conversion area No. 1 began arriving in early March 1995, and were received as late as June 29, 1995. Watermaster staff worked with each appropriator to identify the proposed acreage by assessor's parcel number. The lists of parcels and the approximate acreage of each parcel, by appropriator, are included with Appendix 1 as Tables 2A - 2G for reference. The maps corresponding to these lists are on file with the Watermaster. The eligibility of most of the parcels submitted has been determined; however, the specific eligibility of some parcels is still in question. The eligibility criteria utilized by staff requires that the land:

1. has not been receiving water provided by an appropriator;
2. was not already included in the establishment of the appropriator's production rights; and
3. has been used for irrigated agriculture within the last five years if it is located outside Conversion Area No. 1

[1] Amended from 1.3 af/ac by Order dated September 28, 2000.

The appropriators were also asked which parcels they were proposing to convert for the production year 1994/95. The parcels proposed for conversion in FY 94/95 are included with Appendix 1 as Tables 3A - 3C. Any parcels converted for production year 1994/95 will affect the assessments and available unallocated safe yield from that production year in fiscal year 1995/96. Table 1 is a summary of the total acreage submitted by each appropriator as being eligible for conversion and of the acreage requested by that appropriator for conversion in FY 94/95, if any. Staff has evaluated the parcels requested for conversion in FY 94/95 and finds that all of those requested, or a total of 2, 185 acres, are eligible for conversion based on the above criteria.

When the 27,133 acres in Conversion Area No. 1 is added to the 5,209 acres (Table 1) proposed for conversion that is outside Conversion Area No. 1, there is a total of 32,343 acres remaining to be converted in the Chino Basin.
The 1978 agricultural water use was 84,095 acre-feet. When this is divided by the 32,343 acres, it results in a use of 2.6 af/ac. The value is still approximately 2.6 af/ac if the average annual post-judgment allocation of 82,800 af is divided and all acres were able to be converted as currently prescribed in the judgment, 50% of this per acre use would be allocated to an appropriator, and the appropriator would receive 1.3 acre-feet per acre. This would be a maximum use per acre. In 1994, the agricultural water use was reported as 44,092 acre-feet per acre. If this use is divided by the 32, 343 acres, it results in a present average use of 1.36 acre-feet per acre.

There was a consensus at the workshops and at the pool committee meetings that many of the conversions that potentially could have taken place since 1978, were not submitted by the appropriators. This is probably because of a lack of the right type of information to make the appropriate use-per-parcel determinations and because of the time and money that would be required if they were pursued extensively. Because of this, there was a consensus that the 1.3 af/ac conversion water use determinations were based only on 50% of the current average use.

Watermaster staff anticipates that each appropriator with remaining convertible acreage will request conversion on that acreage each year that they undertake to serve the land. If the service is anticipated to be permanent, they can request permanent conversion. For the acreage outside Conversion Area No. 1, the above criteria will be applied annually to make an eligibility determination. Also, an appropriator will be required to certify that the land is not currently using water that is being reported as agricultural pool production and Watermaster staff will field verify that agricultural activities have ceased, or that the appropriator is actually satisfying the agricultural use.

Chino Basin Watermaster

Unconverted Acreage

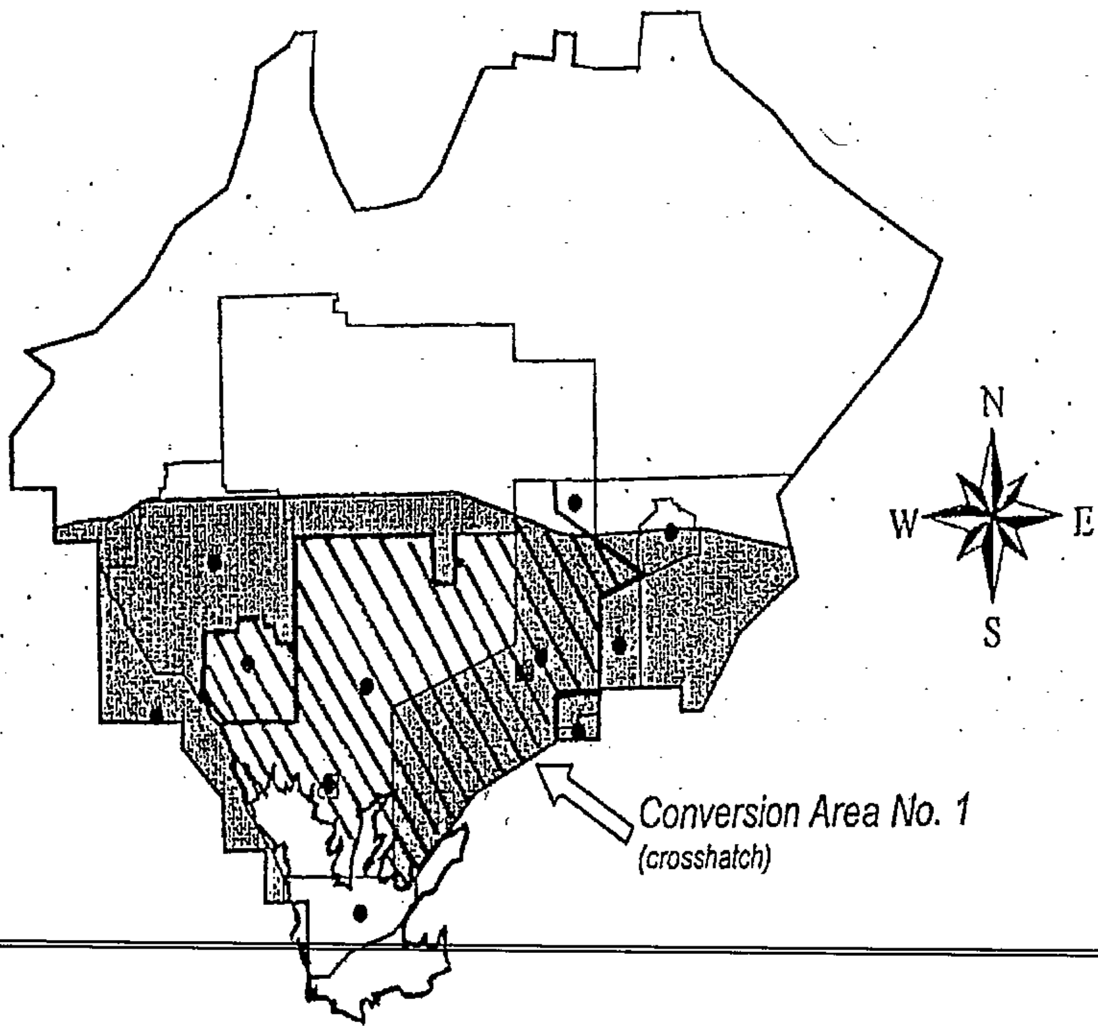

TABLE 1

Chino Basin Watermaster
Proposed Conversion Acres
Revised August 3, 1995

Appropriator	Outside Conversion Area #1		Inside Conversion Area #1	Total FY 94/95 Acres Proposed
	Total Acres Submitted	*Acres Proposed FY 94/95*	*Acres Proposed FY 94/95*	
Chino, City of	1923	519	0	519
Chino Hills, City of	1053	0	0	0
Cucamonga CWD	460	0	0	0
Fontana WC	417	0	0	0
Jurupa CSD	835	327	758	1085
Monte Vista WD	43	0	0	0
Ontario, City of	544	544	37	581
Total	5209	1390	795	2185

Chino
AGRICULTURAL LAND - WATER SUPPLY STUDY
OUTSIDE CONVERSION AREA NO. 1 LIST B

Property No.	Acreage	ADDRESS N/S - E/W	APN	GENERAL NOTES
1	11	4800/12150	1016-121-4,5,6,7,8	ROSES RESIDENCE ON CITY WATER
2	16	4700/12200	1016-131-1,2,3	ROSES CROP ACREAGE SUPPLIED BY PVT.WELL ON No.2
3	10	5350/11750	1014-381-1,2,3,4	BERRY
4	21	5600/12400	1015-261-2,3	TRUCK FARMING MISCELLANEOUS VEGETABLES
			1015-253-9	
5	6	5400/12450	1015-281-21	BERRY
6	7	4000/13000	1019-071-20,21	CHRISTMAS TREE GROWER
	-		1019-081-2,11	
7	38	4800/13250	1019-191-1,2,5	RANCHING DOMESTIC SERVICE ONLY - OTHER USES WELL
			1019-201-1,3	
8	10	3600/13650	1019-611-28,39,40	RANCHING DOMESTIC SERVIE ONLY UNDER DEVELOPMENT
			1019-611-41,42,43,49	
9	21	3700/13750	1022-041-4	LANDSCAPE NURSERY
			1022-05-3,4	
10	31	3900/14000	1022-031-2	GREEN FEED
			1022-26-4	
			1022-27-4	
			1022-082-1,2,8,9,10	
11	58	4000/14200	1022-38-3	GREEN FEED
			1022-39-4	
			1022-40-3	
			1022-58-2	
12	54	4150/13900	1022-10-5,6,7,8	DAIRY
			1022-24-3	
13	142	4300/14300	1022-42-6,7,8	GREEN FEED
			1022-41-5	
			1022-58-2	
			1022-53-11,12,13	
			1022-431-8	
			1022-441-8	
			1022-541-3	
14	18	4200/14550	1022-55-3	GREEN FEED
			1025-10-5,7,8,9	
15	51	4350/14700	1025-09-1	GREEN FEED
			1025-12-1,2,5,6,7	
			1025-21-8,9,12 thru 23	
16	40	4800/14400	1022-50-1,2,3	DAIRY DOMESTIC SERVICE ONLY
			1022-49-1,3,4	
17	320	4900/14700	1025-13-1 thru 6	DAIRY & FARMING GREEN FEED
			1025-20-5,6	
			1025-19-6,7	
			1025-15-1 thru 8	
			1021-471-3,4,6,8	
			1021-461-2,3,4,6,7,8	
			1021-481-1,2,3	
			1024-491-1,2	
			1021-511-1,2,3	
			1021-501-1,2	
			1021-521-1,2,3,4	
			1021-531-1,2	
18	70	5300/15400	1028-201-13,17	DOMESTIC SERVICE ONLY
			1028-511-1 thru 20	
			1028-501-1 thru 25	
			1028-491-1 thru 9	
19	10	6200/12800	1015-511-27	BERRY
20	29	6200/13000	1020-131-1,2	BERRY
			1020-121-21,24	
21	18	6000/14050	1021-291-1,2	GREEN FEED
22	38	6200/14000	1021-261-1,2,3,4	RANCHING DOMESTIC SERVICE ONLY
			1021-231-2	
			1021-101-2,3,4	
23	26	6400/13900	1021-251-1,20	DAIRY
			1021-241-2,3	
24	17	6850/12850	1051-502-31	CORN/BERRY
			1051-631-2	

Chino
AGRICULTURAL LAND - WATER SUPPLY STUDY
OUTSIDE CONVERSION AREA NO. 1 - LIST B

Property No.	Acreage	ADDRESS N/S - E/W	APN	GENERAL NOTES
25	11	6800/13200	1052-301-1,3,4	DAIRY
26	64	6600/13500	1052-331-1,2,3	DAIRY
			1052-341-1,2,3,4	
			1052-631-1,2,3	
27	28	6800/13500	1052-611-1,2	GREEN FEED
			1052-601-2	
28	15	6800/13900	1053-261-3,4,41,71	GREEN FEED
			1053-231-4,31	
29	39.5	6600/13900	1053-251-1,2,3,4	NURSERY
			1053-241-68	
			1053-011-2 thru 5	
30	99	5700/14150	1021-351-1,2	AYALA PARK
			1021-321-1,2	
			1021-311-1,2	
			1021-281-1	
			1026-011-1	
31	80	6800/14300	1053-621-1,2	DAIRY
			1053-491-1 thru 11.13.14.17	
			1053-461-1,2,3	
			1053-451-1,2	
32	61	6950/13100	1052-051-1 thru 18	DOMESTIC SERVICE ONLY
			1052-051-20 thru 25	
33	61	6950/13500	1052-361-1,2,3,4	DAIRY
			1052-371-1,2,3	
			1052-591-1,2	
			1052-581-1,2	
34	61	6950/13900	1053-051-3,4	DAIRY
			1053-061-3,4	
			1053-221-1,2	
			1053-271-1 thru 8	
35	61	6950/14300	1053-441-1 thru 9,12,13	DAIRY
			1053-431-1,2	
			1053-501-1,2,3,4	
			1053-611-1,2,3	
36	10	5250/11550	1014-301-3,4,5	NURSERY & CHRISTMAS TREES
37	20	5350/11600	1014-271-1	NURSERY & CHRISTMAS TREES
			1014-281-4	
40	32	4400/13000	1019-111-27 thru 73	RECENTLY CONVERTED BERRY FARMING TO RESIDENTIAL
			1019-122-1 thru 48	
			1019-123-1 thru 54	
41	30	4600/13500	1019-441-3,4	RANCHING
			1019-511-6,7	
			1019-501-1	
42	10	5250/14150	1021-361-21,22	NURSERY
43	18	5350/13600	1020-571-3,4,6	BERRY
			1020-461-1,2,3	
44	80	5600/13900	1021-041-1 thru 4,6,9	DAIRY DOMESTIC SERVICE ONLY - OTHER USES WELL
			1021-131-1,2	
			1021-201-1,2	
			1021-331-1	
			1021-301-1	
45	10	5950/13750	1021-061-1,2	DAIRY
46	5	6450-13350	1021-381-5	BERRY
TOTAL	1857.5			

Table 2B

THE CITY OF CHINO HILLS
PROPOSED PARCELS FOR
LAND USE CONVERSION

THE CITY OF CHINO HILLS
PUBLIC WORKS DEPARTMENT
GEOGRAPHIC INFORMATION SYSTEM
101 GRAND AVENUE
CHINO HILLS CA 91711
(909)

ID	APN	OWNER	ACREAGE
1	1022-291-09	Boys Republic	4.63
2	1022-291-10	Boys Republic	44.49
3	1022-291-05	Boys Republic	2.32
4	1022-591-02	Boys Republic	28.46
5	1022-291-08	Boys Republic	118.04
6	1025-461-01	De Groot	8.92
7	1025-461-02	De Groot	2.01
8	1025-461-03	De Groot	7.12
9	1025-481-02	De Groot	8.23
10	1025-471-04	De Groot	4.12
11	1025-471-03	De Groot	1.72
12	1025-481-01	De Groot	9.62
13	1025-511-01	De Groot	6.66
14	1025-471-01	City of Chino Hills	6.38
15	1025-471-02	Greening	1.00
16	1025-561-04	Greening	47.24
17	1028-471-01	Greening	66.82
18	1028-351-01	Kramer	1.54
20	1028-351-13	Higgins	4.04
21	1028-351-23	Higgins	38.24
22	1028-351-11	Higgins	7.64
23	1028-201-03	Von Lusk	1.91
24	1028-201-02	Von Lusk	77.57
25	1028-201-74	Von Lusk	54.77
26	1028-201-75	Von Lusk	37.57
27	1028-351-07	Bahan	28.27
28	1017-231-21	Amato	1.79
29	1017-231-22	Trapani	5.65
30	1017-241-14	Richland Pinehurst LP	82.37
31	1017-491-01	Richland Pinehurst LP	78.63
32	1027-492-01	Richland Pinehurst LP	43.31
33	1027-121-07	Richland Pinehurst LP	15.94
34	1057-261-06	Abacherli	128.26
35	1057-261-05	Abercherli	10.00
36	1021-561-01	Van Klavern	13.62
	1021-591-01	Van Klavern	9.50
	1021-591-03	Van Klavern	11.60
	1021-601-04	Van Klavern	8.28
	1021-601-01	Van Klavern	9.16
37	1028-351-16	Higgins	2.60
38	1028-351-14	Higgins	11.21
39	1028-351-18	Weeda	12.16
		TOTAL:	**1053.40**

CONVERSION

CUCAMONGA COUNTY WATER DISTRICT
West gate specific plan property west of Cherry

APN	Acreage	
226-112-08	7.07	
228-012-05	108.62	
06	7.54	
00 (adjacent to Cherry)	110.00	(estimated)
228-092-03	37.36	
14	9.61	
15	9.61	
16	9.61	
17	7.57	
20	11.54	
19	9.73	
22	25.40	
228-091-12	18.68	
24	5.43	
25	9.00	
28	35.51	
07	38.00	(estimated)
Totals	460.28	

APN maps attached

JT:dc(CCWDCOVS.DOC)
6/26/95

CONVERSION

FONTANA WATER COMPANY
West gate specific plan property east of Cherry

APN		Acreage
228-021-28		142.35
27		8.50
226-121-21		12.50
18		137.83
226-091-46		45.78
62		70.04
	Total	417.00

JT:dc(FWCCONVR.DOC)
6/26/95

Jurupa Community Services District
LAND CONVERSION REQUESTS FY 94-95
OUTSIDE OF CONVERSION AREA NO. 1

PARCEL NUMBER	PARCEL ADDRESS		NUMBER OF ACRES	MAP NO	LOT NO
156020026	12400	PHILADELPHIA	10.25	A	1
156020027	12350	PHILADELPHIA	15.41	A	2
156020030			8.79	A	3
156160018	3791	DE FOREST	10.75	B	1
156160035	3065	DULLES	5.21	B	2
156160036	3058	DULLES	9.42	B	3
156160037			7.31	B	4
156160038			5.03	B	5
156160039	3178	DULLES	5.11	B	6
156160046	3431	DE FOREST	5.10	B	7
156160058			2.45	B	8
156160059			1.60	B	9
156160060			0.19	B	10
156160061			0.22	B	11
156160065	3450	DULLES	5.50	B	12
156160066	3204	DE FOREST	5.20	B	13
156160067			5.37	B	14
156160068			5.00	B	15
156160069	3384	DE FOREST	5.00	B	16
156160070			5.21	B	17
156160071	3725	NOBEL	7.88	B	18
156160072			3.55	B	19
156160073	3444	DE FOREST	1.20	B	20
156160074	3590	DE FOREST	10.66	B	21
156160080			5.16	B	22
156160081			6.25	B	23
156160082	10885	INLAND	11.43	B	24
156160084	10980	INLAND	2.51	B	25
156160087	3305	DULLES	20.47	B	26
156160088	3305	DULLES	44.37	B	27
156160089	3305	DULLES	8.40	B	28
156160095	3038	DEERE	12.94	B	29
156160096	3371	DE FOREST	25.03	B	30
156160097			23.97	B	31
183030007	7545	JURUPA	9.90	C	3
183030008	7585	JURUPA	1.99	C	2
183030033	7491	JURUPA	5.69	C	1
183080010	7371	JURUPA	7.55	D	1
		TOTAL ACRES	327.07		

Jurupa Community Services District
LAND CONVERSION REQUESTS FY 95-96
AFTER WATERMASTER VERIFICATION

PARCEL NUMBER	PARCEL ADDRESS		NUMBER OF ACRES	MAP NO	LOT NO
162200006	9894	60TH	5.00	A	1
162200007		60TH	5.00	A	2
162200008		LIMONITE	5.00	A	3
162200009		LIMONITE	4.95	A	4
162200010	9951	LIMONITE	9.65	A	5
162210011	10001	LIMONITE	9.76	A	6
162210001	9709	60TH	5.00	B	1
162210002	6067	BEACH	5.00	B	2
162210003		LIMONITE	5.00	B	3
162210004		LIMONITE	5.00	B	4
165050001	8618	54TH	2.50	C	1
165050002	8646	54TH	2.50	C	2
165050005	5424	PEDLEY	5.00	C	3
165050006	5494	PEDLEY	5.00	C	4
165060001	5419	PEDLEY	5.00	D	1
165060002	5455	PEDLEY	2.86	D	2
165060003	5489	PEDLEY	2.86	D	3
165060013	5511	PEDLEY	3.01	D	4
165080003	5723	PEDLEY	3.25	E	1
165080004	5733	PEDLEY	3.25	E	2
165080005	5793	PEDLEY	7.00	E	3
165080007	5760	PEDLEY	3.00	E	4
165080009	8705	58TH	5.00	E	5
165080010	8695	58TH	2.39	E	6
165080012	8696	56TH	5.00	E	7
165091015	5685	PEDLEY	3.85	F	1
165092004	5690	5685	1.82	F	2
165140008	5935	5685	5.89	G	1
165140029	5831	5685	4.50	G	2
165140030	5853	5685	2.16	G	3
165160001	8626	58TH	3.82	H	1
165160002	8662	58TH	2.50	H	2
165160003	8710	58TH	2.50	H	3
166030025	8238	JURUPA	9.22	I	1
166030023	4800	STONE	14.52	I	2
166030011	4992	STONE	4.63	I	3
166050008	4695	TYROLITE	3.36	J	1
166060005	4911	TYROLITE	8.93	K	1
166060006	4799	TYROLITE	6.19	K	2
166070001	5040	AGATE	4.85	L	1
166070030	5070	AGATE	2.33	L	2
166070009	5025	STONE	2.69	L	3
166070011	5065	STONE	3.63	L	4
166090001	5289	STONE	9.82	M	1
166090002	5250	STONE	5.28	M	2
166090004	5256	AGATE	12.88	M	3
166090023	8440	54TH	2.26	M	4
166090026	5340	AGATE	4.67	M	5
166190017	8600	58TH	10.00	N	1
167020002		GALENA	33.71	O	1

Jurupa Community Services District
LAND USE CONVERSION REQUESTS FY 95-96
AFTER WATERMASTER VERIFICATION

PARCEL NUMBER		PARCEL ADDRESS	NUMBER OF ACRES	MAP NO	LOT NO
167020006		GALENA	9.70	O	2
167020007		GALENA	29.20	O	3
167020008		GALENA	33.70	O	4
167110008	9440	GALENA	10.93	P	1
167160042	4777	FELSPAR	9.37	Q	1
169070006	8705	MISSION	2.57	R	1
169210008	8721	GALENA	1.40	S	1
169270018	4930	AGATE	4.71	T	1
169280020	4945	PEDLEY	2.45	U	1
169280022	8864	PEDLEY	2.71	U	2
169290011	5015	PEDLEY	5.00	V	1
169290020	5071	PEDLEY	4.77	V	2
169290021	5151	PEDLEY	4.77	V	3
169300003	5339	PEDLEY	7.50	W	1
169300005	5355	PEDLEY	8.35	W	2
169300007	5335	PEDLEY	2.39	W	3
169300008	5261	PEDLEY	2.39	W	4
169300009	5235	PEDLEY	2.39	W	5
169300010	5205	PEDLEY	2.38	W	6
169310002	5074	PEDLEY	3.01	X	1
169310003	5071	AGATE	2.72	X	2
169310026	5329	AGATE	2.48	X	3
169310028	5271	AGATE	2.48	X	4
170310041	9200	MISSION	4.14	X	1
171040027	3851	PYRITE	15.41	Y	1
171050013	4100	AGATE	7.69	Z	1
171090011	8531	MISSION	3.22	AA	1
171190004	7868	MISSION	10.96	BB	1
171220002	7837	GALENA	9.64	CC	1
173160020	9150	GRANITE HILL	4.03	DD	1
173160024	8931	GRANITE HILL	2.06	DD	2
173160032	8951	HIGHWAY	4.13	DD	3
183030014	7586	JURUPA	6.92	EE	1
		TOTAL ACRES	508.56		

Monte Vista Water District
P.O. Box 71
Montclair, CA 91763-0071

Proposed Conversion Acres
Submitted by Gil Martinez, August 2, 1995

Property No.	Approximate Acreage	APN (Lot No.)
A	4.3	1013-131-15,17,19
A1	2.4	1013-131-15,17,19 (Lot 1 & 6)
C	8.0	1013-171-1 thru 5
E	9.6	1013-271-1
		1013-531-5
G	9.0	1013-291- 6 & 7
I	10.0	1013-521-4 (Lot 1)
N	.5	1016-101-1
	43.66	

Prepared by J.R. Theirl
August 14, 1995
Based on information provided by Gil Martinez of MVWD on August 2, 1995.

City of Ontario
Existing Agricultural Uses
Exhibit A

Identification	APN	Address	Acreage
1	11335102	1348 S GROVE AV	11.500
2	11336103	1550 S PARCO AV	7.231
3	11336104	1460 S PARCO AV	0.904
4	11336105	1442 S PARCO AV	0.454
5	11336106	1436 S PARCO AV	0.232
6	11336107	1410 S PARCO AV	5.518
7	11336116	1551 S GROVE AV	12.255
8	11336118	1405 S GROVE AV	11.642
9	11341421	1704 S VINEYARD AV	3.677
10	11343105	1160 S MILDRED AV	51.026
11	11351208	O E AIRPORT--OIA	8.524
12	11351210	O E AIRPORT --OIA	7.400
13	21019210	572 N TURNER AV	22.343
14	21121104	3000 E JURUPA ST	20.039
15	21121109	1200 S ARCHIBALD AV	19.395
16	21121111	2900 E JURUPA ST	65.765
17	21131203	O E MISSION BL	4.020
18	21131204	O E MISSION BL	2.022
19	21134101	O S SEAGULL AV	0.615
20	21134102	O E JURUPA ST	0.782
21	21134103	O E JURUPA ST	0.534
22	21134104	O E JURUPA ST	0.530
23	21134105	O E JURUPA ST	0.532
24	21134106	O S AVIATION DR	0.786
25	21134107	O S AVIATION DR	1.016
26	21808103	2300 S MILLIKEN AV	46.266
27	21808105	O E MISSION BL	0.263
28	21808108	O E MISSION BL	49.657
61	21809124	O S MILLIKEN AV	15.280
29	23801131	1000 N ROCHESTER AV	2.270
30	23801219	O E INLAND EMPIRE BL	10.664
31	23801223	O E FOURTH ST	13.856
32	23808140	O S WINEVILLE AV	2.655
33	23824110	5010 E AIRPORT DR	0.000
34	101120109	1241 W STATE ST	0.000
35	101120110	1211 W STATE ST	2.434
36	101120111	520 S MAGNOLIA AV	2.409
37	101122102	616 OAKS AV	0.000
38	101142109	O S ELDERBERRY AV	0.942
39	101142111	O S ELDERBERRY AV	1.942
40	101152112	O S ELDERBERRY AV	1.005
41	101153103	O S BENSON AV	2.566
42	101153104	O S BENSON AV	1.860
43	101143105	O S BENSON AV	4.781
44	101412103	O S OAKS AV	0.063
45	101412104	O S OAKS AV	1.705
46	101421112	1320 W FRANCIS ST	7.281
47	104921105	720 E SUNKIST ST	0.000
48	104930105	752 W PARK ST	2.668
49	104930106	720 W PARKS ST	2.685
50	104942104	1310 S CUCAMONGA AV	4.694
51	104950102	1125 S SULTANA AV	0.207

City of Ontario
Existing Agricultural Uses
Exhibit A

Identification	APN	Address	Acreage
52	105013102	1518 S CUCAMONGA AV	0.000
53	105013103	1558 S CUCAMONGA AV	6.028
53	105016103	1556 S GRPVE AV	0.000
55	105017102	1642 S GROVE AV	9.563
56	105018103	1743 S CUCAMONGA AV	8.970
57	105020101	1687 S BON VIEW AV	9.547
58	105036108	1844 S FERN AV	0.000
59	105045104	1921 S BON VIEW AV	4.740
60	105046109	1056 E FRANCIS ST	9.064
61	011340102	1533 S PARCO AVE	29.000
62	101121106	1300 W MISSION BLVD	1.000
63	101138204	1055 W MISSION BLVD	1.000
64	101446205	1951 S PALMETTO AVE	1.000
65	105115103	1256 E PHILADELPHIA ST	6.000
66	105157177	NW CORNER GROVE AVE & RIVERSIDE DR	1.000
67	104947204	CAMPUS (N OF FRANCIS, S OF PHILLIPS)	6.000
68	011008107	1633 E HOLT BLVD	5.000
69	105144103	NW CORNER EUCLID AVE & RIVERSIDE DR	10.000
		Total	544 Acres

City of Chino
CHINO BASIN LAND USE CONVERSION
PARCELS TO BE CONVERTED IN FY 94/95

PROPERTY No.	ACREAGE	ADDRESS N/S - E/S	APN	GENERAL NOTES
8	10	3600/13650	1019-611-28,39,40	IRRIGATED LANDSCAPE/UNDER DEVELOPMENT
			1019-611-41,42,43,49	
10	31	3900/14000	1022-031-2	ENTERTAINMENT COMPLEX
			1022-26-4	
			1022-27-4	
			1022-082-1,2,8,9,10	
13	142	4300/14300	1022-42-6,7,8	COMM/IND - WAREHOUSE
			1022-41-5	
			1022-56-2	
			1022-53-11,12,13	
			1022-431-8	
			1022-441-8	
			1022-541-3	
18	70	5300-15400	1028-201-13,17	COMM/IND (MISSION LAUNDRY)
			1028-511-1 thru 20	
			1028-501-1 thru 25	
			1028-491-1 thru 9	
23	26	6400/13900	1021-251-1,20	RESIDENTIAL DEVELOPMENT/COMMERCIAL PARK
			1021-241-2,3	
29	39.5	6600/13900	1053-251-1,2,3,4	RESIDENTIAL DEVELOPMENT
			1053-241-68	
			1053-011-2 thru 5	
30	99	5700/14150	1021-351-1,2	AYALA PARK
			1021-321-1,2	
			1021-311-1,2	
			1021-281-1	
			1026-011-1	
32	61	6950/13100	1052-051-1 thru 18	DOMESTIC SERVICE ONLY/RESIDENTIAL
			1052-051-20 thru 25	
*	41	3950/13900	1022-082-1 thru 11	COMMERCIAL DEVELOPMENT
			1022-251-3 thru 14	
TOTAL	519.5			

*** acreage above property number 11 (MAJESTIC SPECTRUM POWER CENTER)**

Jurupa Community Services District
LAND CONVERSION REQUESTS FY 94-95
OUTSIDE OF CONVERSION AREA NO. 1

PARCEL NUMBER	PARCEL ADDRESS		NUMBER OF ACRES	MAP NO	LOT NO
156020026	12400	PHILADELPHIA	10.25	A	1
156020027	12350	PHILADELPHIA	15.41	A	2
156020030			8.79	A	3
156160018	3791	DE FOREST	10.75	B	1
156160035	3065	DULLES	5.21	B	2
156160036	3058	DULLES	9.42	B	3
156160037			7.31	B	4
156160038			5.03	B	5
156160039	3178	DULLES	5.11	B	6
156160046	3431	DE FOREST	5.10	B	7
156160058			2.45	B	8
156160059			1.60	B	9
156160060			0.19	B	10
156160061			0.22	B	11
156160065	3450	DULLES	5.50	B	12
156160066	3204	DE FOREST	5.20	B	13
156160067			5.37	B	14
156160068			5.00	B	15
156160069	3384	DE FOREST	5.00	B	16
156160070			5.21	B	17
156160071	3725	NOBEL	7.88	B	18
156160072			3.55	B	19
156160073	3444	DE FOREST	1.20	B	20
156160074	3590	DE FOREST	10.66	B	21
156160080			5.16	B	22
156160081			6.25	B	23
156160082	10885	INLAND	11.43	B	24
156160084	10980	INLAND	2.51	B	25
156160087	3305	DULLES	20.47	B	26
156160088	3305	DULLES	44.37	B	27
156160089	3305	DULLES	8.40	B	28
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183080010	7371	JURUPA	7.55	D	1
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15	21121109	1200 S ARCHIBALD AV	19.395
16	21121111	2900 E JURUPA ST	65.765
17	21131203	O E MISSION BL	4.020
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19	21134101	O S SEAGULL AV	0.615
20	21134102	O E JURUPA ST	0.782
21	21134103	O E JURUPA ST	0.534
22	21134104	O E JURUPA ST	0.530
23	21134105	O E JURUPA ST	0.532
24	21134106	O S AVIATION DR	0.786
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31	23801223	O E FOURTH ST	13.856
32	23808140	O S WINEVILLE AV	2.655
33	23824110	5010 E AIRPORT DR	0.000
34	101120109	1241 W STATE ST	0.000
35	101120110	1211 W STATE ST	2.434
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37	101122102	616 OAKS AV	0.000
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City of Ontario
Existing Agricultural Uses
Exhibit A

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55	105017102	1642 S GROVE AV	9.563
56	105018103	1743 S CUCAMONGA AV	8.970
57	105020101	1687 S BON VIEW AV	9.547
58	105036108	1844 S FERN AV	0.000
59	105045104	1921 S BON VIEW AV	4.740
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61	011340102	1533 S PARCO AVE	29.000
62	101121106	1300 W MISSION BLVD	1.000
63	101138204	1055 W MISSION BLVD	1.000
64	101446205	1951 S PALMETTO AVE	1.000
65	105115103	1256 E PHILADELPHIA ST	6.000
66	105157177	NW CORNER GROVE AVE & RIVERSIDE DR	1.000
67	104947204	CAMPUS (N OF FRANCIS, S OF PHILLIPS)	6.000
68	011008107	1633 E HOLT BLVD	5.000
69	105144103	NW CORNER EUCLID AVE & RIVERSIDE DR	10.000
		Total	544 Acres

****** NOTICE OF HEARING ******

TO - ALL ACTIVE CHINO BASIN PARTIES, CASE NO. 164327

WHEN - JANUARY 5, 1979, 1:30 P.M.

WHERE - SAN BERNARDINO SUPERIOR COURT, DEPARTMENT 2
351 NORTH ARROWHEAD AVENUE, SAN BERNARDINO, CALIF.

WHAT - THE FOLLOWING ITEMS ARE FOR APPROVAL.

1. FIRST ANNUAL WATERMASTER REPORT.
2. 1977/78 PRODUCTION SUMMARY.
3. FORM OF LOCAL STORAGE AGREEMENT.
4. M.W.D. CYCLIC STORAGE AGREEMENT.
5. INTERVENTIONS AND ASSIGNMENTS.

YOUR PRESENCE AT THIS HEARING IS NOT REQUIRED, BUT YOUR ATTENDANCE IS WELCOME.

NOTE - FILING WITH THE DIVISION OF WATERRIGHTS IS NO LONGER NECESSARY, JUST RETURN THEIR FORMS INDICATING YOU REPORT TO THE CHINO BASIN WATERMASTER.

FRAN BROMMENSCHENKEL
987-1712

APPENDIX N

City of Fontana 2008 Agreement Regarding Transfer of Right of First Purchase of Recharged Reclaimed Water

CITY OF ONTARIO
J3 EAST "B" STREET, CIVIC CENTER ONTARIO CALIFORNIA 91764-4105 (909) 395-2000
FAX (909) 395-2070

April 29, 2008

City of Fontana
Public Works Department
Attention: Kim Morris
16489 Orange Way
Fontana, CA 92335

Subject: Recycled Water Agreement between the City of Fontana and the City of Ontario

Dear Ms. Morris:

Enclosed you will find an original Recycled Water Agreement which has been fully executed. If you should have any questions, please do not hesitate to contact me at (909) 395-2165.

Sincerely,

Eva Frame

Eva Frame
Senior Records Specialist

Enclosures

c: Mohamed El-Amamy, Utilities & Solid Waste Director

AGREEMENT BY AND BETWEEN THE CITY OF ONTARIO AND THE CITY OF FONTANA REGARDING TRANSFER OF RIGHT OF FIRST PURCHASE OF RECHARGED RECLAIMED WATER

This Agreement is entered into as of the 15th day of January, 2008 by and between the CITY OF ONTARIO, California, a municipal corporation ("Ontario"), and the CITY OF FONTANA, California, a municipal corporation ("Fontana").

RECITALS

WHEREAS, the supply of water to the Chino Basin region is limited and it is in the best interest of water and wastewater agencies in the Basin to maximize the reuse and recharge of reclaimed water where appropriate to lower the cost of future increases in basin replenishment, and which lowered cost is shared by water producers in the basin; and,

WHEREAS, Fontana and Ontario are both parties to the "Chino Basin Regional Sewage Service Contract (As Amended)," dated April 12, 1984 ("Regional Contract"), which is incorporated herein by reference, and are both "Contracting Agencies" as that term is defined in the Regional Contract; and,

WHEREAS, Sections 15 and 16 of the Regional Contract provide each Contracting Agency with the right of first purchase of reclaimed water up to the quantity of wastewater delivered to the treatment plant by that agency and Section 16.A.8 provides each Contracting Agency the authority to transfer such right; and,

WHEREAS, Fontana delivers wastewater to Inland Empire Utilities Agency Regional Treatment Plant No. 1 ("Regional Plant No. 1 ") and Regional Treatment Plant No. 4 ("Regional Plant No. 4"); and,

WHEREAS, Fontana does not operate a water delivery system for domestic water and this Agreement does not restrict Fontana's ability for direct use of reclaimed water; and, WHEREAS, Ontario has the ability to use reclaimed water from Regional Treatment Plants which has been percolated for groundwater recharge; and,

WHEREAS, Fontana desires compensation for this assignment and transfer of its right of first purchase of recharged reclaimed water; and,

WHEREAS, this Agreement is consistent with the terms of the Regional Sewer Service Contract with Inland Empire Utilities Agency ("IEUA"), the IEUA Recycled Water Program, and the Chino Basin Judgment and Watermaster Agreements; and,

WHEREAS, Ontario and Fontana currently have an Agreement addressing assignment, transfer and compensation regarding recycled water; and,

WHEREAS, Ontario and Fontana desire to amend that Agreement regarding term, compensation and direct reuse of recycled water:

NOW, THEREFORE, for good and valuable consideration receipt of which is hereby acknowledged, and for the mutual covenants hereinafter contained, the parties agree as follows:

<u>Section 1. Assignment of First Purchase of Reclaimed Water</u>

Subject to the terms of this Agreement, Fontana hereby assigns and transfers its right of first purchase of up to three thousand (3,000) acre-feet per fiscal year (July 1st – June 30th) of treated effluent - reclaimed water recharged into the groundwater basin to Ontario pursuant to Section 16.A.8. of the Regional Contract. Ontario hereby accepts such assignment and transfer and agrees to accept the recharged reclaimed water. The parties further agree that: (1) the 3,000 acre-foot limitation may be increased at any time during the term of this Agreement by mutual, written consent of the parties; and (2) Fontana shall be under no obligation to deliver any minimum level of untreated effluent to Regional Plant No. 1 or to Regional Plant No. 4. (3) if during any given fiscal year, less than 3,000 acre-feet is available for recharge, the actual amount recharged shall be assigned. This Agreement does not pertain to direct reuse of reclaimed water and does not intend to place any restriction on Fontana's or Ontario's ability and rights to purchase reclaimed water for direct reuse. This Agreement only pertains to reclaimed water that has been recharged into the groundwater basin.

Section 2. Payment

(a) On an annual basis, Ontario shall pay Fontana $ 169 per acre foot of recharged reclaimed water assigned under Section 1. This payment amount was calculated from the difference between 93.5% of the January 1, 2008 price of Metropolitan Water District of Southern California (MWD) Replenishment Untreated Water ($248/AF) and the price of reclaimed water paid by Ontario to IEUA under Section 2(a) of this Agreement ($63/AF). The price per acre foot ($/AF) paid by Ontario to Fontana shall be recalculated annually on July 1 using the then current price for MWD untreated replenishment water and for reclaimed water paid by Ontario to IEUA, using the same formula. Payment by Ontario to Fontana shall be due on October 31 of each year for the amount of reclaimed water rights Ontario had purchased during the previous fiscal year. Ontario shall initiate the payment to Fontana by mailing a check for the full amount due from Ontario to Fontana and a copy of the IEUA report showing the amount of reclaimed water recharged during the previous fiscal year. Any payment not received by Fontana from Ontario within 30 days from the due date will incur a late payment penalty of 10% of the total amount due from Ontario to Fontana. If payment is not received by Fontana within 90 days after Fontana gives Ontario written notice as provided in Section 20 that payment is delinquent, then Fontana shall have the option to terminate this agreement pursuant to Section7 of this Agreement.

(b) Ontario shall make all payments for reclaimed water required under Section 16.A.6. of the Regional Contract for treated effluent accepted by Ontario under this Agreement directly to IEUA. Such payments shall include delivery costs, charges for recharged reclaimed water imposed by IEUA in accordance with rates and policy set by the policy committee charged with overseeing the implementation of the Regional Contract.

Section 3. Term and Effective Date

This Agreement shall be effective when executed by both parties and shall have a term of twenty-three (23) years from the effective date. This Agreement may be renewed for an additional period of ten (10) years at the sole request and discretion of Ontario, provided Ontario gives Fontana written notice of its intention to renew at least twenty-four (24) months prior to the expiration date. The intent is to match these terms to the terms of the Chino Basin Watermaster Peace Agreement of 2000. In the event Ontario renews this

Agreement, at the conclusion of the initial 10-year renewal term, the Agreement may be renewed for successive ten (10) year periods subject to the option of Fontana not to extend the Agreement ("Right of Cancellation"). Ontario shall give Fontana written notice of its request to extend the Agreement for an additional ten-year term, at least twenty-four (24) months prior to any expiration date of the existing renewal term Agreement. Fontana shall give Ontario written notice confirming the renewal of the Agreement for an additional term or, if Fontana elects not to renew the Agreement, notice of its exercise of the Right of Cancellation within 60 days after Ontario's request to extend the term. If Fontana fails to provide written notice confirming the extension of the Agreement or exercising its Right of Cancellation within 60 days after written notice from Ontario, Ontario may give Fontana notice that the Agreement will be automatically extended unless Fontana exercises its Right of Cancellation within 30 days. If Fontana fails to respond within 30 days after the notice of automatic renewal, then the Agreement shall be automatically renewed for an additional 10 year term. All of the terms of this Agreement shall apply to each renewal term unless amended by mutual written agreement of the parties.

Section 4. Notice

(a) Pursuant to the Section 16.D. of the Regional Contract and Sections 1 and 5 of this Agreement, Ontario shall accept the assignment of up to three thousand (3,000) acre-feet per fiscal year (July 1st – June 30th) of treated effluent - reclaimed water recharged into the groundwater basin. Ontario shall notify Fontana and IEUA by the last day of July of each fiscal year regarding any increase or reduction of the amount of transferred reclaimed water rights of first purchase to be exercised by Ontario during the same fiscal year. Ontario shall give written notice if Ontario elects not to take any reclaimed water under this Agreement.

(b) After August 1 of each fiscal year, Fontana may on an annual basis exercise or transfer any rights which are not claimed by Ontario pursuant to Section 4(a) of this Agreement to any qualifying party, including subsequent transfer to Ontario of any rights previously unclaimed by Fontana.

Section 5. Recordkeeping

Ontario shall be responsible for preparing, maintaining, and delivering all records associated with and necessary pursuant to this Agreement and Section 16 of the Regional Contract. Ontario shall also file a certified copy of this Agreement, and notices confirming renewal of this Agreement for any additional terms, with IEUA. Ontario shall be responsible for coordinating any action to be taken under this Agreement with, as well as preparing, maintaining and delivering all records or documentation required by, the Chino Basin Watermaster, including but not limited to any transfer of recharged reclaimed water rights pursuant to this Agreement.

Section 6. Delivery

Ontario shall be solely responsible for the construction of the facilities which will be necessary for Ontario to produce and take delivery of the recharged reclaimed water from the groundwater basin pursuant to this Agreement.

Section 7. Termination

This Agreement and the rights and obligation of the parties hereunder shall terminate and be of no further force or effect as to either party upon any of the following occurrences:

(a) if Fontana is permanently prohibited by an order, decree, or judgment of a court of competent jurisdiction from supplying water to Ontario pursuant to this Agreement,

(b) At the option of Fontana, if Ontario fails to take delivery of any recharged reclaimed water pursuant to this Agreement for a period of three (3) consecutive calendar years.

(c) If Ontario fails to make any payment to Fontana under Section 2 (a) of this Agreement within 90 days after written notice from Fontana to Ontario that the Agreement will be terminated for non-payment.

(d) Failure of Ontario to make the payments to IEUA required under Section 2 (a) of this Agreement, or any payments due to the Watermaster associated with Ontario's purchase of recycled water under this Agreement, provided that Ontario shall have the right to cure the default if permitted under the Regional Contract or rules established by the Watermaster.

(e) At the end of the term or a renewal term if Ontario elects not to renew this Agreement for another term or Fontana exercises its Right of Cancellation.

Section 8. Representations and Warranties

(a) Fontana represents and warrants to Ontario as follows:

(1) That Fontana, as of the date of this Agreement, has the right to transfer its right of first purchase of treated effluent to Ontario pursuant to this Agreement, and that Fontana will not take any action with respect to its right of first purchase of reclaimed water that would impair the transfer of the rights of first purchase to Ontario hereunder; and

(2) That the execution and delivery of this Agreement on behalf of Fontana has been duly authorized by the City of Fontana and the officers of Fontana who have signed this Agreement on behalf of Fontana are duly authorized to execute on behalf of Fontana.

(b) Ontario represents and warrants to Fontana that the execution and delivery of this Agreement on behalf of Ontario has been duly authorized by the City of Ontario and the officers who have signed this Agreement on behalf of Ontario are duly authorized to execute on behalf of Ontario.

(c) Fontana disclaims any representation or warranty that the quality of the water which may be taken by Ontario under this Agreement is suitable for Ontario's intended use or for any purpose, or that the water can be produced from the groundwater basin at any particular location or during any time period. The inability of Ontario to produce water from the groundwater basin in sufficient quantities or of sufficient quality to exercise all of the rights transferred from Fontana to Ontario hereunder shall not be grounds for a claim of refund of any monies paid by Ontario to Fontana for the rights transferred hereunder.

Section 9. No Assignment

Neither Fontana nor Ontario may assign this Agreement or any of its rights or obligations hereunder without the express written consent of the other party, which consent shall not be unreasonably withheld.

Section 10. Entire Agreement

This Agreement contains the entire agreement between the parties respecting the subject matter hereof and supersedes all prior understandings and agreements, whether oral or in writing, between the parties respecting the subject matter of this Agreement.

Section 11. Choice of Law

This Agreement shall be governed by the laws of the State of California.

Section 12. Severability

If any term, covenant, condition or provision of this Agreement, or the application thereof to any person or circumstance, shall to any extent be held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the terms, covenants, conditions or provisions of this Agreement, or the application thereof to any other person or circumstance, shall remain in full force and effect and shall in no way be affected, impaired or invalidated thereby.

Section 13. Waiver of Covenants, Conditions, and Remedies

The waiver by one party of the performance of any covenant or condition under this Agreement shall not invalidate this Agreement nor shall it be considered a waiver by it of any other covenant or condition under this Agreement. The waiver by either or both parties of the time for performing any act under this Agreement shall not constitute a waiver of the time for performing any other act or an identical act required to be performed at a later time.

Section 14. Amendment

This Agreement may be amended at any time by the written agreement of both parties. All amendments and changes of this Agreement, in all or in part, and from time to time, shall be binding upon the parties despite any lack of legal consideration, so long as the same shall be in writing and executed by the parties hereto.

Section 15. No Third Party Benefit

This Agreement is intended to benefit only the parties hereto and no other person or entity has or shall acquire any rights hereunder.

Section 16. Further Acts

Each party hereby agrees that it shall, upon request of the other, execute and deliver such further documents (in form and substance reasonably acceptable to the party to be charged) and do such other acts and things as are reasonably necessary and appropriate to effectuate the terms and conditions of this Agreement.

Section 17. Estoppel Certificate

At any time within ten (10) days after request by a party, the other party shall execute, acknowledge and deliver to the requesting party, without charge, a written statement certifying that this Agreement is unmodified and in full force, or if there have been modifications, that it is in full force as modified. The statement shall also contain the date of commencement of this Agreement, the dates to which the administrative charges and any other charges have been paid, and any other information the requesting party may reasonably request.

Section 18. Attorneys' Fees

In the event of any litigation involving the parties to this Agreement to enforce any provision of this Agreement, to enforce any remedy available upon default under this Agreement, or seeking a declaration of the rights of either party under this Agreement, the prevailing party shall be entitled to recover from the other such attorneys' fees ahd costs as may be reasonably incurred, including the costs of reasonable investigation, preparation and professional or expert consultation incurred by reason of such litigation. All other attorneys' fees and costs relating to this Agreement and the transactions contemplated hereby shall be borne by the party incurring the same.

Section 19. Construction

Headings at the beginning of each section hereof are solely for the convenience of the parties and are not a part of and shall not be used to interpret this Agreement. The singular form shall include the plural, and vice versa. This Agreement shall be construed as if both Fontana and Ontario have prepared it.

Section 20. Notices

All notices and demands that either party is required or desires to give to the other shall be given in writing by United States registered or certified mail, return receipt requested, by personal delivery, by facsimile with confirmation of receipt, by telegram, by express courier service or when by electronic mail to the street address or facsimile number set forth below for the respective party or any electronic mail address subsequently given, provided that if any party gives notice of a change of name or address, notices to that party shall thereafter be given as set forth in that notice. All notices and demands shall be effective upon receipt or upon refusal to accept delivery.

To Ontario:	City of Ontario 303 East "B" Street Ontario, CA 91764 Attn: Gregory C. Devereaux, City Manager Facsimile: (909) 395-2189
To Fontana:	City of Fontana 8353 Sierra Avenue Fontana, CA 92335 Attn: Kenneth R. Hunt, City Manager Facsimile: (909) 350-7653

Section 21. Counterparts

This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which, taken together, shall constitute one and the same instrument.

(SIGNATURES ON FOLLOWING PAGE)

IN WITNESS WHEREOF, the parties have executed this Agreement as of the day and year first above written.

CITY OF ONTARIO
A Municipal Corporation

By: ______________________________
Gregory C. Devereaux, City Manager

ATTEST:

____
City Clerk

CITY OF FONTANA
A Municipal Corporation

By: ______________________________ C.H.
Kenneth R. Hunt, City Manager

ATTEST:

____
City Clerk – Deputy

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4/7/08 - 12:14

APPENDIX O

SACC Employment by Shift

SACC EMPLOYMENT BY SHIFT

	First Shift				Second Shift				Third Shift				Total
	Staff	*Shift Time*	*Hours per Shift*	*Total Hours*	*Staff*	*Shift Time*	*Hours per Shift*	*Total Hours*	*Staff*	*Shift Time*	*Hours per Shift*	*Total Hours*	
Office	*150*			*1,200*	*40*			*320*	*90*			*720*	
Wave 1	10	5 AM - 2 PM	8	80	8	1 PM - 10 PM	8	64	10	7 PM - 4 AM	8	80	
Wave 2	10	6 AM - 3 PM	8	80	20	2 PM - 11 PM	8	160	18	7:30 PM - 4:30 AM	8	144	
Wave 3	30	6:30 AM - 3:30 PM	8	240	12	3 PM - Midnight	8	96	45	8 PM - 5 AM	8	360	
Wave 4	90	7 AM - 4 PM	8	720					17	9 PM - 6 AM	8	136	
Wave 5	10	7:30 AM - 4:30 PM	8	80									
Warehouse	*440*			*2,596*	*25*			*200*	*440*			*2,948*	
Wave 1	44	5:30 AM - Noon	6.5	286	10	12 PM - 9 PM	8	80	44	8:30 PM - 4:30 AM	8	352	
Wave 2	176	6:30 AM - Noon	5.5	968	15	3 PM - Midnight	8	120	176	9 PM - 3:30 AM	6.5	1,144	
Wave 3	176	6:30 AM - 12:30 PM	6	1,056					176	9:30 PM - 4 AM	6.5	1,144	
Wave 4	44	6:30 AM - 1:00 PM	6.5	286					44	9:30 PM - 4:30 AM	7	308	
Ramp	*50*			*400*	*30*			*240*	*50*			*400*	
Wave 1	10	3 AM - 11:30 AM	8	80	12	Noon - 8 PM	8	96	10	8:30 PM - 4:30 AM	8	80	
Wave 2	30	3:30 AM - 12 PM	8	240	18	2:30 PM - 10:30 PM	8	144	30	9:30 PM - 5:30 AM	8	240	
Wave 3	10	4 AM – 12 PM	8	80					10	10:00 PM - 6:00 AM	8	80	
Total Staff	640				95				580				1,315
FTE[a]	*525*				*95*				*509*				*1,128*

[a] Full Time Equivalent (FTE) is based on 8 hours/employee/shift; FTE = Total Hours/8